2017

Proceedings of the 9th Sacro Occipital Technique Research Conference

Marina Del Rey, California

May 12-13, 2017

Sacro Occipital Technique Research Conference

Marina Del Rey, California
May 12-13, 2017

Hosted by:

Sacro Occipital Technique Organization – USA

CONFERENCE PROCEEDINGS

Conference Chair
Charles L. Blum, DC
Research Director: Sacro Occipital Technique Organization – USA

Acknowledgements:

It is with the utmost gratitude I wish to thank all the various authors of these submitted abstracts and papers. Only with their selfless efforts can we share what we are finding in clinical practice and help build our evidence base of literature. I also wish to thank those who have donated to the Sacro Occipital Technique Organization – USA Research Fund which has helped pay for the printing of this conference's proceedings. A special thanks also goes to Jason Scoppa, DC, Pamela Woodward, DC, and William Boro, DC who participated with editing of this SOT® Research Conference's Proceedings. A special thanks goes to NCMIC for supporting this research conference as well as helping to advance chiropractic and allied healthcare evidence based research.

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2017 SOT RESEARCH CONFERENCE

Proceedings of the Sacro Occipital Technique Research Conference

Marina Del Rey, California – May 12-13, 2017

Table of Contents

2017 CONFERENCE PROCEEDINGS

Paper Title, Author(s) *(Listed Alphabetically by Lead Author)*

2017 SOT RESEARCH CONFERENCE

Selected Temporomandibular Joint Related Articles from Past SOT Research Conferences (2009-20160

2009 SOT Research Conference Selected TMJ Related Papers

2010 SOT Research Conference Selected TMJ Related Papers

2011 SOT Research Conference Selected TMJ Related Papers

2012 SOT Research Conference Selected TMJ Related Papers

2013 SOT Research Conference Selected TMJ Related Papers

2014 SOT Research Conference Selected TMJ Related Papers

2015 SOT Research Conference Selected TMJ Related Papers

2016 SOT Research Conference Selected TMJ Related Papers

2017 SOT RESEARCH CONFERENCE

Addendum

Proceedings of the Sacro Occipital Technique Research Conference

Marina Del Rey - May 12-13, 2018

Introduction

For Major Bertrand DeJarnette, DO, DC, research was an essential part of being a chiropractor and essential to the future of the chiropractic profession. As early as July 1935 Major Bertrand DeJarnette was a featured speaker at the 40th Anniversary Convention 1895-1935 of the National Chiropractic Association presenting clinical research. Always research was his passion and in an interview in 1982 DeJarnette reiterated, "as far back as chiropractic college, I saw the need for a more scientific basis for chiropractic theory. My own personal physical problems had not been solved by medicine, osteopathy, or chiropractic; so I began experimenting on myself. I'm still at it, and I can see no end of the need for continuous research in chiropractic [1]."

Dr. DeJarnette saw the importance of sharing clinical experience through case report and self-analysis. This started as he first began to find that things he instinctively did for a patient would disappear from his memory if he did not outline them carefully. So before our day and age of computers, he recommended that to begin the first step in research, you would need to buy a notebook, an eraser and long pencil. He emphasized that, "those would be your first three pieces of research equipment. You use your notebook because it is not expensive. You use a pencil because it can be erased, and of course mistakes will be made so you must own an eraser [2]." With those three pieces of equipment he sat down one evening and wrote his first case report of an unusual patient presentation and his treatment rendered. He recollected that he did not sit down to write until perhaps three months after that patient's presentation. Dr. DeJarnette could not believe how much he had forgotten about the details. The lesson he learned was "write the unusual down now [2]".

When Dr. DeJarnette began to study the treatment he had rendered he realized that if any meaningful information were to evolve from his experience, he would have to resolve it himself. Dr. DeJarnette suggested that research has to be a free agency. Basically he saw a need and worked to fulfill that need. He realized that explaining how his discoveries evolved was more difficult than the process of developing new diagnostic and therapeutic interventions [2].

Chiropractic techniques, innovative integrative collaborations, and methods such as sacro occipital technique, temporomandibular disorder co-management, chiropractic manipulative reflex technique, and cranial techniques need an arena to share clinical and other forms of research. Critical study of techniques and innovative methods are what will help propel healthcare forward in this era of evidence informed practice and best practice research.

The SOT Research Conference looks to offer a venue for research papers; specifically those, which investigate sacro occipital technique, dental chiropractic co-treatment, cranial techniques, viscerosomatic/somatovisceral, reflex techniques, and new ground-breaking creative ways of helping humanity without necessarily the use of drugs or surgical intervention. This year's proceedings, like all prior conferences, will be shared with the chiropractic profession, for review, dissemination, and in-depth study.

> "*Research is a study of what you have, and what you need to make it better, and how to make it better is the final research step. S.O.T. never wants to be just good. It always wants to be better and best and greatest and most dependable* [3]."

> "*Research in Chiropractic must go on forever. Someone must do this type work, for it simply will not take care of itself. A profession cannot stand still. Momentum must constantly be generated. Chiropractic research needs many things it does not now have* [4]."""*Sacro Occipital Technic, like all Chiropractic Technics, needs further study. We certainly do not have all the answers to all of man's problems, and neither does any other group of people* [4]."

As a parting comment for his chiropractic colleagues Dr. DeJarnette said, "We must respect each other's beliefs. We must support our colleges and associations. We must work together and unite as a profession. And we must at all times be proud of chiropractic and proud of our calling as chiropractors [1]."

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1. DeJarnette MB. **Cornerstone**. *The American Chiropractor*. Jul/Aug 1982; 82: 22,23,28,34.

2. DeJarnette MB. **The Sacro Occipital Technique Bulletin**. Mar 1975.

3. DeJarnette MB. **The Sacro Occipital Technique Bulletin**. Mar 1978: 2-3.

4. DeJarnette MB. **The History of Sacro Occipital Technic**. Private Practice: Nebraska City, NB. 1958:27.

Evidence-Based Practice

Evidence-based practice (EBP) refers to a decision-making process which integrates the best available research, clinician expertise, and client characteristics. EBP is an approach to treatment rather than a specific treatment.

Evidence-based practice (EBP) involves complex and conscientious decision-making which is based not only on the available evidence but also on patient characteristics, situations, and preferences. It recognizes that care is individualized and ever changing and involves uncertainties and probabilities [1].

EBP develops individualized guidelines of best practices to inform the improvement of whatever professional task is at hand. Evidence-based practice is a philosophical approach that is in opposition to rules of thumb, folklore, and tradition. Examples of a reliance on "the way it was always done" can be found in almost every profession, even when those practices are contradicted by new and better information [1].

> "*It's about integrating individual clinical expertise and the best external evidence* [2]."

However, in spite of the enthusiasm for EBP evinced over the last decade or two, some authors have redefined EBP in ways that add other factors to the original emphasis on empirical research foundations. For example, EBP may be defined as treatment choices based not only on outcome research but also on practice wisdom (the experience of the clinician) and on family values (the preferences and assumptions of a client and his or her family or subculture) [1].

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1. Buysse V, Wesley PW. **Evidence-based practice: How did it emerge and what does it really mean for the early childhood field?** *Zero to Three*. 2006;27(2), 50-55.

2. Sackett DL, Rosenberg WMC, Muir Gray JA, Haynes RB, Richardson WS. **Evidence based medicine: what it is and what it isn't.** *BMJ.* 1996;312:71-72.

Evidence Based Practice: The Hierarchy of Evidence

In biomedical science there is general agreement over an evidence based hierarchy: the higher up a methodology is ranked, the more robust and closer to objective truth it is assumed to be. The orthodox hierarchy looks something like the following table:

Rank:	Methodology	Description
1	Systematic reviews and meta-analyses	Systematic review: review of a body of data that uses explicit methods to locate primary studies, and explicit criteria to assess their quality. Meta-analysis: A statistical analysis that combines or integrates the results of several independent clinical trials considered by the analyst to be "combinable" usually to the level of re-analyzing the original data, also sometimes called: pooling, quantitative synthesis.
2	Randomized controlled trials	Individuals are randomly allocated to a control group and a group who receive a specific intervention. Otherwise the two groups are identical for any significant variables. They are followed up for specific end points.
3	Cohort studies	Groups of people are selected on the basis of their exposure to a particular agent and followed up for specific outcomes
4	Case-control studies	"Cases" with the condition are matched with "controls" without, and a retrospective analysis used to look for differences between the two groups.
5	Cross sectional surveys	Survey or interview of a sample of the population of interest at one point in time.
6	Case reports	A report based on a single patient or subject; sometimes collected together into a short series.
7	Expert opinion	A consensus of experience from the “good and the great.”
8	Anecdotal	An interesting story.

Evidence Informed Practice

The term evidence based medicine (EBM) has traditionally been used to describe a means of treating patients based on research published in biomedical journals. Even though EBM also incorporated expert opinions and a doctor's clinical experience, it was common that insurance companies and other agencies - presumably seeking to protect patients or save money - would focus solely on the randomized controlled trial as the backbone of EBM.

When EBM appeared to be too restrictive or just clearly misinterpreted new terms such as Evidence Based Practice and now Evidence Informed Practice (EIP) have appeared. The value of EIP is that it takes research into account when making a clinical decision but also utilizes patient values and preferences, risk benefit ratio of related or chosen therapy, and the doctor's clinical experience. Because this represents a clearer depiction of an actual clinical experience and at the same time seeks to offer the patient the highest level of care, the belief is that EIP is the best of what EBM has to offer.

It is important that a practitioner is aware of the current research on effectiveness of their care so that they do not inadvertently make false or exaggerated claims regarding the potential benefits of the treatment rendered. Therefore keeping up to date on the research and literature, while time consuming, is an ethical obligation of doctors in practice.

Ideally doctors practicing EIP would best be able to predict and provide outcome expectations against which progress could be measured. In essence we all, as patients or doctors, should receive or offer treatment based on research and clinical experience. New research can uncover therapeutic interventions or benefits of certain types of care that were never before discovered. Also this research may determine that prior care that was customarily rendered is now inappropriate.

The challenge with chiropractic and its various techniques is that we are functioning from a situation where we have limited funds and limited methods to adequately study our innovative therapeutic applications. This conference attempts to offer a tempered and reasonable voice for practitioners on the forefront of care, such as has been the case with Sacro Occipital Technique (SOT) for years. Incorporating current research performed in the patient's best interest with one's own clinical experience is the hallmark of a responsible and ethical physician. Allied healthcare practitioners, chiropractors, and particularly SOT doctors have a responsibility to lead the way with EIP and focus first and foremost on patient based care.

Major Bertrand DeJarnette DO, DC developed SOT with outcome based assessment protocols and with research accountability as its backbone. The onus is upon us, those who learn and utilize his methods, to be informed of the evidence and evolving research and utilize this in the clinical application of SOT and its related methods.

The Case Report: How the Doctor in Practice Communicates to the Research Community

While low on the evidence-based practice hierarchy of evidence the case report is an extremely valuable manner for doctors in clinical practice or "in the trenches" to communicate what is taking place in their practices. Until the doctors in clinical practice publish their case reports, researchers in a college setting can only attempt to guess what is taking place out there in the field.

There are significant limitations to case reports, such as no control subjects, the doctor and subjects are not blinded to the study, and the doctor's bias may cloud the study. So while the case report is an important tool for communication, the doctor authoring these studies needs to exercise caution to not over-interpret his or her findings. Dr. Robert Ward of Southern University of Health Sciences and past editor of *The Journal of Chiropractic Education* answers the question:

"Why it is important to write a case report?"

"Most persons believe that the case report is used to describe unique, or at least highly rare, clinical presentations or diagnostic entities (e.g., "prostatic hypertrophy mimicking as ingrown toenail"). This is the most common use of the case report. However, equally important is the use of the case report to describe novel management approaches to more ordinary conditions.

"Another aspect of why case reports are written involves the audience. Case reports are generally considered as a communication from clinicians to scientists. The pointy-headed ivory tower population doesn't get to see the interesting things that happen in clinical practice. They often rely on case reports from the field in deciding what sorts of pilot studies to run, and those often lead to real full-scale clinical trials (the sort of research that field clinicians generally don't have the time, resource or interest to undertake).

"Case reports are a vital aspect of our literature base, and more of our practitioners need to write them. Until you write up that wonderful method that works in your office, the rest of the world cannot share in its benefits. Without publication, when you die or retire, your discoveries die with you [1]."

1. Ward RW. **Why it is Important to Write a Case Report**. *Dural Connection Internet Edition*. 2006;3(3). [http://soto-usa.com/writing-a-case-report/] Last accessed April 30, 2018.

Defining the Role of Authors and Contributors

1. Why Authorship Matters

Authorship confers credit and has important academic, social, and financial implications. Authorship also implies responsibility and accountability for published work. The following recommendations are intended to ensure that contributors who have made substantive intellectual contributions to a paper are given credit as authors, but also that contributors credited as authors understand their role in taking responsibility and being accountable for what is published.

Because authorship does not communicate what contributions qualified an individual to be an author, some journals now request and publish information about the contributions of each person named as having participated in a submitted study, at least for original research. Editors are strongly encouraged to develop and implement a contributorship policy, as well as a policy that identifies who is responsible for the integrity of the work as a whole. Such policies remove much of the ambiguity surrounding contributions, but leave unresolved the question of the quantity and quality of contribution that qualify an individual for authorship. The International Committee of Medical Journal Editors (ICMJE) has thus developed criteria for authorship that can be used by all journals, including those that distinguish authors from other contributors.

2. Who Is an Author?

The ICMJE recommends that authorship be based on the following 4 criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he or she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. Those who do not meet all four criteria should be acknowledged. These authorship criteria are intended to reserve the status of authorship for those who deserve credit and can take responsibility for the work. The criteria are not intended for use as a means to disqualify colleagues from authorship who otherwise meet authorship criteria by denying them the opportunity to meet criterion #s 2 or 3. Therefore, all individuals who meet the

first criterion should have the opportunity to participate in the review, drafting, and final approval of the manuscript.

The individuals who conduct the work are responsible for identifying who meets these criteria and ideally should do so when planning the work, making modifications as appropriate as the work progresses. It is the collective responsibility of the authors, not the journal to which the work is submitted, to determine that all people named as authors meet all four criteria; it is not the role of journal editors to determine who qualifies or does not qualify for authorship or to arbitrate authorship conflicts. If agreement cannot be reached about who qualifies for authorship, the institution(s) where the work was performed, not the journal editor, should be asked to investigate. If authors request removal or addition of an author after manuscript submission or publication, journal editors should seek an explanation and signed statement of agreement for the requested change from all listed authors and from the author to be removed or added.

The corresponding author is the one individual who takes primary responsibility for communication with the journal during the manuscript submission, peer review, and publication process, and typically ensures that all the journal's administrative requirements, such as providing details of authorship, ethics committee approval, clinical trial registration documentation, and gathering conflict of interest forms and statements, are properly completed, although these duties may be delegated to one or more coauthors. The corresponding author should be available throughout the submission and peer review process to respond to editorial queries in a timely way, and should be available after publication to respond to critiques of the work and cooperate with any requests from the journal for data or additional information should questions about the paper arise after publication. Although the corresponding author has primary responsibility for correspondence with the journal, the ICMJE recommends that editors send copies of all correspondence to all listed authors.

When a large multi-author group has conducted the work, the group ideally should decide who will be an author before the work is started and confirm who is an author before submitting the manuscript for publication. All members of the group named as authors should meet all four criteria for authorship, including approval of the final manuscript, and they should be able to take public responsibility for the work and should have full confidence in the accuracy and integrity of the work of other group authors. They will also be expected as individuals to complete conflict-of-interest disclosure forms.

Some large multi-author groups designate authorship by a group name, with or without the names of individuals. When submitting a manuscript authored by a group, the corresponding author should specify the group name if one exists, and clearly identify the group members who can take credit and responsibility for the work as authors. The byline of the article identifies who is directly responsible for the manuscript, and MEDLINE lists as authors whichever names appear on the byline. If the byline includes a group name, MEDLINE will list the names of individual group members who are authors or who are collaborators, sometimes called non-author contributors, if there is a note associated with the byline clearly stating that the individual names are elsewhere in the paper and whether those names are authors or collaborators.

3. Non-Author Contributors

Contributors who meet fewer than all 4 of the above criteria for authorship should not be listed as authors, but they should be acknowledged. Examples of activities that alone (without other contributions) do not qualify a contributor for authorship are acquisition of funding; general supervision of a research group or general administrative support; and writing assistance, technical editing, language editing, and proofreading. Those whose contributions do not justify authorship may be acknowledged individually or together as a group under a single heading (e.g. "Clinical Investigators" or "Participating Investigators"), and their contributions should be specified (e.g., "served as scientific advisors," "critically reviewed the study proposal," "collected data," "provided and cared for study patients", "participated in writing or technical editing of the manuscript").

Because acknowledgment may imply endorsement by acknowledged individuals of a study's data and conclusions, editors are advised to require that the corresponding author obtain written permission to be acknowledged from all acknowledged individuals.

ICMJE. Defining the Role of Authors and Contributors. [http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html] Last accessed April 25, 2015.

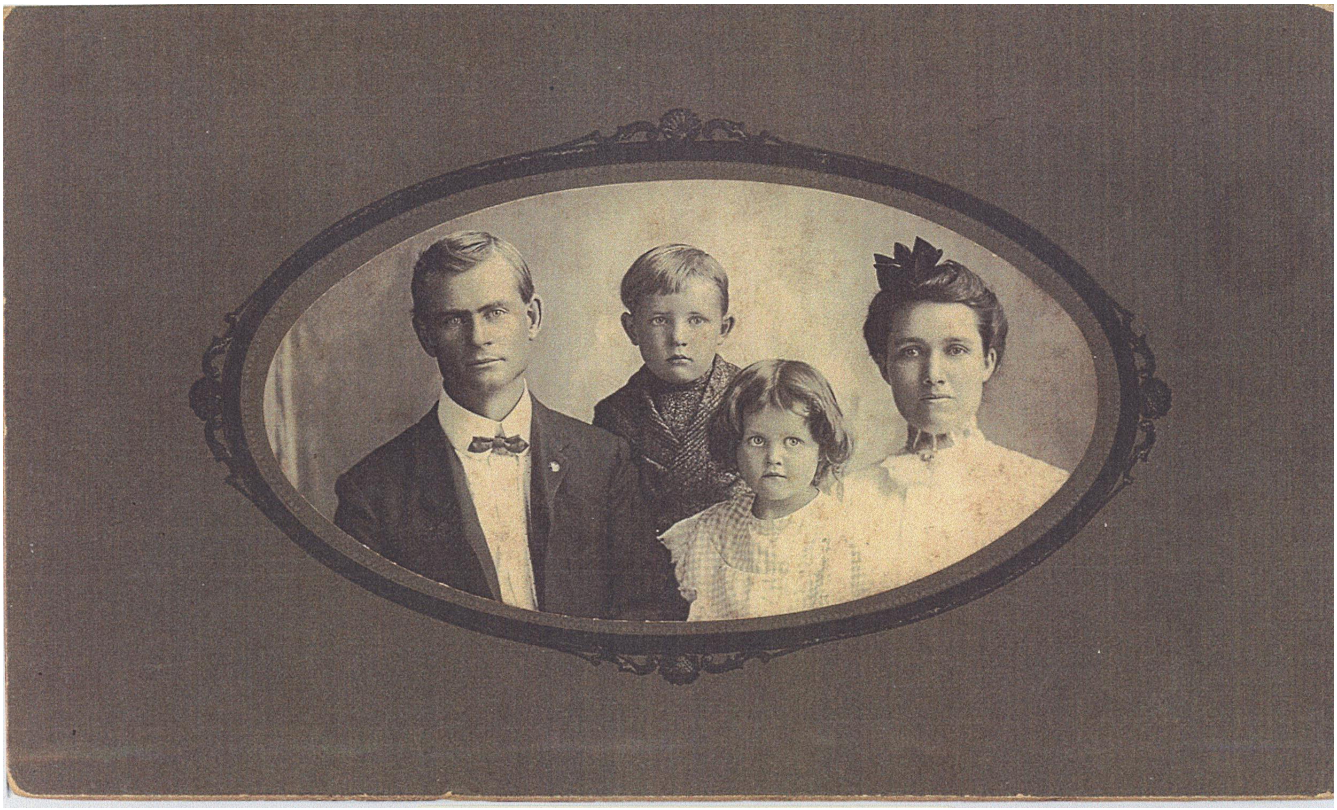
Coming Soon

More than forty years ago, Major Bertram DeJarnette encouraged Nebraska City newspaperman Ivan Beaumont to write a biography of his life. The doctor shared stories and documents with his hometown friend, and a rough draft was written. Each of the busy men added a few notes, but as time and interest slipped away, the stalled project was shelved.

Although information from the unfinished manuscript found its way into articles and time-lines over the decades, this fascinating investigation of Dr. DeJarnette's formative years and early influences has been gathering dust until now.

The title of the biography was and will remain "The Making of a Chiropractor," because its focus is on the people, places and events that put "the Major" onto the road to his destiny. For those elements of the book that were sketched out too vaguely, our editor's thousands of hours of sleuthing has uncovered details that clarify many misunderstandings and fill in details that have been missing in the history of Dr. DeJarnette.

We're sure you'll find "The Making of a Chiropractor" fascinating to read, and that it will provide you with an intimate look at a man whose research and guidance continues to help ease the suffering of millions.



Willis, Major, Fay and Maud DeJarnette in 1904

Complete with sign, Dr. DeJarnette's office at 722 Central Avenue in 1936

Orpheum Theatre Building – 1924 Home of Nebraska Chiropractic College

2018 SOT Research Conference Schedule

May 12-13, 2018 · Marina Del Rey, California

May 12, 2018

2:00 – 2:15 PM **Introduction to the SOT Research Conference and Update on SOT Research**
Charles L. Blum, DC

2:15 – 2:30 PM **TMD, migraines, and airway compromise secondary to deviated septum treated with chiropractic and dentistry care: A case report**
Adam Del Torto, DC, David Shirazi, DDS

2:30 – 2:45 PM **Treatment of chronic TMJ pain and dysfunction using sacro occipital technique and cranial techniques: A case report**
Jason Scoppa, DC

3:00 – 3:15 PM **The sacroiliac nutation lesion theory: A commentary**
Rick Serola, DC

3:15 – 3:30 PM **Interdisciplinary care of a 44-year-old male patient with obstructive sleep apnea secondary to a class two division two malocclusion**
Bruce Johnson, DDS, Richard Gerardo, DC

3:30 – 3:45 PM **Chiropractic and dental care of two patient presenting with cervical spine disc replacement surgery with complications: A Case Report**
Thomas Bloink, DC, Charles Blum, DC

3:45 – 3:55 PM **Panel Discussion**
Presenters

May 13, 2018

9:00-9:10 AM **Relationship between TMJ function and leg lengths**
Charles Blum, DC

9:10-9:40 AM **Current evidence on assessing anatomical versus physiological leg length differences as well as a recent study on the reliability of supine versus prone leg length testing**
Robert Cooperstein, MA, DC

9:40-9:55 AM **Dizziness in a patient with airway compromise and TMD: A case report**
Jeffrey Mersky, DC

10:00-10:50 AM **Cranial Osteopathic Manipulative Medicine: Its current evidence base**
Hollis King, DO, PhD

10:50-10:00 AM **Panel Discussion**
Presenters

SOT Research Conference Presenter's Biographies

Dr. Thomas Bloink specializes in cranial-dental integration in Silicon Valley at the California Cranial Institute, which was founded in 1992. Dr Bloink was on the board of advisors to help create SOTO USA and is actively involved in promoting the organization, presenting at research conferences throughout the world, and developing novel treatment approaches for functional neurological conditions. Dr. Bloink presented his research papers at the International Conference of Chiropractic Research. Montreal, Canada in 2009, European Chiropractic Union (ECU) Convention, London in 2010, World Federation of Chiropractic Congress, Durban in 2013, World Federation of Chiropractic Congress - European Chiropractic Union Joint Conference in Athens Greece 2015, and at the College of Osteopathic and Chiropractic Association Conference in Australia in 2016.

Dr. Charles L. Blum is in private practice Santa Monica, California and past president of SOTO – USA, now their research chair. Adjunct research faculty at Cleveland Chiropractic College, associate faculty at Southern California University of Health Sciences teaching the SOT Elective and TMD Care, as well as at Palmer College of Chiropractic West teaching the SOT Elective. Dr. Blum is a Certified SOT Cranial Practitioner, and on the peer review board of the Journal of Craniomandibular and Sleep Practice (CRANIO), Association of Chiropractic College Conference Peer Review Committee, and Journal of Chiropractic Medicine. He has lectured nationally and internationally, has written various SOT related texts, compiled SOT and cranial related research, and has extensively published in multiple peer reviewed indexed journals and at research conferences from 1984 to the present.

Dr. Robert Cooperstein is a Professor at Palmer Chiropractic College West in San Jose, CA, where he also serves as Director of the Departments of Technique and Research. He mostly instructs in hands-on chiropractic technique, but also teaches pathology. Dr. Cooperstein has served on the PACE Review Committee of the FCLB, and on many occasions on NBCE Committees, including both the chiropractic technique and pathology committees. He is a peer reviewer for several journals and is on the Editorial Board of the Journal of Chiropractic Medicine, Journal of Chiropractic Humanities, and the Journal of Chiropractic Education. He has authored numerous journal articles, as well as several textbooks and textbook chapters. Dr. Cooperstein is also in private practice in San Leandro, CA.

Dr. Richard C. Gerardo is in private practice Burbank, California. Dr. Gerardo has lectured extensively on SOT, Cranial and TMD since the late 1980s. He lectures at SCUSH and CCC-LA on SOT and cranial therapies. Aside from being a Certified SOT Cranial Practitioner, he is a Diplomate of the American Chiropractic Board of Nutrition, Certified in Clinical Nutrition by IAACN, certified in craniopathy, and was on staff and director of the Chiropractic and Craniopathic Center at the Santa Teresita Hospital, Duarte California. Dr. Gerardo has his BS in Biology from California Polytechnic University, Pomona, California is an advisory board member of SOTO-USA. He is actively leading the way with chiropractic and dental co-treatment of TMD working in dental chiropractic interdisciplinary arenas and lecturing on the topic of TMD.

Dr. Bruce Johnson completed his Doctor of Dental Surgery at the University of California San Francisco Medical Center in 1976. He immediately began practice in Eagle Rock offering family dentistry and quickly widened his scope of care to a more comprehensive approach including orthodontic and TMJ/CMD treatment. He is founder and facilitator of the Southern California Dental-Cranial Study Group and has provided presentations for the Southern California Health Sciences University, San Gabriel Valley Dental Implant Study Group, USC Orthodontic Alumni Study Club, California Dental Association, and Sacro Occipital Techniques Organization on lecture topics such as TMJ for Chiropractors, Occlusal Splint Therapy, Muscle and Joint Parameters in TMJ Patients, Altering Occlusion for Periodontal Health, and the Dental-Chiropractic Co-Treatment Paradigm.

Dr. Hollis H. King is currently the Director of Program Services for Osteopathy's Promise to Children and is one of osteopaths "Continuing the Dream and Advancing the Dream" of Viola M. Frymann, DO, FAAO in San Diego, CA. He is also a staff physician the OMT Service in the Center for Integrative Medicine of the University of California San Diego School of Medicine. For the three years prior to moving to San Diego Dr. King was Professor of Family Medicine at the University of Wisconsin School of Medicine and served as Director of the Statewide Osteopathic Residency Program. Prior to this appointment at the University of Wisconsin he was a Professor of Osteopathic Principles and Practice at A.T. Still University School of Osteopathic Medicine in Arizona campus in Mesa, AZ. Dr. King's PhD is in Clinical Psychology and he integrates the osteopathic philosophy of body-mind-spirit into his clinical practice. He is a Past President and Fellow of the American Academy of Osteopathy. He writes a regularly appearing column in the *Journal of the American Osteopathic Association*, "The Somatic Connection," which reviews the evidence base for manual medicine. Dr. King is the Chief Editor of and a contributor to *The*

Science and Clinical Application of Manual Therapy published in 2011 by Elsevier which delineates the research supportive of osteopathic manipulative medicine (OMT) for systemic disorders as well as musculoskeletal conditions. He is the author of the chapter on "Osteopathy in the Cranial Field" in *Foundations of Osteopathic Medicine, 3e* published in 2011 by Lippincott, Williams & Wilkins. He is currently developing a research project in collaboration with the Department of Ophthalmology on "OMT for Intraocular Pressure Lowering in Ocular Hypertensive Patients." Dr. King is author or co-author of 20 peer reviewed research publications on OMT.

Dr. Jeffrey A. Mersky has been in private practice since 1985 and holds certified status as an advanced S.O.T practitioner and instructor of S.O.T (Sacro Occipital Technique) with a special emphasis on Cranial, TMJ disorders. He is a frequent teacher of S.O.T throughout the United States and has special expertise in Clinical Nutrition. The American Chiropractic Physicians Credentialing Center has awarded Dr. Mersky the designation of APC-M (Advanced Practice of Chiropractic Medicine) and he completed a 300-hour Diplomate certification post graduate program in Internal Disorders for the Chiropractic Physician with the designation of board eligible Internist. In addition he has completed course work in Functional Diagnostic Nutritional Medicine and continues his study in this field.

Dr. Jason Scoppa is a certified SOT craniopath (CSCP) and certified chiropractic sports practitioner (CCSP) that practices in Bellevue, WA at Northwest Structural Medicine. He frequently works with local dentists and orthodontists, with roughly 60% of his clientele being dental-chiropractic co-management cases. He is a member of SOTO-USA and the American Equilibration Society (AES), and graduated from Palmer West Chiropractic College after receiving his undergraduate degree from Seattle University. Aside from TMJD, other areas of professional interest include sports medicine, athletic performance enhancement, and injury prevention in athletes.

Dr. Rick Serola graduated Summa Cum Laude from Palmer College of Chiropractic in 1983, as a member of the Chiropractic Honor Society. Over 29 years of clinical research, he developed his own theory on biomechanics, which led to the production of unique orthopedic products which are now sold in approximately 40 countries. He holds numerous domestic and international patents as the inventor and manufacturer of the Serola Sacroiliac Belt and other orthopedic products. He has lectured at various research conferences such as the 2012 Annual SOT Research Conference on "Pregnancy, sacroiliac support belts, and active straight leg raise (ASLR): Incorporating new diagnostics into sacro occipital technique" and the 2013 World

Congress on Low Back and Pelvic Pain Conference on “Pregnancy, sacroiliac support belts, and active straight leg raise (ASLR): Utilizing multiple tests for optimal outcomes.”

Dr. David Shirazi graduated from Howard University College of Dentistry, Washington DC. He then went on to earn his masters degree in Oriental Medicine, Acupuncture, Herbology, and TCM theory from SAMRA University. He completed over 2000 hours of continuing education in TMD and facial pain, cranial mandibular orthopedics, and sleep disordered breathing and has two locations where is practice is limited to those subjects. He is the founder of the Bite, Breathe, and Balance medical study group, dedicated to the multidisciplinary approach of treating craniofacial pain and sleep disorders.

Two patients presenting with cervical spine disc replacement surgery with complications: A Case Report

Thomas Bloink, DC, Charles Blum, DC

Introduction:

Mechanical stress loading to the cervical intervertebral disc is associated with degeneration of the disc and subsequent neurological sequelae, with treatments ranging from conservative to invasive surgery.[1,2] Historically, anterior surgical approaches in the cervical spine have included anterior cervical discectomy alone (ACD), anterior cervical discectomy with fusion (ACDF) and ACDF with anterior plating.[3,4] While surgical fusion has been used to reduce cervical vertebra segmental motion and disc hypermobility, sometimes patients may still experience pain following surgery. Cervical fusion "may also lead to adjacent level degeneration[5-7], pseudarthrosis[8,9], and donor site pain."[1]

In contrast to fusion techniques, cervical disc replacement surgery aims to preserve cervical motion, thus preventing complications associated with rigid arthrodesis and subsequent segmental loss of motion.[4,10-13] It also is intended to help avoid the morbidity associated with cervical immobilization and autologous bone graft harvesting and eliminates the potential infective risks associated with the allograft bone.[14] Post-surgical assessment of cervical spine segmental motion has been, and continues to be, a challenge. Generally, clinical studies reporting the data have placed lesser emphasis on kinematics following intervertebral disc replacements with a greater focus on pain reduction.[1] Clinical reports of success of cervical total disc replacement are encouraging but are also quite preliminary.[15] While long-term studies have not yet been reported,[3] the short-to-intermediate term studies appear promising.[16-20]

This case report focuses on two separate unrelated patients presenting for chiropractic care due to complications following cervical disc replacement surgery.

Case #1 History: A 30-year-old male was injured due to a fall (February 15, 2014) during skiing, traumatizing his neck.His condition progressively became worse, resulting in loss of sensation to his right third and fourth fingers. After undergoing five months of physical therapy he noted there was no improvement. Believing that he had exhausted all conservative means of care he had C5-6 disc replacement surgery in December 2015. Initially hHe felt improved for initial three months post-surgery, but then began to experience pain in the right side of his neck, right shoulder blade, and occasional upper right arm pain. Additionally, approximately two times a week he would also feel the same types of pain on the left side of his neck and upper extremity.

He consulted the spinal surgery center at Stanford where an MRI was three months post-surgery, which was found negative for pathology. He was prescribed Neurontin, which helped somewhat, but still experienced significant pain. He returned for physical therapy at a clinic in Lincoln, Nebraska; however, he didn't experience any significant improvement in his pain. In April 2016 he was prescribed a lower dental mandibular mouth-guard for nighttime clenching and bruxism (possibly unrelated to his cervical spine condition). The patient presented at this clinic for treatment on July 14, 2016 and noted that prior to the trauma and surgery he was an avid runner

but since the injury (February 2014) he was unable to run or even walk more than half a mile due to the pain.

Case #2 History: A 52-year-old female who was suffering from significant neck pain, which radiated down her right arm to her hand and into her second and third fingers. The pain was described as an electric, buzzing, tingling type pain, which was accompanied by weakness (inability to hold simple objects such as a cup). Disc replacement surgery was performed on April 2015 to the C5/C6 and C6/C7 discs, and initially her symptoms were resolved but shortly returned. She also began to feel pain down her left arm to the thumb and first finger, and noted that her right arm symptoms were worse than before the surgery. An MRI was performed that was determined ultimately to be negative, however her neurologist believed there may be a suspicious lesion in the cervical region possibly associated to multiple sclerosis or a dural fistula.

Methods/Intervention:

Case #1 Patient Assessment: Chiropractic assessment determined the patient had malocclusion, anterior premature contact with right working interference and decreased translation of the right temporomandibular joint. Evidence was found of clenching, significant maxillary exostosis, and mandibular tori. Palpatory pain was noted at the bilateral zygomatic maxillary joints, right zygomatic arch, bilateral sphenoid wings, bilateral coronal suture, squamosal sutures along with palpatory pain and hypertonicity of right temporalis and masseter muscles. Palpation revealed his right occiput was in a cranial extension distortion pattern. Cervical spine antalgia was noted with decreased ranges of motion and significant palpatory pain to the cervical spine that was greater on the right side. Muscle assessment found 4+ weaknesses of right supraspinatus, right infraspinatus, right subscapularis, right teres minor, right tricep, and bilateral deltoid muscles.

Case #1 Treatment: Treatment consisted of category one sacro occipital technique (SOT) blocking (reducing pelvic torsion and improving sacral nutation)[21] with SOT intraoral cranial adjustments[22], and sphenomaxillary cranial treatment[23]. He was treated in a collaborative cranial dental model for the first four treatments, going immediately to the dental office to balance the dental appliance following chiropractic and cranial treatment at this office.

Case #2 Patient Assessment: Chiropractic assessment revealed a maxillary deficiency. The patient reported sensitivity to palpation of bilateral temporal mandibular joints, bilateral zygomatic maxillary joints, bilateral maxillary frontal joints, bilateral zygomatic arches, bilateral sphenoid wings, mid sagittal suture, bilateral coronal and squamosal sutures. Sensitivity to palpation and hypertonicity was also noted to the bilateral masseter, temporalis, and medial lateral pterygoid muscles. There was evidence of clenching, excessive tooth wear, malocclusion, and anterior premature contact with bilateral working interference. Assessing temporal mandibular joint (TMJ) translation and opening determined that she had limited opening with a left anterior displaced TM disc with reduction. Cranial evaluation revealed a right occiput in an extension cranial distortion pattern.

The patient's cervical spine was antalgically positioned at rest and she had decreased cervical rotation with active range of motion of only10° bilaterally, which was accompanied by pain at

the limits of rotation. Cervical spine flexion, extension, and bilateral lateral flexion also produced neck pain during motion. Palpatory pain and hypertonicity was noted bilaterally along the trapezius and suboccipital muscles with sensitivity to palpation bilaterally along the cervical lamina from C1-5. Muscle testing revealed a 4+ weakness of bilateral deltoid muscles, supraspinatus, and infraspinatus, along with 4+ weaknesses of the right subscapularis, teres minor, tricep, and bicep muscles.

Case #2 Treatment: Following assessment and beginning care at this office the patient was referred for dental care to take impressions for a lower occlusal dental appliance. The patient was treated at this office for 10 visits from March 31, 2016 through May 5, 2016. Treatment consisted of SOT category one blocking (reducing pelvic torsion and improving sacral nutation)[21] with SOT intraoral cranial adjustments[22], and incorporating sphenomaxillary cranial treatment[23]. On three of those office visits following treatment she was seen immediately by her dentist to balance and equilibrate the lower occlusal dental appliance that she was using.

Results:

Case #1 Results: The patient's response to treatment was dramatic. Following the fourth visit he was able to hike 10 miles in Yosemite national Park, which he claimed he had been unable to do for two and half years. He was then treated for 11 visits between July 25, 2016 and September 8, 2016, and he began to run again and was able to run one mile without experiencing any symptoms. By September 8, 2016 he reported his cervical spine and arm pain were gone and was only experiencing occasional pain in the right shoulder blade. His cervical spine antalgia was no longer present and his cervical spine active range of motion returned to normal in all directions.

Case #2 Results: At her reevaluation on May 5, 2016 her neck pain, which was originally rated as constant and 8 to 9/10, with 10 being most pain possible, was reduced to a 3/10 and only occurred when performing activities like making a bed, driving, laying over sink, and sitting at the computer. The right arm pain radiation to the fingers was significantly reduced. Her left arm symptoms were completely eliminated. Cervical spine antalgia was improved and normal ranges of motion were restored. The 4+ weaknesses of right shoulder and arm muscles were resolved and tested at 5+ or normal. Follow-up MRI tests were performed and found to be normal with the suspicious lesion on the prior MRI no longer visible.

The patient was treated for an additional 14 visits between May 9, 2016 and September 8, 2016. Many of those visits involved treatment of her lumbar spine, sacroiliac joint, and thoracic spine. By September 2016 she reported only occasional pain into the right shoulder and bicep muscle, which occurred three times a month, though only after participating in strenuous physical activities.

Discussion:

Case #1 Discussion: Clinically it is theorized that both patients' TMJ cranial mandibular distortion was affecting their forward head posture, which would increase stress to his cervical

spine. Correction of their cranial mandibular distortion along with balancing their dental mandibular appliance appeared to contribute to improvement of forward head posture and help restore normal cervical ranges of motion, leading to decreases in pain and improvement of cervical spine function.[24-27]

One reason why TMJ disorders are so critical in the management of cervical spine-related disorders is their relationship with the cervical spine and forward head posture.[24-27] It is unclear whether the patients would have been able to forego the surgical interventions if they had received care at this office; however, following the surgery as their symptoms began to return and worsen, the care rendered had a significant effect. It may be important to consider this type of chiropractic, cranial, and dental care as a part of the post-surgical regimen for patients that fit the criteria of having pelvic imbalance and TMJ/cranial related dysfunction.[28-30]
There are various reasons why TMJ disorders might affect the cervical spine, with one reason related to the work of Guzay. Guzay, a student of physics and engineering, attempted to determine where forces from occlusion, masticatory muscles, TM ligaments, and stomatognathic functions would summate. He performed extensive study into this "puzzle" and developed a comprehensive solution that he termed The Quadrant Theorem.[31-33] He determined that the summation of forces related to muscles controlling a pivotal axis of mandibular function occurred at the dens between the atlas and axis vertebrae. Therefore, he expected that, kinematically, there would likely be a relationship between the cervical spine function and the TMJ, as well as TMJ function and the cervical spine.

Stomatognathic or TMJ-related disorders can often have airway-related issues, which affect head and neck positioning. Gelb described how the "airway governs our ability to breathe and to achieve a restful, oxygenated, restorative night's sleep, as well as to perform optimally during the day. Any temporomandibular joint or occlusal philosophy must address airway patency while managing pain and dysfunction, identifying contributing factors, and alleviating perpetuating factors."[34,35] Therefore, in some patients TMJ-related disorders can contribute to a compromised airway issue, and the cervical spine will have a forward position as a means to compensate for a compromised upper airway passage.[36-39]

With any case report, caution must be made in generalizing the outcome to the population at large, particularly since this is only a two-subject case study that cannot include controls, sham grouping, and randomization. In addition, various possibilities for the positive outcomes in a case report such as placebo or ideomotor effects, regression to the mean, and others cannot be ruled out.

Conclusion:

These two case reports suggest that with a subset of patients having complications following cervical spine disc replacement surgery, it may be prudent considering SOT-related chiropractic care that incorporates both cranial and dental interdisciplinary care. A temporal relationship between care for these patients' TMJ disorders and improvement of cervical spine function and pain made the outcomes of these cases compelling. Further research with other patients suffering from failed cervical disc replacement surgery might help determine if these patients

were an anomaly or possibly represent an important subset of patient that can be helped with this novel conservative care.

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Leg length, postural imbalance, and stomatognathic relationships: A review
Charles Blum, DC

Introduction:

Assessment of leg length is a part of the diagnostic process for "several professions: chiropractic, physical therapy, osteopathy, podiatry, and medical orthopedics.[1] The field of chiropractic commonly uses functional leg length (leg lengths that are essentially anatomically the same length), assessments to differentially diagnose pelvic imbalance, its affect on global posture, and its change to determine the effectiveness of care pre and post treatment. A comprehensive study by Triano et al found high quality evidence supporting the use, with limitations, of "measures of leg length inequality."[2] Various studies have found that the functional leg length imbalance exists and that the phenomenon can be reliably measured[3,4] in the prone[5] and supine positions[6].

While postural imbalance is considered to cause functional leg length differences, conversely anatomical leg length (actual length differences between bones of the thigh/leg) is considered to cause postural imbalance. In a review study by Knutson he found that "anatomic leg-length inequality is near universal, but the average magnitude is small and not likely to be clinically significant." [7] He also determined that "the unloaded, functional leg-length alignment asymmetry is a likely phenomenon" [8] and this asymmetry should be eliminated before any necessary treatment of anatomic anatomical leg length imbalance is considered.[8] A study by Cooperstein noted that while it is commonly presumed the ilium rotates posteriorly on the side of a functional short leg and anterior on the long leg side, the pelvic findings for patients with anatomical leg lengths may be reversed creating an important clinical consideration for those treating this phenomenon. [9]

Leg Lengths and The Temporomandibular Joint or Stomatognathic System

An emerging evidence base of literature is developing relating to the relationship between leg length and the temporomandibular joint or stomatognathic system.[10-12] It appears from preliminary studies that dental occlusion imbalance has an affect on "detectable alterations in the distribution of loading on feet surface, during walking." [10] Sakaguchi et al, found that changes in mandibular positioning affected body posture and "when subjects used a heel lift under the right foot, occlusal forces shifted to the right side compared to no heel lift. Based on these findings, it was concluded that changing mandibular position affected body posture and changing body posture affected mandibular position.[11]

A follow-up study by Maeda et al noted, "when subjects used a heel lift of eight mm or more under the right foot, occlusal force shifted to the right side compared to the control ($p<0.05$). When subjects used a heel lift of seven mm or more under the left foot, occlusal force shifted to the left side compared to the control ($p<0.05$). Based on these findings, it was concluded that leg length discrepancy affected body posture and dental occlusion." [12] Since leg length imbalance can have an affect on body posture[13] and pelvic torsion[14], this relationship between mandibular position and body posture represents an important clinical consideration for healthcare

practitioners treating patients with these conditions. But is there a clear relationship between body posture and temporomandibular joint dysfunction?

Posture and The Temporomandibular Joint or Stomatognathic System

While controversial, some studies have found a relationship between temporomandibular joint (TMD) or stomatognathic system disorders (SSD) and body posture. Fuentes, et al noted that TMDs are caused by several factors and that a relationship has been established between TMDs and postural alterations, which are a type of anatomical alteration.[15] Similarly, Strini, et al found that an "individual's postural position can suffer biomechanical alterations due to stomatognathic alterations, causing clinically visible changes in dysfunctional individuals and affecting the performance of the involved structures."[16] An important theme of many of these studies is the ascending and descending component of the relationship between TMD/SSD and body posture.[17] Saito et al, found "a close relationship between body posture and temporomandibular disorders, though it was not possible to determine whether postural deviations were the cause or the result of the disorder. Hence, postural evaluation could be an important component in the overall approach to providing accurate prevention and treatment in the management of patients with temporomandibular disorders."[18]

Postural balance has a direct relationship to pelvis and how the feet distribute gravitational forces. In some cases the imbalance cased by TMD/SSD can be directly affected by pelvic or feet imbalance. Fink et al's study found that in the presence of occlusal interference, functional abnormalities were detected in sacroiliac joint and cervical spine regions and these changes were statistically significant.[19] A ascending relationship between the sacroiliac joint and TMD has been discussed[20-22] and in one case an external derangement-type TMD, was relieved following chiropractic sacro-occipital technique (SOT) treatment, including SOT category two pelvic blocking (sacroiliac joint hypemobility and pelvic torsion) to reduce sacroiliac sprain.[21] In a studies by Rothbart he demonstrated that changes in the frontal plane position of the cranial bones can occur when using proprioceptive insoles and/or dental orthotics.[23,24]

Neurological Related Contributions to Postural Balance

There are different theories why an interrelationship between posture and TMD/SSD might exist. One ascending postural theory relates to visual and vestibular as well as plantar mechanoreceptors, all of which are important players in the regulation of static upright posture. "Each of these input sources detects and responds to specific types of postural stimulus and perturbations, and each region has specific pathways by which it communicates with other postural reflexes, as well as higher central nervous system structures."[25] Another descending postural theory suggests "that tension in the stomatognathic system can contribute to impaired neural control of posture. Numerous anatomical connections between the stomatognathic system's proprioceptive inputs and nervous structures are implicated in posture (cerebellum, vestibular and oculomotor nuclei, superior colliculus)."[26]

Conclusion:

The relationship between TMD/SSD, posture and leg length imbalance is closely interrelated with ascending and descending contributions to the kinematic chain of postural influence. Based on this relationship, with patients that have leg length or postural imbalance it may be crucial for optimal TMD/SSD treatment to consider this ascending myofascial or neurological component during the TMD/SSD treatment process. Likewise when treating patients with leg length or chronic postural imbalance it may be crucial to consider TMD/SSD related descending myofascial or neurological components during that treatment process.

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Distinguishing anatomic from functional short leg on physical examination
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Introduction:

The clinical interpretation of leg length inequality (LLI) crucially depends on the distinction between anatomic LLI (LLIa)[1-3], wherein the legs are measurably of different length; and functional LLI (LLIf), in which cases the legs are de facto equal in length and yet one has been drawn cephalad in some manner (Table 1). Anatomic LLI may increase the risk of somatic complaints in the lower extremities, pelvis, and spine. Functional LLI may reflect mechanical dysfunction of spino-pelvic structures and serve as an outcome measure for clinical changes.

Descriptions of leg length assessment procedures do not uniformly consider that observed LLI (LLIo) may reflect primarily anatomical or functional LLI, let alone what diagnostic difference this may make. A review article on pelvic torsion includes discussion of various models for the functional short leg[4]. An article in press further complicates discussion of the functional short leg issue, by demonstrating quasi-total disagreement of supine and prone measures of LLI[5]. Cooperstein et al reviewed the literature suggesting a functional short leg may be associated with posterior innominate rotation[6], whereas an anatomical short leg has been shown to predict anterior innominate rotation[7]. Upper cervical practitioners are also dependent on models of the functional short leg[8,9]. An upper cervical monograph states: "Not only does the short-leg indicate the presence of nervous imbalance in the CNS`, but the amount of shortness can indicate the degree of neurological imbalance" [9].

Considerations such as these suggest discriminating functional from anatomic short leg may impact on clinical outcomes[10]. Imaging, more specifically scanogram x-ray, is generally regarded to be the reference standard for identifying aLLI[11], even though the accuracy of the scanogram has been put in question[12]. On the other hand, imaging procedures for detecting aLLI can be costly in terms of both economic costs and the potential hazards of exposing the patient to ionizing radiation. Thus, there is a strong clinical rationale for using a less expensive and less invasive method of detecting aLLI.

The purpose of this commentary is to review the low-tech methods by which an observed short leg can be differentially diagnosed as either functional or anatomical LLI.

Low-tech methods to discriminate aLLI from fLLI:

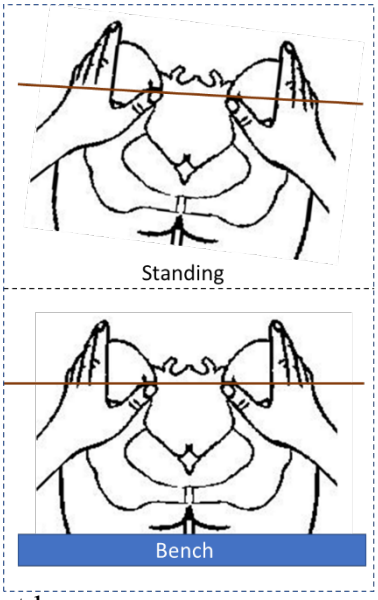
Compressive leg check[13,14]

In this instrumented, prone leg checking procedure, moderate cephalad force is applied to the feet. Cooperstein hypothesizes that this pressure overwhelms whatever impact functional differences in suprapelvic muscle tone have on the relative y axis position of the lower extremities, so that any apparent LLI would represent an anatomic difference[13,14]. Compressive leg checking has been shown to be quite accurate, in that a blinded (compressive) leg checker is able to detect artificially created LLI ± 1.7 mm, and correctly identify *the side* of LLI

irrespective of magnitude, 95.4% of the time[14]. Since clinicians are generally more interested in the side of short leg rather than its amount, this ability to discriminate dichotomously right from left short leg may be the most important barometer of a leg check's accuracy.

In a submitted study currently in review (May, 2018), the results of compressive leg checking were highly correlated with this sitting-standing indirect test for aLLI. Moreover, this submitted study investigated the intra- and interexaminer reliability of compressive leg checking for the first time; both were found highly reliable.

Sitting/standing indirect leg check[15,16]



This test is considered indirect because at no time does the examiner measure, touch, or even inspect the lower extremities. First, we locate the bilateral positions of a pelvic landmark, such as the PSISs in the seated position. They may be on the same horizontal plane, or there may be a height difference between the left and right sides. Being very careful to keep the palpating fingers in place, we then have the subject stand. The landmarks are assessed once again. If the legs are, indeed, the same length, the seated and standing landmarks should maintain their spatial relationship, remaining either on a horizontal plane or showing the same difference as they did seated. If there is a difference between the seating and standing landmark positions (as, one might say, a delta between the seated- standing deltas), there is likely to be leg-length inequality. We do not know to what degree the observed changes are proportional to the amount of aLLI, but it is reasonable to think that such differences may have at least qualitative significance; i.e., identify the side of an anatomical short leg.

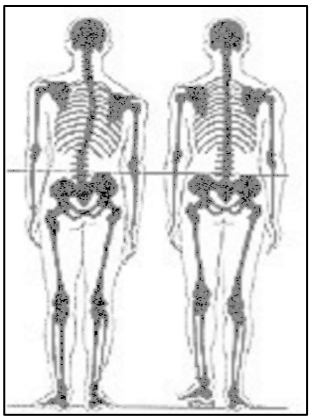
Tape measure methods (TMMs)[17]

The most challenging problem in directly measuring the length of the legs (exclusive of imaging procedures) is that there is no place to put the proximal end of the tape measure or other measuring apparatus. The distal end of the tape measure can be placed on a malleolus, but there is no way to place the proximal end of the tape measure on or even near the femoral head. In lieu of that, investigators and clinicians have been placing the proximal end of the measure at the ASISs, the umbilicus, or the greater trochanters, with predictably poor inter-examiner reliability and relatively unflattering concordance with scanogram x-ray—at least at the level of precision, say, of a few millimeters—that chiropractic clinicians would consider relevant.
A variety of TMMs (also called direct methods) has been described, with one end of the measure applied to either the ASIS, umbilicus, or xiphoid process; and the other brought to either the medial or lateral malleolus. I am aware of 11 studies that compared TMMs to a radiological gold/reference standard[17]. Woerman[18] performed one of the older and more rigorous studies. Although the medial malleolus measurements was closer to the radiological gold standard (hence more accurate), the lateral malleolus measurements exhibited better test-retest reliability and a smaller standard deviation (hence more precise). The accuracy of TMMs is approximately ± 5

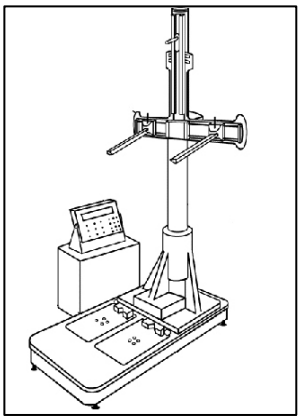
mm, which also happens to be the threshhold aLLI that was clinically significant in Friberg's authoritative opinion[19].

Block indirect method

Block measures determine the amount by which a leg must be lifted, by means of inserting blocks of known width under the leg thought to be short, to level the iliac crests and thus the pelvis. The width of the inserted blocks serves as an indirect measure of aLLI, in essence a surrogate measure. As of 2011[20] there were 8 studies[18,21-27] that compared block methods to a radiological gold/reference standard. The level of accuracy was very comparable to TMMs. Although all of the cited validity studies come from the biomedical literature, chiropractors have done some research on the anatometer[28,29], a computerized measuring tool that deploys the block indirect method for measuring LLI.



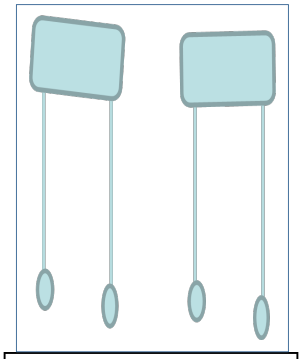
Block indirect method



The Anatometer

Crest-foot method

The rationale for this test is that if there is fLLI, then the short leg is drawn up by contractured paraspinal muscles ipsilateral to the short leg. Therefore, the iliac crest is predicted to be relatively cephalad as well. If, on the other hand, there is aLLI, then the iliac crests are predicted to be more symmetric than the feet. Travel explained this finding by a myofascial mechanism involving the quadratus lumborum muscle[30].



Left, fLLI; right, aLLI

Allis leg check[31]

In this visual test, the supine subject's knees are flexed to about 90^0 while the toes are closely approximated at the foot of the table. The knees are sighted both from the foot of the table and the side of the table for asymmetry in either height or position along the y axis of the body. Cooperstein, having performed a mathematical simulation of this test[31] concluded it lacked validity, primarily due to the difficulty of knowing the relative position of the hips. One hip could be relatively cephalad, or higher from the table top due to differences in the tone or mass of the gluteal muscles.

Conclusions:

An anatomic short leg increases the risk of musculoskeletal problems. The functional short leg well may exist, but little evidence suggests its side or magnitude point toward an appropriate adjustment of either the pelvis or upper cervical spine. At best, there is some evidence warranting a direction for sacroiliac interventions: studies using the friction reduced table

suggest a functional short leg may occur on the side of a *posterior* ilium, at least if the legs are anatomically even. However, we may be hard-pressed to know if the short leg is functional or anatomic. If anatomic instead, we must reckon with a large body of data predicting dose-related *anterior* ilium rotation on the anatomical short leg side. Clearly, an appropriate clinical intervention would logically depend on whether an observed short leg is a structural or functional short leg. Therefore, a clinician needs to determine best as possible whether LLI is anatomical or functional. If we can rule out aLLI in some way, then observed LLI would be presumed functional. Since the risk-benefit ratio of scanogram x-ray or CT scan for measuring relative leg length is unclear for most patients, using one or more of the low-tech methods for measuring aLLI is preferred. Using a combination of tests is preferred to strict reliance on any one method.[32]

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SOT Cranial Therapy with an occlusal splint for the treatment of fibromyalgia and obstructive sleep apnea with blocked sinus.

Rachel Hamel, DC, Mamal Rahimi, DDS, and Charles Blum, DC

Introduction:

Fibromyalgia is a disorder characterized with widespread musculoskeletal pain in specific locations (trigger points), stiffness, cognitive dysfunction, sleeping disturbances and fatigue. It is believed to be a disorder of central pain processing that produces paresthesias such as heightened responses to painful stimuli and pain with non-painful stimuli.[1] The prevalence has been reported to be 3.4 percent in women and 0.5 percent in men, increasing with age to 7.4 percent in women between the ages of 70 and 79 years.[2]

Fibromyalgia is co-morbid with a diversity of medical and psychological conditions such as headaches, chronic fatigue syndrome, irritable bowel syndrome, sleep disturbances, depression and anxiety, obesity and metabolic syndrome, autonomic dysfunction, orthostatic hypotension and postural orthostatic tachycardia syndrome.1 Fibromyalgia can provide substantial disability: difficulty with activities of daily living beyond personal care, increases in unemployment and lost work days, and results in even more healthcare visits than rheumatoid arthritis patients.[2]

Disturbed sleep has been implicated as a key factor for the pathogenesis of fibromyalgia.[3-5] Obstructive sleep apnea (OSA) occurs when there is an obstruction in the airway, characterized by frequent awakenings, disrupted sleep and consequent excessive daytime sleepiness.[6] The severity of the condition ranges from mild vibration of the tissues to death by asphyxiation. It has been shown that there is an association with snoring and OSA in serious medical conditions such as: hypertension, metabolic syndrome, diabetes, heart failure, coronary artery disease, arrhythmias, stroke, gastro esophageal reflux disorder (GERD), pulmonary hypertension, neurocognitive and mood disorders.[6]

There are many complications that can come from daytime sleepiness that arise from the improper sleep wake cycles, which disrupt brain activity and relaxation. Some serious environmental health disasters have been partially attributed to sleep loss and its associated work-related performance failures.[7] Children with obstructive sleep apnea (OSA) often have problems in development, cognition, behavior, and academic performance. Individuals with sleep apnea are at twice the risk of having a traffic accident as unaffected individuals; the higher the apnea-hypopnea index, the higher the risk, and those with OSA are twice as likely to be involved in workplace accidents. Additionally, the annual medical costs resulting from untreated OSA is estimated to be $3.4 billion. [7]

Other than surgery, which is costly, offers risks, and is invasive, the most common intervention for treatment of OSA is continuous positive airway pressure CPAP, which is generally poorly tolerated by patients. It has been estimated that approximately 25% of all patients with OSA discontinue therapy in long-term follow-up. [7] Sleep apnea dental appliances that focus on mandibular advancement have shown promise, [8-10] but can be costly and may affect occlusion and mandibular condyle position, which can produce other secondary issues. [11,12] The following

is a case report of a patient presenting with symptomatology of fibromyalgia, sleep apnea, and sinus restrictions, and discusses an intervention that appeared to facilitate her recovery.

Assessment

A 47-year-old female patient presented for chiropractic care with a thirteen-year history of temporomandibular joint pain (TMJ) rated as a 8/10 (with 10 being most painful), disturbances in vision, deviated septum, restricted left sinus, fibromyalgia, chronic fatigue, excessive daytime sleepiness, "stone-like" muscles, chronic "vice-like" headaches, cognitive impairments, insomnia, chronic myofascial neck and shoulder pain, low back pain with radiation into her right leg, and a burning type pain bilaterally into her legs and feet. She had also been prescribed and utilizing amitriptyline medication for thirteen years, an antidepressant to help with insomnia. She additionally reported that for the past 13 years, most days were spent in bed, with any physical activity disabling her in pain. Prior to care, she began using the guifinocin protocol for fibromyalgia for two months, and reported it decreasing the "trigger point" symptoms from a 10/10 to 9/10.

Methods/Intervention

Examination revealed narrow transverse upper dental arches with an anterior premature contact. Maxillary bone deficiency was found with ridging and exostosis. Decreased anterior translation of the right TMJ with palpatory pain and clicking upon opening was noted along with increased anterior translation of her left TMJ. Pain was elicited with palpation to the masseters, temporalis, suboccipitals and medial and lateral pytergoid muscles. Examination of the teeth showed evidence of clenching and grinding. Cervical spine range of motion was limited and painful. Cervical foraminal compression was positive on the right localizing to the C5 level. Bilateral pain was produced in the posterior sacro-iliac joints with bilateral straight leg lifting at seventy degrees. The left temporal bone was restricted in extension (internal rotation) to palpation and a spheno-maxillary distortion pattern was also determined.

Prior to the examination a sleep study was conducted at Stanford on 2/9/2016. The sleep study revealed a Respiratory Disturbance (RDI) Index of 26 or (5.4/hour) and an Apnea Hypopnea Index (AHI) of 26. Also, it was noted that the oxyhemoglobin saturation (Sp02) was 96% during sleep.

Treatment consisted of eight SOT cranial dental appointments incorporating sacro occipital technique (SOT) intraoral cranial adjustments, sphenomaxillary craniopathy, and neuro emotional technique (NET) for stress related symptoms. Treatments included intraoral maxillary cruciate decompression, restoring bilateral frontal/zygomatic suture movement, releasing zygomatic torsion, opening sphenomaxillary distortions through a "cant hook" maneuver, correcting the primary category temporal bone fixation pattern, category two (supine pelvic block placement) followed by category one (prone pelvic block placement) based on signs and symptoms, and utilizing NET for unresolved emotional issues affecting physical alignment as needed.

Two weeks into treatment she was referred to a dentist who determined her need and fabricated a lower occlusal Gelb mandibular splint for her to use. Instructions were to wear the splint only during sleep hours indefinitely, unless functional orthodontia was followed to correct the severe bite abnormalities. The collaborative chiropractic and dental treatment took place over five weeks.

Results

Following the five weeks of chiropractic and dental care the patient reported an immense reduction in all of her symptoms. Her TMJ pain was mild and she rated it at a 1/10, she was able to sleep without taking amitriptyline, and slept for seven hours with no interruption in sleep. Prior to treatment she had to take multiple naps during the day to function, and usually only slept around 3 hours per night. If she skipped her amitriptyline medication prior, she would have been bedridden for almost two days. At the 8-visit mark she could breathe freely out of both nostrils. Her chronic headaches, neck and low back pain resolved over the five-weeks of care. She was able to hike seven miles and climb 27 floors with no burning in her legs, without the need to take naps to recover. Also her muscles which were chronically tense, started to decrease in hypertonicity. Prior to treatment, she was unable to do any sort of physical activity, and even with low-level increased activity would need to take at least two naps per day to function. Her fibromyalgia type trigger point pain as previously described, also showed a decrease in the severity of her tender points, from a 9/10 to 2/10.

Her cognitive function improved and she reported being able to multitask with mental clarity for the first time in years. Her fatigue decreased, presumably due to being able to get several hours of interrupted sleep and increased oxygenation associated with a decrease in airway compromise. She also reported an increase in her overall well-being. A polysomnogram was performed at the 6-week mark after her initial office visit with the dental mandibular appliance in her mouth to compare to her original sleep study. The results were promising, even though the patient reported having helicobacter pylori the night of the sleep study, which caused her to awake multiple times during the night. Still, her RDI index was 8 as compared to her presenting RDI index of 26 and her AHI was 4 compared to her presenting AHI index of 26. Her oxyhemoglobin saturation SpO2 remained unchanged. [Table 1]

Discussion

Incorporating SOT categorization, SOT cranial, sphenomaxillary craniopathy, NET and a dental mandibular Gelb appliance appeared to have an effect in dramatically decreasing the patient's sleep apnea in addition to significantly decreased and eliminated some of her fibromyalgia type symptoms. This treatment was relatively cost effective, minimally invasive and rendered results in just five weeks time. Hoffman noted that oral appliances in some instances can be helpful and treating mild to moderate OSA, and may offer a viable initial conservative option for severe cases.[13] However, while the appliances may be helpful there is "underuse of dental appliances due to the lack of qualified dentists working in this area, and in part to reimbursement policies."

[13] The majority of government policies cover the cost of a CPAP, but very few cover any of the costs of dental appliances.[13] Therefore, it is surmised that the uninsured cost of dental appliances will often deter individuals from incorporating dental appliances into sleep apnea type care.

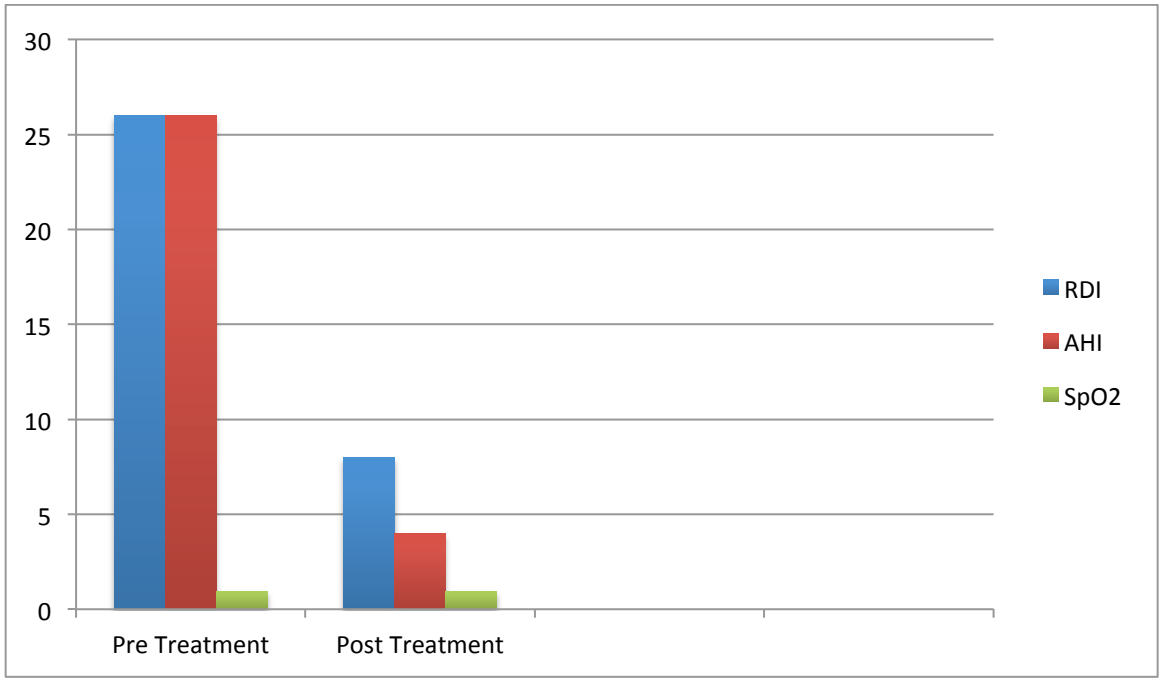

Table 1. Pre and post treatment measuring RDI, AHI, and SpO2

Of interest in this case report was that the patient's OSA relief corresponded with an improvement of her fibromyalgia type symptomatology. There is some research that suggests interesting relationships between OSA and fibromyalgia. One study determined that OSA patients may lack depth of sleep, and this lack of sleep causes fibromyalgia like symptoms in otherwise healthy individuals.[14] Also, it is fairly common that fibromyalgia patients suffer sleep disorders, that are considered similar to those of OSA patients[15] with disorders of sleep patterns being an important feature in the pathogenesis of their fibromyalgia condition.[16] It appears that both OSA and fibromyalgia patients suffer from reaching a deep sleep phase, which limits their rest, ultimately suggesting there may be a relationship between these two conditions.[17]

A recent study attempted to assess this OSA and fibromyalgia relationship and found "that oxidative stress might play a role in the pathophysiology of both diseases, especially if they co-exist in the same patient."[3] Other interesting relationships between these conditions are being discovered, such as that fibromyalgia patients with OSA seem to be responsive to CPAP therapy.[18] Yet in another study found a relationship between fibromyalgia and OSA had a greater prevalence in men as compared to women, and they even concluded that "fibromyalgia may be a marker for occult sleep apnea in males."[19] Another study investigated this relationship, with 31 women diagnosed with sleep apnea and 31 without in respect to pain sensitivity. They concluded that "the differences noted between OSA patients and the control group with respect to myalgic score and the number of tender points suggest that there might be a relation between OSA and pain sensitivity. There might be an association between low oxygen saturation and total myalgic score."[20]

SOT category and cranial therapy has emerging evidence to support its utilization for the collaborative care of patients with TMJ disorders[21-30], OSA[31,32], and fibromalgia[33,34]. With the care of this particular patient it appeared helpful to incorporate a novel treatment focusing on the sphenomaxillary suture as developed by Dr. Buddingh.[35] Buddingh purports that sphenomaxillary suture technique attempts to balance the ptyergoid muscles and surrounding cranial bones to help balance associated dural tension. He contents that "hypertonicity of the pterygoid muscles occurs when the patient's body requires the pterygoid muscle to balance the reciprocation of the anterior falx to the general craniofacial and periosteal dural tensions. Ideally, the hypertonic pterygoid muscles and the concomitant tension into the TMJ is relaxed and balanced via the spheno-maxillary adjustment. Clinical studies have noted that balancing the sphenomaxillary suture causes a reduction of the hypertonicity of the related muscles affecting occlusal relationships." [35]

While the outcome from this case report appears dramatic case reports cannot be generalized to the population at large since they do not have control groups, comparative sham interventions, and are compromised by the placebo and ideomotor effects. This study offers some interesting factors since she had been suffering from OSA and fibromyalgia for years without any improvement. She needed medication, which only minimally improved her pain and function as well as needing frequent naps during the day following any increase in her activities of daily living. The temporal relationship between the care she received and her reduction in RHI and AHI levels, improved sleep, decrease in fibromyalgia trigger points, and other related positive findings is however noteworthy.

Conclusion

As healthcare providers attempt to build an evidence base of information for care of patients suffering from OSA and fibromyalgia the search should focus on low-risk and relatively low-cost options. In this case the patient presented with OSA and fibromyalgia, which after 5-weeks of chiropractic and dental care was found to have significant improvement in her quality of life and activities of daily living. Greater study is needed to identify the subset of OSA patients with concomitant TMD and fibromyalgia symptomatology that could benefit from this approach. Ideally in conditions where a patient does present with OSA and fibromyalgia and is resistant to using a CPAP, the methods utilized in this case may offer another option.

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Interdisciplinary care of a 44-year-old male patient with obstructive sleep apnea secondary to a class two division two malocclusion.

Bruce Johnson, DDS, Richard Gerardo, DC, and Charles Blum, DC

Introduction:

Obstructive sleep apnea (OSA) is a common type of sleep apnea and is caused by obstruction of the upper airway. Sleep apnea is clinically defined as frequent episodes of apnea, hypopnea and symptoms of functional impairment, which could be life-threatening and associated with extreme daytime hyper-somnolence, dysfunction, decreases in health-related quality of life, automobile accidents, and cardiovascular morbidity and mortality.[1] "The prevalence of OSA is much higher, e.g. ≥50%, in patients with cardiac or metabolic disorders than in the general population. Risk factors for OSA include obesity (the strongest risk factor), upper airway abnormalities, male gender, menopause and age (the prevalence of OSA associated with a higher risk of morbidity and mortality increases with age and peaks at approximately 55 years of age)." [2]

OSA is common, with moderate to severe disease present in approximately 9% of middle aged men and 4% of women.[3] Weight is a factor in OSA and a "prospective study with a four year follow-up showed that a 10% weight gain predicted a 32% increase in apnea-hypopnea index (AHI), whereas a 10% loss in weight predicted a 26% decrease in AHI." [4] At this time OSA is "recognized as a major illness, an important cause of medical morbidity and mortality affecting millions of people worldwide, and a major predisposing factor for several systemic conditions, such as hypertension, cardiovascular disease, stroke, diabetes, and even sexual dysfunction."[5-7] The notion that OSA related disorders "may initiate, exacerbate or modulate the phenotypic expression of multiple diseases, including cancer, has gained increased attention."[8] As would be expected from any disorder that is associated with increased mortality and morbidity, OSA is associated with substantial economic costs to society, including increased medical costs.[9]

Continuous positive airway pressure (CPAP) and bi-level positive airway pressure (BPAP) are the gold standard treatments for OSA, but commonly CPAP/BPAP is not well tolerated and therefore compliance is limited.[10,11] Oral appliances (OA) have emerged as an alternative to CPAP for OSA treatment[12] though some studies have found CPAP appears to be more effective in improving OSA when compared to OAs,[13] while others find them comparable.[14,15]

The most commonly used OA reduces upper airway collapse by advancing the mandible. There is a strong evidence base demonstrating mandibular advancing may improve OSA in the majority of patients, including some with more severe disease.[15] However, mandibular advancing devices are not efficacious for all, with approximately one-third of patients experiencing no therapeutic benefit.[13] Still OAs have been effectively used as a treatment option for both non-apneic snoring and OSA to maintain the patency of the upper airway during sleep by repositioning the mandible, tongue, and soft palate.[16] At this time the CPAP is more commonly utilized compared to OAs because the majority of government policies cover the cost of a CPAP, but very few cover any of the costs of dental appliances.[17]

In this study the patient was using an APAP (Automatically-adjusting Positive Airway Pressure)[18,19] machine instead of a CPAP. The difference between CPAP and APAP relates to

the pressure required to hold the upper airway open, and how that's determined. The positive airway pressure, the PAP, works the same in both cases. PAP works primarily by maintaining a distending pressure on the inside of the airway that is higher than the pressure tending to collapse the airway. Both CPAP and APAP machines have a blower-pump that creates the pressure, which is delivered to the patient's airway by a hose that connects to a mask over the nose, or over both the nose and mouth. The difference is that with CPAP a single pressure level is set based on a determination of the average or maximum pressure required to prevent the patient's apneas and hypopneas.

Recently PAP devices have been developed which can, minute by minute, automatically adjust the pressure required to keep the airway open. Recorders in these machines keep track of the average pressure needed while sleeping over several nights. The pressure can then be used to set a CPAP machine pressure level or sometimes an APAP machine can be used as a permanent treatment machine, although these APAP machines are currently more expensive than CPAP equipment. APAP has the theoretical advantage of adjusting the airway pressure to what is needed at any time since conditions change during the night. Most studies have not shown that patient long-term use of PAP is different between the CPAP and APAP systems.[20]

Case History

A 44-year-old male patient (6'5" tall 220 lb.) presented for dental care for treatment of long-term OSA. He had been using an APAP but felt that dealing with his OSA was getting "old" and wanted an alternative solution. His primary complaint was sleep apnea, heavy snoring, afternoon sleepiness, and waking up tired. The patient also noted TMJ sensitivity with left sided disc displacement. He had a history of an anterior TM disc displacement without reduction at age 12-years-old, along with an extensive history of musculoskeletal conditions. More recently he noted having had a deviated septum surgery in 2014 and an upper labial and lingual frenectomy to treat a posterior tongue-tie in 2014.

Diagnosis of OSA was based on a polysomnography with apnea–hypopnea index (AHI) of 31. AHI represents the number of apnea and hypopnea events per hour of sleep.[21] Generally the apneas (pauses in breathing) must last for at least 10 seconds and can be associated with a decrease in blood oxygenation. Typical values are grades as follows:

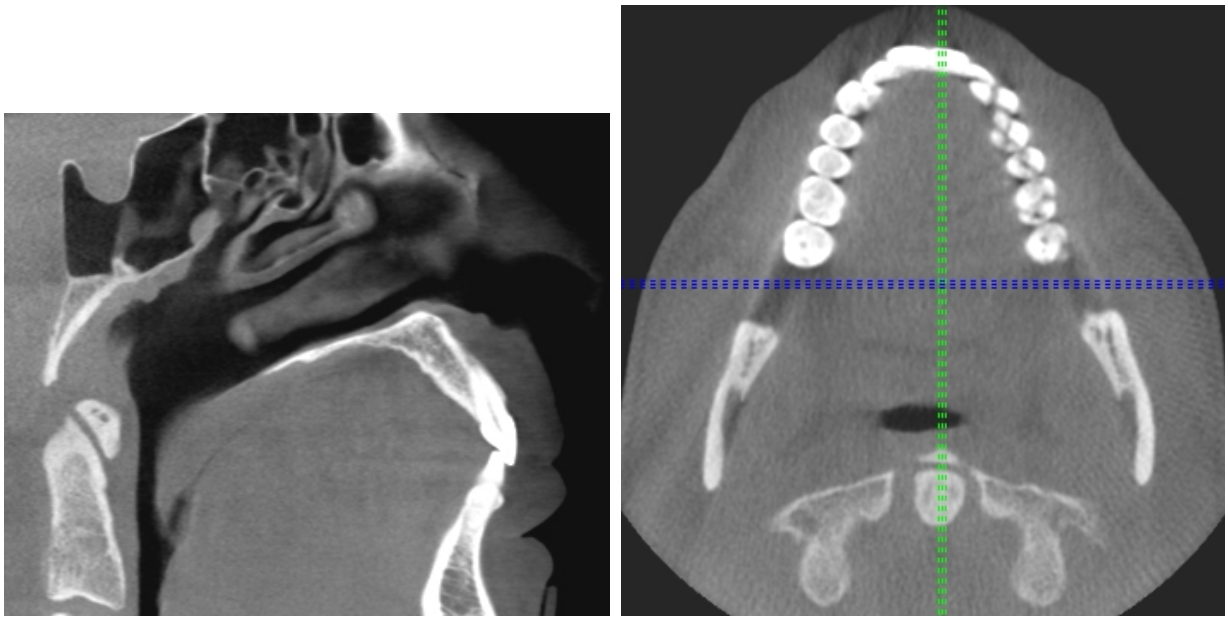
- None/Minimal: AHI < 5 per hour
- Mild: AHI ≥ 5, but < 15 per hour
- Moderate: AHI ≥ 15, but < 30 per hour
- Severe: AHI ≥ 30 per hour

Method/Intervention – Dental

Dental examination revealed a "Class II, division 2" malocclusion and an over-closed vertical dimension, which are major contributing factors in airway compromise. This class of malocclusion includes a retrognathic posture of the mandible and a compensatory distortion of the pre-maxilla downward and backward to "disguise" the discrepancy. Cone Beam

Computerized Tomographic (CBCT) imaging revealed significantly compromised pharyngeal airway, severely compromised temporo-mandibular joints with the condyles posteriorly-superiorly displaced in the glenoid fossae.

Pre-Treatment Images of the teeth showing the "retroclined" incisors and the deep bite.



Profile and superior views of the Airway

Dental treatment procedures were established to correct the posture of the mandible forward to both resolve the compromised temporo-mandibular joints and help bring the tongue forward out of the oro-pharynx. As oral volume was also compromised laterally and vertically, additional airway improvement is expected by increasing the vertical height of the oral cavity as well as arch development laterally. Based on clinical experiences with similar cases, significant reduction in apnea events is predicted. Expectations are that correcting these issues will provide sufficient improvement in oral volume such that the pharyngeal airway space will approach normal and reduce or eliminate the need for APAP. Patient was referred for chiropractic care due to his complex presentation and to facilitate the effects of the Alternative Lightwire Functional (ALF) dental orthopedic appliance[22] used to treat the patient's apnea.

Methods/Intervention – Chiropractic

Postural assessment revealed standing lateral body sway, right high hip, left high shoulder, and right high occiput. Orthopedic findings noted a positive Milgram's Test with cervical foraminal compression, termed in sacro occipital technique (SOT) as a positive cervical compaction test for sacroiliac joint imbalance or category two. Tendonitis was noted at the quadriceps/patellar and Achilles regions bilaterally. Range of motion testing revealed reduced cervical motion on flexion, extension and right lateral flexion, whereas lumbar motion was reduced on flexion and right/left lateral flexion. Temporomandibular joint (TMJ) evaluation revealed a left posterior displaced disc with tension to the left posterior joint space and the temporalis and masseter muscles.

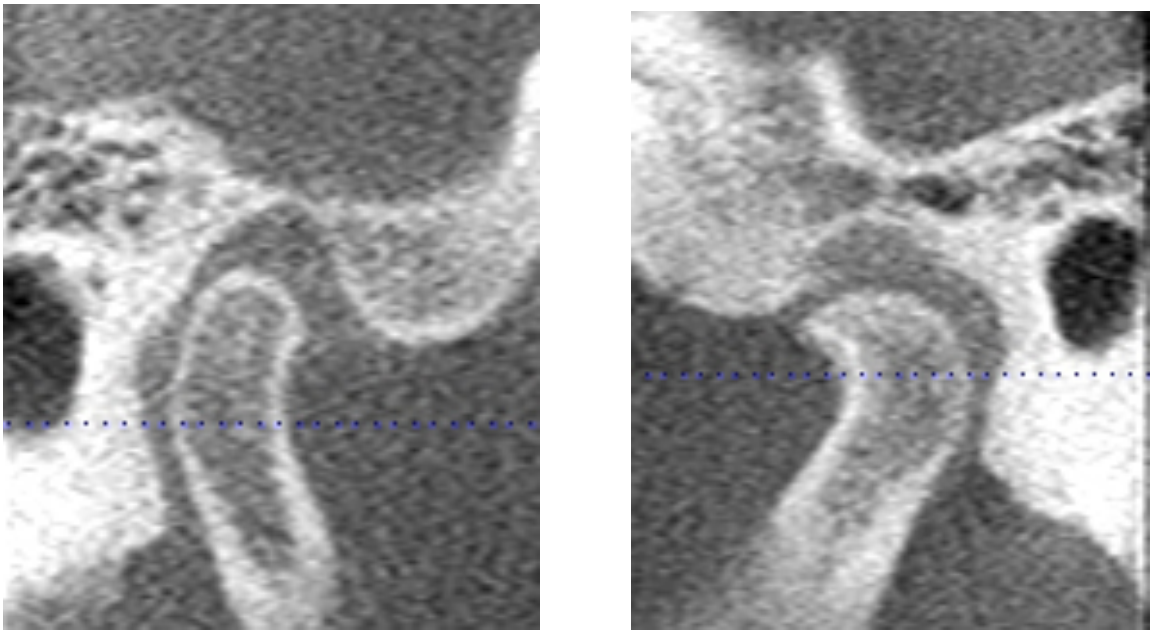
Chiropractic treatment consisted of releasing excessive sacral extension (sacral nutation) restriction, SOT category two treatment, (balance pelvic torsion and reduce sacroiliac joint hypermobility) along with a Serola sacroiliac joint support belt.[23] Based upon SOT indicators the patient's cervical spine, thoracic spine and bilateral knees were treated with chiropractic manipulative therapy (CMT). The patient was also fitted for foot orthotic supports to support any ascending kinematic imbalance. TMJ and cranial treatment focused on myofascial care of the muscles of mastication, intra-oral cranial therapies, and SOT sutural cranial technique.[24,25]

Results

The need for co-treatment in this case was precipitated by the fact that early in dental arch development treatment, his left temporo-mandibular joint locked up to the point of being able to open only about 20mm. With a goal of at least 50mm of inter-incisal opening, it took many months and the combined efforts of the chiropractor and dentist to resolve that issue. After coordinating our treatments of manipulation, prolotherapy injections, and dental orthotics, full range of motion was gradually restored and treatment to increase oral volume was resumed. While the dental care helped reduce any dental stomatognathic contributions the chiropractic therapy helped recapture the TM disc and TMJ function was normalized with reduced myofascial tension. With this reduced descending influences to the kinematic chain the chiropractic care helped eliminate the patient's low back and Achilles pain, and significantly reduced the knee pain.

A more current view where the bite was opened and the mandible postured forward to clear the jaw joints and open the airway.

Visualized on the iCAT images, the angle of the upper incisors and the deep overbite showed a retrognathic posture of the mandible, which tends to draw the tongue backwards compromising the pharyngeal and airway space. The size of the airway in the pre-treatment and the compromised temporo-mandibular joints were demonstrated by the pre-treatment iCAT images. The post-treatment view with the current orthotic demonstrates greater joint stability and improvement in his airway. Final objective results of airway and sleep improvement will be assessed via a sleep study, however the patient reports significant improvement in sleep, much less snoring, and less afternoon fatigue.



The severely compromised temporo-mandibular joints

Discussion:

There are various types of invasive treatments for tongue oral cavity related OSA.[26-30] Often the concept is that the tongue is "too large" for the mouth and surgical interventions are needed to make the tongue smaller or reduce its affect in the oro-pharyngeal space. Another consideration to the tongue - OSA condition is that the mandible needs to be advanced forward so the tongue can be brought forward out of the oro-pharyngeal space and this has led to the usage of mandibular advancing devices or OAs.[31] Some dentists treating this condition believe that, for various reasons, limited dentofacial growth and development is what can lead to decreased dental arch development and this is the reason why the mandible is displaced in a retrognathic position.[32,33]

A popular dental opinion suggests that optimal occlusion occurs when the lower teeth fit within the envelop of the upper teeth. When there is reduced upper dental arch development, such as with this patient, the lower teeth will cant lingually to fit within the envelop of the upper teeth. When this happens, the mandible will achieve a retrognathic position to assist this process. One contribution to poor upper dental arch development is a restricted lingual or labial frenum. A restricted lingual frenum[34,35] will inhibit the growth and development of the upper hard palate since the tongue cannot adequately reach its physiological rest position and stimulate the hard

palate's necessary growth and development.[36,37] With a restricted labial frenum it makes it difficult for the patient to maintain an adequate "lip seal" which leads to mouth breathing and a retro positioning of the tongue and reduced contact of the tongue to the upper hard palate.[38,39] The patient in this case had both a lingual and labial frenectomy as a means to improve airway function, maintain a good lip seal[40], and ultimately helped facilitate the function of the ALF[22] appliance.

Dental chiropractic co-treatment of TMJ disorders and their ascending or descending components has been discussed by DeJarnette since the early 1960 but first published in the evidence based literature by Chinnapi and Getzoff in the early 1990s.[41-43] The majority of the dental and chiropractic co-treatment evidence based care has focused on integrating SOT and SOT cranial procedures with the functional orthodontic and dental care focused on TMJ therapeutic interventions. Recently SOT/dental collaborative care for patients with obstructive sleep apnea has been presented in various research conferences.[44-48] Of interest is that while the patient initially presented to the dentist for help in treating his OSA, the patient did not perceive there was an association between his OSA and cervical, lumbopelvic, knee and Achilles pain and decreased function.

The dental referral for SOT chiropractic care was made after the dentist was beginning dental arch development treatment with the patient, when a significant TM joint restriction was noted consistent with an anterior TM disc displacement. Based on a history of TMJ co-treatment the dentist considered that it might be important to balance any ascending components that could be contributing to the TMJ dysfunction and compromising the dental care.[49-50] Without the chiropractic assistance to reduce the patient's TMJ closed lock and any ascending kinematic imbalance, the patient's dental care for OSA was unable to continue due to the patient's pain and discomfort but also because the patient could not open his mouth for any dental assessment or treatment. Therefore the awareness that the dentist could collaborate with a chiropractor,[51] to offer his patient SOT and cranial care, allowed this patient's craniofacial and dental arch development care to continue.

The outcome to care is compelling. The patient had a resolution of the his closed lock, the improvement of OSA symptoms, the balancing of dental occlusal and TM joint positioning, as well as reduction of chronic Achilles, knee, lumbopelvic, and cervical spine discomfort and restricted ranges of motion. However, caution must be made in generalizing this outcome to the population at large, since this is only a single subject case study that didn't include controls, sham grouping, and randomization. In addition, various possibilities for the positive outcomes, including placebo, ideomotor, regression to the mean, and others cannot be ruled out.

Conclusion:

This case report focused on a patient presenting for dental care to help treat his OSA, which was also being managed by an APAP. During care the patient had some TMJ flare-ups with restricted opening and was referred for SOT chiropractic and cranial care, which helped reduce any ascending postural kinematic influences as well as help recapture the TM disc to allow the dental care to continue. Due to this being a single case study, only cautious interpretation of the

outcomes can be made at this time. Further research with larger patient groups would be indicated to determine if other patients with OSA might also be helped with this dental chiropractic collaborative type intervention.

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JAOA EDITORIAL

Cranial Osteopathic Manipulative Medicine's Growing Evidence Base

Hollis H. King, DO, PhD

Two articles on cranial osteopathic manipulative medicine (OMM)[1,2] were published in the December 2011 issue of *JAOA—The Journal of the American Osteopathic Association*, and a review of a clinical study reporting the benefits of cranial manipulation appears in the present issue's installment of "The Somatic Connection."[3] All of these items bring much-needed attention to the discussion on the validity of the concept and clinical benefits of cranial OMM in the practice of health care.

There is arguably as much, if not more, current research attention devoted to cranial OMM as there is to any other single OMM procedure, yet cranial procedures remain the most controversial.[4] Despite the controversy, I believe there is mounting support for virtually all aspects of cranial OMM, including theoretical assumptions (eg, the Primary Respiratory Mechanism elements), clinical benefits, and physiologic mechanisms of action.

As one reads the systematic review by Jäkel and von Hauenschild,[2] it becomes apparent that a number of studies that used cranial OMM were not included because of the strict selection process used by the authors. Their inclusion criteria required that only articles that specifically described cranial manipulation be included. Hence, Jäkel and von Hauenschild have a possibly limited conclusion, as follows: "The currently available evidence on the clinical efficacy of cranial OMM is heterogeneous and insufficient to draw definitive conclusions."[2] They further state the obvious, writing, "further research into this area is needed."[2] This conclusion is appreciated and respected for its scientific purity, and indeed, the article is not yet another anti–cranial OMM screed—far from it. However, their review could have been more comprehensive and still maintained scientific integrity.

While the tenets of modern research would lead us to isolate the specific OMM maneuver that may produce a measurable beneficial outcome, in actual clinical practice multiple OMM maneuvers are usually employed. In any discussion of the effects of cranial OMM, I can think of at least 3 articles in which clinical benefit in the use of cranial OMM was demonstrated but specific descriptions of cranial OMM were lacking[5,6] or cranial OMM descriptions were vaguely referred to.[7] While the articles by Frymann[5,6] may not have specified cranial OMM, anyone remotely familiar with Frymann's work knows she performed cranial OMM on every patient; during a cranial course she was directing about a decade ago, I heard her publicly state that she did. In the study by Mills et al,[7] treatment included "balanced membranous tension (according to the teachings of William Garner Sutherland, DO, and others)," referring to *Osteopathy in the Cranial Field* by Magoun.[8] Clearly, cranial OMM was used in that study.

Two articles published subsequent to the Jäkel and von Hauenschild systematic review[2] specify cranial OMM and report beneficial outcomes.[1,9] In the study by Shi et al,[1] cranial OMM produced measurable physiologic effects that contribute to our understanding of possible mechanisms of action for cranial OMM. In the study by Lopez et al,[9] specific cranial OMM procedures were described in the treatment protocol, and data showed improved balance and equilibrium in healthy elderly adults.

Jäkel and von Hauenschild[2] were justified in their approach, but I would like the osteopathic medical profession and the scientific community at large to know that much more research has been done that suggests benefit for the clinical application of cranial OMM. Perhaps the pieces are now in place for a fuller review and explication of cranial OMM.

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NEW & Noteworthy

UPDATES ON ACTIVITIES IN THE PROFESSION

Osteopathy in the cranial field: Uncovering challenges and potential applications

Osteopathic physicians eagerly anticipate research results that would provide an evidence base for the use of osteopathy in the cranial field (OCF), or cranial osteopathy. Why? Proving the efficacy of OCF will help reduce the controversy surrounding its use and fulfill the evidence-based requirement for continuing medical education courses accredited by the American Academy of Family Physicians (AAFP). The AAFP, which originally described craniosacral manipulation as "dangerous"[1,2] and therefore would not credit continuing medical education courses containing "OCF" in the title, lifted its disapproval of OCF in January 2002. The organization's disapproval was largely a matter of misunderstanding and lack of knowledge about the research underlying OCF.

Collaboration under way between the AAFP Commission of Continuing Medical Education and the AOA, assisted by the American Academy of Osteopathy (AAO), The Cranial Academy, and the Sutherland Cranial Teaching Foundation, will define terms and establish criteria for CME credit involving OCF.

The osteopathic medical profession has long been challenged to prove the efficacy of osteopathic manipulative treatment (OMT). The AOA Bureau of Research has met the challenge, with further research anticipated from the Osteopathic Research Center, whose main sponsors are the AOA, the American Osteopathic Foundation, and the American Association of Colleges of Osteopathic Medicine. The Center is housed at the University of North Texas Health Science Center at Fort Worth, Texas College of Osteopathic Medicine. The ante has been raised in light of the AAFP's initiative to emphasize evidence-based medicine in many CME courses. The possibility of having evidence-based medicine on one's side in the current healthcare climate is a decided advantage, particularly when there are third-party reimbursement issues. With the lifting of the AAFP's disapproval, research currently under way has added momentum.

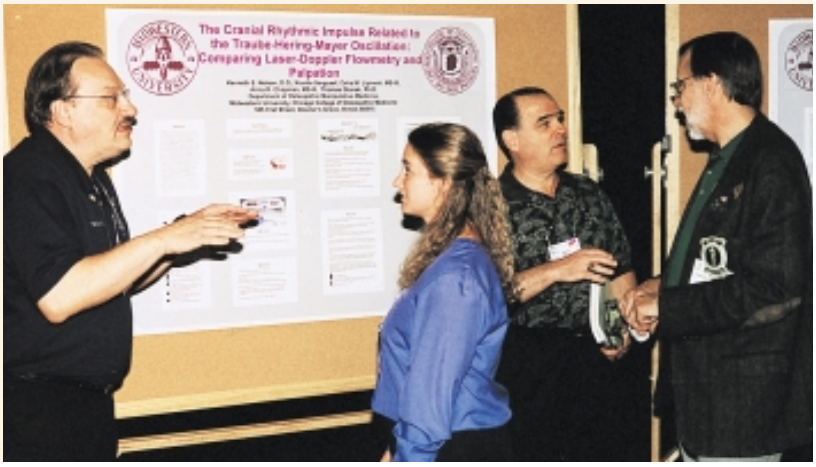
OCF in the spotlight

The AAO and the AOA worked to ascertain the reasoning behind the AAFP's declaration of disapproval.[2] Eventually, the AOA, through representation by AOA Trustee Amelia G. Tunanidas, DO, laid the groundwork for testimony by E. John Lentini, DO, a member of the AAFP Commission on CME. This resulted in clarification of the issue and the removal of sanctions against CME presentations with OCF in the title. Apparently, the initial action by the AAFP Commission on Continuing Medical Education was based on lack of knowledge of the research underlying OCF, as well as confusion about the difference between physician-administered OCF and craniosacral manipulation involving nonphysician clinicians.

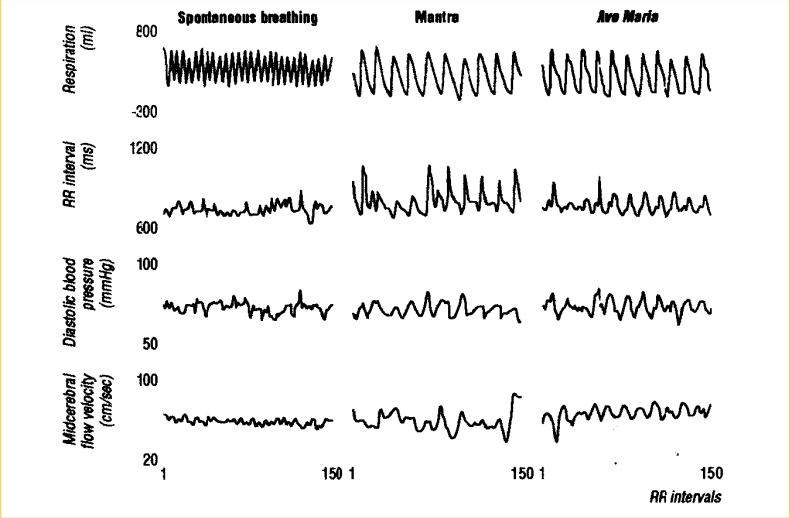
American Osteopathic Association leaders were also concerned that if one type of OMT was declared "dangerous," criticism and banning of other OMT modalities would follow. A prime example of a new possible target was high-velocity, low-amplitude thrust manipulation and association with cerebrovascular ischemia.[3]

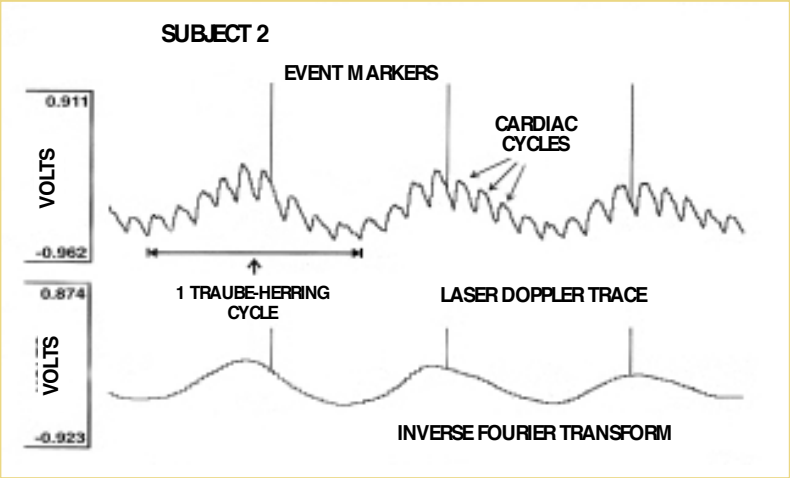
Current directions in research in OCF

Promising research on OCF includes a study that involves measurement of Traube-Hering-Mayer (THM) oscillation.[4,5] Kenneth E. Nelson, DO, and Thomas Glonek, PhD, used a laser-Doppler flowmeter to measure THM oscillation. This oscillation was identified after the invention of the recording



Thomas Glonek, PhD *(left)*, explains a research project on osteopathy in the cranial field to Tara Montgomery, while Jeffrey F. Brookman, DO, listens to a similar explanation from Kenneth E. Nelson, DO. (Photo by Michael Fitzgerald)





Power spectrums of respiration and cardiovascular signals during spontaneous breathing, free talking, and recitation of the "Ave Maria." Note the left shift of the spectrums during vocal sequences, due to slower breathing. Rhythmic recitation (regular oscillations) gives narrower spectral peaks; free talking (irregular oscillations) produces broader peaks. *(The British Medical Journal* grants permission for reproduction of this graph. *BMJ* 2001;323:1446-1449.)

(Below, left) Expanded laser-Doppler flowmeter relative blood velocity record of subject. *Top*—Flowmeter trace, revealing fine structure of the cardiac cycle. The double-headed arrow indicates the wavelength of one Traube-Hering-Mayer cycle. *Bottom*—Traube-Hering-Mayer waveform component only of the top trace. The bottom waveform was created from the top waveform by filtering (removing) the high-frequency cardiac component, leaving only the low-frequency baro and respiratory components. Inverse Fourier transformation of this filtered data generates the bottom trace. Both traces are in register with respect to time, and the event markers indicate the positions of the palpatory findings. (Reprinted from *JAOA*. 2001;101:165.)

manometer and was thought to explain systolic-diastolic variation of blood pressure. Oscillation was attributed to intrathoracic pressure fluctuation of pulmonary respiration and was noted by Ludwig Traube in 1865 to persist after the cessation of respiratory motion. Ekbert Hering independently demonstrated Traube's discovery. Later, Mayer identified an additional, lower-rate oscillation.

Nelson and Glonek described the research on these oscillations, which occur between 6 and 10 cpm. "The THM oscillation has been associated with blood pressure, heart rate, cardiac contractility, pulmonary blood flow, cerebral blood flow and movement of cerebrospinal fluid, and peripheral blood flow, including venous volume and body temperature regulation."[6]

Physiology texts describe THM oscillation as a complex interaction between the sympathetic and parasympathetic components of the autonomic nervous system with renin-angiotensin on the cardiovascular system. Traube-Hering-Mayer oscillation phenomena is an integral aspect of homeostasis. Nelson and Glonek's research demonstrated a statistically significant relationship between a subject's laser-Doppler flowmeter measured THM cycle and an examiner's palpation of the cranial rhythmic impulse (CRI).

Caveat on terminology

Nelson and Glonek's[6] use of the term *cranial rhythmic impulse* in their description of the procedure is a matter of convenience. The term used should actually be *primary respiratory mechanism* (PRM),[7] to describe this phenomena by those who use OCF. Cranial rhythmic impulse is just one aspect of the cranial-motion dynamic. Using this term is discouraged as it is an oversimplification that could lead to misusing the concept. by those unfamiliar with OCF. The term *cranial rhythmic impulse* was never intended to have the same empirical characteristic as measure of blood pressure or heart rate. Nelson and Glonek[6] correctly point out that use of the term has communicative value from its traditional use. Until further research can provide a more detailed operational definition, a caveat is appropriate.

Findings and implications of Traube-Hering-Mayer relationship with primary respiratory mechanism

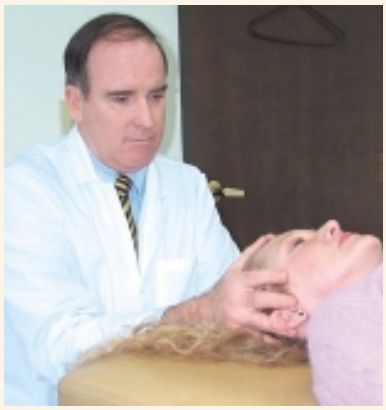
In their subjects, Nelson and Glonek[4] found that the measured frequency of THM oscillation was 6.75 ± 4.50 cpm and that the CRI was 4.54 ± 2.08 cpm. Both figures are consistent with previously determined ranges. The authors wrote that the findings imply that the PRM and the THM oscillations are simultaneous, if not the same phenomenon.[4] Besides establishing a significant relationship of the PRM with other known physiologic phenomena, these findings suggest that measurement of the THM could facilitate development of palpatory skill. That is, feedback on an examinee's THM rate could be correlated with a medical student or physician learning to palpate the PRM.

Nelson and Glonek[6] were even able to ascribe certain aspects of THM oscillations with the so-called fast tide of between 8 and 12 cpm and the slow tide rate of 0.6 cpm. The phenomenon of a still point, a brief cessation in the rhythm of the PRM, was even associated in 79% of cases with a diminished THM amplitude.

Other research on Traube-Hering-Mayer oscillations

At about the same time as Nelson and Glonek's initial publication, research published in the *British Medical Journal* related THM 6-cpm oscillation with enhanced heart-rate variability and baroreflex sensitivity.[8] This study, conducted by Italian and Polish physicians and researchers, compared the effects of recitating the "Ave Maria" in Latin or recitating of a yoga mantra on breathing rate, spontaneous oscillations in R-R intervals and on blood pressure and cerebral circulation (measured by transcranial Doppler ultrasonography).

These researchers cited literature linking a respiratory rate of 6 cpm with favorable effects on cardiovascular events such as increases in arterial baroreflex, oxygenation of the blood, and exercise tolerance. In chronic heart failure, a respiratory rate of 6 cpm reduces the exaggerated sensitivity of the respiratory chemoreflex and improves irregular breathing.



Cranial vault hold treatment position typical in OCF. (Photo by Hollis H. King, DO, PhD)

The researchers' discussion of the autonomic nervous system components and physiology affected by the repetition of "Ave Maria" and the yoga mantras was similar to Nelson and Glonek's discussion of the relationship between THM oscillation and the PRM phenomenon. There appears to be something efficacious in a rhythmic oscillation of around 6 cpm, manifested by the human nervous and vascular systems.

"Ave Maria" and the yoga mantra produced a similar effect, slowing respiration to approximately 6 cpm. They also produced a marked effect on synchronization and increased variability in all cardiovascular rhythms. In that low heart-rate variability and low baroreflex sensitivity related to the THM oscillation are powerful and independent predictors of poor prognosis in heart disease, this research suggested that 6 cpm of breathing and autonomic activity such as THM may have great benefit. The authors concluded that such prayer and mantra practices are beneficial health practices.

Possible effects of OCF on heart-rate variability

An inexpensive study would be to compare the effects of OCF on cardiac R-R interval variability. The appearance of the Nelson and Glonek and European research with THM oscillations as a key ingredient is almost synchronistic. The nature of THM physiology and its relation to OCF and heart-rate variability is a compelling research relationship. If the effects of OCF on R-R interval variability control are found beneficial, this would constitute the kind of research that supports OCF. This could in turn lead to definitive, evidence-based research of the type needed to establish OCF as a medical modality worthy of consideration in clinical practice.

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Dizziness in a patient with airway compromise and TMD: A case report.
Jeffrey A. Mersky, DC and Charles Blum, DC

Introduction:

Evidence is emerging to support the theory that airway oxygenation, which is often associated with obstructive sleep apnea (OSA), is an important condition to include in a differential diagnosis. OSA is a condition that sometimes presents as a symptom of a more complex condition (e.g., cardiovascular, diabetes, cancer, inflammatory diseases, gastroesophageal reflux disorder, etc.) [1-10] without an apparent direct relationship to any airway compromise. One feature of OSA is the jaw-head position-hypoxia relationship that is associated with a persistent forward head posture [11-14] causing chronic skeletal pains that do not resolve with conventional therapies. As a means to sustain optimal airway space with OSA the head tends to move forward and while this improves oxygenation it adversely affects the cervical spine and body posture. Literature suggests there is a relationship between head posture and temporomandibular joint dysfunction (TMD) issues.[15-20]

Case History:

A 38-year-old patient presented for care at this office in November 2016 with an array of symptoms (autoimmune disorders, dizziness, obstructive sleep apnea - OSA, etc.). The onset of his condition reportedly began eight years ago following a surfing accident (fell on left shoulder) and removal of his wisdom teeth. After these events, he began experiencing syncope, brain fog, dizziness, and movement/vertigo, all of which worsen when sitting on soft seats or when hunching over or with his head tilted up or down. He noted that his condition was aggravated with computer work and when his head was in a forward posture. His brain fog prevented him from being able to concentrate at work, and he found his condition debilitating, relentless, and life-altering. He was primarily diagnosed with apnea (OSA), vestibular dysfunction, vascular headaches/migraines, and cervico/thoracic enthesopathy.

At eight years old, the patient reports that he fell off of a cliff and landed on his head. At age 10, he fell onto a skill saw blade and needed multiple stitches to the back of his head. The patient had an automobile accident at 14 years old, which resulted in head trauma and a fractured C7 spinous process. Compounding his presentation the patient had migraines and sleep disorders from the age of 18, which were diagnosed as a form of sleep apnea. Following the diagnosis of apnea, he had his adenoid and tonsils removed at the age of 21. He has had a history of anemia with a low red blood cell count. Of note he was temporarily disabled for 2 months in 2008 and during that time received chiropractic care over the course of a month. The patient reported that chiropractic helped him somewhat, but did not affect the dizziness or brain fog.

A 2010 ECG study showed probable left ventricular hypertrophy of heart, and ejection fraction at 67% of normal. EEG testing at that time showed some brief high voltage bursts of alpha activity followed by some decrease in the background activity. A recent MRI of the brain and head was described as normal. He was recently diagnosed with scleroderma, but was not receiving care for that condition at the time of his presentation at this office. Since early 2016 he

was using a continuous positive airway pressure (CPAP) machine for sleep and as a means to treat his OSA.[21]

The patient had been to 28 different healthcare practitioners including several chiropractors (utilizing upper cervical technique, sacro occipital technique, diversified technique, and nasal balloon technique, etc.), medical doctors (cardiologist, neurologist, ear nose and throat specialist, allergy-immunologist, sleep specialist, internist, rheumatologist), cranial osteopaths, acupuncturists, physical therapists, and massage therapists. He has spent thousands of dollars on care and had been on short-term disability for the past year. For three years prior to beginning care at this office he had been unable to perform physical exercise. With regards to the other care he received, he reported that he felt somewhat better, though only temporarily, with upper cervical chiropractic treatment.

Methods/Interventions:

The patient's examination findings revealed reduced cervical rotation, and pain with lateral cervical flexion localizing to the occiput /C1 and C5 through C7. Lumbar vertebral flexion was limited with pain localizing to the L5 region. SOT cervical compaction test was positive for lumbopelvic involvement. Cervical stairstep was positive at the Occiput /C1 and C5-7 spinal levels. Forward head posture was noted with sensitivity on palpation at the right temporal bone styloid process (can be related to L5[22,23]) and the right 1st costotransverse junction. Body sway analysis noted both anterior/posterior and lateral sway patterns. He had sleep disorders/apnea with inability to reach deep sleep, stage 3-4, associated with frequent limb movements at the time he should enter deep sleep treated with a dental appliance and CPAP.

Treatment focused on SOT and SOT cranial chiropractic interventions, nasal balloon methods for craniofacial sinus expansion, and supplementation with B12/methylated folic acid (to facilitate red blood cell oxygen uptake[24]). SOT interventions focused on releasing right psoas and bilateral piriformis muscles' greater trochanteric attachments. The patient was treated for SB+ pattern, which relates to increased lumbosacral dural meningeal tensions.[25] His cervical spine was treated with cervical stairstep mobilization and adjusting. Osseous adjusting was applied to the thoracic and lumbar vertebra along with an anterior diaphragm pseudo-hiatal hernia release. Common cranial patterns included sphenobasilar right side-bending and vertical strain lesions.[26] Intraoral adjusting focused on releasing his right zygoma that was restricted in external rotation and bilaterally external pterygoid muscle release. The left sphenoidal greater wing was also corrected from an external rotation positioning. Initial use of nasal balloons focused on insertion into the lower right and middle left turbinates, followed with upper and middle turbinate releases [27] on alternate days.

Results:

The patient was treated from November 15, 2016 through March 24, 2018. By early 2018 his eight-year bout with dizziness was reduced and he could function in most activities of daily living. By March 2018 he only noted mild neck pain (50% reduction) with significantly reduced

tension and swelling. His lower back pain would only present on occasion and described by the patient to be 80% improved.

Since he was using the CPAP and an oral dental appliance he noted an improvement in his oxygenation characterized by a pulse oximeter readings of 98%, and a normal Epworth Sleepiness Scale scoring.[28] Initial pre-treatment (November 2016) Roland-Morris disability index scales [29] were scored at 28% for low back pain and disability and with a follow-up approximately six months later showing a minimal change or reduction to 24%, a reduction of 4%. His neck pain disability index scales [30] were initially measured at 52%, with follow-up testing (April 2018) showing a reduction of his neck disability index of 36%, a reduction of 16%. Beck's motor testing [31-34] was normal for TMJ dysfunction and positive for his neck at the initial office visit, and reported as normal after 2nd office visit.

The patient reported that the chiropractic care he received at this office, which consisted of sacro occipital technique (SOT) along with SOT extra cranial/intra oral and nasal balloons gave him at least 50% improvement of his symptoms, which had been unresponsive for eight years, along with giving him the ability to return to work. After approximately five months of care the patient has been able to maintain his improvements and continues to feel increasingly capable of doing his activities of daily living without restrictions. He still self-limits, particularly regarding heavy strenuous work, though for the first time in years he has been able to do rock climbing and other limited sports activities.

Discussion:

The care for this patient's complex presentation was multifactorial with a focus on:

1. Improving airway and oxygenation.

2. Balancing pelvic imbalances affecting and being affected by his compromised visual and vestibular righting.

3. Balancing cranial and craniofacial imbalances, possibly affected by the multiple head traumas and a secondary response to wisdom teeth extraction.

4. Consideration of inflammatory and autoimmune compromise.

Improving airway and oxygenation: The patient had been suffering from OSA and was being treated with a CPAP and nighttime dental appliance. However, one consideration is what would be happening during the day when the patient was not using a CPAP or dental appliance to enhance his airway function. While he did have tonsil and adenoid surgery, further improvement to his airway space may have occurred using the nasal balloon techniques to reduce any turbinate restriction and expand some nasopharyngeal pathway space. One consideration for care was the mechanical expansion of the craniofacial airway in order to improve oxygen intake, and another aspect involved improving red blood cell production by utilizing vitamins B12 and a methylated folic acid supplement.[35,36]

Balancing pelvic imbalances affecting and being affected by his compromised visual and vestibular righting: Many of the factors associated with posture balancing and visual and vestibular righting focus upon assessing the patient in a standing position.[37] This patient's initial presentation was quite unusual because he could function with less dizziness when standing; however, if he sat upon a soft or cushiony surface, he would become dizzy. This suggested that stressors from pelvic or lumbopelvic imbalance were having an effect on his visual and vestibular righting centers, and that these centers may have already been compromised from the prior head traumas.

Balancing cranial and craniofacial imbalances possibly affected by the multiple head traumas and secondary response to wisdom teeth extraction. While it is possible that the pelvic imbalance had a negative effect on the patient's visual and vestibular righting leading to chronic dizziness, it is also likely that the multiple head traumas led to his compromised ability to handle this increased stress.[39,40] SOT and SOT cranial techniques such as those used in this study have been used for the treatment of head trauma and post-concussion syndromes.[41-44] Patients treated with SOT and SOT cranial techniques have presented with minor head trauma with subsequent headaches, dizziness and limited function[41] significant head trauma(s) associated with concussions leading to various conditions such as, OSA, TMJ disorders, and inability to function or perform their activities of daily living. [42-44]

Consideration of inflammatory and autoimmune compromise: Due to the complex and chronic nature of the patient's presentation, genetic testing will need to be performed to help determine if he does have the methylenetetrahydrofolate reductase (MTHFR) gene or any possible genetic defects[45] affecting his health condition. Since inflammatory issues can be related to the lack of having the MTHFR gene it may be helpful to assess if he has a genetic pre-disposition to scleroderma.[46] As a means to facilitate reduction of any inflammatory contribution to his condition dietary recommendations were given to him as of April 2018 for an anti-inflammatory diet[47] and food sensitivity tests are also being scheduled.

This case is interesting as the patient had been to so many health practitioners without much help, yet responded most notably and with lasting results when receiving SOT chiropractic care. As with any case study there are limitations to generalizing its findings to the population at large. This is particularly because this reports is only a single subject case study that didn't include controls, sham grouping, and randomization. In addition, various possibilities for the positive outcomes, including placebo, ideomotor, regression to the mean, and others cannot be ruled out. Yet the temporal relationship between the care rendered and the prior unresponsiveness to other care makes this case and its results compelling.

Conclusion:

This is a complex case report of a 38-year-old patient was seen for care at this office for various symptoms that included autoimmune disorders, dizziness, OSA, TMD, migraines and skeletal pain patient. His condition had not been stable for eight years prior to the specific care rendered, which included SOT, SOT cranial, nasal balloon, and nutritional modification. It was difficult to directly assess what aspects of his presentation were genetic, macrotrauma-induced, or the result

for micro traumas, though the care rendered appeared effective regardless. Further research is needed to determine which subsets of patients with these types of complex conditions might also respond to the type of care rendered this patient.

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Treatment of chronic TMJ pain and dysfunction using sacro occipital technique and cranial techniques: A case report

Jason Scoppa, DC

Introduction:

Although sources differ slightly, The National Institute of Dental and Craniofacial Research (NIDCR) reports a 5-12% prevalence rate of Temporo-Mandibular Joint Disorder (TMD), with an annual cost of approximately $4 billion to treat the two thirds of that population that seeks treatment[1]. In a study by Di Paolo, "epidemiological evaluation, anamnestic and clinical data collected from a sample of 2,375 patients affected by TMD clearly showed that there were large quantities of variables involved in these disorders and which occur with a wide variety of possible clinical signs[2]." In accordance with the current knowledge "…it is not always possible to clarify the etiology of these disorders…[2]" Within this study many of the TMD patients suffered from multiple areas of muscle and spinal pain, as well as experiencing headaches. These tended to occur at a higher frequency on the side of the greatest TMJ dysfunction[2].

More studies are needed on the safety and effectiveness of most treatments for jaw joint and muscle disorders, but the NIDCR[3] strongly recommends using the most conservative, reversible treatments possible. Conservative treatments do not invade the tissues of the face, jaw, or joint, or involve surgery. Reversible treatments do not cause permanent changes in the structure or position of the jaw or teeth. Treatment options listed include self-care and pain medications, and if those do not produce the desired result it is recommended that patients see a dentist for splints, Botox, or surgery.

This case report describes a patient seen for a primary complaint of chronic TMJ pain with accompanying closed lock without disc recapture, as well as shoulder tension and right knee pain. Treatment consisted of Sacro Occipital Technique (SOT) and cranial techniques.

Case History:

The patient is a 28-year-old, Caucasian female that presented with a primary complaint of chronic right-sided TMJ pain and dysfunction that had gotten significantly worse as a result of a car accident a few months prior to her appointment. Other complaints included anterior and posterior shoulder tightness bilaterally, as well as right knee pain. She has a stressful job that requires her to travel frequently and go out a lot for dinner, drinks, and entertaining. The TMJ pain and dysfunction was interfering with her work as it was made worse with talking, chewing, and flying, and would temporarily lock in a closed position[4]. Her visual analogue scale (VAS) for her TMJ pain was 7/10 on average, with pain getting as low as a 2/10. The pain was described as mostly dull, which turned to a sharp pain when she spoke too much, ate chewy foods, or traveled. For the last few weeks she's had to restrict her diet to mostly liquids and soft foods, as her symptoms became worse post accident.

Prior to the initial office visit the patient had utilized multiple care options to address her TMJ pain and dysfunction, including attempting to rest her jaw by following a liquid diet, performing

self-care procedures, and seeing a massage therapist. These interventions didn't result in any change in her condition.

Intervention:

Of significance on testing TMJ translation the patient had limited opening capacity and was reluctant to go through too much testing because of pain. The patient was examined using sacro occipital technique (SOT) [5,6] and cranial analysis. SOT indicators that were assessed pre and post treatment included psoas/iliopsoas tension assessment, supine hip flexor active straight leg raise (ASLR) test[8], muscle testing of sternocleidomastoid (SCM) muscles[9], trapezius fibers[10], sacrospinalis paravertebral muscle tension, arm fossa test[11,12], motion palpation of the vertebral segments[13,14], cervical stair-step assessments[15], and rechecking of the patient's leg length in a supine position[16].

SOT category analysis revealed the patient had pelvic torsion[17,18] and sacroiliac joint (SIJ) hypermobility described as a category two and consistent with a positive arm fossa test [19-21]. She was subsequently treated as a category two with supine pelvic block placement until various active palpatory indicators and arm fossa test were neutralized. Her left psoas was examined and treated via SOT protocol until indicators cleared. Cervical stairstep assessment indicated a dysfunctional C1/C2, and C4/5 articular facet translation, which was treated until normal motion was restored[15]. SOT cranial intraoral TMJ treatment was performed to release internal and external pterygoids musculature[22], TMJ treatment was performed as outlined in the Sacro Occipital Technique Organization – USA (SOTO-USA) TMJ Manual[23].

The cranial procedures utilized consisted of analyzing muscle strength[9], spinal, and cranial motion assessments[13,14]. Right hip flexors, right SCM, and left supraspinatus were found relatively asymmetrically weak to their other side. Motion palpation and stress to the spinal segments found imbalance at – L5, L2, and T12 vertebral levels. Cranial techniques applied to the cranium were utilized, which focus on sutural points that correlate with different areas of the spine via their dural connection. The hip flexors, SCM, and supraspinatus muscles as well as the spinal segments were treated by having the patient touch the involved muscle while the doctor held sutural points on the cranium that correlate with the nerve roots that innervate the muscle being touched. Indicators were checked pre and post to ensure improvement.

The cranial assessment for this patient revealed a left "open occipital bone" (left lambdoidal suture restricted in a position of flexion, with an inferior occipital on the left side) which is associated with left gluteal/piriformis muscle laxity where they cross, level eyebrows and orbital ridge, orbits symmetrical, chin pointing to midline, and the bridge of his nose having a left inclination. The patient was treated to release the lambdoidal suture and lift the occiput on the left side, which simultaneously helped improve SCM and TMJ function.

Results:

Immediately after the first office visit the patient felt some relief but was still sore and felt limited in her opening and movement. Two days after her appointment she contacted the office to tell us that her pain had significantly reduced to the point where she was almost pain free. She was still experiencing apporiximately one short twinge of intense pain per day that she put at around 1% of her waking hours, versus feeling intense pain 25% of her waking hours pre-treatment. She had regained the ability to open and close without pain and was able to return to normal activities. She returned for a follow up visit one month later and reported that her jaw and right knee pain were completely resolved, the left shoulder tension was resolved, and the right shoulder tension was much less though not resolved completely. She returned six months later and her jaw and knee pain had not returned.

The TMD Disability Index assessment tool[24] that was filled out by the patient prior to treatment indicated that she had to alter her activities of daily living related to talking, brushing her teeth, eating, chewing, yawning, and opening her mouth, and while she could participate in recreational activities she needed to be cautious. Following treatment she was able to return to all activities of daily living without any limitations.

TMD Symptom Intensity Scale a type of Visual Analogue Scale (VAS)[25-27] that measures intensity and frequency of pain levels was performed pre and post care. Pre treatment the patient reported pain of 7/10 (10 being most painful) related to jaw pain, painful jaw clicking, jaw locking, and shoulder tension, with a 5/10 relating to headaches and dizziness in relation to her TMJ symptoms. Regarding frequency of symptoms, jaw pain and neck tension were present 75% of the time, while clicking and locking were present 60% of the time. On the follow-up office visit one month later, all TMJ symptoms had resolved except for shoulder tightness on the right side (still rated at around a 6/10, 60% of the time).

Discussion:

With any conservative intervention the risk and benefit, as well as the relative costs of the care rendered should be considered. Low risk, low cost, and good outcomes are always the preference for the patient and doctor. Treatment of TMD can be challenging since symptoms may not be an indicator of dental stress to the dentition or gingiva. Clenching and bruxism can sometimes not be noticed by the patient but viewable on examination of the teeth for occlusal wear patterns, abfractions, and/or gum recession. Integrative chiropractic dental care [28,29] is essential since the first doctor a patient might see for TMD care could be a chiropractor. It is important for chiropractors to understand when it's appropriate to work with dentists, and vice versa. This includes both practitioners having at least an elementary understanding of what the other does.

For example, a patient could have an acute TMD presentation that might be more related to spinopelvic[21,30], cervicocranial[31], and/or stomatognathic[32] imbalance amenable to chiropractic care. If no dental related pathology is noted upon assessment, as was the case with this patient, a trial of chiropractic care for the treatment of TMJ pain and dysfunction would seem reasonable.

While the findings from this study appear dramatic, generalizing case reports to the population at large necessitates caution because "n-of-1" studies have no controls or comparative subjects receiving sham care. Without a range of patients and assessing interventions it is difficult to rule out placebo or ideomotor effects, regression to the mean, and other confounders commonly found with case reports. Yet still, Flyvbjerg [33] suggests that there is often value in the case report and points to Campbell[34] who states:

> "After all, man is, in his ordinary way, a very competent knower, and qualitative common-sense knowing is not replaced by quantitative knowing . . . This is not to say that such common sense naturalistic observation is objective, dependable, or unbiased. But it is all that we have. It is the only route to knowledge--noisy, fallible, and biased though it be[36]. "

With this patient a directly temporal relationship between her presentation and response to care was compelling. Her response a few days post-intervention showed a marked improvement in her condition, and it's important to note that the positive result was sustained at one and six month follow up visits, which indicates stability in her recovery. The care she received offered her relief of pain and allowed her to return to her activities of daily living following one office visit. While there may be various reasons why she responded positively one possibility is the care that was rendered to her.

Conclusion:

There is a wide array of options for patients considering care for TMD. Often the first step for patients involves watching and waiting, as well as over the counter anti-inflammatories and pain relievers. If pain and loss of function persist then determining what to do is a challenging endeavor for patients. Ideally conservative care that is low risk and cost effective would be optimal. In this case a patient with chronic TMJ pain and dysfunction responded well to one treatment, and months later was still stable in this regard. Further research is needed to determine what subset of acute TMJ patients might best respond to SOT and cranial care.

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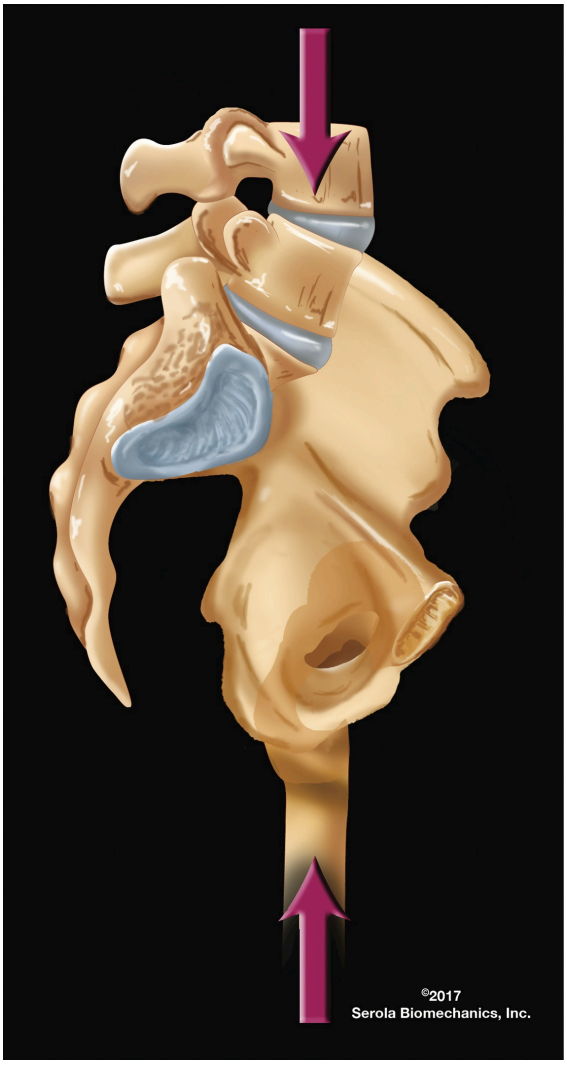
The sacroiliac nutation lesion theory: A commentary
Rick Serola, DC

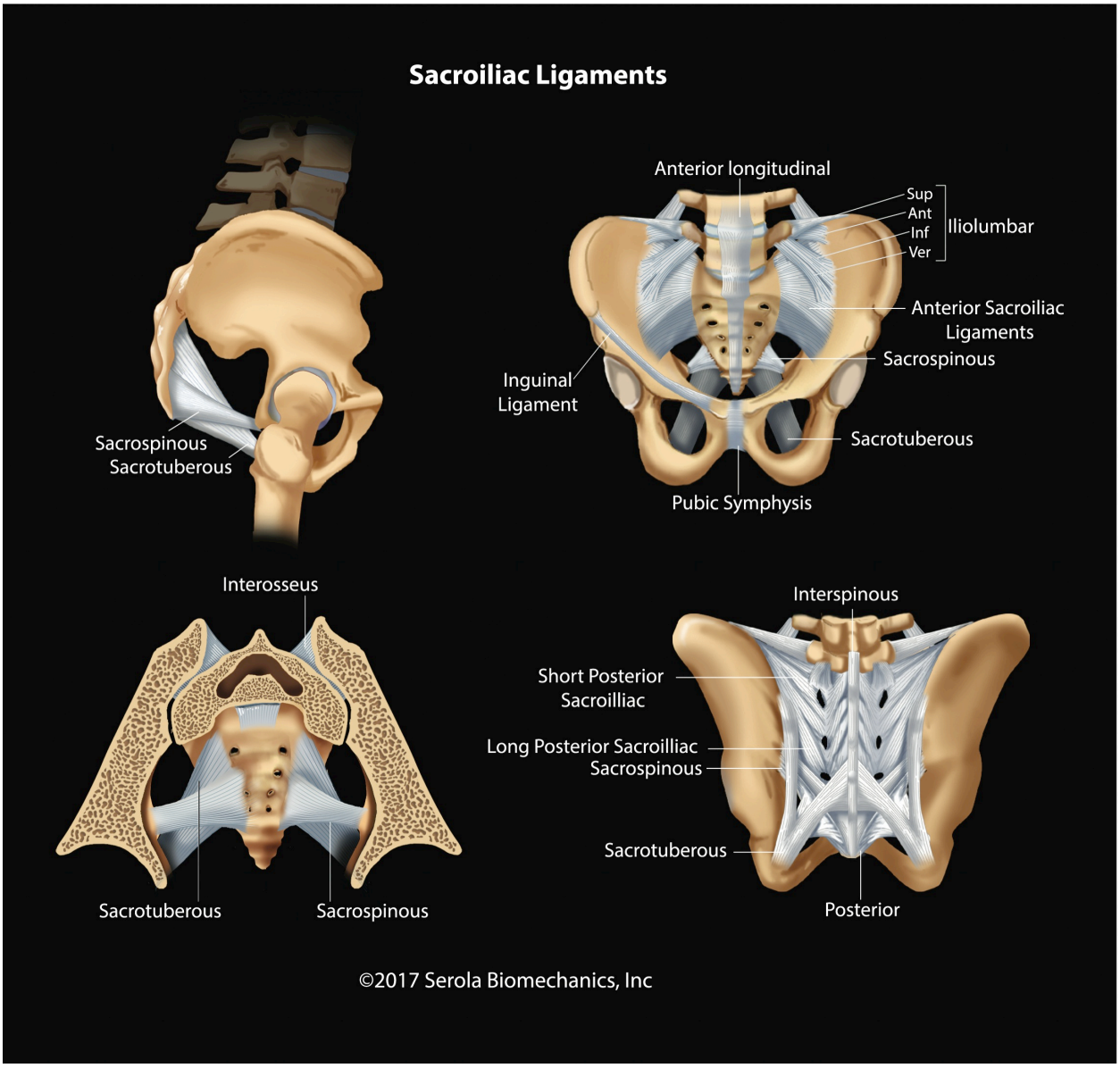
Introduction:

The sacroiliac joint is the center of the motion, shock absorption, and weight transfer between the upper and lower body[1]. When force is transmitted superiorly or inferiorly through the body, a spring-like action takes place. Upper body weight forces the sacral base anteriorly, while ground reaction forces the ilium to rotate posteriorly. The sacroiliac joint is forced into nutation [2,3]. At the sacroiliac joint, this movement winds the interosseous ligament, drawing the sacrum and ilium closer[4 5], but not together[6] in a normal joint. Above the sacrum, the lumbar curve increases like a compressing spring[7]. The interosseous and associated ligaments, including the sacrospinous, sacrotuberous, anterior sacroiliac joint ligaments, and the lower two bands of the iliolumbar ligament become stressed and tighten. Once the energy is absorbed, and the end of range of motion is reached, the body reacts by going into counternutation, and all the above actions are reversed as the spring rebounds. In this sense, the sacroiliac ligaments that restrict nutation can be viewed as the central spring in shock absorption.



Stressed SIJ Ligaments Sprain in Nutation:

When the force is greater than the ligaments can withstand, they sprain, and the joint goes past its normal end point. Failure of this mechanism to maintain ligamentous integrity is the weight-bearing lesion of the sacroiliac joint, termed the "Sacroiliac Nutation Lesion." The central spring in the shock absorber system is damaged and the normal mechanism of force transference[8-10] becomes compromised.



Ligamento-Muscular Responses:

Receptors in the ligaments respond selectively to activate or inhibit muscles to counter the stress applied to the injured ligaments[9,11-16]. On the side of injury, the ligamento-muscular reflex[17]

activates the muscles that cause counternutation and inhibits the muscles that cause nutation, thus limiting the joint's ability to move towards nutation and further damage the ligaments.

Muscles can do one of two things: increase or decrease contraction. This is expressed through speed of response, firing rate, strength, and duration. Muscular imbalance, as a result of ligament sprain, involves nociceptor and mechanoreceptor responses, positive feedback loops, delayed reaction times, weakness and pain, which are expressed through altered structure and movement patterns. Additionally, due to poor blood supply, ligaments do not have the intrinsic ability to return to their normal length and heal, so the joint may remain hypermobile indefinitely [18].

In order to maintain stability in an injured joint, it must be kept within normal range of motion; this can be accomplished by a brace or, to a lesser extent, by compensating muscular hyper- or hypotonicity. One important key is realizing that these muscles are inhibited or tight for a reason – to protect the injured joint. Therefore, it is counterproductive to strengthen the inhibited muscles (which would induce nutation and stress the ligaments) or stretch the tight muscles (which would separate the joint surfaces and stress the ligaments), without first stabilizing the joint. But, with the sacroiliac joint, misconceptions regarding the interrelationship of ligaments and muscles, the shape and movement pattern of the sacroiliac joint itself, and other factors disguise many complications and contraindications that make treatment challenging. The Sacroiliac Nutation Lesion Theory is an attempt to clarify these misconceptions, help visualize the musculoskeletal system as a functioning whole, and enhance treatment options.

One aspect of movement in the body can be seen as shock absorption and rebound; in regard to the sacroiliac joint, they are respectively called nutation/counternutation, but their effects can be found anywhere in the musculoskeletal system, although they may have different names (e.g. foot pronation/supination, cervical and lumbar lordosis/kyphosis, thoracic kyphosis/lordosis, hip flexion/extension, elbow flexion/extension, even exhalation/inhalation, etc.). It may be better to visualize the whole body functioning as a unit in which all loads are shared by multiple joints and muscles. With this perspective, if there is an injury to any shock-absorbing joint, it is possible that other shock absorption mechanisms may be compromised, affecting the body's kinematic chain. Since the sacroiliac joint is a kinematic core structure, stabilizing this joint should be a primary goal of treatment to the musculoskeletal system.

When considering the mechanisms of injury it is not possible to isolate any single ligament as the one that is sprained. As expressed in the principles of tensegrity[19-22], each ligament has a separate vector of support for the sacroiliac joint, but they all act together to provide an end point to its range of motion. Stress is distributed uniformly throughout the structure such that, whenever the joint goes past normal range of motion, all ligaments that restrain the action are likely sprained as a unit.

Although most of the muscular mass of the body attaches to the sacrum and/or innominates, muscular influence on movement of these bones has long been disputed [23,24] and never widely acknowledged. In fact, some anatomy books list the function of muscles that attach to the pelvis only by how they influence the extremities or spine, ignoring their effect on the pelvis. However, research has demonstrated that afferent information from the pelvic ligaments can influence muscle activation patterns to move the pelvis and lumbar spine [9]. Accordingly, the Sacroiliac

Nutation Lesion Theory describes how individual muscles throughout the trunk, pelvis, and upper legs, acting through a combination of vectors dependent on their attachment points and angles of pull, move the sacroiliac joint through the patterns of nutation and counternutation. For this reason, these muscles can be classified as nutators or counternutators. The interplay between these two patterns purportedly governs all normal and dysfunctional musculoskeletal movement.

Although in the literature far more attention is given to the articular area's role in motion and dysfunction, some have suggested that the most significant dysfunction develops though sprain of the posterior ligamentous weight-bearing system[2,6,25-27], without suggesting the role of muscles in this system. The Sacroiliac Nutation Lesion Theory, recognizing the role of muscles, notes that muscle-splinting patterns occur principally for stabilization of the compromised weight-bearing system and that the movement patterns they generate are in line with the configuration of the synovial region of the joint.

Positioned at the center of shock absorption, the sacroiliac joint functions as a direct regulator of muscle tone for pelvic and trunk muscles, thereby influencing posture and lumbar segmental stability[8, 9,10,28]. In its healthy state, the weight-bearing region of the sacroiliac joint is supported by balanced muscular action, which ensures smoothly coordinated movement. However, upon injury to the ligamentous system, structural stabilization is transferred to secondary systems. Muscular coordination is compromised for the sake of joint stability. As in all joints, ligament injuries in the sacroiliac joint can disrupt muscular response patterns and lead to spinal instability [28]. The muscles that attach to the bones that make up the joint will either contract to stabilize the joint or become inhibited to avoid furthering the injury. Understanding the difference can significantly influence treatment outcome.

Ligament laxity allows increased separation of the sacral surface from the iliac surface[1] and weight bearing becomes compromised. The structural framework shifts to distribute gravitational and muscular forces in a manner that avoids overloading the injured ligaments[29]. Because many of the muscles from the head to the knees attach to either the sacrum or innominates, they become directly involved postural balancing, and the effect is transferred throughout the kinematic chain. Because the lesion is almost always nutation, the response is almost always counternutation.

It is also important to note that the effect of a number of ligaments is cumulative; a group of ligaments is able to elicit a greater muscular response at much lower forces than a single ligament [30]. When one considers that the sacroiliac joint is supported by a vast network of ligaments, it is reasonable to assume that a sprain of the sacroiliac ligaments will cause considerable muscular reaction, even at low levels of stress[31], but especially during activity[13,17]. Over time, the counternutation muscles on the lesioned side will become tight and painful[9,32,33]. Conversely, the muscles that promote ipsilateral nutation are inhibited and, over time, may become flaccid, atrophic and painful[34,35]. The structure may be pulled into an altered movement pattern until the ligaments heal, which may be indefinitely[18].

With normal sacroiliac joints, when one side is in nutation, the opposite side is in counternutation, and muscular activity will match. Good examples of this reciprocating activity are gait[36] and cross-crawl patterning. However, with the nutation lesion, the coordination is

disrupted as the muscles attempt to stabilize the sacroiliac joint**.** On the side of lesion, the counternutation muscles will become overactive and the nutation muscles will become inhibited to a similar degree. Conversely, on the contralateral side, the nutation muscles will become overactive and the counternutation muscles will become inhibited. This pattern will remain in an enhanced state as long as the joint remains unstable, and may worsen during periods of stress to the sacroiliac joint.

More commonly, both sides will have a nutation lesion, but one side will be the major injury. When this happens, depending on the severity of the lesion, varying degrees of contraction and inhibition will occur. When muscles are in a pattern of contraction, their antagonists are inhibited. Balanced exercise to both will lead to greater development of the contracted muscles and excessive tightness. As the imbalance between the tight counternutation and inhibited nutation muscles on the side of injury, and the added imbalance between side of injury and the normal, or less injured side, becomes magnified, the muscles may develop pain and structural distortion patterns that may cause more problems than the actual lesion. Other complicating factors may also influence muscle responses, such as patterns of use in work and lifestyle. For example, a massage therapist is more likely to develop shoulder and upper back symptoms, while a runner will be more likely to develop hip, leg, and foot symptoms.

In individuals with low back pain, the nutation muscles on the side of lesion are commonly hypotonic and painful, and the counternutation muscles are commonly tight and painful. The fact that similar patterns of muscle tightness and inhibition in the nutation lesion are both documented and predictable by other researchers, such as Jungmann[37] and Janda[38], strongly supports the concept of the Nutation Lesion Syndrome. The universality of these contraction/inhibition patterns can provide a key to conceptualizing the integration of the musculoskeletal system, with the sacroiliac joint as the core.

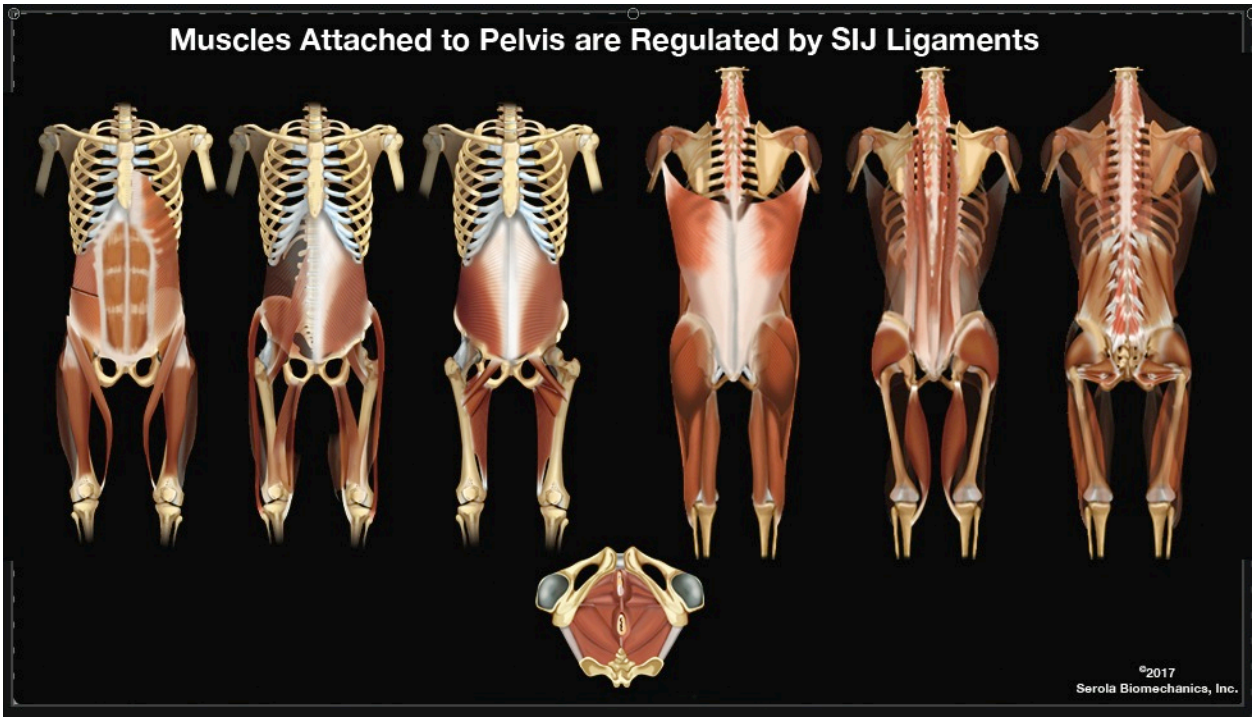
Systemic Effects:

Visualizing immediately superior and inferior to the pelvis, there are two additional significant shock absorber systems. The lumbosacral spine and hip form two highly flexible shock-absorbing mechanisms which displace axial force considerably by transferring forces to the surrounding ligaments, muscles, and fascia through relatively large ranges of motion. But, when the system's center, the interosseous and associated ligaments, become sprained, the lumbosacral spine and hips stiffen to avoid transferring the shock to the sacroiliac joint. As a result, other shock absorbing mechanisms become overloaded and may degenerate and fail, including the foot, knee, hip, symphysis pubis, intervertebral disc, and shoulder[40]. Likewise, a lesion anywhere in the shock absorbing system may transfer additional stress to the sacroiliac joint and eventually lead to sacroiliac dysfunction.

Ligament injuries may be the major cause of chronic back pain[28]. Neural receptors within injured ligaments can disrupt muscular tone and timing and lead to spinal instability. The more ligaments involved, the greater the response, even at lower forces[30]. Considering that the sacroiliac joint is supported by a vast network of ligaments, it is reasonable to assume that a sprain of these ligaments will cause considerable muscular reaction and play a key role in many musculoskeletal disorders.

Neural and muscular reprogramming can disrupt muscular response patterns and lead to recurrent problems, including muscular spasm or inhibition, pain, weakness, joint instability, abnormal posture, disturbed motion patterns, altered gait, apprehension upon certain movements, delayed feed-forward activation, slowed reaction time, and giving way[9,10,18,28,32-34,35,41-46]. Eventually, poor balance and postural control may result in dysfunction and pain. In time, destructive cycles will develop as compensation patterns lead back to further the original injury. In the initial stages, the muscular imbalance may simply alter movement patterns but, over time, it may alter the structure, causing predictable patterns of dysfunction in posture and movement. Muscles distant to the pelvis can become involved, affecting distant joints.

In agreement with the hypothesis of Freeman and Wyke[47], Bullock-Saxton[48], Phillips[49], and Solomonow[50,51] demonstrated that both sensory and motor changes are evident in muscles distant to the bones comprising an injured joint. Bullock-Saxton suggested that "…the arthrokinetic reflex might be considered as a triggering factor that would initiate a whole chain of adaptation reactions, eventually resulting in changed movement patterns" which are not limited to the side of injury, and could influence the uninjured side, as proposed by Lewit[52], Bullock-Saxton continued saying "Because muscles respond in different ways to peripheral injury, the results of this study suggest that the effects need to be sought in areas remote from the site of injury."[48] Because most of the muscles from the head to the knees attach to either the sacrum or innominates, they will become directly involved, thereby transferring the effect throughout the kinematic chain.



A sacroiliac sprain can change coordination patterns in many muscles which, by their attachments to the sacrum and pelvic bones, can act through various vectors and levers to alter posture and joint angles throughout the musculoskeletal system[9]. These distortions can occur

whether the muscles directly cross the sacroiliac joint, as in the knee, or do not directly cross the sacroiliac joint, as in the ankle[51,53], or temporal mandibular joint[54].

In the model proposed by The Sacroiliac Nutation Lesion Theory, as a response to a right sacroiliac nutation lesion, the sacrum is pulled into some degree of counternutation on the right, indefinitely, unless the sacroiliac joint is properly stabilized and healed, which is extremely rare, but possible. Instead of healing, the body adapts; the pelvis will torque, the spine will twist, the extremities will rotate, and joints will move in asymmetrical patterns, etc. The effect can be seen distant to the sacroiliac joint and even on the opposite side. The structural alterations that develop eventually spread throughout the musculoskeletal system and form the basis for many chronic dysfunctions, including those to the foot, knee, hip, spine, intervertebral discs, shoulders, neck, cranium and TMJ. Time and uneven contraction patterns produce chronic dysfunction.

Conclusion:

The Sacroiliac Nutation Syndrome Lesion is believed to create ligamento-muscular responses that may underlie many musculoskeletal dysfunctions throughout the body. Further research is needed to determine reliable and valid tools to assess this condition and investigate conservative treatment options to facilitate healing and limit any associated disability.

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Dental chiropractic non-surgical co-treatment of a 48-year-old male patient with a deviated septum, headaches, and TMJ dysfunction: A case report

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Introduction:

Unraveling a complex patient presentation is a challenging endeavor and often necessities interdisciplinary cooperative care. This case report focuses on a 48-year-old male patient with a history of a deviated septum, breathing difficulties, headaches, and TMJ dysfunction. Initially in the differential diagnosis process, it is crucial to consider whether these conditions are more likely independent or possibly interrelated necessitating interdisciplinary care.

A review of the literature suggests that a relationship may exist between reduced oxygenation and headaches.[1] Supplemental oxygen has been used to treat some types of headaches successfully.[2] Deviated septums affect oxygenation and ease of breathing. Two kinds of septal defects may be found "independently, or together: 1) anterior cartilage deformity of the quadrilateral septal cartilage, caused by direct trauma or pressure at any age; and 2) combined septal deformity involving all the septal components, caused by compression across the maxilla from pressures occurring during pregnancy or parturition."[3] In one study, the incidence of septal deformity in adult skulls was found to be 21% straight, 37% deviated and 42% kinked.[3] The prevalence of deviated septum, as estimated by the population of the USA being managed for this condition at any given time, is approximately 1 in 124 or 0.80% or 2.2 million people.[4]

Viewing the patient's presentation from another perspective, there are relationships between obstructive sleep apnea (OSA), temporomandibular joint disorders (TMD), and headaches. Substantial improvement in headaches have been reported as a result of successful management of sleep disorders that may incite headaches such as heavy snoring or the various forms of insomnia.[5] Other studies have found that "treatment of the temporomandibular region has beneficial effects for patients with cervicogenic,"[6] temple,[7] myogenous, and tension headaches.[8] Of interest is that the OPPERA study determined that there is "a significant association of OSA symptoms and TMD, with prospective cohort evidence finding that OSA symptoms preceded first-onset TMD."[9]

Surgery for deviated septums has been employed since ancient Egyptian times for breathing disorders and headaches. Although the principles behind deviated septal surgery remain much the same, the procedures have had greater refinement over the centuries.[10] Surgical procedures for a deviated septum have been shown to be efficacious in improving nasal airway space.[11,12] However, any surgical procedure offers some risk. Because of that risk, a new medical procedure touted as an alternative to surgery called "balloon septoplasty" is being performed by otolaryngologists.[13] This "new" procedure involves having the doctor "snake a balloon" within the nose and into the nasopharynx using a device to increase pressure and expansion of the nasal passage way. A similar procedure has been used since the early 20th century by chiropractors and naturopaths.[14] This procedure was used along with sacro occipital technique (SOT), chiropractic/cranial techniques and dental TMJ care[15] in this particular case.

Case History:

A 48-year-old male presented with complaints of occluded breathing on the right side of his nose rated at 1-2 on a 1-10 scale with full airway function at a 10. He also presented with right-sided suboccipital headaches, described as migraines occurring once a week and lasting 24-48 hours. The headaches were relatively unresponsive to medication and rated at an 8 on a pain scale of 1-10 with 10 being most painful possible. Visual inspection of the patient revealed a nose deviation to the left. The TMJ in static posture deviated to the right and a right sided side-bending sphenobasilar cranial strain pattern was observed.[16]

Upon jaw opening, the incisal midline moved from the right toward midline and even slightly past midline to the left and then on full opening back to center without any joint crepitus. C1 imbalance was noted on the right displaced in an anterior superior right transverse process posterior along with an inferior position of the occiput on the right side. In addition, C7 and T1 spinous rotations were noted to the left though there was unilateral costotransverse and scalenus muscle sensitivity to palpation on the right.

Initial Chiropractic Methods/Intervention

Patient was treated a total of 17 times with cranial facial release (CFR), cranial balloon treatments,[17-20] sacro occipital technique (SOT) care along with pelvic blocking for sacroiliac joint hypermobility and pelvic torsion.[21] Following the SOT care, manual cranial adjusting procedures were employed.[22] A sacroiliac joint support belt was used to help stabilize the patient's right sacroiliac joint.

Initial Chiropractic Results

The patient responded favorably to care and noted increased/improved breathing from right side and left side of his nose with the right side rated at 7 out of 1-10 post CFR treatment. The patient's headaches reduced to once every two weeks with less severity and decreased duration. However, due to the persistence of headaches and TMJ altered translation, he was referred to an SOT chiropractor certified in cranial technique with a specialty in TMJ dental co-treatment. A referral for dental TMJ care was made to help further improve the patient's airway.

Dental - Chiropractic Methods/Intervention

The dentist treating this patient has a primary focus of TMJ treatment with a secondary degree in acupuncture. The dentist prescribed a TMD/OSA night appliance, daytime TMJ repositioning appliance, acupuncture, and cold laser therapy. TMD/OSA appliance was utilized even though the patient did not have a home sleep study. There was evidence of UARS (upper airway resistance syndrome), a common finding with nasal septal defects which cause resistance to breathing[23-25] and often related to bruxism.[26] The nighttime appliance was fabricated to hold the patient's TMJ in centric relation (CR) while simultaneously reducing bruxism 50-100%, in

addition to preventing the mandible from assuming a retrognathic position during supine sleeping.[27]

The daytime TMJ appliance was prescribed to be worn during all waking hours for 10 weeks, even while eating. The swallowing reflex occurs 2000-3000 times a day which makes our teeth touch, and in the case of the TMJ disorder patient, triggers the nociceptive effect on the joint capsule and associated structures, not unlike chewing food and speaking.[28] The daytime appliance placed the patient in the minimum speaking space position that allowed CR, the phonetic position, and only came in contact to hold CR when swallowing or chewing,[29]thereby repeated nociception is decreased or eliminated altogether. One reason why TMJ disorders are so critical in the management and treatment of tension headaches is their relationship with the cervical spine and forward head posture.[30-33]

Acupuncture protocols were used by the dentist to address TMJ pain and headaches as a means to complement the TMJ dental care.[34] Red laser was also used to increase microvascularization via increased nitric oxide levels, with added pulsed long frequency to increase ATP production of mitochondria for cell function.[35] The chiropractor working specifically with the dentist continued with SOT and SOT cranial care. However as the patient condition was stabilizing and the headaches weren't completely resolving, further assessment revealed the patient had a viscerosomatic reflex imbalance. This imbalance related to an occipital fiber 3, 4th thoracic, gall bladder condition. Chiropractic manipulative reflex technique (CMRT) was employed.[36]

Dental – Chiropractic Results

The patient is still under dental/chiropractic care. The headaches have continued to be reduced 80% in frequency, duration and intensity. Range of jaw motion and translation is much improved and nasal breathing has consistently been improving which has helped reduce the patient's UARS and inability to sleep through the night. The CMRT treatment for the gall bladder viscerosomatic reflex pattern further helped reduce the patient's headaches. While the patient is still under care, the prior chronic and severe headaches have been mostly resolving.

Discussion:

This patient had chronic long-term breathing difficulties secondary to a deviated septum and its affect on airway and TMJ function along with unremitting severe headaches. A study by Zicari et al, "showed a strong correlation between oral breathing and malocclusions, which manifests itself with both dentoskeletal and functional alterations, leading to a dysfunctional malocclusive pattern."[37] Being able to breathe fully through the nasal passages, stomatognathic function particularly related to the tongue and airway can improve and reduce any UARS. Generally with mouth breathing the tongue will lie at the bottom of the mouth leading to a class two retro-mandibular position drawing the tongue backwards into the airway space.[37]

The complex nature of the patient's presentation led to a comprehensive group of therapeutic interventions that consisted of nasal balloon technique (CFR), SOT chiropractic and cranial

procedures, dental TMJ care, acupuncture interventions for TMJ discomfort, cold laser therapy, and chiropractic manipulative reflex techniques. With complex case presentations that incorporate various treatment modalities it is difficult to determine which modality was the most effective or if the whole treatment protocol was needed to have an optimal outcome for the patient. An important aspect of how the care was determined was a balance between patient presentation, differential diagnosis, and patient preference for a conservative method of care.

Conclusion:

A 48-year-old male was treated for chronic nasal airway compromise secondary to a deviated septum and what appeared to be related TMD and chronic headaches. Two chiropractors and a dentist with dual training in dentistry and acupuncture treated this patient with a positive outcome consisting of improved breathing, reduced TMD and headaches. As with any case study it is difficult to generalize its findings to the patient population at large. However, considering the long-time unresponsive and unremitting breathing problems, TMD, and headaches, the observed response to care is compelling. Further studies with similar patient presentations are warranted to determine if this type of conservative collaborative care can represent a low-risk treatment option.

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Selected Temporomandibular Joint Related Articles from Past SOT Research Conferences (2009-20160

SOT Cranial and TMJ therapy for unresolved BPPV: A case report.
Thomas Bloink, DC

Introduction:

Vertigo, also called dizziness, accounts for about 6 million clinic visits in the U.S. every year, and 17–42% of these patients eventually are diagnosed with benign paroxysmal positional vertigo (BPPV). [1] In a 2007 study they found that BPPV accounted for 8% of individuals with moderate or severe dizziness/vertigo. The lifetime prevalence of BPPV was 2.4%, the 1-year prevalence was 1.6%, and the 1-year incidence was 0.6%. The median duration of an episode was 2 weeks [2]. BPPV is a disorder caused by problems in the inner ear. Its symptoms are repeated episodes of positional vertigo, that is, of a spinning sensation caused by changes in the position of the head. [1]

Within the labyrinth of the inner ear lie collections of calcium crystals known as otoconia. In patients with BPPV, the otoconia are dislodged from their usual position within the utricle and they migrate over time into one of the semicircular canals (the posterior canal is most commonly affected due to its anatomical position). When the head is reoriented relative to gravity, the gravity-dependent movement of the heavier otoconial debris (colloquially "ear rocks") within the affected semicircular canal causes abnormal (pathological) fluid endolymph displacement and a resultant sensation of vertigo.

A typical sign associated with BPPV is rotatory (torsional) nystagmus, where the top of the eye rotates towards the affected ear to a beating or twitching fashion. Patients should not experience other neurological deficits such as numbness or weakness, and if these symptoms are present, a more serious etiology must be considered. Two treatments have been found effective for relieving symptoms of posterior canal BPPV: the canalith repositioning procedure (CRP) or Epley maneuver, and the liberatory or Semont maneuver. [1]

Case Report

A 37-year-old female was seen for acute benign vertigo that was referred by her allopathic physician for an evaluation and determination of the need for chiropractic care. The patient had 2-3 months of constant vertigo which was diagnosed as BPPV. She had been treated with the Epley Maneuver and various medications, however they did not resolve her symptoms. Her vertigo would last the whole day with peaks and valleys related to intensity. This affected her ability to function at home, drive her car and even walk “out of the door” of her home.

Assessment: Patient presented with a category two, right temporal bone with external rotation, and significant malocclusion with clenching and anterior interferences. In evaluating the dental signs of malocclusion it was determined that due to the stress of the anterior interferences, particularly on the right side, that the repetitive stress on occlusion created right temporomandibular (TM) condylar compression stress summating at right temporal fossa.

Treatment:

Category two protocols for the pelvis were applied and an intraoral cranial adjustment to the temporal bone, maxilla, sphenoid, and zygoma were performed directed by palpatory pain indicators. Palpatory pain in and around the TM joint (TMJ) was used to help guide treatment as well as ability of patient to achieve sufficient vertical opening. Cotreatment with a dentist was used to help stabilize and maintain the chiropractic cranial and TMJ corrections.

Results:

By the 7th office visit (3-4 weeks of care) the patient's vertigo had resolved. In addition her TM joint translation and opening had improved significantly and pain around the right TM joint and related tissues had been eliminated. The anterior interferences were treated with a nighttime dental appliance that allowed the patient to have bilateral posterior teeth contact and reduced contact to the front teeth.

Discussion:

Occlusion and condylar position is purported to be affected by or affects cranial bone distortion patterns. In instances where the TMJ/dental dysfunction or malocclusion, associated with vertigo [3], is affecting cranial bone distortion the region of cranial distortion overlying specific regions of the cerebral cortex may have a relationship with the underlying cortical functions [4].

Similarly to Hilton's Law where the innervation of the overlying skin of a joint relates to the bone, ligament and muscles it is theorized that regions of cranial bone distortion may have a relationship underlying meningeal, CSF function, and ultimately cortical activities.

Therefore when there is malocclusion affecting the cranial suture and local periosteal tissue, it is theorized that with some patients possibly the internal periosteal dura, CSF circulation, and related cortical region might be affected. On the other hand reliving the stressors of restricted cranial motion and malocclusion could lead to improved cortical function just by reducing global stress to the CNS due to reduce pain and related myofascial tension. Since it is not uncommon for cranial trauma or stress to affect cranial nerve function, it is possible that low level sustained cranial stress or trauma could effect of be contributory to low-level clinical presentations of conditions such as BPPV [5].

Conclusion:

In this case report the patient's response to care was quite dramatic. She was unresponsive to prior care and her quality of life was profoundly affected. It is difficult to extrapolate from this one case and apply this to the general population however the patient's rapid response to care suggests that further investigation into this method of care for patients presenting with vertigo be

considered. *(This is an abstract from a research conference presentation only and does not represent a full work that has been peer reviewed and accepted for publication.)*

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TMD - chiropractic and dentistry: Two case reports.

Charles L. Blum, DC, Alireza Panahpour DDS.

Introduction:

Symptoms of temporomandibular/craniomandibular disorders (TMD/CMDs) vary but often involve severe pain in the jaw musculature, severe pain or difficulty when opening the mouth and chewing, headaches, and ear pain. In conditions where a chiropractor or dentist has reached a therapeutic impasse with a patient's TMD/CMD, cotreatment may be indicated [1,2]. This article presents two case reports demonstrating how cotreatment may proceed initiated by a dental and/or a chiropractic referral.

Intervention:

The treatment involved sacro occipital technique (SOT) management of the patient's presentation, while relating to TMJ dysfunction, was focused on whole body dynamics and function [3]. The treatment with these two patients had similar aspects in that they both presented with sacroiliac joint hypermobility syndrome (category two), cervical intersegmental restricted motion, and needed craniomandibular balancing therapeutic interventions.

Results:

The essential findings in both cases showed reduced pain in TMJ function and/or symmetrical joint translation without crepitus. General relaxation in cervicocranial and craniomandibular musculature was noted by the patient, chiropractor and dentist. The focus was having the patient gain independence from chiropractic/dental care with reduced discomfort and increased function.

Discussion:

With a subset of patients body distortions ascend from the feet, pelvis, spine, and neck to affect TMJ dynamics affecting dental occlusion, condylar position, and airway space. With another subset of patients patterns of body distortions descend from TMJ dynamics affecting dental occlusion, condylar position, and airway space [4]. A main obstacle for chiropractic/dental cotreatment is the lack of awareness and knowledge of each other's professional treatment and diagnostic focus as well terminology. Research studies have noted a relationship between ascending and descending relationships associated with CMD/TMD and postural dysfunctions [5].

Conclusion:

While these two cases illustrate how the chiropractic and dental fields can work together for successful treatment outcomes, there is a need to determine what subsets of patients may fit this

model. *(This is an abstract from a research conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)*

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Unity of form and function - a new dental paradigm: A case series.
Albert S. Chinappi, Jr., DDS

Introduction:

In this era of evidence-based dentistry, the profession may be limited by longstanding but unexamined assumptions that still form the framework of our diagnoses and treatment. A system of care called "functional orthopedics" seems to indicate the possibility of a different paradigm based on maxillary expansion and mandible repositioning. Exploration of the scientific literature finds support and possible explanations for the observed results.

Functional orthopedics ultimately strives to convert all malocclusions into Class I dental malocclusions prior to employing fixed mechanics. This is accomplished by using active plates and orthotics or jaw positioning appliances. Research involving using this protocol for children and adults has led to a re-examination of the basic assumptions that exist in dentistry today. In light of some novel clinical outcomes, this article will explore two of those assumptions and propose a new paradigm in which optimal function is the overriding consideration.
The first assumption, specific to orthodontics, concerns the inclination to avoid expansion in either dental arch in older children and adults. Since sutures fuse early in life, it was assumed that rapid maxillary expansion would be ineffective and unstable in patients over 12 or 13 years of age. As a consequence palatal expansion techniques were limited to younger patients.

The second assumption, common to all phases of dentistry, relates to the location of the mandible in the face. The long-held dental paradigm has been to accept the existing jaw position or to coax it posterior. However in most malocclusions, except some Class III facial patterns, the mandible may be in a compromised position. Deep bites, cross bites, and maxillary arch discrepancies likely are examples of that compromise in which the mandible hasn't been allowed to develop to its full downward and forward potential because of maxillary constriction. That altered posture, in turn, impairs the function of the cervical-mandibular musculature.

Mohl states that the role of head posture in mandibular function at least with "some of the dysfunctional problems involving the masticatory system could be in some way related to the adaptive requirements imposed by chronic or acute postural demands or vice versa."[1] While there may be support for the relationship of dentition to mandibular location; of importance is that a main concern is the etiology. Clinical experience and published studies have noted that maxillary width is not necessarily rigid but can be altered in children and also with adults [2]. Current research suggests that chronic and acute postural dysfunctions may be related to masticatory system dysfunction. [3-5]

Therefore the basis for the paradigm of functional orthopedics is to allow the mandible to "recover" from its compensatory position affecting and being affected by postural influences. If postural influences are related to the cervicomandibular muscle complex then dental diagnosis and treatment planning should include those influences.

Case Report Series

While each patient's (n=13) presentation was different from the other they all presented with dental malocclusions and reported varying degrees of cranio-mandibular dysfunction. The patient's medical histories were non-contributory. These patients were selected for this case series because post treatment the maxilla appeared to be responsible for the developmental location of the mandible and once corrected it had a profound effect on the cervical spine and head position

Methods and Intervention:

Thirteen cases are presented, 5 adolescents and 8 adults. Each was treated using the system of facial orthopedics known as functional orthopedics. Functional jaw orthopedics utilizes a philosophy that orthodontic treatment seeks to alter the shape of the bony alveolus in the maxilla and, in turn, the location of the mandible and its alveolar processes. This is accomplished along with moving teeth and re-shaping the dental arches. Functional orthopedics incorporates a style of orthodontics employing removable appliances (active plates and jaw positioning appliances) in addition to fixed mechanics. The goal of this system of treatment is to correct the pre-existing maxillary deficiency, reposition the mandible and avoid extractions and surgery if at all possible.

Results:

Each of the cases presented show dramatic dento-facial changes. Full alignment of the dentition was accomplished non-extraction and non-surgical. Outcome assessment measures utilized classic dental evaluations for class II and class I positions. Diagnostic evaluations determined that pre-treatment Class II malocclusions were corrected to Class I and showed significant improvements in both the antero-posterior and vertical positioning of the mandible to a "normal" position. In other words the amount of downward and forward repositioning of the mandible was dramatic. Most significantly were changes in the adult, "non-growing" patients, changes that would only be possible with significant correction in the cranio-cervical musculature. The changes in the cervical spine were equally dramatic and quite evident in the study. One case showed changes in spinal curve simply by changing the mechanical forces used in treatment, indicating a possible advantage of this treatment philosophy.

Discussion:

In the 13 subjects of this study functional changes included improvement of the cervical curve and relief of TMD type symptoms including, but not limited to, headaches and muscle spasms. If we consider the mandible and maxilla as being within a matrix of tissues and function, we are led to a new premise -- that in some instances the musculature may hold the mandible in an altered posture (compensatory position) to assure and maximize contact between maxilla and mandible dentition. Theoretically, due to the maxillary deficiency the mandible may be unable to assume its "normal" rest position, because the teeth will not fit together. The maxillary malocclusion, be

it narrow arch, cross-bite, deep anterior over-bite, or division 2 type incisor position actually create impedance inhibiting the mandible from positioning downward and forward to achieve a physiological compatible rest position. This, in turn, tends to have a significant impact upon the stomatognathic and cranio-cervical position and function.

Conclusion:

The cases treated in this report demonstrate that a subset of patients with malocclusions can be the result of inadequate maxillary growth and the subsequent inability of the mandible to attain a full physiologically neutral position. At any age, when a deficiency in the maxilla is corrected and the correct arch form is in place, the mandible would logically be able to assume a more neutral position within the musculature template. The effects of maxillary expansion and mandible repositioning on stomatognathic and cranio-cervical function and its relationship functional body positioning are worthy of future research. With posture having influence on the stomatognathic system and maxillary expansion and mandible positioning likewise affecting cervicocranial posture the implications for the dental and chiropractic co-treatment can be profound. *(This is an abstract from a research conference presentation only and does not represent a full work that has been peer reviewed and accepted for publication.)*

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Patient with severe tremors, complex pain syndrome, and migraines co-treated with dental and SOT chiropractic care: A case report.

Richard C. Gerardo, DC

Introduction:

A 42 year old female presented with an unsteady Parkinsonian type of gait (shaking, rigidity and pain) diagnosed as psychogenically driven based on various university healthcare clinics. She also had tremors that would occur when she would stand from a seated position starting from her right leg and radiating superiorward affecting her whole body. She also diagnosed with an atypical version of a complex regional pain syndrome (CRPS) called complex pain syndrome (CPS) due to its whole body generalization as well as a history of migraines.

"CRPS is a severe chronic pain condition characterized by sensory, autonomic, motor, and dystrophic signs and symptoms. Patients with CRPS are commonly refractory showing only modest improvement with most current therapies [1]." In one study CRPS (n=888) syndrome affected mostly white women in the 25- to 55-year-old age group. It was often precipitated by trauma (surgical or nonsurgical) and commonly involved the lower (approximately 56%) and upper (approximately 38%) extremities [2]. Evaluating referral patterns for CRPS (n=102) 61% had presented first at the general practitioner, while 80% subsequently consulted one or more medical specialists, most frequently an anesthetist (55% of the cases) or a specialist in rehabilitation medicine (41%) [3].

The patient's CPS was fibromyalgic in nature with pain that was severe, migratory and occurred in multiple major joints, all her muscle groups experienced pain, spasms, and involuntary contractions. She had nighttime leg spasms that would awaken her from sleep. The pain and muscle tension led to multiple ranges of motion limitations generalizing to all joints of her body. The patient's condition had been occurring for nine years and was gradually worsening.

The patient had seen neurologists, internal medicine, rheumatologists, and visited multiple university hospital clinics. At the initial office visit she was prescribed medications for her tremors, migratory pain, and migraines that included Aciphex, Topamax, Atenolol, Tramadol, Gabapentine, Cymbalta, Minoxidil, Fluocinonide, Zanaflex, and Neurontin. A sleep study at Stanford University Health Clinic found that the patient did not exhibit sleep apnea however she still had no REM sleep even though she was taking sleeping medication and would sleep. This finding helped explain why she found her sleep not restful. Due to the severity of the patient's symptoms and their whole body disturbance on her multiple levels chiropractic and dental care was attempted simultaneously since all other interventions were unhelpful.

Methods – Intervention/Treatment:

Initially the patient was co-treated with a dental night and day time appliance, trochanter belt, and treated for category two or sacroiliac joint hypermobility syndrome. During the course of treatment over the initial months she was treated with category two protocols, sutural cranial temporomandibular joint (TMJ) interventions, T8 chiropractic manipulative reflex technique

(CMRT) for the liver along with supportive nutritional supplements and dietary restrictions to support liver function and reduce general body inflammation. The SOT cranial procedures were incorporated to facilitate her category two stabilization and enable her to accommodate to the dental modifications.

Results:

At the first office visit with the dental appliance, trochanter belt and category treatment all her shaking would stop when standing. Concurrently as the shaking would cease her pain would also be reduced and her range of motion also increased gradually but notably over the months of care. Treatment began in February 2009 and she was treated only one time per week and though she attempted to come for treatment more frequently the travel time to the office (2.5 hours one way) was too stressful, physically and emotionally since you was unable to drive her self. While she was initially treated one time a week from February 2009 through July 2009 following July 2009 she reduced care to two treatments per month.

Prior to February 2009 the patient could not stand up and cook, do housework, drive and was categorized as completely disabled. During the first 4 months of treatment, if the patient attempted to overextend herself and perform activities beyond her low physiological adaptive range her condition would relapse for one to two days. Then on the third day, following a period of rest, she would recover to a level of disability that she had attained prior to the flare-up. As of August 2009 she stabilized without the flare-ups and could stand, garden, take care of house, drive, and begun an exercise program. The patient's medication has been consistently reduced as her condition has improved and which is currently less then half of the medications that she was taking prior to when the dental-chiropractic co-treatment commenced in January.

Discussion:

A report written by her internal medicine doctor dated March 19, 2009 described the patient's progress which was significant since this doctor had been treating the patient for years. "Complex pain syndrome remarkable improved with chiropractic intervention and this dental appliance. I have seen in the past with" this patient "that, sometimes, there can be transient improvements when a new modality has been added, but this seems different. We are hopeful that she will continue to have the excellent response that she has had at this point."

It is interesting that a relationship appears to have been found with this patient's severe tremors, migratory joint pain, and migraines and her pelvis and TMJ function. Her tremors could be affected by having a trochanter belt placed and would return when it was removed. Likewise a similar reaction occurred with her dental appliances which indirectly described a relationship between pelvic stability and TMJ occlusal or condylar function. While the pelvic TMJ relationship appeared unrelated one study found that temporomandibular joint dysfunction plays an important role in the restriction of hip motion experienced by patients with CRPS (n=20) [4]. In another study a relationship between the sacroiliac joint, cervical spine and TMJ so that pelvic function and TMJ function was found [5] indicating an evidence based association.

It is always difficult to determine whether a treatment is offering a placebo effect or not. However in this case the patient had been to multiple doctors and facilities and had no idea the type of dental or chiropractic care she would be receiving. Her initial symptoms, while described as idiopathic or psychologically driven, responded in a consistent predictable continual physiological manner and her ability to return to prior activities, reduced pain, and increased function were welcomed by the patient and family.

Conclusion:

The patient's response to care was dramatic particularly since her condition had persisted for 9 years and was progressively worsening. The patient was not responsive to any care she had prior to February 2009 and this made her response to chiropractic and dental co-treatment all the more significant received. Further research is indicated to determine what patients with tremors, fibromyalgia, and migraines may respond to chiropractic and dental co-treatment. The unusualness of this patient's presentation will make this type of study difficult. However when a patient has multiple unresponsive neuromusculoskeletal clinical conditions a trial period investigating whether chiropractic SOT and cranial care in conjunction with dental appliance therapy may be indicated. The future challenge is developing a predictive group of tests to determine what subset of patient with severe tremors, fibromyalgia, and migraines would be responsive to this type of care. *(This is an abstract from a research conference presentation only and does not represent a full work that has been peer reviewed and accepted for publication.)*

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Dental chiropractic co-treatment of patient presenting with chronic severe fibromyalgia, head, neck, and jaw pain with depression.

Jeffrey A. Mersky, DC, William Halligan, DDS

Introduction:

Dental chiropractic co-treatment of temporomandibular joint disorders (TMD) may be an important part of patient healthcare. Reviewing a claims data base of a large New England managed care organization comparing the health care utilization patterns of patients with TMD to non-TMD subjects, found that TMD patients were greater utilizers of health care services and had higher associated costs than non-TMD subjects. For some of the major diagnostic categories, such as nervous, respiratory, circulatory, and digestive, the inpatient and outpatient claims differences in utilization and costs were as large as 3 to 1. The psychiatric claims for TMD patients exhibited differences that were at least twice as large as those for the non-TMD subjects [1].

Various studies have found relationships between dental occlusion and body posture and conversely relationships between body posture and dental occlusion. In a study with 46 asymptomatic subjects body posture was more stable when subjects would bite down in centric relation. However altering body posture by changing leg length with a heel lift, shifted the occlusal force distribution to the ipsilateral side [2]. Therefore if patients can be helped with TMD related symptoms and related patterns of postural dysfunction this may offer patients a viable alternative for recalcitrant pain and discomfort as well as reduce healthcare costs relating to various TMD associated health conditions.

Case Report:

A 35 year old female was referred to this office by her dentist for dental chiropractic cotreatment of multiple chronic unremitting conditions. She was under the care of a rheumatologist who diagnosed her as having fibromyalgia, along with severe head, neck, and jaw pain with depression. Following her intake with the co-treating dentist he decided that she would need chiropractic care as well as biofeedback to facilitate any dental splint treatment he would use for treatment. The dentist found that the patient had 28 trigger points associated with temporomandibular joint (TMJ) dysfunction and myofascial responses related to this imbalance.

When the patient had her first intake examination at the chiropractic office she noted that she was currently taking 14 medications. She was taking multiple medications for her fibromyalgia, various pain relievers, medication for both depression and anxiety, and Prilosec to deal with the secondary stomach pain from the medication. Base line EEGs were taken and she also began biofeedback therapy. Having tried virtually everything the patient felt this was her last option.

Methods:

Chiropractic treatment consisted of sacro occipital technique (SOT) diagnosis and analysis. Of interest the patient presented without any leg length discrepancy and the posterior sacroiliac (SI)

joint was stable and functional. Evaluation of sacral nutation (SB+/- cough test) found reduced movement on sacral counternutation (SB+) also known as sacral flexion occurring with sacrocranial inhalation phase of motion [3]. The patient was treated with pelvic blocks while prone (SB+) with blocks placed bilaterally at the ASIS facing caudally at 45° angles [3,4]. On inhalation pressure was applied to the sacral apex encouraging sacral counternutation.

During the block placement and sacral pressure the vertebral column was monitored and at regions of decreased blood flow (vasomotor response) pressure was applied inferior/superior at the related vertebra's spinous process asking the patient to determine if there was pain and which point was the most sensitive. Sensitivity was noted during multiple office visits with the range localizing to the spinouses of T4, T5 and T6. In SOT occipital fiber analysis these areas related to viscerosomatic regions related to reflexes associated with the gall bladder, stomach, and pancreas. Chiropractic manipulative reflex technique (CMRT) was applied to those regions of involvement when there were related viscerosomatic reflexes and referred pain patterns associated with the specific organ [5].

The cervical spine was treated using an SOT method called cervical stairstep technique which allows for repositioning and normalizing motion of cervical motor units. Since the patient requested not to have joint cavitation to her cervical spine this became the treatment of choice. Cranial and TMJ techniques were applied to reduce any ascending postural patterns of imbalance affecting occlusion and assisting the dentist to create an optimal dental splint. This specific dental splint or orthotic was centered with the mandibular condyles in the glenoid fossae with the condylar-disc assembly braced against the posterior slope of the eminence, and verified with joint images with the orthotic in place.

As the patient used the splint for day and night-time the chiropractic care then was used to assist her body's ability to accommodate to descending postural influences from her adjusted new occlusion. Biofeedback was also incorporated to assist the patient's ability to relax without medications as well as develop internally driven coping skills.

Results:

Chiropractic and dental evaluations 5 weeks post-treatment found that the patient had markedly decreased pain with 28 trigger points reduced to only two. Spinal range of motion had been significantly improved as well as her ability to open her mouth to a normal range (38-42 mm as compared to initial office visit of 28 mm). Prior to care she was having difficulty sleeping where as at the evaluation she noted she was sleeping better, felt more relaxed, less anxious, and had sensations of well-being. She was only taking 4 medications and noted that her digestive issues had improved. Her activities of daily living such as outside activities, energy levels, and social relationships had significantly improved. EEG findings found significant improvement comparing initial scan to 5 week post-treatment phase of care. Of interest is that the biofeedback practitioner found significant improvement of EEG findings with dental splint in place compared to without, even at the 5 week evaluation period.

Discussion:

With any patient presenting with chronic pain and dysfunction it is difficult to clearly state that one method of care will create a positive change. In this case it appears that the chiropractic care working in conjunction with her dentist and biofeedback practitioner helped reduce the patient's level of pain, dysfunction, reliance on medications, and improved her quality of life and activities of daily living.

Dental chiropractic co-treatment and integration can be a valuable tool evaluating and treating ascending and descending patterns of postural distortion relating to dental occlusion. SOT chiropractic's ability to evaluate and treat sacral nutation as well as locate areas of dural port tension [4] may be a valuable tool co-treating TMD and related airway dysfunction. CMRT may also have been important to reduce any viscerosomatic feedback to the T4-6 region and function to improve visceral function [5].

The cervical stairstep technique, which adjusts cervical articular facet motor units, as well as TMJ and cranial therapy, can be important tools assisting a patient's response to dental orthotic splint treatment. These therapies can facilitate joint coupling and kinematic accommodation between body posture and dental occlusion, TM condylar position, and airway dysfunction.

Conclusion:

The future of healthcare will likely include interdisciplinary co-treatment involving low risk procedures and offering alternatives to long-term medication use and extensive invasive costly procedures. As the field of dentistry develops methods of treating TMD, chiropractors can be a valuable member of an interdisciplinary team treating ascending body posture imbalance affecting pelvis, head, and neck position. Chiropractors trained in SOT have a unique ability to facilitate cranial bone balance and motion along with treating non-dental mechanical TMJ dysfunction. Single subject case reports without controls do not allow for broad generalization of findings from treatment interventions. However the patient's non-response to various prior therapies along with her degenerating condition and the temporal nature of her recovery immediately following care should encourage further research. *(This is an abstract from a research conference presentation only and does not represent a full work that has been peer reviewed and accepted for publication.)*

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Integration of SOT cranial therapy with an occlusal splint for the treatment of obstructive sleep apnea: A case report.

Thomas Bloink, DC, Mamal Rahimi, DDS, Charles L. Blum, DC

Introduction:

Obstructive sleep apnea (OSA) relates to an obstruction to the continuum of airway expressed as sleep-disordered breathing. This spectrum ranges from slight vibration of tissues at its mildest to death from asphyxiation at its severe extreme. Between lies pathologic snoring and periods of complete airway closure and breathing cessation called "apnea". Some of the most serious chronic diseases of man have been associated with snoring and sleep apnea, including: stroke, hypertension (high blood pressure), myocardial infarction (heart attack), arteriosclerosis (hardening of the arteries), cardiac arrhythmias (irregular pulse), diabetes, gastro-esophageal reflux disorder (GERD), polycythemia vera (thickening of the blood) and others.

Sleep disordered breathing also disrupts the normal patterns of brain activity and relaxation, precluding restorative sleep. Overwhelming daytime sleepiness contributes to the risk of accident and injury from decreased attention span, judgment and reflex. The risk of automobile accident in the untreated sleep apnea patient is about 8 times as compared to that of a normal sleeper. Therefore as might be expected work productivity and safety suffer.

Common treatments for OSA usually start with a continuous positive airway pressure (CPAP) machine and can progress to surgery to facilitate airway expansion and/or increase function. Surgery is costly and invasive yet patient compliance with CPAP machines is estimated at only 40%. From a dental perspective oral apnea appliances (e.g., TAP, SOMNIMED, OAYSIS), which are based on the concept of mandibular advancement, have shown promise but are also expensive and may adversely affect occlusion or condylar position. The following is a case report of a patient presenting with symptomatology of sleep apnea and relates the treatment rendered to facilitate her recovery.

Case History:

A 56 year old female patient presented for chiropractic and dental care with symptoms of short term memory loss, foggy-headedness, temporomandibular joint (TMJ) pain, chronic myofascial neck and shoulder pain and fatigue. She also had a history of vertigo along with poor quality of sleep and significant excessive daytime sleepiness.

Methods/Intervention:

Cranial-dental exam revealed a dental class II with narrow arches and premature anterior contacts. Decreased translation of the right TMJ with crepiits and clicking upon opening and lateral movements of the left TMJ. Pain was reported upon palpation to the medial ptyergoids, masseters, and temporalis muscles. Examination of the teeth showed evidence of clenching and bruxism. Cervical spine range of motion was limited and painful. The right temporal bone was

subluxated in extension (internal rotation) and spheno-maxillary distortion pattern as described by Buddingh [1] was noted.

Following this evaluation a sleep study was advised to rule out sleep apnea, however her history and presenting symptoms were consistent with sleep apnea and the sleep study could help differentiate between OSA or if related to central nervous system dysfunction. The sleep study did reveal a Respiratory Disturbance (RDI) Index of 17.1 and an Apnea Hypopnea Index (AHI) of 16.3. Also it was noted that there was lowest oxyhemoglobin saturation (Sa02) of 89% during sleep.

Treatment consisted of six SOT chiropractic cranial-dental treatments incorporating SOT intra-oral cranial adjustments [2] and spheno-maxillary craniopathy [1] in conjunction with occlusal balancing by a lower flat plane splint [3] by Dr. Rahimi. The treatment was performed over a 3-4 week period of time.

Results:

Following treatment the patient reported significant reduction of all symptoms. Follow-up polysomnogram was performed one month following prior study and with the dental appliance in her mouth she showed improvement as RDI and AHI were both reduced to 2.9 and lowest Sa02 was 92% during sleep. The patient had significantly reduced TMJ pain and the chronic myofascial neck and shoulder pain had gradually resolved over the 3-4 weeks of care. Due to her increased ability to sleep and increased oxygenation, she was also less fatigued and functional during the daytime.

Discussion:

The combination of SOT cranial therapy with a flat plane lower GELB type occlusal splint not only resolved this patient's apnea and accompanied symptoms but was also minimally invasive, less costly, and only required a 3 to 4 week treatment program. Splint type therapy has been found to be helpful for OSA patients and one prospective randomized study found "that a dental appliance could be an alternative treatment for some patients with severe OSA [3]." In addition to the standard SOT cranial therapy a portion of the cranial therapy rendered was based on a method of adjusting the sphenomaxillary suture as developed by Buddingh, which essentially attempts to balance tensions of the pterygoid muscle and related cranial bones.

Buddingh has determined that "The sphenoid bone is influenced to the anterior by the pterygoid process at the maxilla suture, the occiput to the posterior at the sphenobasilar articulation. Hypertonicity of the pterygoid muscles occurs when the patient's body requires the pterygoid muscle to balance the reciprocation of the anterior falx to the general dural tensions. The hypertonic pterygoid and the concomitant tension into the TMJ will purportedly be reduced via the spheno-maxillary adjustment. Clinical studies have noted that balancing the spheno-maxillary suture causes a reduction of the hypertonicity of the related muscles affecting occlusal

relationships. This change appears to have an affect also on the dental cone, the curve of Wilson and the curve of Spee [1]."

Working together the dental and chiropractic profession can help determine if dysfunctional postural patterns or OSA have predominant descending or ascending influences. In an important study investigating this ascending and descending contribution of posture and TMD imbalance, Sakaguchi et. al., while evaluating 45 asymptomatic subjects, found that "Body posture was more stable when subjects bit down in centric occlusion. Changes in body posture affected occlusal force distribution. Altering body posture by changing leg length shifted the occlusal force distribution to the same side that had a heel lift [4]."

While for the sake of clarity and ease in clinical assessment we would prefer patients to have either an ascending or descending contribution to postural influence, more commonly, they present with a mixture of both patterns. It is in these "mixed" presentation patients that chiropractics and dentistry can offer improved patient outcomes. The typical patient, such as the patient in this case report, that may likely need chiropractic dental co-treatment will usually present with a low pain threshold, low physiological adaptive range, and a history of musculoskeletal pain or injuries. Patients with OSA will also tend to have general poor health due to the lack of rest and oxygenation, which will predispose them to various chronic presentations.

Future research may need to determine whether the patient could achieve improved function with only chiropractic care or dental care and whether the optimal care would be a co-treatment methodology. Clinically many chiropractors and dentists are realizing that the relationship between posture and the stomatognathic system makes collaborative efforts necessary [5].

Conclusion:

With any case report the finding however apparently significant need to be evaluated from a cautious perspective because of the bias of the research clinician, the lack of a control group, as well as comparative sham procedure. The pre and post sleep study findings do show some objective change and the patient did report significant clinical improvement relating to reduced pain and function. However follow up studies with this patient are indicated. Greater study is needed to identify the subset of apnea patients that could benefit from this approach.

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Sleep apnea and anemia, is there a relationship?

Charles L. Blum, DC, Jeffrey A. Mersky, DC

Introduction:

According to a national sleep foundation, 26% of study subjects had a high risk of obstructive sleep apnea [1]. Obstructive sleep apnea is the most common respiratory disorder of sleep. This related sleep restriction leads to a variety of adverse physiologic and long-term health outcomes including all cause mortality, diabetes, and cardiovascular disease. Consequences of sleep apnea include increased human errors, loss of productivity, and elevated risk of accidents. Conditions such as acute and chronic insomnia, excessive sleepiness, and sleep apnea warrant public health attention, since residual sleepiness during the day may affect performance of daily activities such as driving a car.

This study is questioning whether there may be a relationship between OSA and anemia. A pattern has been noted of OSA patients presented to this office that have been treated by dental appliance therapies, surgical interventions, and a continuous positive airway pressure device where upon a blood test have been found to have anemia. Whether this relationship has a causal or casual relationship has not been determined. Since this office is involved with dental chiropractic treatment of TMJ related dysfunction it is not uncommon to see patients also with OSA [2].

A review of the literature has found that there are various studies investigating a relationship between children with sickle cell anemia and OSA [3]. In our aging population a relationship between anemia of aging (AOA) and OSA has been found. "World Health Organization defined anemia of aging (AOA) when men and women greater than 65 years, respectively, have unexplained hemoglobin (Hgb) less than 13 and 12 g/dl [4]." It has been suggested that AOA and OSA may share common inflammatory processes and that OSA inflammatory processes may interact with OSA hypoxia-induced erythropoiesis [4]. In another study that treated anemia in patients with OSA, congestive heart failure, and breathing disorders, they found that "Hemoglobin level improvement correlated with improvement in OSA+CSA (central sleep apnea), CSA, minimal SaO2, Epworth Sleepiness Scale score, and New York Heart Association class (all $P < .001$) [5]."

Due to recently finding clinical relationships between sleep apnea and (prior undiagnosed) anemia, patients presenting with apnea to this office are evaluated for anemia by laboratory blood tests when indicated. The following case represents characteristic similar to a subset of patients seen in this office who have presented with history of sleep apnea.

Case History:

A 66-year-old female presented with chronic fatigue (5 year duration), cervical spine and temporomandibular joint (TMJ) dysfunction. She presented with sleep apnea, which was moderately treated by a continuous positive airway pressure (CPAP). The patient had obesity

issues, was pre-diabetic, and thyroid imbalance. Her medications included Levothyroxin (thyroid), Propanolol HCL (hypertension), and Simvastatin (cholesterolemia).

Methods/Treatment:

Due to the complex nature of her presentation laboratory analysis was performed to determine if there were any other issues contributing to her ongoing symptomatology. Of significance the blood test revealed: elevated glucose levels, elevated hemoglobin A1C, low RBC count, low hemoglobin, and low hematocrit, iron levels were on low side, low neutrophils, and elevated lymphocytes.

Sacro occipital technique (SOT) cranial TMJ care were utilized which included category two treatment to reduce sacroiliac joint hypermobility, balancing of TMJ function by cervical stairstep and manual cervical adjustments of the cervical spine, and cranial sutural technique as described by DeJarnette. The patient was being seen concurrently by a dentist who specializes in TMJ dysfunction and sleep apnea. The patient was using both a day and nighttime dental appliance, which she was using along with the CPAP.

Specific dietary protocols were utilized to facilitate balancing her blood chemistry. These consisted of Blood Type Diet A (vegetarian diet) and specific nutrients to address the anemic issues and other issues such as iron citrate (25 mg/day), sublingual B12/Folic Acid (2,000 mcg/twice a day), ginger/curcumin (to reduce generalized inflammation), fish oil EPA/DHA (720/480 mg/day), laucricidin (to help her immune function), and vitamin C (1,000 mg/4 times a day).

Results:

Patient's fatigue improved significantly within two weeks of beginning treatment. While the cervical spine and TMJ dysfunction improved at the two week mark she did not have resolution until one month. She was seen at intervals of twice a week for three weeks, then once a week for 3-4 weeks, and then once a month until the present. She took the recommended supplements for 4 months and the laboratory analysis revealed ongoing anemia issues however the blood values were improving though her glucose and hemoglobin A1C had worsened. Upon discussion with the patient she indicated that she was not following the recommended diet but noted that she would take the nutrients.

Ultimately her anemia improved showing increased RCB production, hemoglobin, and hematocrit findings. Her fatigue had lessened and her myofascial and skeletal pain had significantly decreased particularly with regard to her cervical spine and TMJ regions. All of her activities of daily living increased due to reduced pain and increased energy. However she realizes her condition is complex and will need long term care to prevent reoccurrence of prior symptoms. While the laboratory analysis indicated improved blood chemistry trends, it still appears she will also need long term care and monitoring for optimum rehabilitation. She is currently compliant with monthly chiropractic care, utilizing a TMJ nighttime appliance, CPAP, and is regular with her nutrients (based upon laboratory analysis), however she is not compliant

regarding her diet, which at this time includes too much sugar, carbohydrates, and processed foods.

Discussion:

While there is a relationship between TMJ disorders and OSA [2] what is not clear is whether there is a clear relationship between OSA and anemia. A suggested relationship has been associated with possible hypoxic effects related to apnea and its affect on the erythropoietin (EPO) feedback loop. Essentially a feedback loop involving erythropoietin helps regulate the process of erythropoiesis so that, in non-disease states, the production of red blood cells is equal to the destruction of red blood cells and the red blood cell number is sufficient to sustain adequate tissue oxygen levels but not so high as to cause sludging, thrombosis, or stroke. Erythropoietin is a glycoprotein hormone that stimulates red blood cell production and is produced in the kidney and liver in response to low oxygen levels. In addition, erythropoietin is bound by circulating red blood cells; low circulating numbers lead to a relatively high level of unbound erythropoietin, which stimulates production in the bone marrow.

SOT chiropractic and cranial techniques commonly involve treatment of multifactorial conditions, which can involve secondary non-musculoskeletal conditions. This case report described a patient who presented to this clinic with musculoskeletal issues, TMJ dysfunction (co-treated with dentist), sleep apnea (treated with CPAP), and laboratory tests suggesting various conditions such as anemia. In this clinic there has been a pattern of patients presenting with OSA and subsequently anemia found on laboratory blood analysis. Since OSA has overlapping symptoms with anemia it is possible that a clinician may not anticipate that the fatigue in a patient's presentation may be related to anemia and not just the patient's OSA.

Conclusion:

The purpose of this case report is to illustrate a subset of patients seen in this clinical practice, which involves dental co-treatment of TMJ disorders, OSA, and secondary effects or associations with anemia. It is unclear what the exact relationship may be between OSA and anemia and this may related to hypoxia and erythropoietin feed back loop. Greater study into the relationship of TMJ disorders, OSA, and anemia is suggested to determine if the findings presented in this case report have a causal or coincidental relationship.

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Dental chiropractic interdisciplinary care of three patients with different conditions yet similar symptom presentation: A case series.

David Shirazi, DDS, MS MA LAc, Richard C. Gerardo, DC, Charles L. Blum, DC

Introduction:

Dentists and chiropractors have been treating patients with temporomandibular joint disorders (TMD) for decades [1]. In the past two decades dentists and chiropractors have begun the process of developing co-treatment methodologies to facilitate and improve patient outcomes. One aspect of developing this mode of co-treatment involves determining whether a patient's primary presentation originates from postural (lower extremity, pelvis, and spinal) influences or TMD [2]. John Beck, MD developed a method for dentistry of testing the body and Autonomic Nervous System (Motor Reflex Testing – MRT) to determine which orthopedic structure related to balance is the patient's primary presenting condition associated with nervous system irritation [3].

From the Sacro Occipital Technique (SOT) and Cranial perspective, it is believed that while the MRT is a valuable test (most can dictate the primary source of orthopedic imbalance), the MRT needs to be incorporated with SOT findings to create a method for an optimal dental chiropractic co-treatment process. Incorporating MRT and SOT differential diagnosis includes the chiropractic SOT analysis, which can lead to a secondary interpretation of the MRT test results. Utilizing SOT cranial diagnosis is also important in an ascending postural pattern and a descending TMD pattern to include another primary diagnosis: the cranial lesion. Therefore, from this perspective, when the MRT indicates an ascending or descending primary pattern a neurological irritation rather than a musculoskeletal condition is present.

Motor Reflex Testing (MRT) (also called Autonomic Reflex Testing) is purportedly a system of evaluation with the premise that structural imbalance or compromise produces posture avoidance mechanisms such as loss of balance or strength to testing of a muscle. The following are descriptions of the three common tests used to evaluate the patients in this case study and include the wall, parachute, and dark/light tests.

Wall test: In this test, patient is standing upright with feet in the patient's normal position for standing. Both arms are bent at 90` facing forward. Doctor makes sure patient is standing like a statue, and not pushing toward the doctor, who will be pressing inwardly on the arms individually (the radial nerve is pressed on both sides to stimulate the nervous system directly). If the patient's arms are unable to sustain their position the wall test is positive and the patient is considered to be in a state of structural instability. Next, to determine if the patient has an ascending or descending component to their presentation, he is asked to place his back against a wall and the doctor performs the test again. If test shows positive again, that means the patient likely has an ascending issue originating in the feet. If patient can now hold his hands firm (test is negative) after radial nerve provocation and inward pressure of the arms the primary dysfunction is considered to be descending from either the temporomandibular joint (TMJ), cranium or cervical spine (or any combination thereof) downward.

Parachute test: While seated upright with no back support, the patient outstretches his arms in front of the torso, and turns the thumbs down. The ability to hold the arms in this position is

tested by the doctor by pressing downward gently. The doctor then scratches over radial nerve area and the arms are individually retested. If an arm comes down, it is considered positive for Trigeminal nerve inflammation or involvement. Next, a tongue blade is placed on the teeth to hold centric relation (ask patient to count 66-77 and place the jaw where the jaw goes in that phonetic position). With tongue blade in place the parachute test is repeated. If the patient's arms can resist the downward pressure it is believed that the patients TMD is the cause of their Trigeminal inflammation. Following this test (if positive), to differentially diagnose between TMD and cervical spine influences as well as to determine a possible primary concern of the ANS, the patient stands up while tongue blade is still inside the mouth and perform the wall test. If the patients standing test is now negative with the tongue blade in the mouth the patient is considered a TMJ primary (with the tongue blade in the patients' mouth (the TMD component relieved) the patients balance returned). If patient tested positive for the standing test with the tongue blade further testing is needed to determine the primary structural injury.

Dark/light test: While patient is seated upright with no back support, place patient hands in same position as when performing the wall test. Retest with inward pressure stimulating the radial nerve both sides and test for the patient to resistance this inward pressure to get a baseline. Then either have patient close their eyes, or place a black object in front of the patient and retest. If patient now cannot resist the inward pressure, the patient is considered to be in a state of reflex sympathetic dystrophy (RSD). Retest the patient after placing the tongue blade in the mouth to attain centric relation. If following closing their eyes/staring at a black object they can now resist inward pressure, then the TMD is the cause of RSD. If not, and they still have difficulty resisting the inward pressure then lightly scratch the cervical spine and retest (light touch stimulates the A delta fibers and temporarily stops nociception firing). If then the patient can resist inward pressure the cause of the patient's RSD is originating in the cervical spine. This test can also be performed on any of the upper or lower extremity peripheral nerves.

Along with standard dental and chiropractic (sacro occipital technique) SOT diagnostic protocols MRT was used to help differentiate the various types of patient presentations. These differential diagnostic procedures are believed to help determine where to focus care and how to monitor the patient's progress in an effective manner as these tests are repeated to determine how the patient is responding to care and to re-evaluate for new primaries.

Case Summary:

Symptom presentation can often be confusing since sometimes the treatment will need to vary regardless of what the patient describes what or where their pain might be. For instance, in the three cases discussed in this report series each patient presented with jaw pain, limited cervical range of motion, and some related headaches. Patient A presented with a closed lock, with scoliosis, and determined by MRT to be a cervical primary. Patient B presented with a history of a jaw fracture that healed in a "broken" position (by the oral surgeon) and determined by MRT to have both a primary TMJ and cranial contribution. Patient C was a classic closed lock case (disc displacement with and without reduction) with tension type headaches and neck pain and determined by MRT to be a temporomandibular joint (TMJ) primary.

Patient A:

Patient A is a 18-year-old female presented with chief complaint of jaw locking, worse upon awakening. MRT confirmed a cervical primary condition. Cone Beam Computerized Tomography (CBCT) was taken and revealed a closed lock reduction (disc displacement without reduction), military neck (mild kyphosis), ligament laxity, and scoliosis. Decreased space was noted between C1-Occiput, and C1-C2. The patient indicated she was a cheerleader and had sustained many falls. Her history appeared to corroborate the MRT, which suggested that the temporomandibular (TM) disc displacement being secondary to cervical spine issues.

Dental Treatment Protocol: The patient was prescribed a nighttime deprogramming orthotic. This not only reduced the clenching events and their duration, but also guided the condyles into centric relation with each "clench." The goal of this initial intervention was to control nighttime parafunction, as well as to relieve excess upper trapezius firing due to the same parafunction. Within a few days of using the nighttime orthotic the patient noted over 90% reduced early morning "locking."

Chiropractic Treatment Protocol: The MRT was found to be an indicator of the most neurologically irritated area at that time and not a chiropractic diagnosis. SOT indicators found that the patient had an unstable musculoskeletal system leading to the overcompensation of the musculoskeletal system and the overloading of the cervical spine

The diagnosis was a category two (sacroiliac joint hypermobility syndrome) with lumbar, thoracic, and cervical joint fixations. Sutural compression and tensions in the cranial facial structures with associated myofascial restriction from the primary TMJ muscles (masseter, ptyergoids, and temporalis). The cervical primary diagnosis from Dr. Shirazi was used as an indicator for a musculoskeletal imbalance that needed diagnosis and treatment.

Category two [4] SOT blocking protocols were performed including the use of a trochanter belt with ancillary techniques performed including Iliofemoral, psoas /diaphragm release, and 1st rib manipulation. Prior to category two blocking tension was released in the dural membrane using an SB+ blocking procedure. Cervical compaction testing elicited a positive result which was cleared with active and passive manual cervical manipulation associated with step one and two of SOT sutural cranial techniques. The TMJ imbalance was treated by releasing the cranial sutural tension and distortion of the craniofacial structures along with soft tissue manipulation around the TM joint to help reposition the TM disc. In order to the TM disc position it was communicated to the dentist that prolotherapy would be important to help reduce retrodiscal tissue laxity.

Dental Chiropractic Treatment: After cervical spine issues were addressed and patient treated with SOT and cranial protocols, a day orthotic was fabricated in the same centric relation position associated with symmetrical cervical positioning. The orthotic was to be worn mostly when exercising and especially when cheerleading. During that time, in coordination with the chiropractic care prolotherapy was initiated on right and left posterior joint space, to reduce ligament laxity and facilitate joint stability without the day or nighttime orthotics.

Six months after treatment was initiated the patient no longer had any jaw pain or had TMD, posturally the spine was found in a more symmetrical AP plane, and the space between C1-occiput and C1-C2 was improved.

Patient B

Patient B is a 40-year-old male presented with chief complaint of jaw clicking with intermittent locking, ear congestion and pain, and neck pain. Motor Reflex Testing confirmed a TMD Primary condition. CBCT was taken and was discovered cervical subluxations, retruded condylar position, disc displacement with reduction (clicking and popping), calcified stylohyoid ligaments as well as gonial notching, both of which are common signs of a history of nighttime parafunction. Patient was an avid golfer and plays baseball. It was considered that positional changes in golf may have contributed to his presentation.

Dental Treatment Protocol: A daytime orthotic and nighttime deprogramming orthotic were prescribed at the same time. The goals were not only to reduce the clenching events and their duration at night, but also guide the condyles into a centric relation when the patient chews or swallows during the day. The nighttime appliance focus was to control nighttime parafunction, as well as to relieve excess upper trapezius firing due to the same parafunction. As MRT presented a TMD primary condition, greatest success can be achieved by clearing the neurology of the structural injury of greatest importance to the ANS.

Chiropractic Treatment Protocol: The diagnosis was a category two (sacroiliac joint hypermobility syndrome) with lumbar, thoracic, and cervical joint fixations. Sutural compression and tensions in the cranial facial structures with associated myofascial restriction from the primary TMJ muscles (masseter, ptyergoids, and temporalis).

Category two blocking [4] protocols were performed including the use of a trochanter belt with ancillary techniques performed including Iliofemoral, psoas /diaphragm release, and 1st rib manipulation. Tension was released in the dural membrane prior to category two blocking using an SB+ blocking procedure. The patient's TMD was treated by releasing the sutural tension and distortion of the craniofacial structures along with soft tissue manipulation around the TM joint to help reposition the TM disc.

Dental Chiropractic Treatment: As the patient was wearing the day and nighttime orthotics, SOT chiropractic adjustments commenced and during the course of the patient's use of the orthotics. When cervical spine was 'corrected' and in a symmetrical stable position, prolotherapy was utilized to recapture joint displacement.

Five months after treatment was initiated the patient no longer had any jaw pain, had TMJ stability, the spine was stabilized in a lateral plane, and ear symptoms had resolved. While the patient was under chiropractic care he had reduced cervical spine pain however as the patient felt better he attempted to reduce the chiropractic treatments and subsequently his neck pain increased.

Patient C

Patient C was a 15-year-old male presented with chief complaints of jaw pain and tension type headaches, constant. MRT confirmed a cranial and TMD primary condition, which was clinically assumed to be due to the repetitive nature of the mandibular condyle contacting the temporal bone of a patient. CBCT was taken and was discovered cervical spine intersegmental asymmetry, retruded condylar position, and severe condylar remodeling. The severe condylar remodeling was assumed to be caused subsequent to being kicked in the jaw while on the floor and then being surgically corrected (mouth wired shut) to that dysfunctional position. The patient had a "heart shaped" condyle, a calcified stylohyoid ligaments as well as Gonial notching, which are signs of a history of nighttime parafunction. The patient is a young high school student who plays the tuba in the marching band.

Dental Treatment Protocol: A daytime orthotic and nighttime deprogramming orthotic were prescribed at the same time. The focus was to not only reduce the clenching events and their duration at night, but also guides the condyles into centric relation when the patient chews or swallows during the day. The orthotics also prevented the condylar repetitive stress to the temporal bone eminence day and night. Of note, the nighttime appliance was not rigid, which had as its additional goal of allowing normal cranial flexion and extension, and also allowing for normal cranial bone and suture compliance. The nighttime appliance was to control night parafunction, as well as to relieve excess upper trapezius firing secondary to this TM parafunction.

Chiropractic Treatment Protocol: The MRT was found to be an indicator of the most neurologically irritated area at that time and not a chiropractic diagnosis. SOT indicators found that the patient had an unstable musculoskeletal system with significant muscle tension and distortion.

The SOT diagnosis found an unstable category two [4] with thoracic spinal joint fixations. Sutural compression in the cranial facial structures was found associated with myofascial restriction in the primary TMJ muscles (masseter, ptyergoids, and temporalis). There was a dural torque pattern that transmitted down to the upper cervical spine, which appeared to contribute significantly to the cervical segmental asymmetry and headache symptoms.

Category two blocking protocols were performed including the use of a trochanter belt with ancillary techniques performed including Iliofemoral, psoas /diaphragm release, and 1st rib manipulation. Tension was released in the dural membrane prior to category two blocking using an SB+ blocking procedure. The TMD was treated by releasing the dural and sutural tension and distortion of the craniofacial structures along with soft tissue manipulation around the TMJ to help reposition the TM disc. In this case it became clear that the only way for this patient's specific condition to resolve was through extensive cranial treatment

Dental Chiropractic Treatment: During the process of the patient wearing day and nighttime orthotics, chiropractic adjustments were utilized through the course of dental and TMJ modifications. Initially acupuncture was attempted but the patient was not capable of tolerating the needles. Therefore electro- acupuncture was attempting and used successfully in conjunction

with the oral appliance therapy and SOT cranial adjustments to reach maximum medical improvement, which in this case was a complete resolution of presenting symptoms.

Five months after treatment was initiated patient no longer had any jaw pain, had a stable TMJ, the cervical spine was stabilized in a lateral plane, and was no longer having headaches.

Discussion:

In these three cases each patient presented with jaw, head, and neck pain but with each case the treatment varied. The MRT and other dental and SOT chiropractic related tests helped guide patient care. MRT is a safe, simple, repeatable and method to differentially diagnose the region of the body contributing to the patients presenting symptoms and help guide treatment for each specific patient. Clinically the MRT can be a very useful tool to determine how to prioritize patients' treatment particularly when a patient presents with spine/pelvic/foot or TMJ issues (i.e. multiple symptoms). Developing a methodology to prioritize an ascending versus a descending primary condition helps determine what part of the body should be treated and resolved first. As found clinically and with the three patients in this case report when the proper sequence is found, this can aid the therapeutic intervention. Also, MRT can help determine if there is not a structural component to their presenting symptoms, particularly where the patient complains of pain in the orthopedic structure, and therefore can help aid in determining if there is a referral source of that pain.

From a chiropractic SOT perspective instability in the kinematic chain above or below the cervical spine will create asymmetry and increased compensatory tension into the musculoskeletal system. While the MRT is an extremely valuable test to help guide dental co-treatment and monitor patient progress the SOT chiropractic examination and treatment protocols are necessary to treat the patient so that they can have an optimal response to the dental interventions. At this time from an SOT standpoint it appears that when the MRT indicates an ascending or descending primary it is a sign of neurological irritation and not necessarily a musculoskeletal diagnosis to dictate chiropractic treatment.

Further study is indicated to evaluate how dentists and chiropractors can work together utilizing their varied diagnostic modalities [5]. Determining what may be the primary ascending and descending contribution to the patient's TMD presentation can be an essential part of the assessment and treatment process. The MRT gives the dentist a valuable tool to help guide their care and the SOT examination and treatment modalities offers the chiropractic valuable tools to facilitate the patients ability to adjust musculoskeletally to changes in occlusion or condylar position.

With case reports where there are no control groups or comparative sham procedures utilized there is always the chance of biased reporting. It is also possible with patient presentations that the improved clinical findings were related to a regression to the mean. However in these three cases it did appear that the patients' condition was chronic or stable and that care followed a progression of improvement consistent with the initial examinations and treatment rendered.

Conclusion:

In these three case reports dental and chiropractic diagnosis and treatment yield good outcome. Of interest is that while some of their symptoms were similar they all needed different types of treatment. Sometimes where the pain or dysfunction appeared to be located was not the region needed the maximum intervention. As with any case report no strong extrapolations can be made from the results or data, still there the clinical success suggests that further study is indicated into dental chiropractic co-treatment. This co-treatment study would seem especially important with patient that are presenting with both musculoskeletal and dental issues. Also when a dentist or chiropractor that is treating a patient with TMD finds their care is not creating the necessary outcome it may indicate the need for referral and co-treatment.

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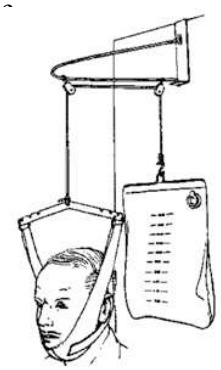
Cervical traction, TMJ disorders, chiropractic and dental co-treatment: A case report.
Charles L. Blum, DC, Richard C. Gerardo, DC

Introduction:

Cervical traction has been discussed in the literature for years. This method of treatment for neck pain has been found to be an effective tool in treatment of cervical spine conditions such as disc related compression, osteoarthritis, myofascial tension secondary to temporomandibular joint (TMJ) disorders, and acceleration/deceleration injuries without post trauma instability [1-5].

Although cervical traction is rarely dangerous to perform, there are still some contraindications that must be taken into account when performing this treatment in a clinical setting or prescribing it for home use. With severe cervical spine pain or dysfunction, a thorough examination and radiographic investigation may need to be performed. It is essential to rule out any neoplastic conditions, unstable post-traumatic cervical spinal segments, syndromes associated with joint instability (e.g., Marfan syndrome), and thoracic outlet syndrome where traction may compress the brachial plexus between the anterior and mid scalenus muscles [1].

Shore et al noted "that patients in cervical traction for the treatme cervical spine syndromes frequently complain that the traction m them worse. It is possible that such patients may be suffering fro TMJ symptoms [6]." This was because the majority of all cervical traction units utilize a chin strap which causes pressure or compression to the mandible and resultant increased stress to the condyles, discs, and related joint soft tissue. As a means to deal this pressure or stress to the TM, they suggested that "the physici treating a patient with cervical traction should consider prescribi occlusal splint for patients without posterior teeth. The splint sho be designed to distribute the stresses through the mandible to the maxillae via the teeth, splint, and TMJ [6]."



The purpose of this article is to discuss the use of a novel form of cervical traction, Pronex Cervical Traction, as a means to facilitate the positive effects of cervical traction due to the application of traction without any chin or mandible pressure as a means to limit any iatrogenically caused temporomandibular joint (TMJ) disorders [7-9].

Case History:

The patient presented as a 66 year- old female, happily married, 5'10" tall with significant pain and stiffness in her neck and crepitus (popping and clicking) when using her jaw. She was referred to me by her dentist for cranial and sacro occipital technique (SOT) treatment for conditions interrelated to her TMJ disorders (TMD). Her presenting symptoms consisted of neck

stiffness and pain with loss of range of motion. She could not tolerate cervical manipulation. The pain and stiffness disrupted her sleeping, related to TMD problems, and adversely affected her ability to drive due to the pain and restriction in turning her head.

Methods/Intervention:

Evaluation of patient's cervical range of motion was found to be reduced by 30 % of normal and radiographic analysis revealed moderate degenerative joint disease in the lower cervical spine from C4-C6 . Palpation of the cervical spine musculature and associated soft tissue found marked fascial restriction, rigidity. There was pain upon palpation (as reported by the patient). Range of motion [10-12] and myofascial palpation for pain [13-15] have both been found to have some reliability and validity.

Treatment consisted of cervical traction utilizing the Pronex Cervical Traction. This is a hand controlled pneumatic traction device which does not apply any pressure or tension to the chin or mandible. The cervical traction was applied for 10-15 minutes immediately before the treatment of the cervical spine and the TMJ. The patient's head was placed in the traction unit in the supine position and the doctor pumped the sphygmomanometer bulb until the patient felt a mild distractive pressure in the cervical spine. Then the patient was given the sphygmomanometer bulb to pump when she felt her muscles had relaxed and no cervical traction was felt. When there was no traction felt by the patient, the patient then gave the bulb 2-3 more pumps until she felt some traction and then continued to relax in that position. Following 15 minutes of care the patient was then treated with SOT procedures; particularly cervical stairstep correction [16] and cranial therapeutic techniques for the TMJ [17].

Results:

It was significant that the patient allowed her neck muscles and cervical spine to be manipulated and treated following the cervical traction. She had not at allowed this manipulation in approximately 10 years. Following treatment the patient had a marked increase in cervical range of motion (reached normal levels) and a 90% decrease in pain and tension on palpation. Immediately following traction the patient could relax and the cervical spine manipulation and the associated soft tissue were much less resistant and more responsive to treatment, which was believed to increase the effectiveness of the interventions. While the patient did have relief from the care rendered, the cervical manipulation was performed with very low force and no residual pain to the patient. The ability to treat the cervical spine also appeared to aid in her post-treatment decrease in TMJ related tension and pain.

Discussion:

Since the advent of chiropractic and dental co-treatment of TMJ disorders, it is not uncommon for patients with TMJ pain or dental co-treatment to be seen by chiropractors [18-23]. As

demonstrated with this case, there is a value of being able to perform cervical traction without creating any adverse tension or pressure to the TMJ, dental occlusion, and related soft tissues.

Multidisciplinary models of care for various types of conditions appear to be the wave of the future for the treatment of complex patient presentations and treatment of TMJ and cervical related dysfunction. This represents one such opportunity [24]. Ascending and descending issues can contribute to a patient's symptom presentation. This suggests that TMJ dysfunction may contribute to cervical spine pain and cervical spine pain may contribute to TMJ pain or disorders. In one chiropractic study, Vernon and Ehrenfeld concluded that cervical spine pain "may be interrelated with temporomandibular joint syndrome due to malocclusion and that when such cervical spine pain is not satisfactorily responsive to routine chiropractic care, dental examination may be indicated [25]."

On the other hand, dental studies have reported that malocclusion, TM condylar position, and airway dysfunction all can have an effect on cervical spine and head position [26-8]. Yet in clinical circles we are commonly left with the situation that the body is a closed kinematic chain with relationships between psychosocial, biomechanical, myofascial, neurological, ergonomic, and a multitude of other integrating factors. For this reason it is not unexpected that the research has found that posture and dental occlusion [29] and the neck and TMJ [30] are closely integrated. Essentially, stress to one joint will commonly affect the other one. Therefore to be able to effectively apply a therapeutic approach to either joint without exacerbating or creating an adverse reaction would be preferred.

While this case was dramatic to the patient, chiropractor, and dentist, it is very difficult to generalize these results without further study. Limitations to the study included are similar to most case reports in that there were no control subjects or comparative sham procedures. Future studies could incorporate objective assessment tools and other forms of cervical traction, which may or may not have pressure to the jaw or chin. These greater studies could help rule out confounders such as the placebo effect, regression to the mean, and ideomotor effect. Of significance is that prior to the cervical traction and SOT cervicocranial treatment, the patient did not allow chiropractic treatment of the cervical spine for the past 10 years. Also of significance is the temporal relationship between the treatment rendered and her immediate increase of motion and decrease of pain.

Conclusion:

The purpose of this case was to explore the efficacy of using cervical traction without pressure to the jaw to support chiropractic treatment as well as to facilitate a patient's ability to receive care for neck and jaw pain and stiffness. The value may be what might be the long term effect of the traction, if preformed as a daily treatment as a home therapy. Greater study needs to be performed to evaluate whether the findings in this study could lead to larger group studies with controls. While the face validity of creating pressure upon the jaw with cervical traction would be expected to have an adverse effect, further comparison studies are needed to come to a definitive conclusion. Further research is needed to determine if patients that need cervical

traction, yet have some TMJ dysfunction, represent a specific subset of patients that require this novel form of cervical traction.

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Chiropractic and Dentistry– The Need for Mutual Understanding of TMD Co-treatment: A Case Report.

Charles L. Blum, DC

Introduction:

Like the story of the blind men groping around an elephant and each one proclaiming they know what the elephant is by their limited experience it is common in healthcare that professions tend to wear diagnostic blinders. Both the field of dentistry and chiropractic are entering the arenas of interdisciplinary care [1-4]. With the treatment of the temporomandibular joint (TMJ) and its related disorders (TMD) dentists and chiropractors commonly see their roles as being independent and sufficient for "all" types of presentations. The purpose of this case report is to illustrate how a patient presenting for chiropractic care clearly needed dental co-treatment for his chronic TMD bruxism condition.

Bruxism is characterized by the grinding of the teeth and is considered an oral parafunctional activity that often occurs during sleep. In most people, bruxism is mild enough not to be a health problem. In some cases bruxism may relate to some other underlying condition which may be emotional, stress related, airway related dysfunction, and a myriad of other triggers.

Within the chiropractic community it is commonly understood that there are many different chiropractic techniques all of which claim that they have the answer for most conditions. Since chiropractic care, regardless of the technique, is considered helpful and most practitioners utilize a conglomeration of techniques, it is likely that each technique has something valuable to offer. Figuring out which subset of patient may respond best to which technique is worthy of future investigative comparative studies.

Similarly in the field of dentistry and particularly with the care of TMD there is a vast expanse of methods and techniques to treat patients with clenching, bruxism, oral parafunctional behavior, and other related TMJ disorders. One faction believes all TMD conditions are biopsychosocial [5,6] whereas another group, while acknowledging a biopsychosocial component, believes that dental occlusion also can play an important role [7-9]. Within each group there are multiple factions who have various treatment methodologies and rationales, commonly discussed with confidence beyond the evidence. Regretfully dentistry differs from chiropractic in that some treatments can be relatively irreversible.

As a means to build a bridge between the professions [10-3] Steigerwald and Maher developed an outcome assessment tool for chiropractors to determine when a patient might have a TMD condition and warrant a dental referral [14]. Blum and Globe developed a preliminary outcome assessment tool for the dentist to use when a patient might have myofascial postural influences affecting a patient's TMD condition and warrant a chiropractic referral [15]. At this time neither tool seems to be widely utilized.

In discussions with dentists who specialize with TMD care one common response about their reticence to refer to a chiropractor is that chiropractors will tell the patient that their dental problem is a "cervical vertebra that is out of place [16]." For some chiropractors they contend there

are chiropractic studies illustrating that some forms of TMD have been successfully treated with chiropractic manipulation to the spine [17-23].

In discussions with chiropractors who treat patients with TMD and do not co-treat with a dentist they commonly believe that chiropractic treatment can take care of the patient's presenting condition and that all dentist do is make splints or affect the teeth which make the condition worse. However the dental literature has many published studies of TMD patients treated without chiropractic care successfully [24].

Which profession is right? Which technique or methodology within each profession is the correct one?

The answer cannot be conclusive at this time, and even a preliminary answer is guarded. What seems reasonable is that both professions could be right and all techniques may be helpful for a subset of the TMD patient population. However it may also seem reasonable that for some conditions one or the other profession, or possibly both professions may be needed for the optimal outcome. Likewise many techniques may help but with some patients only one might be preferable. At this time both the dental and chiropractic profession have much work to do to build an adequate evidence base in this regard.

With the following case history it illustrates the limitations of chiropractic care for the treatment of a patient with an acute trauma induced cervical sprain/strain and chronic bruxism.

Case Report:

A 19-year-old male presented to my office with a history of attempting to do a back flip on a trampoline when he landed on his head and compressed his neck. While taking the case history his parent, who was in the room, noted that he also had persistent and intense bruxism at night creating significant sounds that would waken others near his room at night. Upon questioning the patient reported that he has had multiple orthodontic procedures and currently has a maxillary metal bridge placed lingually along his incisors, which was described by the patient as a retainer. The orthodontic care the patient received began initially with a transverse expander to widen his hard palate and then was under orthodontics for what was believed to be aesthetic reasons.

Methods/Intervention:

Evaluation revealed decreased cervical range of motion with some sensitivity to palpation at the right C3 transverse process, sacroiliac joint sprain with pelvic torsion (left short leg), and significant TMJ related findings. Upon examination it was noted that on closing his incisors would contact end to end typical of a dental class three (mandibular occlusal protrusion) presentation and when palpating his retro-condylar space (between the mandibular condyle and mastoid) there was very minimal space typical of a dental class two (mandibular condylar retrusion) TM condyle position. He had a left opening deviation, where he would open at the midline, shift to the left and end at full opening at the midline.

Treatment:

Treatment involved reduced thoracic anteriorities, sacro occipital technique (SOT) orthopedic blocking to treat the L3 right rotation until the swelling and sensitivity at the C3 transverse subsided [25], pelvic supine block placement to reduce pelvic torsion [26-8], and treating the cervical spine with cervical stairstep [29], HVLA adjusting based on cervical stairstep findings, and DeJarnette step one sutural cervical cranial releases [30]. Some attempt was made to evaluate the upper and lower dental arch development by releasing the cruciate suture sagittally and the mandible transversely with the goal of determining whether this might help both the occlusion (class three) and condylar position (class two).

He was given an exercise with his tongue placed at a region behind the front teeth and pressing firmly as he opened and closed, which normalized his TM joint translation eliminating the deviation [31]. He was told to do this exercise 3 sets of 10, 5 times per day, and reevaluate in 2-4 weeks whether he would need to continue by opening without the tongue pressure repeatedly.

Results:

The cervical spine range of motion and pain improved immediately following the treatment. The TM joint translation relating to the deviation was improved but it was evident that he would need to continue with the exercise likely daily for 2-4 weeks to sustain any lasting change.

It was clear however that there was no improvement in the occlusion or condylar position, which warranted a referral to a dentist familiar with functional orthodontics trained within a dental chiropractic co-treatment methodology.

Discussion:

While the response to the treatment for the presenting complaint of cervical pain and decreased range of motion was improved what appeared a greater concern was his chronic bruxism and mandibular position. Typically patients with a class two position will have some degree of obstructive airway compromise [32-5] found frequently at night leading to bruxism. One theory for night-time bruxism is that the body unconsciously attempts to open the airway space by advancing the jaw forward along with the tongue and when the jaw naturally goes back to its resting position backward it draws the tongue with it and will close the airway space. This process then repeats itself the whole night leading to chronic bruxism.

The challenge with this particular case is that proper dentition is optimal with a class one position and the patient's presentation of a protruded jaw with incisor's touching end to end when closed is commonly treated by retruding the mandibular condyle backward within the condylar fossa. However his condyle was already retruded to the point where there was virtually no space for palpation between the ramus of the mandible and the mastoid. Commonly with this type of condylar position the mandible is advanced forward to facilitate bringing the tongue

forward and opening the airway space. But with this patient his mandibular teeth were already positioned too far forward relative to the upper dental arch, hence the dental challenges of treating this case.

A dentist who specialized in functional orthodontics and dental chiropractic TMD co-treatment was contacted via email and a letter introducing the patient along with the chiropractic clinical findings. The following was an excerpt from the dentist's email published with permission from the dentist:

> "Dental relationships are very often a different classification than skeletal ones, which many practitioners believe cannot coexist, but I know it does, having seen it and treated it many times in my career. Missing the coordination of skeletal and TMJ diagnoses leads to improper or inadequate treatment.
>
> "Cases in which the mandible is actually hypertrophic are really, really rare, but do exist, and can require a surgical intervention. More commonly, it is the lack of midface growth and development expression in the maxillae and cranial base that is the root of the issue. The more severely affected the midface is, the more it supports condylar distalization as the mandible tries to complete its genetic growth potential downward and forward and the maxillae and its teeth hold it back. Many orthodontic doctors address only the dental issue and actually pull the mandibular incisors lingually toward the tongue in an attempt to get them behind the maxillary ones. Usually they end up with an end on incisor relationship. The ALF (Alternative Lightwire Functionals) appliance has been a godsend for these patients, working far superiorly than any other appliances I have used for this over the years, and I have used almost all of them.
>
> "A nice easy diagnostic tool to use is to mentally scribe a level plane (or place a ruler) from the tragus of the ear to the ala of the nose of the patient's profile. Then drop a 90° angle from this plane just inside the nares and the lips and chin should be on this perpendicular. It really reveals well the midface's lack of development, regardless of where the teeth are positioned. Most malocclusions of whatever Class exhibit some degree of unrealized midface expression and will look flat (instead of the more ideal convexity) in this area. Most of these cases have airway issues, swallowing issues, sinus issues, and some degree of TMD. This creates parafunctional 'habits' perpetrated by the neuromuscular system in an attempt to self correct [36]."

Dental chiropractic co-treatment [10-2] can be a part of a rapidly growing field of interdisciplinary care [13, 37]. Since postural changes have been found to have an ascending affect on dental occlusion, condylar position, and airway space [38-43]; treatment of postural influences prior to irreversible dental procedures is preferred. Likewise occlusion, condylar position, and airway space has an affect on posture [38-42] so following any changes to those regions by the dentist, if the patient has a myofascial response (e.g., increased neck or back pain); a referral to a chiropractor may be indicated to facilitate the patient's accommodation to the descending postural influences.

Nocturnal bruxism [44] is not a condition that can be ignored particularly when it is chronic and associated with unusual dental morphological patterns, such as with this patient. Aside from the noise associated with bruxism there is often related masticatory muscle tension leading to a long-term affect on the dentition and airway space that can lead to serious sequela [45-6].

So that greater interdisciplinary relationships can be developed it is essential for the chiropractic profession to understand that no chiropractic type adjustment will change the shape of the teeth or the size of the mandible or upper dental arch. Chiropractic has its place in the treatment of TMD but we need to be reasonable and complementary so that our patients can receive the best care possible.

Conclusion:

SOT chiropractic analysis and treatment allowed for a relatively quick and easy resolution to this patient's neck trauma however his bruxism appeared to be much more complex than what could be expected to be helped by just chiropractic care alone. Therefore he was referred to a dentist who could assess and help co-treat this patient with the hopes of him not needing surgery to shorten the mandible, which is a common procedure for this type of presentation. The purpose of this case report was to illustrate a working treatment program where both chiropractic and dentistry can play an integral part in an attempt to improve patient care and outcomes.

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Chiropractic and dental care of a patient with temporomandibular and sacroiliac joint hypermobility: A case report.

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Introduction:

Generalized joint hypermobility (GJH) is a hereditary connective tissue disorder characterized by lax joints and the presence of musculoskeletal symptoms. The syndrome has been under-recognized and has only recently been taken more seriously 1-3. Prevalence in children has been estimated at 10-25% 2,3. Females tend to be affected more than males, and those of African or Asian descent appear to be affected more than Caucasians. GJH may underlie common orthopedic problems such as back pain. Certain sequelae of GJH are common. "These include acute ligament and soft tissue injury, overuse injuries, possible increases in fractures and a possible predisposition to degenerative joint disease after years of excessive joint motion 4. Left untreated or undiagnosed, hypermobility may result in a chronic pain cycle and high levels of disability 5. Further, it has been shown that there is increased pain sensitivity in teenagers who have had early pain experiences 6. There is some disagreement as to the definition of GJH and a number of scales have been used to aid diagnosis 1. "

In 2003 Hakim and Grahame developed a simple and reproducible self-reporting questionnaire that identifies individuals with hypermobility. Analysis demonstrated that a positive answer to any two questions in this five-part questionnaire gave the highest combined sensitivity and specificity for detecting hypermobility. The sensitivity and specificity was 84% and 80-89% , and overall the questionnaire correctly identified 84% of all cases and controls [7].

1. Can you now [or could you ever] place your hands flat on the floor without bending your knees?
2. Can you now [or could you ever] bend your thumb to touch your forearm?
3. As a child, did you amuse your friends by contorting your body into strange shapes or could you do the splits?
4. As a child or teenager, did your kneecap or shoulder dislocate on more than one occasion?
5. Do you consider yourself "doublejointed"?

Temporomandibular joint disorders (TMD) are a multifactorial condition with aspects of biopsychosocial and mechanical implications 8. A primary cause of TMD can be muscular hyperactivity and parafunction, as in the case of bruxism, with secondary effects on the oral musculoskeletal system, like various types of displacement of the disc in the temporomandibular

joint (TMJ) 9. TMD can often result in significant pain, with symptoms affecting other regions of the body 10. As TMD persists, dental occlusion, tooth health, condylar position 11, and airway space may be affected 12. The issue of GJH has been studied in the dental field and its possible relationship to TMD. The issue of GJH is therefore important when chiropractic and dental professionals are co-treating TMD patients 13,14.

Generalized joint hypermobility (GJH) has been considered a predisposing factor for the development of temporomandibular disorder (TMD). In the study by Pasinato, they found that "individuals with TMD associated or not to GJH do not differ significantly regarding clinical and psychosocial aspects, except in the mandible opening range of motion, which if kept at physiological levels can lead to a late diagnosis of TMD in these individuals 15." "One epidemiological study 16 has shown that individuals with GJH have a higher risk of developing reciprocal click, indicating a diagnosis of disc luxation and a lower risk of mouth opening limitation 15."

Winocur et al. stated that "hypermobility by itself does not affect the TMJ, unless there is a movement dysfunction such as a click or a joint lock. Thus, the GJH-associated parafunction may be worse to the TMJ, since the condylar translation movement happens with a higher pressure because of the joint overload 17." While there are studies that have not found relationships between GJH and TMD, some studies have a correlation 18,19. In the Hirsch et. al, study (n=895) the associations between GJH and reproducible reciprocal clicking or limited mouth opening were statistically significant in a trend test 20.
Pasinato et al., note that "as more health-care professionals and patients understand TMJ hypermobility, the more contributions we'll have to develop a more specific preventive approach to the TMD. Thus, the GJH could be included as a standard diagnostic component of this dysfunction. 15." The purpose of this case report is to share a novel protocol for the treatment of chiropractic and dental treatment of a patient with TMD that presented with hypermobility of the sacroiliac joint (category two 21) and TMJ.

Case History:

A 47 year old female patient presented November 2010 with chief complaints of pain when chewing, jaw pain, limited mouth opening range of motion, and TMJ crepitus. Patient was evaluated dentally and was found to have multiple areas of the masseters, open and closed joint capsule, cervical and trapezius trigger point pain. Imaging revealed disc displacement without reduction on left TMJ, with early degenerative joint disease as well. Motor reflex testing 22 showed patient as neurologically TMD primary, descending presentation.

Following dental evaluation and delivery of daytime repositioning orthotic and night deprogramming orthotic, the patient was referred for concurrent chiropractic treatment in early December 2010; sequence of the use oral orthotics prior to chiropractic referral was based on Motor Reflex Testing. Chiropractic evaluation noted pain to the jaw, left leg, and right hand. The patient reported a healed fracture of the thoracic spine (T7, T8). The cervical compaction test (Milgram's Test with Cervical Foramina Compression) noted primary cervical involvement. Range of motion in the cervical and lumbar regions were generally reduced by 10%. Evaluation

of the sacroiliac joint 23,24 found indications of a hypermobility syndrome (category two) with a right physiologically

Methods/Intervention:

Dental orthotic therapy was initiated within the first two weeks, with a daytime and night orthotics, to be worn 24 hours. Referral to chiropractic was initiated after orthotic delivery, based upon Motor Reflex testing presentation. After approximately 8-week, when it was determined that capsulitis of TMJ was no longer present, procaine injections were initiated at one month intervals, followed by prolotherapy.

In the first two months of chiropractic care the patient was treated for her sacroiliac joint hypermobility syndrome, manipulations to the thoracic, cervical, and craniomandibular system. Emphasis was made to treat the psoas and tensor fascia lata muscles bilaterally. The patient could not tolerate cervical adjusting and decided to stop chiropractic care for a period of time and substitute massage. By July 2011 her condition had not progressed and the dentist insisted that it appeared for her condition to resolve that the chiropractic care was integral for her recovery.

From July 2011 through February 2012 the patient was seen for chiropractic care weekly and then from February 2012 to April 2012 has been seen every other week. Dentally the patient received prolotherapy injections every 2-3 weeks on the side of TMJ adhesions and joint restriction, secondary to the hypermobile retrodiscal tissue. The injections (with procaine, dextrose and bacteriostatic water) were localized in the retrodiscal tissue and sometimes in the ligaments or adhesive tissues to break down the scarring. The prolotherapy was also used to create increased retrodiscal tissue tension to start a posterior ‘pull’ on the disc, owning to the anteriorly displaced disc.

The first four injections were with procaine alone, which was intended to act as lubricant to aid in joint movement, as well as utilize procaine’s' unique quality of breaking down into PABA, a 'B' vitamin. Procaine itself, should theoretically reduce scar tissue. adding dextrose to the injection tends to make it a pro-inflammatory compound that induces the body’s ability to address issues of increasing connective tissue stabilization via the prostaglandin/inflammatory pathway. After the first four procaine only injections the injection was switched to a 10% dextrose solution (prolotherapy), the other 90% being bacteriostatic water and procaine, for 6 more visits. Afterwards, it was increased to 25% dextrose, to induce a greater inflammatory response. In general, when there is a purely anterior disc displacement, the injection is given in the posterior joint space, as was this case. If the joint is medial or anteromedial, then it’s given laterally or posterolaterally, respectively.

The chiropractic care worked closely with the dental application of prolotherapy but informing the dentist when the disc and condyle were in an optimal position. Once in an optimal position the goal was to inject the retrodiscal tissue to help support the disc position on joint translation and preventing close locked positioning. Initially the left TMJ was not moving adequately due to adhesions in the capsule tissue and the joint would translate with a left deflection pattern. Joint distraction would cause pain to the left TMJ region.

Since her progress was slower than anticipated the dentist referred patient to an oral surgeon for an arthocentesis procedure into the left TMJ. However, she preferred the chiropractic care and prolotherapy, because she was resistant to the idea of the arthrocentesis. With the continued chiropractic care and prolotherapy injections by January 2012 the adhesions on the left side released and she was able to open normally. Following January 2012 the patient was seen every other week for chiropractic care.

Results:

The patient has made a good recovery of TMJ function. Initially the patient presented with chronic jaw pain, limited jaw range of motion - 27mm (normal range is 42-66mm), headaches, neck pain and lower back pain. As of April 2012 the patient is free of most pain, has full range of motion in the cervical and lumbar spine, negative sacroiliac hypermobility findings, and can open her mouth greater than 42mm with normal joint tracking and translation. The patient is still being treated with chiropractic SOT cranial and TMJ procedures on a bi-weekly basis to maintain stability and balance in the sacroiliac joint. The cranial and sacroiliac joint treatment was to help to support adjacent musculature as well as the musculature in her TMJ region, maintain disc position since she has a tendency to tense and clench her jaw which could predispose her to relapse.

Discussion:

In general, whenever there is a chronic disc displacement without reduction, there are strained, stretched ligaments in the posterior joint space. When cranial/chiropractic manipulation reduces the disc but it doesn't stay reduced, prolotherapy is indicated to strengthen and tighten the posterior band of ligaments.

“Prolotherapy is an injection-based complementary and alternative medical therapy for chronic musculoskeletal pain. Prolotherapy techniques and injected solutions vary by condition, clinical severity, and practitioner preferences; over several treatment sessions, a fairly small volume of an irritant or sclerosing solution is injected at sites on painful ligament and tendon insertions and in adjacent joint space during several treatment sessions 25.” “Side effects related to prolotherapy for back and neck pain, such as temporary postinjection pain, stiffness, and bruising, are common and benign. Adverse events related to prolotherapy for back and neck pain is similar in nature to other widely used spinal injection procedures 26.”

Prolotherapy, or "proliferative therapy," is also known as regenerative injection therapy and can be an effective modality for the treatment of TMD. Hakala discussed how prolotherapy can be used to help reduce “TMJ pain and joint noise in a majority of patients who have reached a plateau with use of an intraoral appliance, physical therapy, and home care 27.” Refai et. al., found that prolotherapy with 10% dextrose appeared promising for the treatment of symptomatic TMJ hypermobility, as evidenced by the therapeutic benefits, simplicity, safety, patients' acceptance of the injection technique, and lack of significant side effects 28.

Dental and chiropractic co-treatment has been found important for integrative care of patients presenting with complex musculoskeletal and craniomandibular presentations 29-32 Much of the interrelationship between dentistry and chiropractic treatment of TMJ condition involves an interdependence between posture and occlusion. Head position 33, TMJ condylar position 34, airway space 35, and posture all seem to work together to create a relationship between occlusion and the body's position in space 36,37.

Conclusion:

This patient's condition necessitated a long-term ongoing conjoint dental chiropractic care to reach a successful outcome. It is possible that if the patient had the arthrocentesis as suggested her progress might have moved faster but she determined that there were risks from the procedure she did not wish to sustain. Therefore she chose a longer course of care which had led to a full recovery of TMJ function without pain. Concurrently her sacroiliac joint hypermobility syndrome and related soft tissue tension patterns in the lower extremity, cervical spine, and jaw region have also significantly improved. With case reports it is difficult to rule out placebo or ideomotor effects or that the patient would have improved without care, yet the chronicity of her condition and unresponsiveness to other interventions, suggests a temporal relationship. Further research is indicated to determine if the results from this case can be extrapolated to a specific subset of TMD patients.

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Chiropractic and Dentistry: A Case Report Illustrating The Need for Mutual Understanding of TMD Co-Treatment.

Charles L. Blum, DC, Rebecca L. Griffiths, DDS

Introduction

The fields of dentistry and chiropractic are realizing the need for collaborative interdisciplinary care as a means to help patients. [1-4] A quick review of dental and chiropractic literature concerning the treatment of the temporomandibular joint (TMJ) and its related disorders (TMD) illustrates how dentists and chiropractors commonly see their roles in the treatment of TMD as being independent.

It is commonly understood within the chiropractic community that there are many different chiropractic techniques, all of which claim that they have the answer for most conditions. [5] Chiropractic care is considered helpful, regardless of the technique, and most practitioners utilize a conglomeration of techniques.[6] It is likely that each chiropractic technique has something valuable to offer.

As a means to build a bridge between the professions, [7-10] Steigerwald and Maher developed an outcome assessment tool for chiropractors to determine when a patient might have a TMD condition warranting a dental referral. [11] Blum and Globe developed a preliminary outcome assessment tool for dentists to use to determine if a patient might have myofascial postural influences affecting a patient's TMD condition and warranting a chiropractic referral. [12]

The purpose of this case report is to illustrate how a patient presenting for chiropractic care clearly needed dental co-treatment for his chronic TMD/bruxism condition. Bruxism is characterized by the grinding of the teeth and is considered an oral parafunctional activity that often occurs during sleep. Bruxism may be mild enough not to be a health problem for many people. However, in some cases bruxism may be related to other underlying conditions, which are emotional, stress related, airway related, or related to a myriad of other triggers.

The following case history illustrates the limitations of chiropractic techniques for the treatment of a patient with an acute, trauma induced cervical sprain/strain, and chronic bruxism.

Chiropractic Assessment

A 19-year-old male presented to my office with a history of attempting to do a back flip on a trampoline when he landed on his head and compressed his neck. His parent divulged during the case history that the patient also had persistent and intense bruxism at night, creating significant sounds that would awaken others near his room. The patient reported upon questioning that he has had multiple orthodontic procedures and had a mandibular metal bridge bonded lingually along his incisors, which was described by the patient as a retainer. The orthodontic care the patient received began initially with a transverse expander to widen his hard palate and then proceeded with routine orthodontic treatment for what was believed to be aesthetic reasons.

Chiropractic Methods/Intervention

Evaluation revealed decreased cervical range of motion with some sensitivity to palpation at the right C3 transverse process, sacroiliac joint sprain with pelvic torsion (left short leg), and significant TMJ related findings. [13] It was noted upon examination of his TMJ range of motion that when closing, his incisors contacted end to end. This is typical of a dental Class III (maxillary retrusion/mandibular protrusion) presentation. Palpation of his retro-condylar space (between the mandibular condyle and mastoid) revealed that there was very minimal space in this area, which is typical of a dental Class II (mandibular condylar retrusion) TM condyle position. He exhibited an opening deviation to the left; opening first at the midline, shifting to the left, and ending at the midline at full opening. This path is typical of disc displacement with reduction internal derangement of the TMJ.

Chiropractic Treatment

The patient was treated initially with sacro occipital technique (SOT) orthopedic blocking to treat the L3 right rotation until the swelling and sensitivity at the C3 transverse subsided, [14] pelvic supine block placement to reduce pelvic torsion, [15-17] treating the cervical spine with cervical stairstep, [18] HVLA adjusting based on cervical stairstep findings, and DeJarnette step one sutural cervical cranial releases. [19] Some attempt was made to expand manually the maxillary and mandibular dental arches by releasing the cruciate suture sagittally and the mandible transversely. The goal was to determine whether this might help to allow the mandibular incisors to recede to a more ideal position behind the maxillary incisors, as well as to increase the retro-condylar space.

The patient was given an exercise to perform during which he placed his tongue in the region behind his front teeth and pressed firmly as he opened and closed, which normalized his TM joint translation and eliminated the deviation. [20] He was told to do this exercise in 3 sets of 10, 5 times per day, and be re-evaluated in 2-4 weeks concerning whether there was continued deviation of his TMJ translation.

Chiropractic Results

The cervical spine range of motion and pain improved immediately following the treatment. The TMJ translation relating to the deviation was improved by approximately 50%, but it was evident that this patient would need to continue with the exercise daily for 2-4 weeks. While the improved translation indicated better TM disc and joint motion due to habit and tissue tension patterns, it has been found clinically that this exercise is continued necessarily to sustain opening along the midline.

However, it was clear that there was no improvement in the dental occlusion or condylar position, which warranted a referral to a dentist trained in functional orthodontics and trained within the dental chiropractic co-treatment methodology. [**Figure 1**] At his last

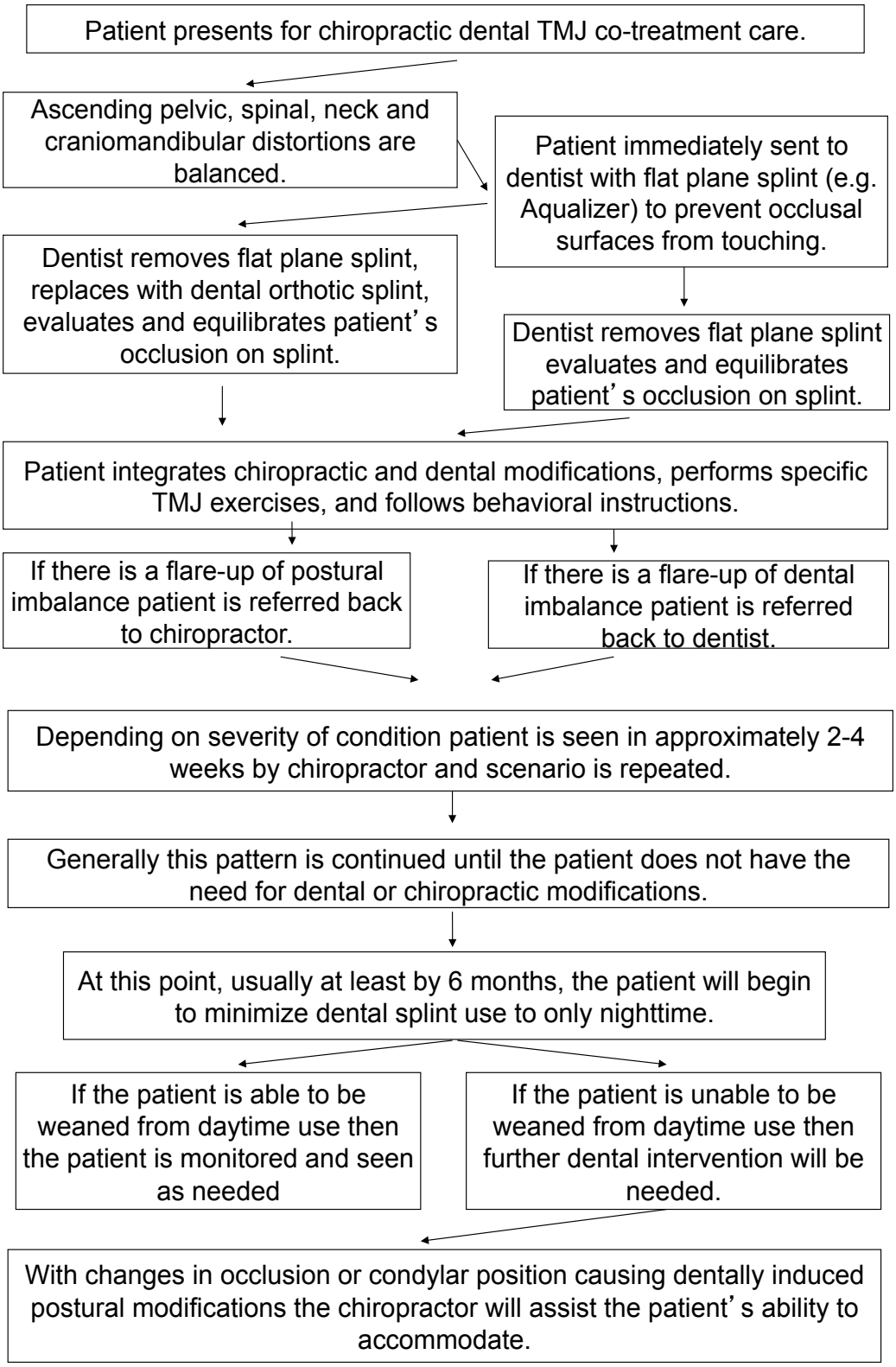

Figure 1. A sample chiropractic dental co-treatment

office visit (August 29, 2012) he indicated that for the first time in years he doesn't worry about his "jaw locking" every morning, he is sleeping better, doesn't seem to be grinding his teeth, and his related headaches have subsided.

Dental Assessment

The patient presented for dental care in December 2011 with chief complaints of jaw locking, migraine headaches, jaw pain, limited mouth opening, and tooth grinding. He has had prior orthodontic treatment and has developed TMD with joint locking. He was being treated locally for his TMD and has had several appliances. The most current TMD treatment involved the use of both daytime and nighttime orthotic appliances. The daytime orthotic was a maxillary appliance with an anterior ramp that advanced his mandible into a 6 mm underbite when occluding on it. The nighttime orthotic added vertical support, but it supported his mandible 3 mm to left of his skeletal midline. The patient did not wear any appliance while eating. He said his bite had changed from wearing the appliances and he began occluding end to end on his anterior teeth.

The patient presented with Class III molar and canine dental relationships bilaterally. He exhibited a tongue thrust during swallowing, lisp type speech impediment, mouth-breathing, forward head posture, and facial asymmetry. Displacement and reduction of the disc in his left TMJ was palpable through the left external auditory meatus when opening and closing his mouth. A bonded mandibular lingual arch orthodontic retainer was present lingual to the mandibular anterior teeth.

Dental Methods/Intervention

Examination of the maxillary arch form revealed bilateral internal rotations of the premaxillae and maxillae. Examination of the maxillary teeth revealed lack of alignment of the dental midline with the maxillary skeletal midline.

Examination of the mandibular arch revealed depressed vertical development of alveolar bone of the mandibular left quadrant. The patient's mandibular posterior teeth are tipped more lingually on his right than his left due to greater vertical alveolar bone development on his right. These findings are directly related to the adaptive closure pattern of the mandible and most likely occurred during the exchange of primary with permanent dentition. Examination of the mandibular teeth revealed lack of alignment of the dental midline with the mandibular skeletal midline.

Imaging examination revealed: flattening of the lateral poles of the mandibular condyles bilaterally; hypertrophied inferior, middle, and superior nasal turbinates; morphologic bending of the left mandibular condyle; pharyngeal and nasal airway impingement; posterior and superior displacement of the left condyle; medial subluxation of the disc of the left temporomandibular joint in centric occlusion; asymmetry of the glenoid fossae; the left orbit, left mastoid, left lesser wing of sphenoid, and the left side of the hard palate are all superior in position to the same

structures on the right; the right gonial angle is superior to the left; mandibular deviation from skeletal midline to the left; retrognathic maxillae; short and pointed tooth roots; rotated cervical vertebrae at C1, C2; compression of the cervical intervertebral spaces at C1/C2, C2/C3; slight compression of the atlantoaxial joint; and loss of normal cervical spine curvature.

The patient exhibited cranial and dental asymmetry, maxillary retrognathism, and bilateral premaxillary and maxillary internal rotation. These issues are causative to the deviation of the nasal septum, hypertrophied nasal turbinates via decreased lymphatic drainage in the midface, and to the mandibular closure to his left of his skeletal midline. His compensatory mandibular closure to the left causes medial displacement of the disc of the left temporomandibular joint and rotation of the upper cervical vertebrae. The internal rotations of the premaxillae and maxillae and the lingual tipping of the patient's mandibular teeth have rendered insufficient tongue space for the proper function of the tongue during breathing, swallowing, and speech. The forward head posture exhibited by the patient is believed to be an adaptation to his airway restrictions. The tongue thrust during swallowing and the lisp type speech impediment are believed to be an adaptation to the decreased airway and lack of sufficient functional tongue space.

Dental Treatment

ALF (Alternative Light Force) appliances [21, 22] were delivered to this patient on 3 February 2012 and as of this writing, he has had 14 adjustments at 2-3 week intervals. The maxillary ALF was designed for correction of the internal rotations of the maxillae and premaxillae and to achieve anterior movement of the patient's underdeveloped midface. It is non-removable by the patient.

The mandibular Omni ALF was designed with shells to fit over the mandibular posterior teeth. The shells are adjusted and balanced to allow repositioning of the mandible in alignment with the skeletal midline. The Omni supports the mandible where there is no disc displacement upon closure of the mouth. It is used also to begin the correction of the lingual tilt of the mandibular teeth and bone that occurred in adaptation to the maxillary architecture and possibly the prior orthodontia. It is removable for hygiene only and is worn continually, especially while eating. This treatment protocol is necessary to re-train the myofunctional adaptations of the muscles of mastication and to sustain the correction of the myofunctional airway compensations.

Dental Results

The patient's progress reports document 50% symptom improvement within the first 3 weeks (by 24 February 2012), 75% symptom improvement within the first month (by 1 March 2012), and 100% symptom improvement in 3 ½ months (by 18 May 2012). **[Figure 2]**

Orthodontics will be necessary to reposition the patient's teeth for proper occlusion in the corrected bite and for support of the TMJs and cervical spine. That phase of treatment may take up to 2 years, due to tooth root morphology and the speed at which teeth may be moved safely.

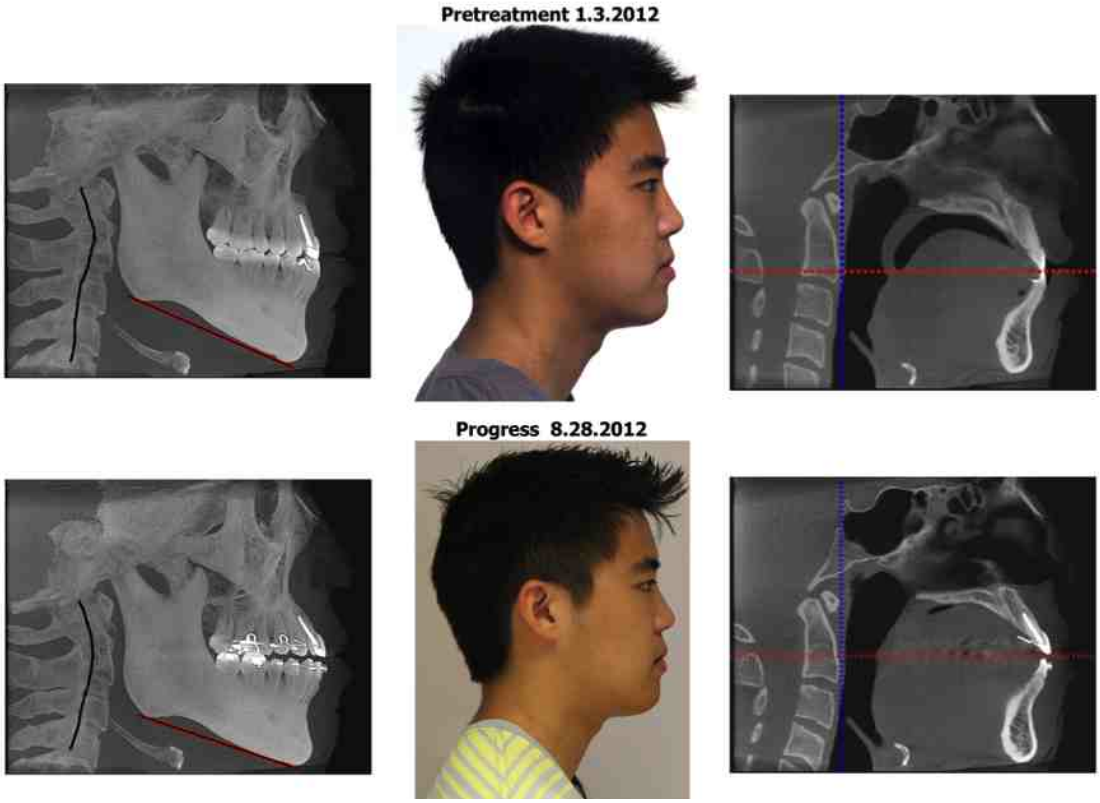

Figure 2. Mandibular position and forward head posture pre and post treatment relationships

The patient's prognosis and ultimate stability is excellent from a dental perspective. However, incorporating chiropractic, myofunctional therapy, [23, 24] and the Buteyko Breathing Method [25] may be necessary for an optimal outcome and long-term stability. Clinically, and with similar cases, posture, breathing, and tongue habits will need to readapt functionally as dental orthopedic/orthodontic structures are modified.

Discussion

Although the response to the treatment for the presenting complaints of cervical pain and decreased range of motion was improved following the initial chiropractic office visit, what became a greater concern was this patient's chronic bruxism and mandibular position. The bruxism appeared to be related to a dysfunctional relationship between the osseous shape of his upper and lower dental arches, which had a direct effect on his occlusion and condylar position. Typically, patients with a Class II position will have some degree of obstructive airway compromise, [26-29] which is found frequently to occur at night, and leads to bruxism. One theory for night-time bruxism is that the body attempts to open the airway space by advancing the lower jaw and tongue forward. When the lower jaw returns to its resting position backward, it draws the tongue with it, and this closes the airway space. This process repeats itself the entire night, leading to chronic bruxism [30].

The challenge with this particular case is that the common orthodontic treatment for a mandible protruded with respect to the maxillae and incisors that occlude end to end involves retrusion of the mandibular condyles posteriorly within the condylar fossae. The dental occlusion needed to be optimal, with Class I positioning, but the patient presented with his left condyle already retruded to the point where there was virtually no space for palpation between the ramus of the mandible and the mastoid. Common treatment for cases with this type of condylar position involves advancing the mandible to increase joint space in the TMJs and bring the tongue anteriorly, which opens the oro-pharyngeal airway space. This patient's mandibular teeth were already positioned too far forward relative to the upper dental arch; hence, the dental challenge of treating this case.

Dental chiropractic co-treatment [31-33] can be a part of a rapidly growing field of interdisciplinary care. [34, 35] [**Figure 1**] Since postural changes have been found to have an ascending effect on dental occlusion, condylar position, and airway space, [36-41] treatment of postural influences prior to irreversible dental procedures is preferred. Likewise, dental occlusion, condylar position, and airway space has a descending effect on posture. [36-41] So, following any changes to those regions by the dentist, should the patient have a myofascial response (e.g., increased neck or back pain), a referral to a chiropractor may be indicated to facilitate the patient's accommodation to the descending postural influences.

Nocturnal bruxism [42] is not a condition that can be ignored, particularly when it is chronic and associated with unusual dental and skeletal morphological patterns, such as with this patient. Aside from the noise associated with bruxism, there is often related masticatory muscle tension leading to long-term effects on the dentition and airway space that can lead to serious sequelae. [43, 44]

Conclusion

SOT chiropractic analysis and treatment allowed for a relatively quick and easy resolution to this patient's neck trauma. However, resolution of his bruxism was much more complex than the result expected to be gained by chiropractic care alone. Therefore, he was referred to a dentist who could assess accurately and co-treat this patient successfully. The purpose of this case report was to illustrate a working treatment paradigm in which both chiropractic and dentistry play integral roles in improving patient care and outcomes.

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The Relationship of Cranial Facial Growth and Development to the Sacro Occipital Technique (SOT) Category System: Three Case Studies.

Harvey Getzoff, DC

Introduction:

The intent of this paper is to examine whether deficiencies in cranial facial growth and development can impede normal homeostasis of functional systems as described by the SOT Categories[1]. Cranial facial growth and development is determined by the growth of its various structural parts in relationship to the development of its organs, functional spaces and soft tissues of the head necessary for human function[2]. The organs are the brain, eyes, ears, teeth and tongue. In addition to the four pairs of sinuses, the functional spaces include the nasal and oral pharynx used for ingestion and respiration[3]. The soft tissues are the muscles and the periosteal tissues lining the sutures, sinuses, mandibular condyle, teeth and the surfaces of the cranial bones.

Ian Walters in his chapter on Craniofacial Orthopedics in Darryl Curl's book Chiropractic Approach to Head Pain states that, "Alteration in shape, size and position of bone as well as its origin and maintenance are secondary, compensatory and obligatory to prior changes in soft tissue, organs and functional spaces[4]." The growth and development of the cranium is a process of outward displacement essential to life. Walters refers to it as, "microcosm of an expanding universe[4]." An often found limitation of cranial facial growth and development in the mid face (primarily the maxillae), inhibits not only respiration but the positioning and development of the mandible. This results in malocclusions and TMJ disorders. Albert Chinappi DDS wrote in his paper "The Unity of Form and Function-A Dental Paradigm," that, "the mandible hasn't been allowed to develop to its full potential because of maxillary constriction[5]."

The three functional systems in question are the Primary Cranial Sacral Respiratory Mechanism[6] (PCSRM) (SOT category one), the weight-bearing system of the body (SOT category two) and the lumbar spine and its relationship to the cervical spine and the pelvis (SOT category three) [7]. Major Bertrand DeJarnette, D.C. founder and developer of the Sacro Occipital Technique (SOT) [8,9] addressed the understanding of human function by classifying three clinically definable but interrelated categories. These categories not only have methods of identifying the level of dysfunction (called indicators) and specific treatment protocols, but they give us a model of function for which to strive[7].

Category One addresses The Primary Cranial Sacral Respiratory Mechanism (PCSRM). The PCSRM is a system of harmonious functional units that allows the central nervous system to be nourished and protected as it regulates and coordinates function throughout the body. The components of the PCSRM are the inherent motion of the sacrum and the cranial bones/sutures, the dura and it attachments, the movement of cerebral spinal fluid and the expansion and contraction of the ventricles and the brain[6]. Upledger states that, "The physiological nature of the suture determines the type of motion in which it participates and which it will allow[10]." This is not an isolated concept and has been also discussed by Retzlaff[11] and Moss[12].

Category Two addresses the weight bearing qualities of the body as it functions in a gravitational environment. Further stated, Category Two is the ability of the weight bearing structural system of

the body to fully communicate through the nervous system so that maximum weight bearing function can occur within the demands of a gravitational environment. Roger Sperry PhD, determined that, "90% of the brain's activity is used to balance your body within the gravitational field of earth[13,14] ." In SOT the key components of the weight bearing system are the weight bearing portion of the sacroiliac joint, the entire spine, the cranial suture system along with the position of the head[15].

Category Three addresses subluxations of the lumbar spine and its compensatory methods. As stated by DeJarnette in his 1980 SOT Manual, "The lumbar subluxation is primary in the Category Three[16]." Understanding the importance of the compensatory qualities of the cervical spine, the styloid processes of the temporal bone and the pelvis to the lumbar spine can be crucial in identifying and adjusting the Category Three[17]. The Step Out Toe Out (SOTO) procedure is a key component of Category Three, helps define the severity of the lumbar subluxation while initiating a pelvic response[18].

The following case studies will examine not only the functional systems in question but the cranial and dental findings as they relate to these three patient presentations.

Case Study #1

Female, Date of birth, 11/08/1947.

Basic History: Initial visit on 3/20/1985. The patient's symptoms included left jaw joint pain, difficulty opening mouth and chewing, teeth feel out of alignment, pain sudden, and onset three weeks previous after yawning. Also reported was left neck pain and generalized headaches. Prior to onset of jaw joint pain the natural spaces between the two upper central incisors and lateral incisors had been closed by a dentist.

Key Findings: On standing plumb line analysis the head was positioned with a noticeable head tilt (left ear lower than the right) associated with the left shoulder higher than the right. Standing with eyes closed there was motion in all directions, limited, while always returning to the center. In the seated position the cervical ranges of motion were limited on the left in both lateral flexion and rotation. There was a left leg length deficiency with heel tension (reduced manual induced ankle dorsiflexion). Palpation of the occipital fibers[19] revealed a line two area five on the left along with a thoracic seven line two finding. Occipital fibers are swelling at the region of the suboccipital region that DeJarnette utilized to assess visual and vestibular righting and specific vertebral imbalance. A right crest sign (increased paravertebral muscle tension at L4/5 region) was related, via a Lovett Brother Relationship[20], to the ipsilateral temporal bone function and indicated a right temporal bone imbalance. Utilizing the SOT cough test, the sacrum was found to be in nutation and termed an SB+[21]. There was no arm/fossae[22] or step out toe out[18] findings. There was no leg length discrepancy in the supine position. Cranial ranges of motion revealed restriction of the right maxillary/malar and temporal/frontal sutures[23]. The left temporal mandibular joint (TMJ) was painful and restricted on opening.

SOT Diagnosis: Category one with right temporal and frontal external restriction as the key findings were found and did not clear with pelvic blocking. All SOT findings (indicators) were addressed as part of the category one adjusting protocol[1]. A referral to the Orthodontist was made at the initial visit, because of the recent dental history, the difficulty opening the mouth, and the appearance of a maloclussion.

Dental Diagnosis: Class 2 division 2 occlusion with a deep bite, a retruded jaw and a narrowed maxillae.

Summation: After three weeks and six adjustments the pain and dysfunction were reduced. All findings were still present but with greater mobility of the cervical spine. Orthodontics was begun five months after her initial chiropractic adjustment. She successfully completed orthodontics (maxillary expansion and mandibular repositioning). The dental spaces were reopened, enhanced laterally, and later all spaces were restored with bonding. At her adjustment in mid-January 2013 she stated she has not had a headache or jaw pain, which had persisted for twenty five years. There was no head position or cranial findings and the patient attempts to receive chiropractic adjustments approximately every 3 weeks.

Case Study #2

Male, Date of birth, 08/12/1947.

Basic History: The patient noted pain in his right hip area and down the right leg posterior and lateral and into the right ankle. There was numbness in the right foot. There was mild pain in the lumbosacral area. Sitting, bending, getting up and standing worsened all symptoms. The onset was two months prior to the initial visit on 01/17/1983. There was no history of trauma but there was a previous episode 5 years earlier. He reported having difficulty sleeping due to the pain and was taking three different medications for the pain. The patient was referred by the orthodontist to the chiropractic office because of the extensive back, hip, and leg pain.

Key Findings: On the plumb line the head was positioned with the left ear lower than the right, while the spine was leaning to the right with very limited motion when the eyes were closed. The right styloid process was tender to palpation[17]. There was a right leg length deficiency, a left iliofemoral joint restriction and a right SOTO restriction[18]. Tenderness was elicited at the interspinous space of lumbar 4/5 when palpated. The Straight Leg Raise (SLR) [24] was possible bilaterally at 40 degrees and the right psoas muscle was constricted. Cranial ranges of motion[23] revealed restriction of the left maxillary/malar suture. The left TMJ was restricted on opening.

SOT Diagnosis: Category three, with a subluxation of lumbar 4/5 and resultant disc pathology as the key finding was found on evaluation. All SOT findings (indicators) were addressed as part of the category three adjusting protocol[1].

Dental Diagnosis: Class 2 Division 2 deep bite, with missing lateral incisors and narrow maxillae. The left TMJ was in a closed lock.

Summation: After 5 and ½ weeks and 15 adjustments the pain was greatly reduced. Pelvic blocks were no longer necessary to reduce any pelvic torsion or discopathy. There were no spinal lean or unilateral styloid tenderness. There were no longer any psoas, iliofemoral or SOTO findings. The SLR progressed to 60 degrees bilaterally. Orthodontics began 04/12/1983 and was successfully completed 1 year later (maxillary expansion, mandibular repositioning). The orthodontics was so successful that the lateral incisors were able to be restored and the TMJ functioned normally. The patient was last seen in the chiropractic office December 2012 doing well, and presently receives one adjustment per month as a preventive measure. As of April 2003 it was noted that since December 2012 normal head position has been found at each chiropractic visit.

Case Study #3

Female, Date of birth 06/15/1966.

Basic History: The patient's initial office visit 06/09/2003 and she presented with bilateral TMJ pain primarily on the right with generalized headaches which began 4 months prior. The initial onset of the pain was 8 years prior to the initial office visit. Bilateral neck and trapezius tightness was presented along with a chronic history of ringing in the ears, allergies and sinus problems. The patient was referred to the office by the Orthodontist.

Key Findings: On the plumb line the head was position on the right while the spine was curved to the left. There were unilateral differences at the thoracic 1/first rib junction and postural instability when the eyes were closed. There was left leg length deficiency with a left upper arm/fossae finding (findings of weight bearing sacroiliac joint instability)[22]. Also found was a right rotational restriction of the cervical spine and an occipital line[19] 2 area 4 - thoracic 6 subluxation. The cranial ranges of motion[23] revealed restrictions primarily at the right maxillary/malar suture. The right TMJ was unable to translate and opening was limited

SOT Diagnosis: Category two (weight bearing sacroiliac joint instability) with right maxillary/malar suture restriction as the key finding was found. All SOT findings (indicators) were addressed as part of the category two adjusting protocol.

Dental Diagnosis: Class 2 Division 2, narrow maxillae, with a right cross bite. There was a history of a four bicuspid extraction and a closed lock of the right TMJ.

Summation: Improvement was significantly noted regarding head position, negative arm/fossae finding, no leg length differential, stability during plumb line analysis, full cervical ranges of motion, along with normal cranial and the TMJ findings. Orthodontics began one week after her initial office visit. There were 15 adjustments over a 9 month period. Orthodontic care was successful relative to maxillary expansion with the result that the cross bite was eliminated and her mandible was restored to a more functional position leading to normal translation and opening.

Discussion:

Cranial facial growth and development is an ongoing homeostatic process affected by the development of organs, functional spaces and soft tissue responses influencing osteoblastic and osteoclastic activity to maintain structural integrity. Guyton in his text book Human Physiology says, "the shape of bone can be rearranged for proper support of mechanical forces by deposition and absorption of bone in accordance with stress patterns[25]." Arey in his textbook Developmental Anatomy stated, "although the shape of a cranial bone and its architectural design are hereditary the final appearance is modified in conformity with the stresses actually encountered in post natal life[26]." Wolff's law states; "The shape of a bone depends upon the physical stresses applied to it".[27,28] Ian Walther sums up the process by stating that, "The periosteal matrix (soft tissue) may therefore be said to orchestrate growth through a concert of apposition and resorption[4]."

While the cranium is responding to the developing soft tissue, organs, and spaces, the rate of growth is ongoing and defined. Chinappi describes it this way:

> "The vault and cranial base develop first because of their relationship to the expanding brain. This growth is complete by about six years of age. In close proximity to the cranial base, the second growth area is the mid face or maxilla. The growth in the width of the maxilla is ninety five percent complete for males and ninety eight complete for females by twelve years of age. The growing mandible depends on the process of intra-membranous bone formation and remodeling for the bulk of its substance. The overall mandibular remodeling and condylar growth are geared to accommodate housing for the developing teeth to adapt to the mandibular displacement movements and to adapt to the complex growth changes occurring throughout the whole head[5]."

Cranial bone development is both controlled and responsive to the functional needs of the tissues involved. It is important to understand that mandibular positioning as well as head position is dependent on the growth of the mid-face (the maxillae) and the need for the mandible to sustain function. Chinappi states that "Ultimately, the malocclusion is a result of the system failing to provide a correct environment. Once the maxillary dentition has made its accommodation to the process, the later developing mandible is at mercy[5]."

Chinappi comments on the effects of maxillary expansion and mandibular repositioning by saying that "unexpected but frequent observed functional changes include improvement of the cervical curve and relief of temporal mandibular disorder type symptoms including but not limited to headaches and muscle spasms[29]." DeJarnette noted that "the cranial lesion can produce any effect humanly possible to produce in the human body and it can affect all tissues of that body[30]." The stressors associated with poor head position are both neurological (vestibular and proprioceptive)[31] and mechanical (postural and the destructive effect on all types of soft tissue). Physicians should consider cranial growth and development as part of patient evaluation and care. Chinappi suggested that orthodontic care be based on "a philosophy of treatment that seeks to alter the shape of the bony alveolus in the maxilla and, in turn, the location of the mandible and its alveolar processes[29]."

As summarized by Donald Enlow in his textbook Facial Growth "Development is a process working toward an ongoing state of aggregate, composite, structural and functional equilibrium. Any change

in any given part must be proportionately matched by appropriate growth changes and adjustments in many other parts, nearby as well as distant, to sustain and progressively achieve functional and structural balance of the whole[32]."

Conclusion:

It appears that head position and cranial function can be altered by deficiencies in cranial growth and development. Structural functional systems also respond to head position and cranial function. Cranial and dental diagnosis can play a critical role in functional systems' assessments (SOT categories). Application of the theory that maxillary deficiencies and resultant mandibular positioning associated with postural accommodations can be co-treated with dental and chiropractic procedures was examined in this paper. The success of these three cases, each representative of one of the three SOT categories, demonstrates that a chiropractor and a dentist working together can create synergistic beneficial outcomes. Further research is indicated to examine dental and chiropractic interdisciplinary care for a subset of patients with compromised dental growth and development consistent with functional system breakdown.

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Orofacial myofunctional therapy: A case report.

Joy L. Moeller, BS, RDH, Charles L. Blum, DC

Introduction:

The purpose of this case report is to help the reader learn how to identify orofacial muscle disorders, habit patterns, or restricted frenum attachments. Once gaining some familiarity with the assessment of orofacial muscle disorders then there can be understanding when and who to refer to, and the importance of training to successfully address the underlying cause of many related structural problems. Orofacial myofunctional therapy (OMT)[1] can be part of an interdisciplinary team incorporating chiropractic and dentistry to help treat symptoms of temporomandibular joint disorders (TMD) and obstructive sleep apnea (OSA) or sleep breathing disorders (SBD)[2]. Also included will be an overview of some outcome assessment forms utilized by some OMTs for diagnosis and treatment of TMD and/or OSA/SBD.

Orofacial myofunctional therapy, a neuro-muscular re-education of the oral facial muscles, is a modality that promotes the stability of the stomatognathic system. Studies have been performed for years to understand the relationship of skeletal form and muscle function[3]. When the tongue is resting against the hard palate (thus maintaining the proper oral volume) it enhances and/or creates stability for the TMJs. If the tongue is habitually resting down and forward in the mandible, as may happen with a lack of patency of airways and/or lack of chewing beginning with baby foods, prolonged use of bottles and pacifiers, presence of digit sucking[4] or a restricted frenum[5], normal form and function may be disrupted[6].

While a primary function of the tongue is to protect the airway, improper oral resting posture of the tongue will have a negative influence on the development of the oral cavity. Add that to the modern diet of processed foods (soft foods may lead to low muscle tone by diminishing the frequency and intensity of mastication[7]), a smaller oral volume may not support proper upper airways, the stability of the TMJs, or the development of optimal dental arches[8].

Orofacial myofunctional therapists are trained to promote functional posture[9] (in absence of mechanical obstruction) with behavior modification. The goals for the patient are to become aware of and eliminate noxious habits and achieve nasal breathing, lip seal, and proper mastication. Orofacial myofunctional therapists also promote patient compliance in proper care and use of oral appliances in management of TMD and OSA, as well as minimize muscular discomfort due to the use of those appliances[10-12]. An interdisciplinary team approach for health care is critical for benefit of the patient and treating the cause of TMJ and OSA related disorders.

Case Report:

The Assessment:

The patient was a 48 year old female referred by her chiropractor, who had heard about OMT by his referring functional dentist. Her primary occupation was that of an actor. Patient was born with a restricted lingual frenum which may have led to her low tongue-rest position and mouth breathing habit. At the first examination the patient was nervous and constantly putting her hands

on her face and her fingers in her mouth. Despite her anxiety regarding her disorder and having been seen unsuccessfully by many other practitioners, she remained positive concerning her choice to consult for OMT. As she tried to cope with her chronic pain there were times when she felt her condition was hopeless.

The patient described her chronic neck pain to be a "9" on a pain scale of "1-10" with 10 being most painful, while her TMD pain was characterized at a "10," and frontal headaches were a constant "9." In a craniofacial evaluation she exhibited an open mouth at rest, was clenching and grinding, and had an overbite, chronic sinus infections, vertigo for eight months, earaches, and intermittent tinnitus. She also presented with chronic indigestion with gastro-esophageal reflux disease (GERD). The patient reported that she had financial hardship due to the fees for previous treatments, and her career had been hampered by the years spent managing her overwhelming health problems.

Health History:

The patient was bottle fed to age 3 or 4, was slow at crawling, walking and talking. She grew up a chronic mouth breather with constant sore throats, colds, and sinus problems. She had a shoulder surgery and was told she had a "frozen" shoulder. She felt her conditions may have worsened when her brother died, two years prior to her presentation at the office. The emotional stress of his early death may have led to a collapse of her ability to cope with her myofunctional disorder.

Examination:

The patient's upper hard palate measurement indicated a high narrow palate, (30 mm from first molar to first molar (average is 38-42 mm). Generally mouth breathers show a narrower hard palate at the level of second premolars and first molars and deeper palate in the level of second premolars when compared to nasal breathers[13]. Her masseter muscles did not palpate as having normal tension or function. She had a 6 mm overbite. The Epworth Sleepiness Scale[14] indicated results within normal range. She indicated she clenched her teeth and bit her nails constantly. She reported GERD and difficulty swallowing pills. Her tongue rest position was on the floor of her mouth and observation of drinking and eating indicated a facial grimace on swallowing. Her Mallampati Score[15] was 3.5 (between 3 and 4).

The focus for OMT care at this office was the elimination or reduction of her chronic pain by normalizing orofacial muscle functions. But there were some challenges since the time required for treatment was difficult for the patient to schedule due to her career. However, the chronicity of her presentation and her initial quick recovery of function encouraged the patient to make the necessary accommodations for OMT.

The patient was made aware of how she had been resting her tongue in the wrong position (down and forward) and how her improper sleep position may be putting stress on her TMJs. The patient became aware that by constantly touching her face and biting her nails, she was likely influencing the proper position of the tongue and lips at rest. Also, her constant leaning on her face and texting was probably contributing to her TMD pain. Because awareness and

replacement of negative habits with positive ones may lead to change, behavior modification is known to lead the way to positive functional changes.

The outcome assessment measures utilized for clinical measurements included scoring for pain, Mallampati score, oral myofunctional evaluation scores (OMES)[16,17], evaluating function of breathing, swallowing, and general oral habits along with symptoms of OSA and TMD were assessed and evaluated.

Mallampati Scoring

Class 1. Complete visualization of the soft palate
Class 2. Complete visualization of the uvula
Class 3. Visualization of only the base of the uvula
Class 4. Soft palate and uvula are not visible at all.

The Mallampati scoring of the orophyarynx visibility is a simple and "noninvasive method used to assess the difficulty of endotracheal intubation, but its clinical usefulness has not been validated in patients with sleep-disordered breathing.

"The Mallampati score was an independent predictor of both the presence and severity of obstructive sleep apnea. On average, for every 1-point increase in the Mallampati score, the odds of having obstructive sleep apnea (apnea-hypopnea index> or = 5) increased more than 2-fold (odds ratio [per 1-point increase] = 2.5; 95% confidence interval: 1.2-5.0; p = .01), and the apnea-hypopnea index increased by more than 5 events per hour (coefficient = 5.2; 95% confidence interval: 0.2-10; p = .04) [13]."

Nuckton TJ, Glidden DV, Browner WS, Claman DM. Physical examination: Mallampati score as an independent predictor of obstructive sleep apnea. Sleep. 2006 Jul;29(7):903-8.

The oro-facial myofunctional evaluation with scores (OMES) is a valid and reliable clinical evaluation tool for young and adult subjects who may have TMD and/or OSA. It utilizes parameters such as appearance, posture and mobility of lips, tongue, cheeks and jaws, respiration, mastication and deglutition [16,17]. The OMES scoring indicated the patient had a myofunctional disorder.

The examination revealed laterization of her tongue that moved her entire jaw left and right, indicating restriction of her frenum. The patient did not like to chew food; rather, she preferred soft foods or she swallowed foods without adequate mastication and bolus formation. Upon swallowing, her tongue protruded and her mentalis muscle activated. The patient was diagnosed bilateral tongue rest position and thrust with orofacial muscle disorder. Restricted lingual frenum and sleep disordered breathing were also noted.

Orofacial Myofunctional Evaluation Protocol With Scores (OMES)

Date:_____/_____/_____

Name:_____

Birthday: ___/____/____ Age:_____

Adress: _____

APPEARANCE AND POSTURE

Lips Posture		**Scores**
Normal lips closure	Normal	(3)
Lips closure with effort	Activity increased of lips and *Mentalis* Muscle	(2)
Absence of the lips closure (lips incompetence)	Light dysfunction	(2)
	Severe dysfunction	(1)

Vertical Mandibular Posture		**Scores**
Normal posture	With freeway space	(3)
Occlusion of the teeth (or)	Without freeway space	(2)
Open mouth	Light dysfunction	(2)
Excessive Open mouth	Severe dysfunction	(1)

Checks Appearance		**Scores**
Normal		(3)
Increased volume or Flaccid/drooping	Light dysfunction	(2)
	Severe dysfunction	(1)

Face Appearance		**Scores**
Symmetry between right and left side	Normal	(3)
Asymetry	Light dysfunction	(2)
	Severe dysfunction	(1)

Tongue Posture		**Scores**
Contained in the oral cavity	Normal	(3)
Between dental arches	Adaptation or dysfunction	(2)
	Excessive protrusion	(1)

Palate Appearance		**Scores**
	Normal	(3)
Decreased Width	Light	(2)
	Severe	(1)

Treatment/Intervention:

Treatment consisted of jaw stabilization exercises, habit elimination and behavior modification, and re-patterning the oral facial muscles and changing their function for optimal rest position, chewing and swallowing. The patient was instructed to do exercises three times a day for approximately ten minutes. She was given exercises to develop proper lip seal, tongue exercises for the tip, middle, back and sides of the tongue, and to restore proper function of the muscles of mastication. Lifestyle-type modification included awareness of how sleeping on her sides or stomach may affect her jaw position and function, and she was referred to the Mayo Clinic

[http://www.mayoclinic.com/] and Steven Park's [http://doctorstevenpark.com/] websites for sleep hygiene solutions. The patient was referred to a handout from USC on positional sleeping and its effect on sleep disordered breathing. Also, the patient was given a handout from Darrick Nordstrom, DDS, stating that if you do sleep on your back and you suspect sleep disorders, you should raise the head of the bed the height of a brick so the tongue does not drop into the airway.

Results:

At a one week follow up visit, after treatment for jaw stabilization, the patient reported that her pain was gone. The patient was referred back to her chiropractor to stabilize her neck, cranial, and back structures so that the functional training could begin in order to re-pattern the orofacial muscles. Structural support incorporating chiropractic adjustments, , along with eliminating habits and muscle re-patterning, led to long term stability. The multidisciplinary approach, in this case, may also include dental support in the form of a dental appliance or splint and/or an occlusal adjustment or an expansion device. The patient scored her pain a "0", on a pain scale of "1-10" with 10 being most painful, while she reported her initial findings of jaw pain, headaches and neck or back pain at a "10 or 9".

Facial tension was not present during the swallow, and her symptoms of GERD and indigestion subsided. Following OMT her overbite decreased by 2 mm, with her tongue habitually resting up against the palate, along with a significant reduction of her habits of touching her face and nail biting.

The patient's first score on her OMES was below "Normal" by 30 points. The OMES chart shows their control mean standard deviation (s.d.) was at 91 and a typical TMD patient mean s.d. was 85[16,17]. This would indicate that the patient scored very poorly. After myofunctional therapy was instituted the OMES was used to determine if there was any discernible change in scoring.

Because OMT treatment is reversible, there are no side effects. However, not doing the treatment long enough to promote neuromuscular automaticity or poor compliance may compromise or limit long-term success. Long-term stability may involve changing the patient's occlusal relationship. As her tongue rests in the palate and her lip seal improves, her teeth may move slightly and require guidance from her dentist.

Regarding stability of treatment, the outcomes are better if the program is followed for about a year to allow the neuromuscular automatization to take place. The patient should continue with the treatment (exercises and ergonomic modifications) along with the structural support offered by the chiropractor, as the muscle exercises and habit elimination help change muscle patterns.

Discussion:

There are various types of assessment tools to evaluate if a patient is presenting with OSA, such as the STOP[18] or STOP BANG[19] Questionnaires, 4-Variable Screening Tool[20], Pittsburgh Sleep

Table 1. Oro-facial Myofunctional Evaluation Scores (OMES): Initial 02/11/13								
Posture:	Lips	2	Mandible	2	Face	2	Tongue	2
Mobility:	Lips	10	Tongue	14	Mandible	12	Cheek	10
Functions:	Breathing	1	Degution	12	Mastication	7		
							Total = 70	

Table 2. Oro-facial Myofunctional Evaluation Scores (OMES): Follow-up 04/16/13								
Posture:	Lips	3	Mandible	3	Face	2	Tongue	3
Mobility:	Lips	11	Tongue	6	Mandible	14	Cheek	12
Functions:	Breathing	2	Degution	14	Mastication	9		
							Total = 89	

Quality Index (PSQI)[21], and Epworth Sleepiness Scale (ESS)[14,22] (the one used in this study). The ESS has been used frequently to assess daytime sleepiness, particularly in the context of clinical sleep disorders.

The 8-question ESS is easy for the patient to answer and offers good historical data. This information, combined with the clinical findings, help to select which patients may be good candidates for further detailed sleep studies[23,24]. Therefore the ESS is not considered a stand-alone evaluation tool to diagnose OSA or SDB.

Other OSA assessment tools such as the STOP[18] is a validated questionnaire that utilizes four yes/no questions related to snoring, tiredness during daytime, observed apnea, and high blood pressure (STOP). The STOP BANG[19] questionnaire also combines clinical findings of body mass index, age, neck size, and gender (BANG). The STOP BANG has a high sensitivity, especially for patients with moderate to severe OSA. For instance, with the STOP BANG assessment tool a score of 3 or more out of a possible 8 was taken to indicate high risk for presence of OSA.

Another validated assessment tool for moderate-to-severe OSA is called the four variable screening tool[20], which consists of only 4 variables: sex, blood pressure level, body mass index, and self-reported snoring. Lastly, another assessment tool that can be utilized to measure OSA could be the PSQI[22]. This tool has its benefit in that it gathers more data but its limitation is that it is not as quick or easy for the patient to fill out.

It was helpful that the patient was familiar with OMT and compliant with her treatment. The following photographs illustrate some changes in facial appearance, TMJ function, tongue function, and dental function. Although EMG measurements would have helped to further demonstrate the functional changes in an objective manner, for the patient, the changes and improvement of her activities of daily living were reported as “profound.” Also, although the patient noted that most of her symptoms worsened with dental work (maxillary veneers), the patient refused to have veneers re-done.

Epworth Sleepiness Scale
SITUATION: 1. Sitting and reading 2. Watching TV 3. Sitting inactive in a public place (e.g., a theater or a meeting) 4. As a passenger in a car for an hour without a break 5. Lying down to rest in the afternoon when circumstances permit 6. Sitting and talking to someone 7. Sitting quietly after a lunch without alcohol 8. In a car, while stopped for a few minutes in traffic
0 = no chance of dozing **1 = slight chance of dozing** **2 = moderate chance of dozing** **3 = high chance of dozing**
The scores for the eight questions are added together to obtain a single number. A number in the 0–9 range is considered to be normal while a number in the 10–24 range indicates that expert medical advice should be sought. For instance, scores of 11-15 are shown to indicate the possibility of mild to moderate sleep apnea, where a score of 16 and above indicates the possibility of severe sleep apnea or narcolepsy. Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep 1991;14(6):540-5.

Conclusion:

The purpose of this study was to show the benefits of myofunctional treatment working in a multi-disciplinary team with TMD patients. As with any case study, the findings from care for this patient may not be generalized to the population at large without a control group, sham procedures, and randomization. Yet the pre- and post-therapy assessments and the temporal relationship between the interventions and her chronic unremitting discomforts suggest that OMT may have played a significant role in her recovery. Due to the finding of this study, greater research into OMT relationship to interdisciplinary are in the field of OSA, orthodontics, TMD, and co-treatment may be warranted.

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Post concussion syndrome, temporomandibular joint disorders, and chiropractic dental co-treatment: A case report.

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Introduction:

The awareness of sports-related concussions with post-concussion syndromes is gaining exposure in the chiropractic profession [1]. However, head trauma is common even when a subject is not participating in sports. For instance, in the United States, of 1.7 million people with traumatic brain injury (TBI), 52,000 die and 275,000 are hospitalized annually [2]. Still, sports-related concussion accounts for at least, and likely more than, 300,000 head injuries per year in the United States [3].

At the 4th International Conference on Concussion in Sport held in Zurich in November 2012, a consensus statement was developed helping to create a definition of concussion:

1. "Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may be utilised in defining the nature of a concussive head injury include:

2. "Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an ''impulsive' force transmitted to the head.

3. "Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.

4. "Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.

5. "Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged [4]."

The following case describes a patient who had a concussion with subsequent post-concussion syndrome symptoms that persisted for five months. Since treatment regimens for concussions and post-concussions are still being formulated [5,] low risk interventions such as chiropractic may offer a safe therapeutic approach to supplement care.

Case History:

On September 13, 2013 the patient, a 21-year-old caucasian female, stood up abruptly, felt lightheaded, and fell down forward into a desk hitting her head on the desk and then on the floor. She was momentarily unconscious and awoke on the floor with significant head pain. Emergency services arrived, immobilized the patient, and transported her to the emergency room where she was examined and released. No CAT scan or MRI was performed.

Over the next few months she began to feel lightheaded and nauseous when exercising. These symptoms progressively worsened until she had to stop all exercise activities. Her symptoms progressed to include frontal and bilateral sphenoid headaches and were aggravated by all cognitive activities such as studying and using the phone, causing her to significantly reduce her physical and cognitive activities. After finishing school on December 12, 2013 she stayed in bed for much of the rest of the month. She noted some slight recovery following that time but had to significantly decrease all physical and mental activities now and felt profoundly constrained. For instance, driving caused her headaches, she routinely felt off balance when weight bearing, she was unable to attend school due to physical and cognitive limitations, and other related activities of daily living were also compromised.

Methods/Intervention:

Physical exam findings on February 12, 2014 noted the following: She had a close-locked TMJ, with no translation of right temporomandibular joint, along with decreased translation of left temporomandibular joint. Exquisite sensitivity was noted upon palpation at the right zygomatic maxillary joint, right zygomatic temporal joint, right upper medial orbit, right sphenoid wing, right temporomandibular joint, right squamosal and coronal sutures. There was evidence of clenching, significant maxillary buccal exostosis, which could have been secondary to clenching or dental parafunction and consistent with her malocclusion and bilateral working interference [6-8]. Evaluation noted photophobia and contrast sensitivity. She had convergence insufficiency with the left eye deviating laterally. Tuning fork bone conduction on right mastoid caused local irritation. She had a noted right occiput in a cranial extension position. The right occiput position led to compensatory hypertonicity and palpatory pain at the right gluteal muscles due to their attempt to maintain descending visual and vestibular postural righting [9]. Pelvic torsion with reduced sacral nutation (sacro occipital technique's category one) [10] was particularly noted at the upper left side of the joint while related sacroiliac joint right sided hypermobility (sacro occipital technique's category two) was stabilized .

Treatment consisted category one prone block placement with a physiological right short leg to reduce pelvic torsion and improve sacral nutation along with category two supine block placement to reduce sacroiliac joint right sided hypermobility [10]. Spheno-maxillary cranial adjusting [11] was performed based upon the patient's right inferior maxilla. Sacro occipital technique intraoral cranial adjusting treated her right occiput, which was in extension [12]. Due to her dental and TMJ-related presentations a referral was made to a dentist that specializes in temporomandibular joint disorders (TMD). The dentist performed an evaluation and delivered and equilibrated a mandibular occlusal splint on February 27, 2014, which was followed up on

March 6, 2014 for one more equilibration. She was seen for a total of nine treatments at this clinic. Each dental equilibration at her dentist's office was preceded by sacro occipital technique category one and cranial treatments the same day.

Results:

As of March 18, 2014 the patient was completely pain free with no symptoms of lightheadedness, brain fog, or nausea. She has been able to exercise, and has been lifting light weights. She was also able to run five miles. This is a significant improvement given that her symptoms and lack of function were consistent since her accident of September 2013.

Discussion:

Physical exam revealed excessive clenching with malocclusion which was hypothesized to be triggering a head pain – TMJ parafunction – leading to increased head pain. Ultimately this cycle inhibited her ability to recover from her post concussion syndrome. Although not every post concussion syndrome may benefit from this therapy, it is possible that this particular subset with malocclusion and clenching secondary or related to head trauma or concussion may need to be evaluated in a new light.

Head trauma and TMD has some basis in the literature [13,14]. Yustin and Neff describe in a study of a "56-year-old female suffering from TMD caused by trauma to her temporal head area. The management consisted of occlusal devices until her condition stabilized followed by prosthodontic rehabilitation to obtain and maintain a physiologic maximum intercuspation [15]."

A relationship between dental occlusion and the use of TMJ splints, orthotics, or appliances to prevent secondary effects of head trauma or concussion has also been discussed in the literature. For instance Takeda et al reported that "Mouth guards can reduce distortion to the mandibular and the acceleration of the head from the same blow. So mouth guards might have the possibility to prevent mandibular bone fractures and concussions [16]." In a similar vein Singh et al studied concussion/head trauma prevention in high-school football athlete investigating the use of dental orthotics. They found that "preliminary results of this study suggest that a customized mandibular orthotic may decrease the incidence of concussion/mild traumatic brain injuries in high-school football athletes …[17]"

Conclusion:

With any case report the findings are limited due to the lack of control, possible regression to the mean, and any possible placebo/ideomotor effect. However, the temporal nature of the patient's response to care, the lack of response to prior therapies, and the length of her symptoms prior to care suggests that the care rendered played an important part of her recovery. Further research is needed to determine whether a subset of post-concussion or head trauma patients may have TMD which is limiting their ability to fully recover function and return to their activities of daily

living. Collaborative efforts between emergency room doctors, chiropractors and dentists (with TMD care training) with post concussion patients may help ultimately lead to improved patient outcomes.

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Dental-Cranial functional model and the understanding of cranial facial distortions in dentistry: A Commentary.

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Introduction

The purpose of this presentation is to facilitate an understanding of cranial facial distortion (CFD) patterns as a reaction to compromised growth and development of the cranial facial structures, along with the results of these patterns on the whole body's kinematic chain. There are various factors that will be discussed which include cervical headgear (CHG) and its effect on craniofacial growth and development, the orthotropic paradigm, related sympathetic nervous system overload and stress, and suggestions for interdisciplinary treatment and prevention.

Cervical Headgear

Cervical headgear (CHG) has been most commonly used to treat anteroposterior (class II) malocclusions for over a century[1]. In its most common iteration, headgear attaches to the braces on the teeth via metal hooks or a facebow. Straps or a head cap anchor the headgear to the back of the head and/or neck. Elastic bands are used to apply pressure to the bow or hooks with the purpose of restricting maxillary growth so that the mandible is not too far posterior relative to the maxillary dentition. In general its purpose is to inhibit the upper jaw from growing, thereby preventing or correcting an overjet (maxillary incisors too far forward relative to the mandibular incisors).

While CHG may maintain an aesthetic maxillary and mandibular incisor positioning there are other secondary iatrogenic factors that many in the dental field have referred to as the "Head-Gear Effect" (HGE)[2]. The (HGE) causes a cranial facial distortion (CFD) associated with alterations in the growth and development of the facial structures and due those modifications in craniofacial growth and development compensations and distortions are subsequently developed throughout the entire musculoskeletal system. In order to better understand this phenomenon, the HEG's dental cranial relationship will need to be explored and discussed. As Isaac Newton noted there is always a cause and effect, an action and reaction[3]; in sacro occipital technique (SOT) terminology DeJarnette called this "resistance and contraction" (R+C) factors[4].

There is published literature that discusses the effect of cervical headgear on the cranial base and the convexity of the maxillary profile. Alió-Sanz et al noted that "cervical headgear treatment induced cephalometric flattening of the cranial base and a decrease of the angle measured from the anteroposterior relationship of the maxillary basal arch on the anterior cranial base[5]." Also Kirjavianen noted that "Cervical headgear treatment in Class II correction is associated with a decreased facial convexity caused by the restriction of forward growth of the maxillary A-point, while the rest of the facial profile, including the mandible, continue to grow forward at a normal rate[6]."

In traditional or orthodox orthodontic care, "headgear" conjures up an image of a child's face with straps that wrap around the head to some sort of metal bar that attaches to braces and mouth

piece. As previously stated, the primary purpose of this is retraction and/or intrusion of maxillary teeth (pulling them toward the back of the head). Historically the orthodontic approach tended to focus on the belief that there are too many teeth (or the teeth are too big) for the mouth. Protocol in traditional orthodontics recommends the extraction of four bicuspids[7] or premolars [8.9] to reduce crowding and make space so that they can then pull teeth together and straighten them.

However, there is significant concern amongst functional orthodontists that removing teeth can lead to various secondary issues aside from facial morphology[10]. For instance Broadbent noted that, "most occlusal "chewing" function occurs with the first molar and premolar teeth. It is reported that 90% of chewing function occurs at the first molar and bicuspid region. Physiologically oriented orthodontists must consider: soft tissue profile and facial esthetics, incisal misguidance (interference), narrow or constricted maxilla, underdeveloped or retruded maxilla, overdeveloped or prognathic mandible (Class III actual of effective condition relative to maxilla), crowding or displacement of teeth, and (TMJ) temporomandibular joints must be considered[11]."

The functional dental approach as described by Broadbent believes traditional orthodonture creates posterior pressure on the remaining six front teeth, maxilla, cranium, and compromises the airway space[12]. A primary goal of traditional orthodontics is helping the patient to achieve an attractive smile with straight teeth along with an improvement in facial aesthetics. These traditional orthodontic modalities utilized are predominately braces and sometimes headgear. While traditional orthodontic perspectives support their methods of treatment,[13] physiological based or functional dentistry questions the long-term effects of removing teeth.

Stack described how historically "providers of orthodontic services were solely concerned with esthetic/cosmetic considerations of the teeth. In more recent years emphasis has been placed on the interdigitation of the teeth in centric occlusion combined with the absence of occlusal interferences in sliding/gliding jaw movements with the teeth in partial contact with each other (protrusive, cuspid disclusion, etc.) [14]." He continued that, "still more recently true jaw function, or, function of the entire stomatognathic system, as opposed to the more limited functional movement of the teeth as influenced by their inclined planes when in partial occlusion, has come to the fore[14]."

So in conjunction with removal of teeth and use of headgear, the term "headgear effect" (HGE) has been used in dentistry to describe the "downward and backward growth" of the oral facial structures even without the use of cervical headgear. This pattern of growth and/or development in SOT cranial terminology would be called a "cranial facial distortion" (CFD), which can have a relationship to the cranial-sacral and the musculoskeletal systems as well as the oral facial structure.

Clinically it is believed that the CFD is associated with restricted or distorted growth patterns of the upper jaw inhibiting normal growth patterns, restricting upper arch width and/or length. Since the lower dentition will attempt to fit within the shape of the upper dental arch this upper arch restriction may lead to decreased growth and advancement of the lower jaw, commonly resulting in a narrowing and elongation of the face.

Orthotropic Paradigm

John Mew, DDS described a model of the growth and development of the oral facial structure which utilizes an "orthotropic" (growth guidance) paradigm[15]. According to Mew, treatment to straighten crooked teeth treats only the symptoms, not the cause Mew proposes this is the reason there is commonly a relapse following completion of treatment. Often by removing teeth, this narrows and shortens the oral cavity ultimately hindering orofacial growth and development[16].

Orthotropic paradigm's orthodontic objective is to facilitate growth of maxilla up and forward versus down and back. Mew believes that some types of malocclusion are related to vertical growth instead of horizontal. He suggests that cases should be started by eight years old, since it is around that age that maxillary growth and its affect on the cranium is most optimally controlled [17]. Instead of aesthetics, Mew believes that the most important factor to focus care is to change (expand) the shape of the dental arch as a means to restore nasal breathing and eliminate mouth breathing. By reestablishing a more protrusive mandibular position, this helps bring the tongue forward opening the airway space therefore helping to optimize TMJ position and function[18].

Sympathetic Nervous System Overload and Psychogenic Stress

With the stresses or tensions associated with iatrogenically induced CFD and its affect on craniofacial growth, secondary effects such as temporomandibular joint disorders (TMD) and airway space compromise can create a cascade of clinical presentations. Research appears to have found a relationship between TMD and psychogenic or stress disorders[19,20] that are experienced by orthodontic patients[21].

From a chiropractic perspective it does seem reasonable to assume that stress to the craniofacial and cervical region could have an inhibiting factor on the parasympathetic system[22] due to its compromise on the craniosacral autonomic outflow. So it is not unreasonable to find clinically that TMD patients who have had orthodontic care presenting with a HGE/CFD would be challenging chiropractic patients to treat. Clinically, patients presenting with HGE/CFD often, due to chronic nature of their condition, tend to be difficult, sensitive and psychologically challenged, due to their heightened sympathetic response that leads to reduced coping skills. In fact, at times this subset of patients may be so sensitive that typical high velocity, low amplitude manipulations are not possible due to patient guarding, necessitating that treatment focuses on only passive or indirect manipulations. Once HGE/CFD patients can be separated into their own specific subset, then specialized care can be rendered, ultimately making them (as a group) easier to manage.

However, what appears interesting is that similar psychogenic stressed patterns have also been found with non-orthodontic patients. Therefore while TMD patients are often hypersensitive and psychogenically challenged, those with HGE/CFD-- particularly with dental extractions -- appear to have significantly stressed systems. HGE/CFD can be present in patients with TMD with or without the use of cervical headgear, though those TMD patients with HGE/CFD will tend to have a lower pain threshold[23,24] and increased fear avoidance behavior[25].

Wahlund et al compared adolescents [n=60] with chronic TMD to a healthy control group evaluating sensitivity to all types of somatic and emotional stimuli. In their study "the results showed that adolescents with TMD pain reported significantly greater sensitivity ($p<0.05$) to aversive somatic and pleasant somatic stimuli than the controls[26]." Their findings suggested "chronic TMD pain states in adolescents are accompanied by amplification of bodily, but not purely emotional stimuli and that cognitive systems are implicated, not only an alteration of the nociceptive systems[26]."

Airway Compromise, Head Posture, and SOT

Patients presenting with CFD patterns display a relationship between the upper cervical spine and chronic TMD or HGE affecting airway function. This was initially described by Casey Guzay's Quadrant theory, in which he determined that the forces of the mandible and the bite rotate around a point in the sub-occipital region in the cervical spine[27]. The lever action of the mandible and associated musculature create an inferior pressure, distorting the cranial sutures and dural membranes via the temporalis, masseter and pterygoid muscles. This also results in a tilting of the entire head forward and downward to help to open airway space, creating a forward head posture as a reaction and compensation. This attempt to maintain airway space, proper dental occlusion, condylar position, and tongue position can lead to sleep–apnea/open mouth breathing habits along with bruxism, parafunction, and grinding patterns[28].

The mechanics of the mouth breather is often related to the compromise of the airway and associated musculature in and around the mouth. The head, neck, and TMJ relationships tend to be more balanced with nasal breathing and with the lips closed (lip seal). Ultimately the pressure coming from outside the teeth (lips & cheeks) needs to match the pressure from inside the teeth (tongue) to maintain the maxillary dental arch. So, when the mouth is open a significant part of the day and/or night to breath, the tongue tends to not reside within the maxillary arch but more commonly in the lower mandibular region. With this lower tongue placement it will significantly decrease any upward and outward pressure on the maxilla and the lingual surface of the teeth, thus inhibiting the necessary craniofacial growth and development[29,30].

With mouth breathers, not only will the tongue not stimulate upper arch development but inward forces from the cheeks and lips will not be counter balanced, further causing the dental arch to "collapse" inward, down, and backward. This will lead to the maxillary arch becoming narrower, the palate becoming higher, and the maxilla will be restricted from expanding anteriorly or laterally. This maxillary arch restriction can be associated with craniofacial suture tension[31], trigeminal nerve irritation[32], and TMD changes leading to posture and compensations throughout the musculoskeletal system[33-35].

With mouth breathing patterns, bruxism and grinding can be an attempt by the patient to unconsciously find a way maintain good airway space and still have adequate dental occlusion. Airway space and proper dentition cannot adequately function independently, so when there is airway compromise or obstructive apnea the dentition is commonly challenged and results in clenching, bruxism, and parafunctional activities. This pattern is associated with the need for

adequate oxygenation, excessive stimulation of pain receptors, and leads to increased systemic stress load.

From a clinical cranial SOT perspective, the CFD patterns associated with narrowing of the face and skull[5,17] keep the cranial system restricted (extension phase) and unable to release all the way into its flexion phase (inhalation). This restricted growth and development has a functional affect on the cranial suture system reducing cranial compliance, limiting cranial motion associated with CSF pulsations or cranial rhythms. With cranial motion limited, this can lead to an increased predisposition for the craniofacial and craniosacral systems to have cranial extension restrictions or fixations.

In SOT the narrow face and high narrow upper dental arch are associated with what is called cranial internal rotation or extension (SB+). The ability of the craniofacial and craniosacral system to enter into internal rotation or extension (SB+) and external rotation or flexion (SB-) allows for a balanced functional system[36]. This can have far reaching implications since cranial internal/external rotation or flexion/extension is associated with the ability of CSF pressure variants, pulsations, or fluctuations to be buffered as the cranium moves through increased and decreased pressure changes in response to these pressure variants[37]. Also the ability to have this craniofacial bone or suture flexibility allows muscular forces, most particularly associated with mastication, to be distributed throughout the craniofacial system and not focused at one point of muscle insertion. For instance, Buckland-Wright has noted that small movements have been observed between facial bones in animals, indicating the presence of a flexible component within the skull, thus allowing large forces to be exerted during biting without overstressing the facial bones[38,39].

In addition, cranial meningeal tensions are reflected to the sacral region via the pia (filum terminale) and dura (internal attachments at S2) so that the craniosacral system is responsive caudally to tensions found cranially. Therefore if the craniofacial system is restricted in only one phase of flexibility, such as extension, this may have an adverse affect on the functional motion at the sacrum, affecting sacral nutation (extension) and counternutation (flexion) [37,40].

This imbalanced sacral nutation is believed to have a physiological effect since normal sacral nutation plays an important role in CSF circulation from the lumbosacral cistern, cranialward[41]. Also it is purported that a stressed craniofacial craniosacral system may also lead so inhibition of parasympathetic nervous system activity. This reduced parasympathetic activity tends to lead to increased sympathetic stimulus[42] creating a persistent state of musculoskeletal tension[43] as an adaptive and compensating mechanism in the body.

So this HGE/CFD, airway compromise, parasympathetic inhibition, and other subsequent related physiological effects will over time create a multifactorial condition with secondary compensations or body distortions. The internal craniofacial tension caused by altered dentocranial growth and development can create increased stress in all of the cranial sutures while concurrently affecting the shape of the cranium. The muscle tension secondary to TMJ disorders or airway compromise increases tensions in the suboccipital muscle region, creating a forward head posture[28,44,45].

As this tension pattern persists it can lead to increased tension along the falx cerebri to the internal aspect of the frontal bone creating an inferiorward tension which transmits throughout all of the facial bones and sutures. The maxilla, zygoma, and mandible are under a craniofacial tension drawing the bones inferiorly, posteriorly, and medially. This starts a cascade of changes, beginning with increased muscle tension in muscles of mastication, compromised stomatognathic function, and a tendency for clenching and/or bruxism.

Clinically it has been found that the CFD subset of patients tends to have the following types of presentation:

1. Loss of cervical curve, increased forward head posture and increased tension in cervical musculature[28,44,45].

2. Suboccipital tension[27].

3. TMD/CMD (craniomandibular disorder) – symptoms[46,47].

4. Decreased lumbar curve and/or increased lumbosacral disc angle[48].

5. Unstable or dysfunctional sacroiliac joint[33,49,50].

6. Pain in feet and metatarsals, poor foot mechanics – collapse of arches[51,52].

7. Muscle tensions may be present in any of the areas mentioned above.

The narrow craniofacial with a high hard palate or extension distortion leads to a diminished nasopharynx cavity and reduced air flow and oxygenation. It also reduces and decreases nasal breathing, while increasing the tendency to mouth breathe and sustaining these vertical growth patterns of the oral facial structures. This tendency is perpetuated because the tongue has no ability to locate itself in the upper hard palate that is considered the tongue's physiological rest position. As the tongue rests downward it forces mouth breathing and subsequent retro-positioning of the mandible, or a dental class two position.

The basic concepts of proper craniofacial growth and development as described by Mew[15] or Chinappi[46] consider craniofacial and stomatognathic system as necessitating function to allow for proper physiology locally and distally affecting the whole kinematic chain. This relationship is far reaching since there appears to be airway compromise affecting oxygenation as well as increased sympathetic nervous system function.

Dental therapeutic interventions (orthodontic, restorative, etc.) from a physiological perspective need to consider growth and development, TMJ (occlusion and condylar position), airway passages, and stomatognathic function. If not, it is possible that they could contribute or cause some CFD patterns by not addressing whole-body relationships. Therapies have to consider the various stressors to the system, along with the myriad of secondary problems associated with apnea [53,54] and possible sympathetic overload[55,56].

The reduced oral cavity created by reduced size of the upper dental arch, lingual tipping of the mandibular dentition, retro-positioning of the mandible, and relative size and position of the tongue all creates airway compromise, reduced oxygenation, and excessive sympathetic nervous system stimulation. The musculoskeletal system will develop adaptive compensation distortions, and it is not uncommon for the patient to have increased fear avoidance behavior[25], low pain thresholds[57,58], and a limited physiological adaptive range[59].

Within the subset of patients with CFD, generalized pain can aggravate and complicate this pattern. The compromised airway and oxygenation along with sympathetic stimulus will eventually overload the patient's physiologic adaptive mechanisms. Ultimately the body will attempt to compensate and adapt to the imbalanced stressors until it begins to fail. As the body begins to fail to compensate there will be alteration in sub-optimal posture, compromise of musculoskeletal function, osteoarthritis, degenerative joint diseases, decreased flexibility or joint hypermobility, as joints are challenged muscles will increase tension to maintain support, and lowered pain thresholds leading to generalized pain syndromes.

Therapeutic Interventions

There are various methodologies available to deal with CFD associated with HGE or poor growth and development. One aspect can be incorporating dentistry and chiropractic (SOT cranial techniques)[47,60] preventatively to facilitate a child's growth and development allowing for upper dental arch development and good orofacial behavior. From a dental perspective this incorporates focusing on upper dental arch expansion, leading to optimal dental occlusion, good condylar position, and appropriate tongue to oral cavity space and function. It is not about a focus on removing teeth (bicuspids) or using head gear to retroposition a mandible[61].

Chiropractic (SOT cranial) care is focused on maintaining good anterior sacroiliac joint (sacral nutation – category one) motion and posterior sacroiliac joint (weightbearing ligamentous integrity – category two) support. Assessment and treatment is directed to the whole body kinematic chain from an ascending (feet, knees, hips, pelvis, spine to craniofacial and TMJ regions) as well as a descending (TMJ, craniofacial, spine, to the pelvis) orientation[62,63]. SOT craniofacial treatments facilitate growth and development, improve TMJ function, and help integrate these changes into the patient's entire neuromusculoskeletal kinematic chain[47,60, 62-65]. Autonomic nervous system balance is important and can involve balancing viscerosomatic/somatovisceral reflexes to help the patient cope with any sympathetic nervous system overload of parasympathetic nervous system inhibition[66].

Oral myofunctional therapy (OMT) can be incorporated into care with resistant TMD and CFD cases[67,68]. OMT involves a neuro-muscular re-education of the oral facial muscles, is a modality that promotes the stability of the stomatognathic system. OMT treatment commonly consists of jaw stabilization exercises, habit elimination and behavior modification, and re-patterning the oral facial muscles and changing their function for optimal tongue rest position, chewing and swallowing so that the tongue does not drop into the airway[69,70].

The interdisciplinary relationship between the dentist, chiropractor and OMT therapist incorporates myofunctional aspects regarding internal and external pressures to the dental arch and its affect on function and growth and development. For instance the pressure pushing out on the dental arch from the tongue is supposed to match pressure pushing inward from the lips and cheeks. With a mouth-breathing patient, their mouth is open a large part of the day and night due to the lack of ability to get enough oxygen through the nasopharyngeal and this position allows the lips and cheeks to have a slow consistent long term sub-optimal effect on the dental arch. With a mouth breather it is found clinically that the tongue does not press into the maxillary arch, and so this arch slowly collapses inward, backward, and down or a combination of these distortions. This pattern becomes persistent since when the tongue is not in it physiological rest position (upper dental arch) aside from growth and development being affected the back of the tongue closes off the airway space leading to airway compromise.

Another preventative factor that can be investigated is the use of nutrition to facilitate proper stomatognathic function and dental growth and development This was studied in animals by Pottinger. Pottinger demonstrates in his book "Pottinger Cats[71]." how a compromise in the developmental patterns of cats can be attributed to moving away from raw to cooked food diets. Pottinger found that cats moved from raw to cooked food diet had a significant loss of teeth, poor dental arch development, swollen organs, fertility, hair loss, skin problems, and significant behavioral changes[71]. Pottinger also, through radiographic study, noted a relationship between mandibular underdevelopment and microtrauma and fracture in the feet suggesting a possible relationship between these distal osseous boney structures[71].

In humans, this concept is further investigated by considering "developmental nutrition[71]."Developmental nutrition as discussed by Price in his book "Nutrition and Physical Degeneration" examines how diets of processed food can significantly alter oral facial structure as well as general development. Price, a dentist, performed anthropological studies in the 1930s traveling globally and studying the diets and nutrition of various cultures. His book concluded that aspects of a modern Western diet (particularly flour, sugar, and modern processed vegetable fats) cause nutritional deficiencies that are a cause of many dental issues and health problems. The primary dental issues he observed from a "modern Western diet" included the improper development of the facial structure (overcrowding of the teeth) in addition to dental caries[72].

Conclusion

The significance to dentists and cranially trained chiropractors or osteopaths is the realization that there is a common pattern of compromised craniofacial growth in a subset of our patients. Looking at the body as a matrix of structure and function, with the dental growth and development, airway, and autonomic nervous system balance as integrated aspects of a patient's health, can be an essential aspect of healthcare treatment or prevention. This concept of a comprehensive, whole body approach to diagnosis and can facilitate the treatment of myriads of problems that are seen clinically.

Examples can be patients presenting with migraine headaches, teeth grinding, bruxism or clenching, TMD/CMD, tinnitus, vertigo, general loss of strength, chronic fatigue, snoring, sleep

apnea, low pulse oxygen levels, and loss of cervical curve or forward head posture. It is not uncommon to find with the CFD subset of patients cervical and lumbar muscle tension from the resulting compromised or compensatory posture, predisposing them to thoracic outlet syndrome, carpel tunnel syndrome, and other upper extremity type disorders. Therefore these patients may have interrelated disorders throughout their entire neuromusculoskeletal system and kinematic chain.

Ideally the future for these patients will be more hopeful if interdisciplinary relationships can be developed between dentists, chiropractors, osteopaths, OMT, podiatrists, nutritionists, and other healthcare practitioners. The ultimate goal is to improve dental or craniofacial growth and development as well as airway space, and reduce related secondary apnea or upper airway resistance syndromes and excess sympathetic nervous system activity. This field of study and care should warrant significant further research since it may represent a large, understudied portion of our patient population.

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Is it Mental or is it Dental? Cranial & Dental Impacts on Total Health: A Commentary.
Raymond Silkman, DDS

Introduction

The widely held model of orthodontics, which considers developmental problems in the jaws and head to be genetic in origin, never made sense to me. Since they are wedded to the genetic model, orthodontists dealing with crowded teeth end up treating the condition with tooth extraction in a majority of the cases. Even though I did not resort to pulling teeth in my practice, and I was using appliances to widen the jaws and getting the craniums to look as they should, I still could not come up with the answer as to why my patients looked the way they did. I couldn't believe that the Creator had given them a terrible blueprint --it just did not make sense. In four years of college education, four years of dental school education and almost three years of post-graduate orthodontic training, students never hear a mention of Dr. Price, so they never learn the true reasons for these malformations. I have had the opportunity to work with a lot of very knowledgeable doctors in various fields of allopathic and alternative healthcare who still do not know about Dr. Price and his critical findings.

These knowledgeable doctors have not stared in awe at the beautiful facial development that Price captured in the photographs he took of primitive peoples throughout the globe and in so doing was able to answer this most important question: What do humans look like in health? And how have humans been able to carry on throughout history and populate such varied geographical and physical environments on the earth without our modern machines and tools?

The answer that Dr. Price was able to illuminate came through his photographs of beautiful, healthy human beings with magnificent physical form and mental development, living in harmony with their environments.

What Is Happening?

It has been well documented and Nobel prizes have been awarded to researchers that have established the relationship between proper form and development and proper physical functioning of the body. The changes in facial structure that we observe in our children today are an extremely serious matter. I would like to explore the consequences of what is happening to human physical form.

Let's evaluate what happens to our children or adults who have faces that are narrow and long, who have lower jaws that are not developed properly, or who have a profile view showing a very weak chin. What happens when we see jaws so narrow and small that the teeth are crowded and overlapping? What happens when the cranium is underdeveloped in various dimensions and the eyes are not level with one another?

What is the physical health legacy of these individuals going to be? What happens when we see children and adults with forward head posture--necks that are holding the head in a forward position?

There’s an old saying, that someone "has his head on his shoulders." The translation: well-grounded minds require well-grounded and well-supported physical forms and bodies. Unfortunately today a lot of people don’t have their heads on their shoulders--their heads are positioned in front of the shoulders.

Since a normal adult cranium weights between 12 to 18 pounds, the musculoskeletal strain in the neck or cervical region to support a forward head posture can cause a cascade of events leading right down to the feet. The forward head posture in most individuals creates improper spinal alignment and lack of proper curvature to the spine at critical areas.

There is also an alarming trend in hip and knee replacement surgeries and many individuals have improper or mostly flat arches in the feet necessitating orthotics in their shoes or, even worse, corrective surgeries.

What happens to people when they don’t have their heads on their shoulders? What is causing this effect and why does the body support this apparently futile posture? We will answer that question.

The Cranium or Skull

Let's discuss the significance of the skeletal structures in the head. The human cranium is made up of roughly 22 cranial bones not including the ones responsible for sound transmission. One of the key bony structures in the cranium is the maxilla, or the upper jaw. The cranium also houses the extremely important glands of the endocrine system. Two of these glands, the pituitary and the hypothalamus, are housed in another very important bony structure known as the sphenoid bone residing directly and in close contact with the maxilla.

The entire brain, and all of the structures or glands housed in the cranial cavity as well as the spinal cord and all of the peripheral and accessory nerves in the entire body are covered by a continuous-membranous sheath called the dural membrane. In dissections, it has been demonstrated and documented that pressure or force on the dural membrane in the cranial cavity or at the brain level will create pulsation or an opposite force at the end of the spinal cord, and vice versa.

If the cranium is not developed properly, the dural membrane can become twisted and torqued, thus possibly creating nerve conduction issues, hormonal imbalances or pain. You can imagine the effects that this can have on the nervous system and on an individual’s overall health and well being.

Interestingly, medical research has demonstrated the presence of constant and rhythmic movement of the cranial bones at the contact areas, also known as the sutures. Just as in breathing, when the lungs fill with air and then empty, so there is a movement of cerebral spinal fluid up and down the spinal cord and around the brain. So, unlike the popular belief that "it’s good to have a solid noggen," we now know that this does not mean an immovable head or

cranium. The inherent motion in the cranial bones is very important to over all health. Various accidents or trauma or surgical interventions of the face and head can have a negative effect on this motion.

There are also various foramina or openings in the bones of the skull which allow nerves and blood or lymphatic vessels to pass from the cranium to the lower areas and vice versa. If any of the cranial bones is under-developed or misshapen, as often happens to be the case, then these foramina can also be malformed.
For example, they may be ovoid rather than circular because of underdevelopment, which may cause an impedance to flow of circulatory or neurological vessels going through that particular foramen. Improper drainage of our waste products through our lymphatic system or lack of oxygenation or nourishment of cranial tissues and organs may be experienced as negative effects on brain function and mental clarity.

The Maxilla

This bony structure provides visible structure to the whole mid-facial area. Eleven of the cranial bones directly contact the maxilla and the rest of the cranial bones have an intimate contact with the bones directly in contact with the upper jaw or maxilla. Therefore the position and size of the upper jaw has quite a lot to do with proper cranial development and facial aesthetics.

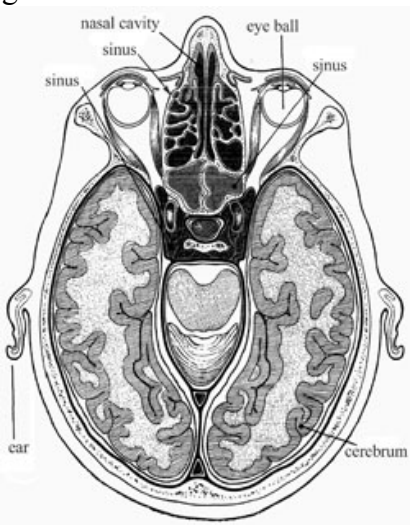
The entire floor of the orbit or eye sockets, where the visual globes or the eyeballs are housed, is made up of the upper jaw or maxilla. When the maxilla is not well developed, and the face is long and skinny, the eye sockets do not develop properly; the eyeballs cannot develop as a sphere, but may take on a football shape. The resultant developmental pattern can create various ophthalmic issues such as astigmatism or myopia. We can treat astigmatism with corrective lenses but the treatment does not really address the root of the issues.

Airway Obstruction

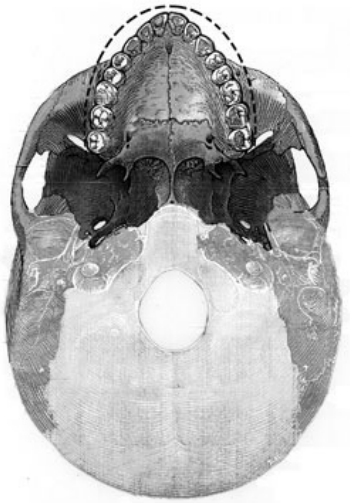
The most serious consequence of under development of the maxilla is airway obstruction and mouth breathing. Eighty five percent of the nasal airway is made up of the maxilla, which provides the floor of the nasal cavity and houses all of the nasal sinuses typically referred to as the sinus cavities. Therefore, an individual with a narrow or improperly formed maxilla will have extremely narrow nasal passages, which limit flow of air and breathing capabilities, and will thus experience difficulty in having proper sinus health and drainage.

It is an important fact that the soft tissues develop to their genetic size, even when the bones do not! You might think of the head as a box that must house all of the structures that the genetic code needs to express and that will develop, but lack of proper dimensions to the cranial bones and the cranial cavity causes overcrowding, overlapping or deviation of some soft tissue areas. This can be illustrated by the example of over packing a suitcase.

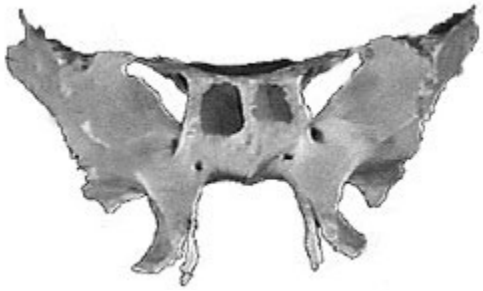
An example of this "over packed suitcase" in humans occurs in the nose. How often have you heard someone say, "I have a deviated septum"? The septum is the cartilaginous tissue membrane that separates the two nostrils vertically. Imagine this soft tissue developing to its normal size, but the maxilla remains underdeveloped. The developing septum has to express its dimension somewhere, so it has two choices—it either deviates or bends to one side or the other (the deviated septum) or it grows through the maxillary suture and creates the condition known as palatal tori. These are bumps or ridges in the middle of the palate and most people have them to some degree or another.



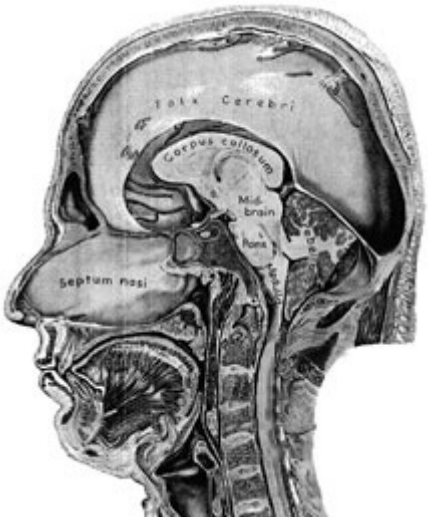
View of the interior of the head. Note the small area in the center where the nerves and blood vessels must pass.



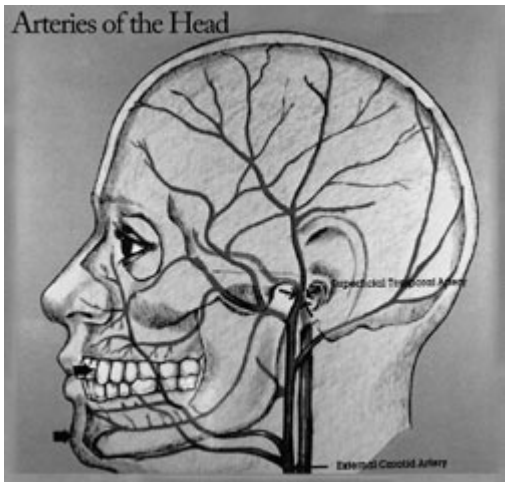
The maxilla viewed from underneath. Note the narrow palate in this illustration.



The complex sphenoid bone, positioned behind and above the maxilla.

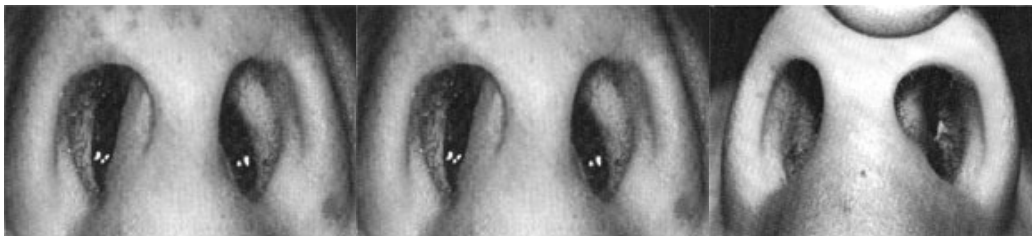


Side view of the head showing the tongue and the nasal cavity



The arteries in the head. If the passages for these arteries run through skeletal openings that are too narrow, many detrimental effects can occur.

A deviated septum blocks proper nasal air flow causing the individual to take up mouth breathing most of the time. There are a variety of other soft and hard tissue conditions associated with the nasal cavity such as polyps, enlarged turbinates and muscosal conditions that also serve to restrict air flow.



A deviated septum or overgrowth of the soft tissue in the nose can cause blockage of the nostrils, leading to mouth breathing.

Breathing through the nose creates an avenue of air that's moisturized, humidified and even somewhat filtered. Furthermore, when we breathe through our nose, the air passing through the nasal airway and contacting the turbinates--shelf- like bony structures--is slowed down. This allows the proper mixing of the air with an amazing gas produced in the nasal sinuses called nitric oxide (NO). Nitric oxide is secreted into the nasal passages and is inhaled through the nose. It is a potent vaso-dilator, and in the lungs it enhances the uptake of oxygen. NO is also produced in the walls of blood vessels and is critical to all organs.

Mouth-Breathing

Let's evaluate the differences in mouth breathers and nose breathers. The consequences of mouth breathing can occur from the moment of birth because all infants are obligate nose breathers. That is the mechanism by which breast feeding and breathing can occur simultaneously. If a

baby has obstructed airways, he may turn away from the breast due to lack of air and prefer a bottle, which allows him to consume his food more quickly.

A mouth breather will not be humidifying the air, or slowing it down to allow the proper mixing of NO with it. The lungs will have difficulty providing maximum oxygenation for the body with this dry, unhumidified, unfiltered and, most importantly, NO-lacking air. This constant and chronic condition affects the cardiovascular system and the heart because the smooth muscles that line all of the arteries react to this poorly oxygenated air with a kind of tightness, a kind of permanent tension, which can be very stressful and depleting to the body. Furthermore it has been clinically shown that blocking NO production in healthy individuals results in moderate hypertension and reduced heart output as well as shortened bleeding times by activation of platelet blood-clotting factors.

Due to the lack of proper oxygenation, the ability to deliver fully oxygenated blood to the cells is also much reduced. Thus mouth breathing has a negative effect on every cell in the body as it deprives them of oxygen. Overall wellness and health requires proper oxygen as every particle of our being requires oxygen. Cancer cells, by the way, are anaerobic by design. Other manifestations of mouth breathing include snoring and cessation of breathing (also known as sleep apnea), some types of headaches, hypertension without other known clinical causes, bed wetting, chronic ear or sinus infections, TMJ pain, sleep disorders and dark patches under the eyes.

Visual Diagnosis

Much valuable information can be obtained by looking at and studying the faces of traditional peoples with proper physical development and form. I am deeply grateful to Dr. Price and all of the photographers and cinematographers who have provided us with such valuable clues and information.

We can tell a lot about an individual's physical development just by looking at the face. One of the things I look at in profile view is the nasal-labial angle. In a well developed person, this angle is an acute angle, that is, less than 90 degrees. A nasal-labial angle that is obtuse, that is greater than 90 degrees, is a sign that the maxilla is not well developed or positioned in the front-to-back dimension of the skull. The proper development of the maxilla is absolutely critical to the formation of the entire head and to the health of the entire body—and not just physical health but spiritual and emotional health as well.

In the photograph at left we see an individual with a nasal-labial angle of about 110 degrees, a sure sign that the maxilla is underdeveloped. As a consequence, he will not have an optimal development of the rest of head. Predictably, he has a narrow palate and in this case, he has had four premolar teeth extracted.

Another sign of poor facial development can be detected in the eyes. When someone is looking straight at you and you can see the sclera or white of the eye ... that is a tip off to a very, very under developed upper jaw and mid-facial area.

Another area of interest is the soft tissues and skin. Sagging and wrinkles are minimal or non-existent in people with good physical development as they age. Their faces don't sink back into their craniums. Wrinkles happen when the scaffolding—the bony structure—becomes diminished in comparison to the muscles and skin.

As I mentioned, the soft tissues of the body grow to their genetic size, even when the bony structures do not. The skin, the tongue, the tonsils and the nasal tissues grow to their genetic size but when the nutrition is missing, the bony structures are compromised. So the face will have an excess of skin and musculature, the tongue and tonsils will be too large for the mouth. Nasal bumps can also result--the nasal tissues are out of proportion to the facial structure so they protrude. People who have proper facial development do not have nasal bumps.

The TMJ and the Lower Jaw

When we look at the skull from the profile view we observe the temporomandibular joint, the TMJ. Most joints will go through normal hinge motion, and some of them like the shoulder and hip joint will have a rotational motion that is more complex. However, in these joints, the two bony members stay in contact with one another throughout the motion of the joint. The TMJ is unique in that it is designed to provide both hinging and sliding motion. In order to accomplish this compound hinge-and-sliding movement, the TMJ has a disc that slides in concert with the lower jaw or mandible. When the lower jaw is not positioned forward enough, the TM Joints do not develop very well, and the discs can get jammed behind or in front of the joint. They can even become perforated and cause some of the "clicks and pops" that can be heard when people open and close their mouths. Immediately behind the TM Joints we also have the ear canals and important vascular and neurological structures, which can become impinged upon as well.

What we call an overbite or overjet should really be called an underbite, because it is caused by the mandible, the lower jaw, which is too far back, not the maxilla that is too far forward. But when children come to the orthodontist with what the public calls an overbite, they are often treated by removing some of the teeth in the upper jaw and then with a device known as neck gear or headgear to pull the maxilla back. The thinking is that the apparatus will stunt the growth of the maxilla and allow the lower jaw to grow and catch up, or that the maxilla has grown too far forward and must be pulled back.

But the maxilla is already stunted due to poor nutrition and so you can imagine how this type of treatment may cause more compression, more jamming of the bones in the head with possible detrimental whole body effects. The correct treatment for this condition is to widen the palate with an appliance so the lower jaw position can be corrected forward and allow proper physiological form and function as our ancestors have enjoyed throughout the millennia.

More Visual Clues

When children or adults are not breathing properly they tend to develop dark patches and bags under their eyes. This is due to lack of adequate circulation as well as venous blood pooling in these areas.

Kids that are mouth breathers will always have chapped lips and typically the line separating the inner lining of the lip and the outside lining, known as the vermilion border, will be visible. Also mouth breathers in profile tend to have very weak chins and elongated faces. Typically these individuals will suffer from chronic sinusitis or sinus infections, colds, respiratory problems and lung-related issues.

Typically children with bags under their eyes have short attention spans because they do not have good circulation and oxygenation of the head and can tire easily. They are literally suffocating.

Furthermore, they don't sleep very well--they are always tossing and turning and they wake up tired. Your body recuperates during sleep and sleep is especially important for teenagers. Teenagers need to go to bed before 10:00 pm because certain brain cycles designed for recuperation of the body kick in at around that time. These cycles will be interrupted if sleep mode is delayed to after 10:30-11:00 pm. The recuperation and rebuilding necessary to cope with stressful daily activities will then be compromised. These are the tired, sleepless kids who tend to have a diet high in sugar, trans fats and grains. They may end up labeled as ADD or ADHD and treated with drugs.

Airway capacity is the biggest and most important part of the well-being of a human being. It is important to stress the fact that breathing through the mouth and breathing through the nose have extremely disparate effects on the body. We are not designed to breathe through our mouths. The body is able to live by breathing through the mouth, but it suffers greatly for doing it.

Internal Structures

The structures that hang off the mandible or lower jaw include the tongue and the nasal pharyngeal areas, which eventually lead down into the lungs.

Other structures that can affect the airways further back in the throat area or the pharyngeal airway space are the tonsils and adenoids. About 85 percent of the children I see in my practice have extremely large tonsils and do you think they can breathe very well? It is not possible to breathe very well when tonsils, which are typically supposed to be almost unnoticeable, are so inflamed that they are almost touching and practically closing off the airway in the back of the throat, right where air is supposed to pass on its journey towards the lungs.

These structures also become swollen due to food allergies, especially allergies to pasteurized dairy. Every time I've had a kid and a mom convinced that they should stop everything

pasteurized and processed and then eventually go to raw dairy products I have seen some reduction in tonsillar size, although this doesn't happen overnight.

Examples of Poor Facial Development

Narrow face, mouth breathing, and sclera showing under the eyes.

Over bite or over jet, dark areas under the eyes, and weak chin.

Narrow face, circles under eyes, nose bump, and tendency for face to sag.

(Interestingly, I have had two cases of children who stopped having epileptic seizures as soon as they had their extremely massive tonsils taken out. Please note that I usually do not recommend removal of organs and body parts.)

Almost invariably a narrow or under-developed maxilla can cause the effect of holding back the lower jaw or the mandible. This improper positioning of the mandible and its inherent retrusion causes a lack of physical and physiological space for the tongue and the pharyngeal tissues, which again will provide an impedance to the airways, causing breathing difficulties and lowered oxygen uptake by all of the tissues.

The most important orthodontic appliance that you all have and carry with you twenty-four hours a day is your tongue. People who breathe through their nose also normally have a tongue that postures up into the maxilla. When the tongue sits right up behind the front teeth, it is maintaining the shape of the maxilla every time you swallow. Every time the proper tongue swallow motion takes place it spreads up against maxilla, activating it and contributing to that little cranial motion, that cranial pumping that we discussed earlier. Individuals who breathe through their mouths have a lower tongue posture and the maxilla does not receive the stimulation from the tongue that it should.

When the tongue doesn't fit inside the jaws or dental arches it retracts back into the throat and pushes on the floor of the mouth. The result is something that looks like a double chin, even in women who are very thin. When we begin palate-widening procedures, this problem disappears--without plastic surgery.

And then what happens when orthodontists treat these problems by removing teeth? If he takes out eight teeth out of a total of 32 (four first molars and then later on four wisdom teeth), the patient ends up missing one-fourth of his teeth. What are the consequences of this? Can you take out 25 percent of anything that's supposed to be whole and expect it to be okay? I consider the teeth as organs and do not recommend the removal of teeth for tooth crowding or orthodontic treatments.

And what happens when a child is given head gear or neck gear, when you put a force on a cranium to pull it back? There can be serious consequences.


Types of headgear used to pull back the upper or lower jaw

The Final Answer: Adaptive Capacity

Our bodies have an adaptive capacity to deal with shortcomings. Those of you who have studied CPR know about the ABCs of resuscitation. The A stands for airways and what are you supposed to do when someone needs assistance? You tilt the head back to open the airway. Similarly, when the airways are chronically blocked, the body tilts the head back. But humans cannot walk around with their noses up in the air for too long. The eyes must be parallel with the horizon, so the body then leans the head forward. Forward head posture in essence is a chin lift procedure with the eyes corrected to the horizon in a vertical or standing position.

That's where that characteristic forward head posture comes from. This chin-lift, head-tilt-forward posture helps open up the airways. As I mentioned, craniums on adults weigh 12-18 pounds. Imagine a bowling ball.

If I carry the bowling ball close to my body, I can carry it without becoming tired, but if I carry the bowling ball out in front of my body, what happens? I am going to suffer from fatigue. So then, in order to balance the head tilted forward, I may extend my butt out a bit, which creates a misalignment of the hips, but helps to balance the extra forward weight of the ball. How many people do you know that have hip and lower back problems? Most of those people also have airway problems. Also, there are limbs attached to the hips--we call them legs--so when the hips go out of alignment, the knees have to adjust to this weird hip posture.

These adjustments are all very subtle. One doesn't wake up and feel that he or she is going to walk differently. Can you imagine that all of these issues and events can start with a baby who is chronically breathing through its mouth? So airway capacity is the most important hallmark of the well-being of a human being. If you have good airway capacity, you will go through life with a strong immunity to illness.


Breathing difficulties can lead to the tiring head tilt forward position.

Sympathetic Overload

When the bones in the head are underdeveloped or misaligned, the soft tissues are over-crowded and unable to assume their normal shapes and positions and the air way is obstructed. When, in addition, the diet is not nourishing and lacks proper fats, the nervous system also suffers.

Let me explain: as you may know, there are two types of autonomic nerves, sympathetic and parasympathetic. The parasympathetic nervous system works to calm us down and to heal. The sympathetic nervous system is the part used when one needs to get out of a dangerous situation. It operates when we are under a lot of stress, and we are not meant to be under constant physical stress. When the sympathetic nervous system is activated it places the body and mind in an alert mode and this mode and the constant stress depletes the bodily reserves and nutrients.

Sympathetic nervous system overload also occurs when the airway is obstructed and the input or sense to the nervous system is akin to a hand or choker around the neck. What type of response do you think the nervous system will have? It's on high alert at all times. This is why kids who are mouth breathers have a strong gag reflex, for example. For them, the mouth is the source of air as well as the source of food, and the mouth was not designed to perform both of these functions. So kids and adults who are mouth breathers have strong gag reflexes, sometimes so strong that they can't get near their mouths without difficulty, not even with their own toothbrushes or eating utensils. This, of course, precludes certain psychological issues that can also create a strong gag reflex but can be ruled out during an assessment.

So mouth breathers tend to have amped-up sympathetic nervous systems, always on alert, and they have a hard time getting their physical or mental bodies to relax. Many have found an avenue of dealing with this issue subconsciously, namely exercise and physical exertion. This is because during physical exertion large volumes of air are inhaled, which may give the body the input it needs to make up for the lack of proper oxygenation during rest periods.

Long-Term Consequences

People who are not well oxygenated and who have poor posture often suffer from fatigue and fibromyalgia symptoms, they snore and have sleep apnea, they have sinusitis and frequent ear infections. Life becomes psychologically and physically challenging for them and they end up with long-term dependence on medications—and all of that just from the seemingly simple condition of crowded teeth.

In other words, people with poor facial development are not going to live very happily. They're always going to be in and out of treatment, hopefully with a more holistic alternative practitioner—but you can take all the herbs in the world, you can take all the homeopathic medicines for these conditions, but the truth is, you cannot have proper function without the proper structure. If you don't have the proper form how do you expect proper function even with the best alternative care?

So, as you can see, airway capacity is extremely important and many times when we do the procedures that widen the palate, correct the head tilt and allow a person to breath through the nose, that person suddenly becomes happy. It is amazing to see the things that happen when we take steps to expand the palate and the upper jaw. The patients go through a literal expansion, but they also open up in many ways-- they open up their hearts and their personalities and relationships change. They become more pleasant, more contented. A lot of amazing things can come about just from changing the shape of the maxilla for a human being.

Well-Formed and Hardy

My friends think I am nuts but I can stare for hours at photographs of well-formed individuals and just marvel at the beauty of proper physical form and function and the capabilities for hard work and functioning that these individuals tend to have.

Examples of excellent facial development: Note the broad middle portion of the face, well-developed lower jar and smoothness (lack of sags or circles) under the eyes. These individual illustrate the full expression of our genetic blueprint.

Let's ask a question: who can perform better in jobs or sports with very difficult physical requirements and conditions? Generally you will find the well-developed (that doesn't mean large muscle mass), well-formed individuals who are capable of such physical feats and they tend to come from rural or isolated areas or from families that have consumed more traditional diets and therefore had much better development than the average city child growing up these days. Many of these individuals are people who come from other parts of the world and are involved with professional sports and or jobs we consider menial, such as doing our gardening, housework and construction work, and even raising our children--people who are able bodied and capable.

Therefore if we are looking for the magic period to help a child grow into an individual with amazing physical capabilities then we must acknowledge that the most important developmental period is preconception and the nine months in utero or in the womb--this is when the foundation is laid for living a full 120 years. The parents should prepare themselves well in advance of conception by eating a nutritionally supportive diet, based on the principles discovered by Weston Price, and continue that diet during pregnancy. If, through out the individual's life, such nutritional practices are continued, then the possibility to have excellent physical form and function is highly likely, with great rewards to that individual. Please take into consideration the fact that over the last 100 to 120 years in this country, many events and conditions have slowly weakened the offspring born in each successive generation. Modern medicine classifies some of

the physical symptoms encountered in the younger generations as genetic; however, even though there may be genetic aberrations occurring due to toxicity of the environment, these symptoms are a reflection of the improper human development due to poor nutrition.

The people who were born in the 1920s, '30s and '40s tended to drink and smoke. They had teeth extracted, root canals and metal fillings, yet they are generally not the chemically sensitive individuals we see in our population today, young people in their twenties who can't handle even a little bit of lavender scent in the room.

Sources of Energy

We must also briefly discuss other sources of input or energy besides diet needed to create proper physical form and mental function. There is a concept that views a human being as a sort of battery or capacitor. We are the sum of all that goes into us, not only our physical diet but also the input of an emotional or spiritual nature, including our connections to one another, to nature and animals, to art, to the Creator and also, most importantly, to ourselves.

A connection that more than 90 percent of individuals lack is the connection to the earth. Historically, humans have had some form of physical contact with the earth and its electro-magnetic field. We worked on the land and collected our sustenance with our feet or bodies in contact with the earth and without the interference of man-made materials and building structures. So it's important to literally stay connected with the earth by walking barefoot outside and letting all of our senses recalibrate themselves to what our body knows as normal.

Finally, we get energy from our belief systems and from our beliefs about ourselves. When something goes wrong, do we berate ourselves or do we see our troubles as important lessons given to us because we are worthy to receive them?

Humans Recognize Proper Facial Form

While very few people have heard of the work of Weston Price these days, we haven't lost our ability to recognize proper facial form. To make it in today's society, you must have good facial development. You're not going to see a general or a president with a weak chin, you're not going to see coaches with weak chins, and you're not going to see a lot of well-to-do personalities in the media with underdeveloped faces and chins. You don't see athletes and newscasters with narrow palates and crooked teeth.

Unfortunately the trends in cosmetic facial and body enhancement procedures make one believe that all can be bought with money and surgery, but a word of caution: avoid implantation of objects or removal of organs as they interfere with normal and natural processes of the body, mind and soul. Great research has demonstrated that cells communicate with one another via a form of light and surgery tends to disrupt these light pathways, also called meridians or chi pathways.

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A Review of a Commentary Published 1994: A New Management Model for Treating Structural Based Disorders: Dental Orthopedic and Chiropractic Co-Treatment.

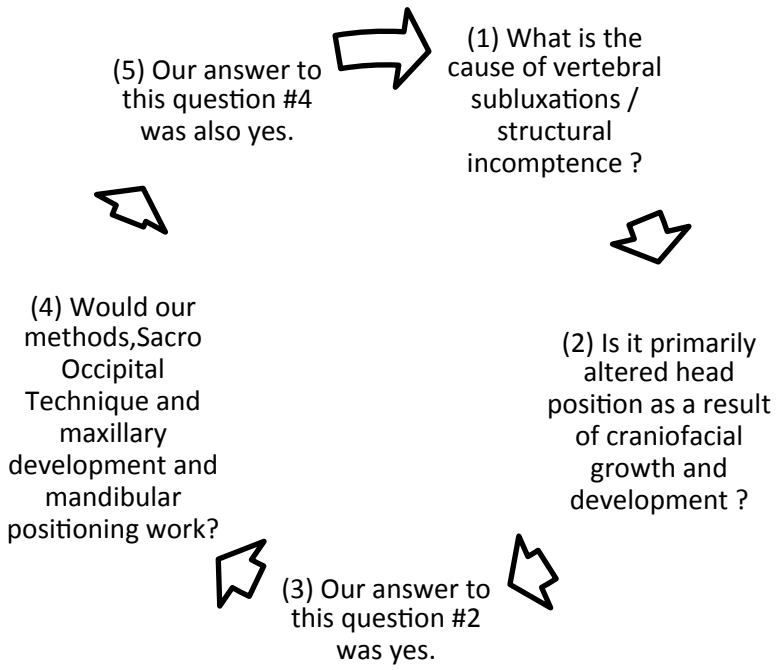
Albert Chinnapi, Jr., DDS, Harvey Getzoff, DC

Introduction:

The intent of this paper is to review the principles and methods outlined in the first of a series of articles published in the Journal of Manipulative and Physiological Therapeutics in 1994 [1], 1995 [2], and 1996 [3]. That article, "A New Management Model for Treating Structural-Based Disorders: Dental Orthopedic and Chiropractic Co-Treatment [1]", presented a management model that the authors developed over a 12 year period of time before publication. The purpose of this review by the original authors, Albert Chinappi DDS and Harvey Getzoff DC, is to examine whether those principles and methods stated in the original commentary are still valid today, 20 years later. This review reveals that the operating principles of the model as initially outlined have not changed. Methodology and techniques, especially in orthodontic materials have certainly advanced, but the underlying principles have remained constant.

In order to bring our principles from the realm of theory to a state of practicality we have utilized the following thought process, [Chart # 1] while keeping in mind the words of Ralph Waldo Emerson, "The man who grasps principles can successfully select his own methods. The man, who tries methods ignoring principles, is sure to be lost." As a result of applying these principles and methods in a significant number of patients for over 20 years, our combined model of care has been validated, with 3 cases studied over 32, 30, and 11 years.

Chart # 1



Principles and Methods

The initial article addresses the question of structural competence with the following statement: "It holds that the dental occlusion, as well as the spine, pelvis and cranium are determining factors in the functional health of the body. Instead of treating each as an isolated segment, the jaws, cranium, spine and pelvis are considered interdependent parts of a whole body system [1]." Further along in the article we describe the principles of the co-treatment care model as that "which holds that facial-development and the resulting dental occlusion are factors in postural alignment [1]." Many authors/ practitioners, Walther, Walters, Scully, Barnes, Braun, Curl and Chek [4-7] to name a few have written extensively about the relationship of the head, and jaw to postural dysfunction. Guyton describes the relationship of the vestibular apparatus of the head and neck proprioception [19]. The thoughts of some of these authors are part of the original articles. In addition to the original articles we have both published articles that further address the relationship of the head to the structures of the body. Chinappi in Inside Dentistry, "The Unity of Form and Function, The New Dental Paradigm, October 2012 [7] and Getzoff presented at the International Research and Philosophy Symposium 2013, a paper titled "The Relationship of Cranial Facial Growth and Development to the Sacro Occipital Technique (SOT) Category System [10]."

Philosophical Guiding Principles:

Chart # 2

The body is a functional system: not individual random parts acting independently.	We monitor functional indicators as a primary method of evaluation.	We don't treat: we facilitate change through adjustments to the system.	What we do as a clinician is either enhanced or diminished by the person we do it to.

We share the following set of principles [Chart # 2] not only in applying the Chiropractic Dental model but also in the management of all of our patients. These principles have developed as key philosophical and clinical guides. We wrote in the initial commentary at various times about their importance and have not wavered since. As stated in the original article, "The Orthodontist is a specialist in the areas of growth and development, responsible for the correction of the results of abnormal facial growth, i.e., the malocclusion. As the Orthodontist began to work on jaw positioning and arch expansion he experienced unexpected results. He gradually converted his practice to one that places a heavy emphasis on functional jaw relationships. This applies that the diagnostic criteria are often located outside the oral cavity [1]."

Also stated in the original article that simultaneously "**The Chiropractor began to look at spinal subluxations not only as a reduced or local event but as a by-product of structural deficiencies in other areas, primarily the cranium.** This shift in emphasis did not minimize the role of the subluxation, but placed it within the context of a larger system. With a greater

awareness of systematic influences the Chiropractor began to focus on the process of normal development as an initiator of structural competence or incompetence, not an isolated occurrence [1].”

This model lends itself to not only a system method of care but a method of analysis based on functional indicators. As stated in the original commentary, “The co-treatment model entails analyzing each patient from a developmental and postural perspective. The Chiropractor studies the patient’s function by range of motion studies, postural observations, orthopedic tests and SOT indicators.(13) The Orthodontist analyzes developmental influences on the body of poor facial development by evaluating not only the dental occlusion but the mandibular posture. These factors are integrated with standard chiropractic and dental histories as well as lifestyle issues [1].” The importance of the co-operative role of the patient in the achievement of a successful outcome can’t be underestimated. We say it this way in the original commentary: “The model demands that the patient assume a greater responsibility for the outcome [1].”

Principles of Craniofacial Growth and Development:

Chart #3

First Growth Site	Second Growth Site	Third Growth Site
Vault and cranial base	Mid face-Maxilla	Mandible
Completed by age six	Completed primarily by age 12	Into the 20’s

Craniofacial Growth often is delineated in terms of the rate of growth of its various components. [Chart3] “The vault and cranial base develop first because of their relationship to the expanding brain. The second growth area is the mid-face or maxilla [1].” Cranial bone development, the mid-face and maxilla, is both controlled by and responsive to the functional needs of all the structures and tissues involved [5,9,14,18]. The third growth area, the mandible, is responsive to multiple factors inclusive of the development of the mid- face and “Since maxillary growth stops earlier it seems to set the anterior limits of future mandibular growth. This, in turn, might play a significant role in the developing malocclusions [1].” “The growing mandible depends on the process of intra-membrane bone formation and remodeling for the bulk of its substance. The overall mandibular remodeling and condylar growth are geared to accommodate housing for the developing teeth, to adapt to the mandibular displacement movements and to the complex growth changes occurring throughout the whole head [10]. Mandibular length is not predetermined genetically [1,11].”

Effects of Craniofacial Growth and Development on Structural Function:

Chart # 4

Cranial/Facial function is the result of a process of growth and development	Head position is primarily a by-product of Cranial/ Facial growth and development	Altered head position affects structures throughout the system.	Clinical decisions are guided by the principles of normal Cranial/Facial growth and development.

Much has been written about the effects that the function of the craniofacial structures have on the Structural System of the body [4-7,12,14-17]. The second article of our initial series traces a patient that was referred to the Chiropractor (Getzoff) from the Orthodontist (Chinappi) experiencing neck pain that showed significant improvement, both symptomatically and functionally when there was combined care [2]. The third article of the series illustrates a patient that was under the care of the Chiropractor for lower back pain that showed improvement, again, both symptomatically and functionally when undertaking Orthodontic care.(3) Remarkable x-ray improvement was noted and illustrated in both articles [2,3]. The effects of craniofacial growth were part of our commentary throughout the three articles. "If the position of the nasomaxilla complex affects the mandible, is it possible that other structures are involved as well?

Assuming the intimate anatomic relationship of the mandible to the neck and understanding the compensatory nature of the Temporal Mandibular Joints (TMJ) the mandible may act to balance the superior influences of the mid- face against the demands of the cervical musculature to set head position. Therefore, a postural change of the mandible might alter the cervical anatomy or even affect sacroiliac function [1,11,12]." Our initial article cites many references referring to the influences of head position on the structures of the body [1]. However, as the model has evolved over the last twenty years, greater emphasis has been placed on the asymmetric development of the mandible, maxilla and mid -face and its effect on head position. This can't be overstated, **unilateral craniofacial differences are common and proper diagnostic methods are essential.**

Chart #5

Dental	**Chiropractic**
Craniofacial Growth and Development	SOT, A Systems Method of Chiropractic
Dental Diagnosis	Basic Dental Diagnosis/Sutural Analysis
Maxillary Expansion/Mandibular Positioning	Malar/Maxillary Suture Adjusting

Principles and Methods of the Model of Care:

The model of care is based on the intrinsic connection between craniofacial growth and development and structural competence.

The original paper outlined a very exact method of referring, based on acuteness, chronicity and the severity of the initial examination findings. These factors were broken down into three phases of care, preliminary, intermediate and wellness [1]. Referral was delayed based on the factors stated above and until certain symptomatic goals were achieved. As a result of an even greater understanding of each other's work, abilities and clinical goals, the previous method of co-treatment is seamless. [Refer to Chart # 6] The referral is made at the time of the initial patient visit. By outlining the clinical needs at the initial visit, the patient senses the urgency for combined care while placing its value at the forefront and not, in any sense, alluding to a rescue mission if done at a later time. Clinical judgments are presently based on functional needs, but symptoms are kept in mind. If symptoms remain an issue as care continues then there is greater communication between the two offices. Otherwise, functional goals have been set and continually monitored without the need for further contact unless treatment decisions require needed input. Each office refers based on functional needs even in cases where the patient presents with symptoms other than head, neck and jaw pain [2,3]. Both the Dentist and the Chiropractor utilize examination criteria from each other's profession. The Orthodontist utilizes both postural observation and cervical ranges of motion. The Chiropractor understands how to make initial diagnoses of dental malocclusions. Consultations, in both offices, are guided by the principles outlined in Chart # 4. It must be kept in mind that functional change of structures that have been developing and adapting for a lifetime often has some limitations and certainly can take time. In the words of Albert Einstein, "The only reason for time is so everything doesn't happen at once."

Combined Case Study:

The following case study Chart # 6 illustrates the care given in each office to a 40-year old female patient. Histories, evaluation and treatment center around the Cranial Facial Growth and Development model and the structural responses throughout the body as discussed in this paper. "The model for function for Category 2 [posterior sacroiliac joint sprain] is the ability of the weight bearing structural system of the body to fully communicate through the nervous system so that maximum weight-bearing function can occur as the structural system operates within the demands of a gravitational environment. Category 2 deals with the primary neurological principle the reception of the massive sensory input (stimuli), the integration of the input and the ability of the body to respond to the input through the motor system [20]." Treatment and assessment of the category 2 patient is multifactorial and often utilizes pelvic blocks or wedges placed under the patient's pelvis in a supine position.

Chart #6

Present Terminology	Dental		Chiropractic		1994 Terminology
	Date	November,11, 2010 Initial Visit	Date	November, 15, 2010 Initial visit	
History	11/11/10	▪ Saw 3 dentists who recommended a bite guard and made the diagnosis of a dislocating disk, needing surgery. ▪ **Presented with the Magnetic Resonance Imaging (MRI) findings of closed lock. ***	11/15/10	▪ Pain right jaw joint,* right head (temporalis area), neck and trap area. ▪ Duration 20 years, more severe since August 2010. Night guard helpful initially. ▪ Medication (Med): Prednisone	Orientation and Evaluation (Report of Findings, Referral)
Exam Findings	11/11/10	▪ **Right Temporal Mandibular Joint (TMJ) closed lock with limited jaw opening of 24 mm and deviation to the right. Dental Class ll malocclusion on right.** ▪ Class l on left. Narrow maxilla. Right maxillary dentition, tipped to the palate.	11/15/10	▪ Category 2, altered head position. Right, cervical restrictions, Right Leg Deficiency (RLD), left lower fossae. ▪ **Cranial sutural restrictions right max. /malar, sutural release points on right.** ▪ Unable to open right TMJ *	Evaluation (System Analysis)
Treatment, Adjustment	11/20/10 3/22/11 3/30/11 4/20/11 12/14/11 3/20/12	▪ Removable Expander ▪ **Cone Beam Computed Tomography (CBCT) indicates no TMJ abnormalities**** ▪ Fixed Braces ▪ Second Expander ▪ Vertical Mechanics ▪ Braces removed ▪ Anterior Bite appliance for maintenance.	11/15/10 Thru 1/16/11	▪ Category 2 blocking. ▪ Trap fiber 6, T8, Cervical Stairstep, Figure 8 ▪ Sutural Technique, Right maxillary/malar, sutural release. ▪ Homecare. ▪ 8 Adjustments, head righted.	Preliminary (Pain Relief) and Intermediate Care (Maximum Function)
Outcome		▪ 50% reduction in overbite. ▪ Jaw opening 45+ mm with no deviation, no pain. ▪ Significantly improved dental occlusion.	1/16/11 Thru 3/26/11	▪ 12 additional adjustments ▪ Complete relief, No Meds, and improvement in all findings. Now being adjusted once/month. ▪ No l imitations in translation of right TMJ**	Wellness Care (Retention and Maintenance)

*MRI of the temporomandibular joint dated 11/10/11 impression, "Irreducible anterior displacement of right temporomandibular meniscus. The left joint was normal".

**Cone Beam CT of the temporomandibular joints dated 3/22/11, "Temporomandibular joint condyles, their articular fossae and eminences exhibit good symmetry and no abnormalities.

Discussion:

The period, November 2010 to March 2011, when both maxillary expansion and category 2 adjusting were making functional changes simultaneously, is when the right TM joint recaptured the disk. **Radiographic evidence illustrated the effectiveness of the therapies.**

Note that the dental and chiropractic exam findings, independently performed are similar while using different terminology. The Dentist finding a Class ll malocclusion on the right while the Chiropractor found cranial sutural restriction through palpation and head position alterations also on the right.

From March 26, 2011 to present (December 22, 2014) the patient is being adjusted once per month. There is no evidence of Category 2 [13,20] findings, no alteration of head positioning with no limitations of translation of the right TMJ. There are no reported symptoms. Thoracic 8, cervical and cranial bone and suture adjusting has continued to maintain optimum function.

We feel that this case study affirms a key statement made in the original article and questioned and commented on throughout this article. “This model of care features a high integration between the chiropractor and the functional orthodontist and assumes an intrinsic connection between facial growth and development and structural competence [1].”

Conclusion:

“The beginning of knowledge is the discovery of something we do not understand.”
A P Herbert.

A mentor (Dr. Morton Amsterdam) of one of the authors (Chinappi) was fond of saying, "there are many treatment plans, but one diagnosis". The point in evidence here is that both professions need to look outside their world and understand that the body functions as a system. These systems are integrated and interrelated, inclusive of the head, spine, pelvis and dentition. Ignoring a part of it is incomplete therapy. As stated in the original article " Our purpose is not to present formal research results, but to present an alternative approach to patient management and one that has proven successful for the authors [1]"....even 20 years later.

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Chiropractic as part of an interdisciplinary team for the care of a patient with diplopia: A case report.

Thomas Bloink, DC, Charles L. Blum, DC

Introduction:

Diplopia, commonly known as double vision, consists of visual confusion associated with the simultaneous perception of two images of a single object that may be displaced horizontally, vertically, diagonally, or rotationally in relation to each other. It is usually the result of impaired function of the extraocular muscles, where both eyes may still be functional but cannot converge to target on a desired object. Diplopia may be due to mechanical problems, disorders of the neuromuscular junction, and/or disorders of the cranial nerves (III, IV, and VI) that affect the muscles. [1]

In one study [n=96] it was found that "the common types of diplopia were horizontal, vertical and torsional diplopia, respectively. The common causes of diplopia were head trauma (38.5%), systemic diseases from diabetes mellitus, hypertension (20.8%), undetermined group (15.6%), eye diseases (9.4%), and etc. Sixth cranial nerve paralysis was the most frequently found amongst the third, fourth and sixth cranial nerves. [2]" Another study diagnosed secondary diplopia in "93 of 260 (35.8%) diplopic patients. Among patients with secondary diplopia, the most frequent diagnoses were stroke (45.2%), multiple sclerosis (18.3%), brain tumors (11.8%), and cerebral aneurysms (7.5%) [3]."

Comer et al [n=165] noted that the majority of cases in their study (88.5%) had binocular diplopia. "Cranial nerve palsies were the most common cause of binocular diplopia accounting for 98 (67%) of cases. Isolated sixth nerve palsy was the largest diagnostic group (n=45). Microvascular disease (hypertension or diabetes mellitus, or both) was present in 59% of patients with cranial nerve palsies, and of this group, 87% resolved spontaneously by five months, rising to 95% by 12 months." [4]

A 59-year-old male began to experience intermittent diplopia 50% of the time, which after three-days became constant. Over the previous 30 years it was not uncommon for him to initially awaken with "double vision", but after a few minutes it would go away. When his condition became constant he consulted with an ophthalmologist who diagnosed him with a fourth cranial nerve palsy causing a vertical displacement of his eye. He was given prism glasses to correct the displacement. Weeks later he presented for an assessment and treatment at this clinic.

Methods:

Patient was assessed with sacro occipital technique, cranial therapeutic methodologies as well as for any temporomandibular joint (TMJ) imbalance. Examination noted anterior displacement with reduction of right TMJ disc as well as decreased TMJ translation. Various other findings such as malocclusion, anterior premature contact with bilateral working interference, evidence of clenching, maxillary exostosis and mandibular thickening all indicated the need for dental co-management.

Cranial palpatory pain was noted at the right zygomaticomaxillary joint, right upper medial orbit, right sphenoid wing, right coronal and squamosal sutures, and a right occipital extension cranial distortion pattern. Pelvic torsion with sacroiliac joint hypermobility was noted and treated on the left (sacro occipital technique [SOT] - category two). Treatment was directed by palpatory pain; hypertonicity of right suboccipital muscles was noted along with palpatory pain from C-1 to C6 along the right lamina and transverse processes. He had cervical spine antalgia with decreased rotation range of motion of 25°.

The patient was treated for a total of six visits over approximately six weeks beginning in February 2015, and care was directed at stabilizing the sacroiliac instability using SOT blocks and a sacroiliac support belt. Spheno-maxillary cranial adjustments were administered to the maxilla and zygomatic bones along with intraoral cranial therapy for an occipital extension cranial distorsion. Cranial-dental co-treatment consisted of a lower occlusal splint, which involved one-visit per week for three-weeks in a row of chiropractic care (at the three week mark), with the splint equilibrated by the dentist immediately after chiropractic cranial treatment.

Results:

By the third office visit the patient was making consistent progress, with reduced neck pain, decreased antalgia, and significantly improved cervical ranges of motion. At that time it was deemed appropriate to refer to have the splint dentally equilibrated. It was also noted at that time the patient reported a 70% reduction in diplopia. By the fifth dental visit he stopped needing prism glasses. Follow-up ophthalmology examination in May 2015 found no evidence of diplopia, which had persisted at various levels for over 30 years. At the time of publication, he was not waking up with “double vision,” though greater time is needed to determine if this change is permanent.

Discussion:

There is not much in the literature regarding chiropractic and optometric or ophthalmological co-treatment of patients. One study by Tymms discussed a 13-year-old male with intermittent diplopia referred for chiropractic care by his optometrist. In this case only one treatment achieved a full resolution of the patients symptoms with the optometrist finding on re-examination a correction of the over-convergence [5].

With cases that do not have a discrete relationship, it is difficult to explain what were the specific mechanisms that affected improved ocular function following a chiropractic intervention. Many possibilities relating to chiropractic manipulative therapy and its affect on visual fields, vision, and optic nerve function have been discussed by Gorman et al in the literature [6-10].

There is one study, specific to the field of chiropractic, that discusses the relationship between eye-head-neck coordinated movement, which could help explain how a disruption in these pathways could initiate diplopia in a patient. [11] This relationship was also discussed by Morningstar et al [12] who presented an extensive review that details the anatomy and interactions

of the postural and somatosensory reflexes and identified the important role the nervous system plays in maintaining reflex control of the spine and posture. Examined is the relationship between visual, vestibular, and plantar reflexes and their relationship to body posture, [12] that lends some biological plausibility to the clinical responses found in this case.

Posture and eye function has also been studied in the dental field by Stack and Sims [13] who described how balanced posture "depends on vestibular function, vision, and proprioception to maintain posture, to navigate in one's surroundings, to coordinate motion of body parts, to modulate fine motor control, and to initiate the vestibuloculomotor reflexes." [13] They described how the "visual, vestibular, and skeletal systems, which contribute to balance disorders, and the dental (stomatognathic) system may also contribute to balance disorders." [13] Theoretically, TMJ or stomatognathic disorders, as seen with the patient in this study, may have an impact on eye or visual function. Aside from balancing stomatognathic function the craniomandibular and cranium may have some degree of contribution to cranial nerve entrapments of cranial nerves 3, 4, and 6[14-16]. This contribution may explain the patient's apparent temporal response to the cranial manipulative care.

Interdisciplinary care of patients that includes chiropractic in the equation may offer low risk options when other options fail. At this point the methods for interdisciplinary care involve working in a hospital setting or having an independent clinical practitioner develop a team of collaborating healthcare professionals. This case demonstrated how an ophthalmologist, chiropractor, and dentist all worked together to help a patient presenting with diplopia of unknown origin.

With case reports it is difficult generalize their findings because multiple subjects aren't used to deal with issues of regression to the mean, placebo or ideomotor effect, and other confounders. The temporal relationship between the patient's presentations, which had been relatively stable, to his response to care at each office visit, is compelling nonetheless. It may be important to develop a method of isolating which subsets of patients with diplopia might best respond to chiropractic care. This is because patients with similar presentations – cervical spine dysfunction, TMJ sensitivity and tracking disorders, cranial bone sensitivity to palpation, sacroiliac joint dysfunction and related postural disorders – may all be a starting point for developing a possible clinical prediction rule.

Conclusion:

A 59-year-old male with diplopia was treated at this office in conjunction with care from this ophthalmologist who prescribed prism glasses for the patient to be able to function. Following chiropractic and cranial care, as well as TMJ co-treatment with a dentist, the patient's condition resolved and his 30-year intermittent condition had stabilized. It is difficult to generalize from case reports; however, the ongoing nature of the patient's condition and the temporal relationship between the care received and his significant response warrants further study. Determining if there might be a subset of patients with visual or ocular disorders that might be helped with chiropractic and/or interdisciplinary care also deserved greater exploration.

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Chiropractic as part of an interdisciplinary team for the care of a patient with an orbital pseudotumor: A case report.

Thomas Bloink, DC, Charles L. Blum, DC

Introduction:

Orbital pseudotumor is a clinical entity characterized by features of a space-occupying, non-specific inflammatory condition of the orbit. [1] "Orbital pseudotumor is believed to be a nonspecific, acute or chronic inflammatory process involving the intraorbital soft tissue. Orbital pseudotumor may masquerade as sinusitis with orbital complications or as a severe upper respiratory tract infection." [2]

"Orbital pseudotumor is a benign intraorbital process confined to the orbit but extraorbital involvement can occur." [3] It is among the third most common orbital diseases and accounts for 5-10% of orbital processes. "Clinically, orbital pseudotumor has been categorized as myositis, dacryoadenitis, and an anterior, apical and diffuse process. Patients may present with diplopia, conjunctival chemosis, proptosis or abnormal computed tomography scan (CT scan) findings. Patients may also have associated optic neuropathy [3]."

They are commonly diagnosed through computed tomographic (CT) and/or magnetic resonance imaging (MRI), blood tests, as well as histological differentiation [4-7]. Therapeutic options are steroid therapy, immunotherapy, pulsed chemotherapy, radiotherapy and surgery [8,9].

A 47-year-old female woke up January 15, 2014 with darkness and limited vision in the right eye, which after two hours appeared to resolve itself. After consulting an ophthalmologist she was diagnosed with swelling of the optic nerve in the right eye. An MRI and spinal tap were performed and were negative for pathology. She was diagnosed with an orbital pseudotumor and was unresponsive to treatment with steroidal anti-inflammatories. The ophthalmologist believed that aggressive care was not indicated and when the patient's condition was unresponsive to steroids suggested the patient "watch and wait" for her condition to improve. She attempted to take over the counter pain relievers, which were moderately effective and upset her stomach.

After six months the patient did not note any improvement in her symptoms and presented for chiropractic care July 1, 2015 with a diagnosis of orbital pseudotumor along with increased pressure in her head the prior several days. She reported chronic intermittent headaches in the orbital region usually when awakening, which were characterized as mild migraines occurring one to two times a month and lasting two hours. The headaches would include flashes of light in either her right or left eye affecting her whole vision at onset, then at the center, and then later would become a blind spots of the center of the eye. Following the headaches she would have a dull achy feeling in the frontal area that radiated to bilateral sphenoid wings. She also had a past history of tinnitus for years and began using hearing aids four years before presentation. The patient had a history of bruxism that was controlled with an upper dental appliance.

Methods:

Examination noted obstructive airway compromise with maxillary deficiency, maxillary exostosis, and mandibular tori. Temporomandibular joint (TMJ) dysfunction was noted with evidence of clenching, malocclusion, decreased joint translation, and sensitivity and hypertonicity of the temporalis muscles. Sensitivity to palpation was noted in the craniofacial bones and sutures, as well as hypertonicity of the sub-occipital muscles, which guided cranial manipulative care. She also was treated for a left sacro-iliac (SI) joint instability (sacro occipital technique (SOT) – category two) associated with sensitivity and swelling in the upper aspect of that joint. Care was focused on reducing pain and improving function in the TMJ, craniofacial region, and pelvis.

At the first office visit the patient was told to stop using the upper dental appliance since this could further compromise her airway due to limited tongue space in its physiological rest position (near incisal papillae). With a maxillary exostosis and mandibular tori there is reduced space for the tongue, and an upper appliance further compromises this space leading to posterior tongue positioning and airway compromise. There was some consideration that airway compromise might be contributing to her symptoms due to signs of obstructive sleep apnea and reduced oxygenation when awaking. She was treated for eight visits from July 1 to August 24, 2015.

Results:

After her fourth office visit on July 16, 2015 the patient reported her eyes were doing much better, and she was no longer waking up with the previous visual symptoms, which had persisted since January 2015. She was referred back to her ophthalmologist who determined there was a 65% improvement in her pseudotumor, which had previously been unresponsive to pharmaceutical interventions as well as "watching and waiting." She is currently scheduled for dental co-treatment to better maintain her reduced craniomandibular distortions with a mandibular appliance.

Discussion:

A review of the chiropractic literature (chiroindex.org) found two articles that had key words "pseudotumor cerebri" and related to diagnosis and treatment of a patient presenting with benign intracranial hypertension. [10,11] Other than those two articles this is the first presentation of chiropractic interdisciplinary treatment of a patient presenting with an orbital pseudotumor. Chiropractic care within interdisciplinary and multidisciplinary arenas may offer patients greater options when traditional allopathic methodologies do not suffice. Developing a team of practitioners who better understand each other's place in the care of various conditions can be important for optimal treatment of complex, little understood patient presentations. [12-14] It is possible that a reasonable trial of chiropractic care for patients who have complex unresponsive conditions, such as orbital pseudotumor presentations, might be appropriate within an interdisciplinary arena.

It is unclear what specifically helped this patient, whether it was craniomandibular or TMJ disorders relating to airway compromise, or contributory pelvic imbalance and other conditions that may have affected the patient's orbital symptomatology. It is possible that the patient was misdiagnosed or that the condition would have resolved regardless of treatment. The temporal relationship between the improvement and care rendered was compelling. However, it is very difficult to generalize the patient's response in this case to patients at large, since it represents only one subject.

While unusual, there have been two studies that discus a relationship between TMJ imbalance and orbital pseudotumors. [15,16] "Occasionally the disease may extend into the middle cranial, the pterygopalatine, and the infratemporal fossa through the various foramina of the orbit, although extension into the infratemporal fossa is very rare." [15] It is possible that concomitant stressors relating to posture and TMJ disorders might make chiropractic care an important consideration with subsets of patients that have postural challenges and TMJ dysfunction. [17-21] Differentiating what specific subset of patients presenting with an unresponsive benign orbital pseudotumor that might respond to an interdisciplinary approach of the type used in this case could be an important for patients with a refractory condition.

Conclusion:

A 47-year-old female patient presented at this office with a diagnosis of orbital pseudotumor and concomitant headaches along with unresponsive visual disturbances. When steroidal therapy and "watching and waiting" for over six months yielded no improvements, she sought care at this office in conjunction with ophthalmological and follow-up dental TMJ care. Once SOT and craniomandibular care were instituted she had a lessening of her headaches as well as a 65% improvement in her orbital pseudotumor, according to her ophthalmologist. It is difficult to generalize from case reports; however, the ongoing nature of the patient's condition and the temporal relationship between the care received and his response warrants further study.

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Sacro occipital technique and stomatognathic interventions in the treatment of a professional football player with multiple concussions, TBI, TMD, and OSA: A case report.

Richard C. Gerardo, DC, Charles L. Blum, DC

Introduction:

Concussions in professional, college, high school, and young adult football players have recently gained greater public awareness.[1-4] The Centers for Disease Control and Prevention (CDC) estimates that between 1.6 and 3.8 million sports-related concussive injuries occur annually in the USA[5] and account for 5–9% of all sports-related injuries.[6,7] Several studies contend the true incidence is likely higher than what is currently documented because many athletes fail to report concussions.[8-10]

"The increasing frequency of sport-related concussion and the emerging possible long-term health risks continue to raise concern in the health care community, in the general public, and to those who set public policy [11]." "Although it has been widely believed that athletes are fit to return to play when observed symptoms resolve, researchers are also examining the possible prolonged effects of concussion, subconcussive impacts, and repeated concussions on cognitive difficulties, emotional disturbances, depression, and behavioral issues as well as chronic or recurring physical symptoms, such as headache."[12-15]

Generally these secondary post-concussion or traumatic brain injury (TBI) clinical and sub-clinical effects are poorly understood; therefore "possible long-term neurological consequences of repetitive sports-related concussions have received increased recognition and attention in recent years [1]." A main factor in understanding the effects of sport related post-concussion or TBI is that it appears "many individuals suffering from mild or moderate TBI do not seek medical advice." [5,16,17] This is likely due to the "sport mentality" of an athlete, which often means attempting to ignore pain or dysfunction since this would reduce their ability to play their chosen sport, affect their financial income if they are or are wanting to become a professional athlete, not wanting to disappoint their teammates, and other related factors.

In recent years retired professional football players have called for greater awareness of concussions/TBI and their long-term effects. As role models professional football players have a significant place in this arena since collegiate and high school youth athletes attempt to emulate the professionals as they strive to become professional themselves. What is disconcerting is that "the overall incidence rates for concussion in youth football players aged 8-12 years was comparable with that reported previously for high school and collegiate samples. However, participation in games was associated with an increase in risk of concussion compared with practices, which was higher than rates previously reported for high school and collegiate athletes [4]."

This case report focuses on a retired professional football player who reported experiencing repeated head trauma and receiving a significant number of concussions during his high school, college, and professional football-playing career.

Case History:

A 56-year-old male retired professional football player sought treatment at this office for what he believed were late gradual onset of post-concussion sequelae secondary to multiple concussions that occurred during his playing career. Since retiring from football he began to note gradually increasing TMD stress as well as insomnia, which appeared related to some type of sleep apnea. He has a history of high blood pressure, which is being treated successfully with medication. Along with the temporomandibular joint dysfunction (TMD) and apnea he also presented with disc herniations at the C-5/6 level, memory loss, fatigue, low back pain and general body stiffness.

Prior to receiving care in this office he had sought the care of a dentist for sleep apnea, who prescribed a night-guard dental appliance. While the appliance would help his sleeping and reduce his insomnia it would not help his concurrent clenching /grinding which were at a sufficient magnitude to break the appliance. Of interest is that he was seen at this office due to TMD (clenching/grinding) and sleep related disorders, which were believed to be associated with his history of multiple concussions.

Methods/Intervention:

Utilizing sacro occipital technique (SOT) assessment, the patient presented with findings indicative of pelvic torsion and sacroiliac joint hypermobility syndrome (category two). This is characteristically found with various SOT indicators, one of them a positive arm fossa test [18]. Additionally the patient was assessed for ascending or descending primary kinematic chain influences and was found to have a primary descending influence to body posture from the cervicocranial region. SOT's assessment for this is termed the cervical compaction test, which is a combination of Milgram's sign and foraminal compression testing [19]. The cervical compaction test purports that if a positive Milgram's sign is improved with cervical foraminal compression this is considered a sign of descending postural influences to the postural kinematic chain.

The patient also was assessed for forward head posture (FHP) and airway passage compromise, possibly associated with stomatognathic obstructive apnea [20,21]. He was found to have a pattern of craniofacial and stomatognathic distortion associated with forward head posture likely secondary to orofacial "downward and backward growth and development" which was adversely affecting his airway passages [22].

Specific intraoral cranial techniques as well as myofascial therapy to all the associated stomatognathic musculature affecting the tongue and airway space [23] were performed. Category two pelvic block placement [24,25] was utilized along with specific TMJ and craniofacial sutural corrective techniques to balance the craniocervical, TMJ and pelvic regions [26,27].

The method of treatment is based upon determining if the anatomy and tension patterns related to the relationship between the oral facial musculature and craniofacial osseous distortion support a healthy orthotropic "upward and forward" pattern of growth and development. If the opposite pattern were found then primary areas of myofascial treatment would be the suprahyoids, tongue,

styloglossus, genioglossus hyoglossus, palatoglossus, internal/external pterygoids, platysma, sternocleidomastoid, and masseter muscles. Craniofacial osseous care would be applied to the zygomas, maxillae, palatines, vomer, ethmoid, and sphenoid bones and their relationship in enhancing "upward and forward" patterns of motion to improve airway space and function. The goal of upward and forward myofascial and craniofacial guidance is to reduce compression and distortion caused by stress upon the stomatognathic system from clenching/grinding and associated with an obstructive sleep apnea (OSA).

Results:

Following the second/third treatments the patient's response to care was dramatic and for the first time in year's he was able to sleep for 2-3 nights in succession without issue. He also subsequently had reduced neck and low back pain, and decreased insomnia with less signs of sleep apnea and related fatigue. Affects of the treatment would be sustained for approximately three days following care at which time his condition associated with his TMD and sleep apnea would return. While the night-guard did help his OSA and insomnia treatment began when the appliance was broken. Of significance for the patient is that following the chiropractic care not only would his OSA and insomnia improve but he also noted reduced clenching and grinding.

The patient has been seen at this office for eight treatments, due to his travel schedule, for over five months. Although there have been positive results from care, the results have proven to be temporary and the high frequency of visits necessary to maintain the result is unsustainable from a practical point of view. Specific dental TMD co-treatment has been discussed, which might include dental appliances and orthodontic treatments to support, stabilize his repeated relapses and support optimal airway space and function [28-30].

Discussion:

"Although doctors of chiropractic manage patients with concussion on a day-to-day basis, there is presently little in the literature on this topic. The topic may be overlooked because of areas in which chiropractic treatment excels, such as neck pain and back pain, or because research funding is focused in these areas and not others." [31] The complex nature of concussion also makes researching this phenomena challenging since post-concussion syndromes or TBI secondary effects can be multifactorial, insidious, and have gradual onset. [32,33]

Football organizations have attempted to find ways to minimize the potential for head trauma and concussions with specifically fabricated helmets and mouth guards to protect their players' dentition, stress to the TMJ, and prevent concussion. [34-36] For instance the inclusion of mouth guards with football helmets was found to contribute to "lowered forces on the dentition and TMJ, but ironically did not reduce "concussion risks." [36] In a preliminary study by Singh and colleagues they determined "that a customized mandibular orthotic may decrease the incidence of concussion/mild traumatic brain injuries." [37]

A relationship between athletic head trauma and TMD has been tenuously discussed in the literature. In one case a relationship between sports related concussion and TMD was found with a 21-year-old female athlete who had a concussion with subsequent post-concussion syndrome symptoms that persisted for five months. Treatment consisted of SOT pelvic block placement along with cranial and TMJ adjusting. A dentist equilibrated the patient's mandibular occlusal splint over a nine-week period, which was immediately preceded by chiropractic care prior to each adjust of the splint, which led to her full recovery. [38]

Current research suggests an association between concussion, TBI, and sleep disorders. [39,40] A study of sleep disorders in adolescents secondary to TBI demonstrated that three years after TBI "without any discernible clinical sequel, adolescents still complain of sleep disturbances that could be confirmed by both polysomnographic and actigraphic monitoring." Sleep-related breathing disorders also appear to be common in adult subjects suffering from TBI. [41] Interestingly OSA and TBI have been found to have a relationship in the literature. The literature suggests "it is possible that early identification and treatment of OSA may improve cognitive, and thus potentially functional, outcomes of TBI patients with this disease." [42]

In this case a professional football player presented with unremitting TMD and sleep related disturbances believed to be related to OSA. According to the patient's history the symptoms presented gradually following numerous repeated concussions, with TMD and OSA symptoms becoming more prevalent following his retirement. The research does preliminarily discuss a relationship between concussions and TMD, as well as TBI and sleep disturbances.

The care rendered to this patient appeared to have a significant affect on his symptoms and clinical signs, since no other care over the prior years had any affect on his persistent symptomatology. However, it is noted that the care was temporary and would last approximately three days, after which his symptoms would return. This suggests a consistent temporal relationship between the care rendered and his symptomatology. However with "n of 1" studies that do not have controls or comparative interventions we cannot rule out the placebo or ideomotor effects, regression to the mean, and other confounders.

Conclusion:

This study presented a patient who suffered multiple concussions and TBI secondary to playing profession football that appeared to be related to the development of his subsequent TMD and OSA. SOT chiropractic and cranial care were applied to affect the stomatognathic myofascia and related craniofacial structures with the purpose of improving airway; the patient noted improvement in his symptoms, though temporary. It would be with some hesitation that this case study would be reported to the post-concussion population at large, since greater study is needed to determine if there is a relationship between concussion/TBI and TMD/OSA. Also it would be important to determine if there is a subset of patients with concussion/TBI and TMD/OSA consistently responsive to conservative chiropractic interventions.

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Treatment of acute TMJ pain and dysfunction with sacro occipital technique and cranial (vector point) techniques: A case report

Jason Scoppa, DC

Introduction:

Although sources differ slightly, The National Institute of Dental and Craniofacial Research (NIDCR) reports a 5-12% prevalence rate of Temporo-Mandibular Joint Disorder (TMD), with an annual cost of approximately $4 billion to treat the two thirds of that population that seeks treatment [1]. In a study by Di Paolo, "epidemiological evaluation, anamnestic and clinical data collected from a sample of 2,375 patients affected by TMD "'clearly showed that there were large quantities of variables involved in these disorders and which occur with a wide variety of possible clinical signs.' In accordance with the current knowledge…it is not always possible to clarify the etiology of these disorders…" Within this study many of the TMD patients suffered from multiple areas of muscle and spinal pain, as well as experiencing headaches. These tended to occur at a higher frequency on the side of the greatest TMJ dysfunction[2].

More studies are needed on the safety and effectiveness of most treatments for jaw joint and muscle disorders, but the NIDCR[3] strongly recommends using the most conservative, reversible treatments possible. Conservative treatments do not invade the tissues of the face, jaw, or joint, or involve surgery. Reversible treatments do not cause permanent changes in the structure or position of the jaw or teeth. Treatment options listed include self-care and pain medications, and if those do not produce the desired result it is recommended that patients see a dentist for splints, Botox, or surgery.

This case report describes a patient seen for a primary complaint of acute TMJ pain, closed lock without disc recapture, and chronic tinnitus with treatment utilizing primarily Sacro Occipital Technique (SOT) and Vector Point cranial technique.

Case History:

The patient was a 63-year-old, 6'1, 165lb, Caucasian male. He presented as an extremely health conscious gentleman following a mostly plant based diet and exercising regularly. His primary complaint was of acute unremitting left jaw (temporomandibular joint – TMJ) pain that started insidiously a few days prior to his visit. His visual analogue scale (VAS) for his TMJ pain was 4/10 at rest with mostly dull pain, which turned to a sharp pain when he attempted to open his mouth or move his neck. For three days prior to the initial office visit chewing had become impossible for him so he had resorted to following a liquid diet. Additionally he reported experiencing constant ringing in both of his ears (tinnitus) for more than 10 years.

The patient had one other instance of TMD pain prior to this episode. In 1999 he was seen by a dentist for the removal of amalgam fillings. The dentist recommended he also start wearing a maxillary TMJ splint though he had no previous history of TMJ pain or dysfunction. Within a day or so of wearing the splint he started having intense pain in his left jaw. After getting the splint adjusted a few times over the course of a month the pain went away and he had been pain

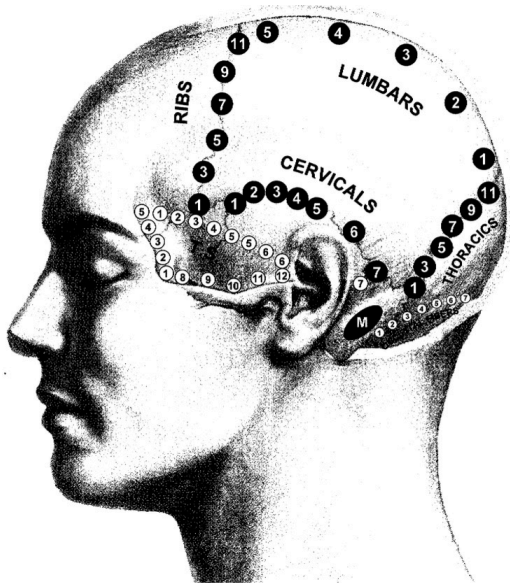
free up until the few days prior to the initial office visit. He stopped wearing the dental splint around five years ago without any noticeable return of TMJ pain or dysfunction.

Prior to the initial office visit the patient had utilized multiple care options to address his TMJ pain and dysfunction, including attempting to rest his jaw by following a liquid diet, performing self-care procedures, and seeing his regular chiropractor that performed neurological based chiropractic care [4]. These prior interventions didn't result in any change in his condition. He was reluctant to return to a dentist and have another splint made because of the cost and potential of getting worse, as he had experienced previously.

Intervention:

Of significance on testing TMJ translation the patient couldn't open his jaw more than two fingers width without intense pain. The patient was examined using sacro occipital technique (SOT) [5,6] and Vector Point[7] cranial analysis protocols [Figure 1]. SOT indicators that were assessed pre and post treatment included psoas/iliopsoas tension assessment, supine hip flexor active straight leg raise (ASLR) test[8], muscle testing of sternocleidomastoid (SCM) muscles[9], trapezius fibers[10], sacrospinalis paravertebral muscle tension, arm fossa test[11,12], motion palpation of the vertebral segments[13,14], cervical stair-step assessments[15], and rechecking of the patient's leg length in a supine position[16].

Figure 1: Vector Point Cranial – Cranial Reflex Contact Points

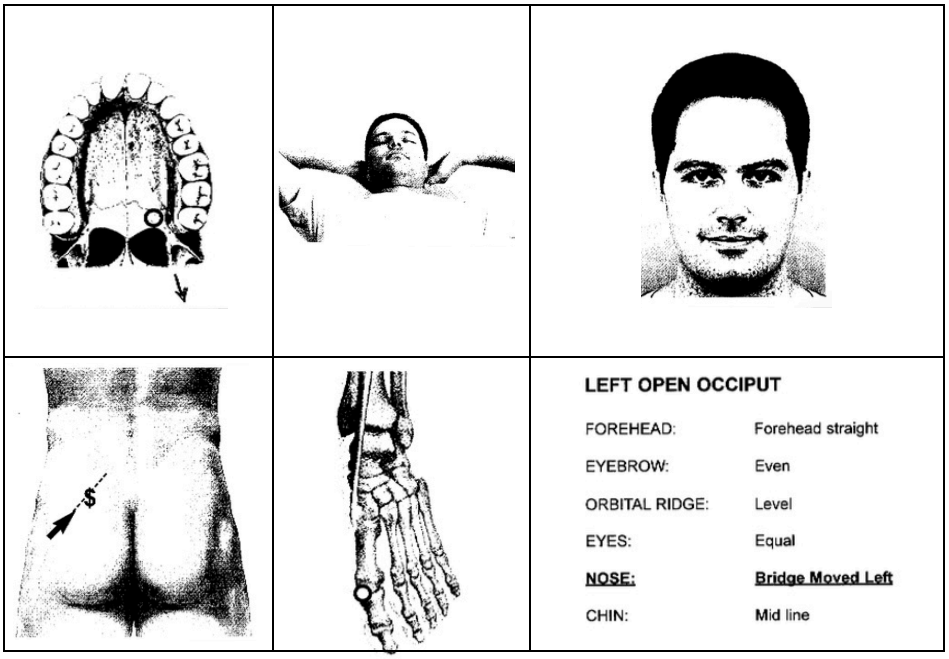


SOT category analysis revealed the patient had pelvic torsion[17,18] and sacroiliac joint (SIJ) hypermobility described as a category two and consistent with a positive arm fossa test [19-21]. He was subsequently treated as a category two with supine pelvic block placement until various active palpatory indicators and arm fossa test were neutralized. Cervical stairstep assessment indicated a dysfunctional C2/C3 articular facet translation, which was treated until normal

motion was restored[15]. SOT cranial intraoral TMJ treatment was performed to release internal and external pterygoids musculature[22], TMJ treatment was performed as outlined in the Sacro Occipital Technique Organization – USA (SOTO-USA) TMJ Manual[23].

Vector Point[7] analysis utilizes muscle strength[9] and spinal motion assessments[13,14].
Right hip flexors and left SCM were found relatively asymmetrically weak to their other side. Motion palpation and stress to the spinal segments found imbalance at – L5, L4, T12 and T7 vertebral levels. Vector Point[7] cranial techniques applied to the cranium involve utilizing sutural points that correlate with different areas of the spine. The hip flexors and SCM muscles as well as the spinal segments were treated by having the patient touch the muscle while the doctor utilized the vector points on the cranium that correlate with the nerve roots that innervate these areas until improvement was noted.

Figure 2: Vector Point Cranial – Left Open Occiput



The Vector Point[7] cranial assessment for this patient revealed a left "open occipital bone" [Figure 2] (left lambdoidal suture restricted in flexion position, with a inferior occipital on the left side) which is associated with left gluteal/piriformis muscle laxity where they cross, level eyebrows and orbital ridge, orbits symmetrical, chin pointing to midline, and the bridge of his nose having a left inclination. Patient was treated to release the lambdoidal suture and lift the occiput on the left side, which as performed simultaneously helped improve SCM and TMJ functioning.

Results:

After the first office visit the patient was able to open and close without pain and stated that only a small amount of tension and soreness remained in his jaw. He returned for a follow up office visit five days later and reported that the soreness in his TMJ was gone. The only symptom that

remained was the tinnitus, which had been present for 10 years. Eight months later he returned for minor neck pain and reported that his TMJ pain had not returned.

TMD Disability Index assessment tool[24] noted prior to treatment he had to alter his activities of daily living related to talking, brushing teeth, eating, chewing, yawning, and opening his mouth, and while he could participate in recreational activities he needed to be cautious. He had tinnitus and could sleep well with the use of over the counter anti-inflammatory pain medication. Following treatment he was able to return to all activities of daily living without any limitations.

TMD Symptom Intensity Scale a type of Visual Analogue Scale (VAS) [25-27] that measures intensity and frequency of pain levels was performed pre and post care. Pre treatment the patient reported pain of 4/10 (10 being most painful) related to jaw pain, painful jaw clicking and jaw locking, with a 2/10 relating to tinnitus symptomatology. Regarding frequency of symptoms, jaw pain, painful jaw clicking, jaw locking, and tinnitus was present 100% of the time. On the follow-up office visit all TMJ symptoms had resolved with his only unresponsive condition, tinnitus still present at a 2/10 level, 100% of the time.

Discussion:

With any conservative intervention the doctor always should weigh risk and benefit as well as the relative costs of the care rendered. Low risk, low cost, and good outcomes ~~is~~ are always the preference for the patient and doctor. Treatment of TMD can be challenging since sometimes symptoms may not actually be an indicator of dental stress to the dentition or gingiva. Clenching and bruxism can sometimes not be noticed by the patient but viewable on examination of the teeth for occlusal wear patterns, abfractions, and/or gum recession. Integrative chiropractic dental care [28,29] is essential since sometimes the first doctor a patient might see for TMD care might be a chiropractor.

With that said, a patient could also have an acute TMD presentation that might be more related to spinopelvic[21,30], cervicocranial[31], and/or stomatognathic[32] imbalance amenable to chiropractic care. If no dental related pathology is noted upon assessment, as was the case with this patient, a trial of chiropractic care for the treatment of TMJ pain and dysfunction would seem reasonable. Tinnitus can be a common finding in patients suffering from TMD [33], and while treatment of tinnitus with SOT and cranial care has been found to be helpful in some subsets of patients[34], in this case the patient's tinnitus was unresponsive to this type of care.

While the findings from this study appear~~ed~~ dramatic, generalizing case reports to the population at large necessitates caution because "n-of-1" studies have no controls or comparative subjects receiving sham care. Without a range of patients and assessing interventions it is difficult to rule out placebo or ideomotor effects, regression to the mean, and other confounders commonly found with case reports. Yet still, Flyvbjerg [35] suggests that there is often value in the case report and points to Campbell[36] who states:

> "After all, man is, in his ordinary way, a very competent knower, and qualitative common-sense knowing is not replaced by quantitative knowing . . . This is not to say

that such common sense naturalistic observation is objective, dependable, or unbiased. But it is all that we have. It is the only route to knowledge--noisy, fallible, and biased though it be[36]. “

With this patient a directly temporal relationship between his presentation and response to care was compelling. His return for follow up care five days and eight months later noted stability in his recovery. The care he received offered him relief of pain and return to his activities of daily living following one office visit. While there may be various reasons why he responded positively one possibility is the care that was rendered to him.

Conclusion:

There seems to be a wide array of options for patients considering care for TMD. Often the first step for patients involves watching and waiting, as well as over the counter anti-inflammatories and pain relievers. If pain and loss of function persists then determining what to do is a challenging endeavor for patients. Ideally conservative care that is low risk and cost effective would be optimal. In this case a patient with acute TMJ pain and dysfunction responded well to one treatment and-eight months later was still stable in this regard. Further research is needed to determine what subset of acute TMJ patients might best respond to SOT and Vector Point care.

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SOTO-USA Research Update

SOTO-USA is dedicated to bringing you the most updated and comprehensive research relating to Sacro Occipital Technique (SOT). Research is the future of chiropractic and SOT. Publishing this research sets the foundation for the future of SOT and protects its future worldwide. Understanding the published research allows us to grow, learn and modify our technique and diagnostic methods to fit our discoveries and stay current in the scientific community. The research department of SOTO-USA is goal oriented and focuses on action and results. **Please consider a tax-deductible donation to SOT research so SOTO-USA can help us further SOT's prominence in chiropractic healthcare**.

SOTO-USA is an organization dedicated to the advancement of SOT and the work of Major Bertrand DeJarnette, DO, DC. One of the many ways in which we at SOTO-USA contribute to the chiropractic profession is through the publishing of articles, newsletters, compendiums, and manuals relating to the art, science and philosophy of SOT (please visit our website for a complete listing of publications; www.SOTO-USA.org).

Association of Chiropractic Colleges – Research Agenda for Chiropractic (ACC RAC) Conferences
Papers Presented at the 2015 Conference and the 2016 Conferences

The ACC RAC conference is one of the most prestigious chiropractic research conferences regularly attended by college presidents, research and technique chairs, and many other influential doctors and practitioners affecting the future of chiropractic and healthcare. Since SOTO-USA's inception in 1999 we have attended every conference and had a paper accepted at every ACC RAC conference possible.

This year we had 4 SOT related papers and a workshop accepted for the 2016 ACC RAC Conference:

Colby-Allen S, Blum CL. Sacro occipital technique and autism spectrum disorders: A case series. J Chiropr Edu. 2016;30(1):71.

Cuthbert S, Blum CL. A potential clinical prediction rule for 52 patients with headache and cranial dysfunctions: A retrospective case-series report. J Chiropr Edu. 2016;30(1):72.

Bloink T, Blum CL. Chiropractic as part of an interdisciplinary team for the care of a patient with diplopia: A case report. J Chiropr Edu. 2016;30(1):70.

Cashman S. Blum CL. Trapezius fibre muscle analysis: An inter/intra-examiner reliability study. J Chiropr Edu. 2016;30(1):54.

Gleberzon B, Blum CL, Roecker CB, Good C. Workshop: Can we develop a standardized chiropractic technique program? 2016 ACC RAC Conference.

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Last year's ACC RAC 2015 Conference we had five papers accepted:

Bloink T, Blum CL, Rahimi M. Integration of SOT cranial therapy with an occlusal splint for the treatment of obstructive sleep apnea: A case report. J Chiropr Edu. 2015;29(1):92

Gerardo RC, Blum CL, Shirazi D. Chiropractic and dental care of a patient with temporomandibular and sacroiliac joint hypermobility: A case report. J Chiropr Edu. 2015;29(1):96.

dal Bello F, Bergesch P, Blum CL. The influence of the chiropractic treatment in patients with insulin resistance associated with diabetes type 2: A case series. J Chiropr Edu. 2015;29(1):94.

Boro WJ. Intervention in menorrahagia through chiropractic adjustment and spondylotherapy: A case report. J Chiropr Edu. 2015;29(1):92

Tuttle D, Hochman J, Sullivan S, Hasek R Quantitative assessment of changes in brain activity after a chiropractic adjustment. J Chiropr Edu. 2015;29(1):106.

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European Chiropractic Union's (ECU) Convention
May 29-31, 2014 – Dublin, Ireland

The following is shared by Dr. Aimee Carroll our SOT representative to the 2014 ECU Convention: "With a theme of 'celebrating diversity' the European Chiropractors Union Annual Convention, was held in Dublin, Ireland. Of significance four of the fourteen poster presentations were from SOTO-USA, and the only ones on SOT technique, it was a good showing for the organization, and many attendees showed interest."

Carroll A, Blum CL, Young M. Treatment of low back pain in pregnancy with Sacro Occipital Technique (SOT): A case report.

Blum CL, Griffiths RL. Chiropractic and Dentistry- The Need for Mutual Understanding of TMD Co-treatment: A Case Report.

Moeller JL, Blum CL. Orofacial myofunctional therapy: A Case Report.

Evans A, Yelverton C. The validity and specificity of the arm fossa test.

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The **World Federation of Chiropractic (WFC) and Association of Chiropractic Colleges (ACC)** had a joint conference that took place October 29 - November 1, 2014, in Miami, Florida.

Dr. Beth Dominicis, from the Southern California University of Health Sciences (SCUHS), presented a paper on, "Interdisciplinary clinical training in a chiropractic college setting: Dental and chiropractic co-management of temporomandibular joint disorders (TMD)." Representing SOTO-USA, Richard C. Gerardo, DC, and Charles L. Blum, DC.

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This year at the **Chiropractic and Osteopathic College of Australasia (COCA) 11th Biennial Conference**, October 9-11, 2015, Melbourne Australia the following 2 SOT related papers were presented:

Chiropractic as part of an interdisciplinary team for the care of a patient with an orbital pseudotumor: A case report. Drs. Thomas Bloink and Charles Blum.

Chiropractic as part of an interdisciplinary team for the care of a patient with diplopia: A case report. Drs. Thomas Bloink and Charles Blum.

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Last year at the **Chiropractic and Osteopathic College of Australasia (COCA) 10th Biennial Conference**, October 10-11, 2014, Sydney Australia the following SOT related paper was presented:

The relationship between the trapezius muscle and spinal segments T1 to L5.
Presented by Shaun Cashman, DC

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World Federation Congress (WFC) – ECU Joint Congress in Greece
May 13-15, 2015 – Athens, Greece

The WFC 13th Biennial Congress, incorporating the 2015 Annual Convention of the European Chiropractors' Union and hosted by the Hellenic Chiropractors' Association, takes place from May 13 - 16, 2015 at the Hilton Athens Hotel in the beautiful and historic city of Athens, Greece.

The following SOT related papers were accepted for presentations at this conference:

Chiropractic cranial treatment of a patient with idiopathic intermittent hearing loss: A case report.
Thomas Bloink, DC, Charles Blum, DC

Post concussion syndrome, temporomandibular joint disorders, and chiropractic dental co-treatment: A case report.
Thomas Bloink, DC, Charles Blum, DC

Intervention in menorrahagia through chiropractic adjustment and spondylotherapy: A case report.
William Boro, DC

The **World Federation of Chiropractic's 12th Biennial Congress,** hosted by the Chiropractic Association of South Africa (CASA), took place in Durban, South Africa from April 10-13, 2013.

In 2013 we had 5 SOT related papers accepted for this conference:

A comparative study between the effects of side-lying sacroiliac adjustments and sacro occipital technique on the muscle strength of the gastrocnemius muscle in asymptomatic adult males.
Charmaine Dell

The effects of diversified chiropractic manipulation versus sacro-occipital technique in chiropractic management of sacroiliac syndrome.
Grant Pretorius

SOT cranial and TMJ therapy for unresolved BPPV: a case report.
Thomas Bloink, Charles Blum

Integration of sot cranial therapy with an occlusal splint for the treatment of obstructive sleep apnea: a case report.
Thomas Bloink, Charles Blum

The validity and specificity of the arm fossa test.
Andrew Evans

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8th Interdisciplinary World Congress on Low Back & Pelvic Pain
October 27 - 31, 2013 - Dubai.

This program is held every three years. All the disciplines involved in the treatment and research of musculoskeletal disorders around the globe come together in a very stimulating meeting related to musculoskeletal disorders. Once again SOTO-USA was an endorsing member of this conference, offering our members registration discounts and building prestige for SOT.

Thanks to Dr. Christine Benner SOTO-USA was represented at this conference. With her MS in human anatomy as well as being a certified SOT/Cranial practitioner and acupuncturist, her eclectic background put our profession in high esteem. She presented the following six papers:

Benner CD, Blum CL. CMRT and acupuncture in the treatment of dysmenorrhea (oligomenorhea) and low back pain: A case report.

Blum CL, Benner CD. Sacroiliac joint hypermobility syndrome: A chiropractic perspective - a pilot survey.

Shaneyfelt D, Blum CL, Benner CD. Styloid process sensitivity in a patient with low back pain and radicular syndrome: A case report.

Gerardo R.C., Shirazi D., Blum C.L., Benner C.D. Chiropractic and dental care of a patient with temporomandibular and sacroiliac joint hypermobility: A case report.

Rosen MG, Blum CL, Benner CD. SOT chiropractic care of a 47 year-old female with left-sided sciatica caused by a 16mm left paracentral disc extrusion: A case report.

Serola R, Blum CL, Benner CD. Pregnancy, sacroiliac support belts, and active straight leg raise (ASLR): Utilizing multiple tests for optimal outcomes.

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North American Brain Injury Society (NABIS) Conference
13th Annual Conference on Brain Injury Conference. Tampa, Florida - April 6 - 9, 2016.

Remeta EM, Blum CL. Chiropractic cranial treatment model and neuroplasticity in a post stroke 72-year-old male: A case report.

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10th World Congress on Brain Injury
International Brain Injury Association (IBIA) Conference, San Francisco, CA - March 19-23, 2014.

In 2014 SOTO-USA has two papers accepted for the IBIA 10th World Congress on Brain Injury.

"Chiropractic care and its effects on a patient with a moderate traumatic brain injury (TBI).", reference 0405 (Pollard R, Blum CL, Remeta EM).

"Chiropractic sacro occipital technique (SOT) and cranial treatment model for traumatic brain injury along with monitoring and supplementing for neurotransmitter balance: A case report.", reference 0404 (Remeta EM, Blum CL).

North American Brain Injury Society (NABIS) Conference
26th Annual NABIS Conference, New Orleans, Louisiana, September 18 - 21, 2013.

In 2013 Ryan Pollard shared an oral presentation of his paper at the NABIS interdisciplinary conference.

Pollard R, Blum CL. Chiropractic Care and Its Effects on A Patient with a Moderate Traumatic Brain Injury. Reference 0046. North American Brain Injury Society's 11th Annual Conference on Brain Injury. September 18-21, 2013. New Orleans, Louisiana.

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Recent Sacro Occipital Technique and Cranial, Related Papers

Blum CL. R + C Factors and Sacro Occipital Technique Orthopedic Blocking: a pilot study using pre and post VAS assessment. J Can Chiropr Assoc. 2015;59(2):134-142.

Cooperstein R, Blum C, Cooperstein E. Assessment of Consistency Between the Arm-Fossa Test and Gillet Test: A Pilot Study. J Chirop Med. 2015;14(1):24-31.

Powell W, Knaap SFC. Cranial treatment and spinal manipulation for a patient with low back pain: A case study. J Chirop Med. 2015;14(1):57-61.

Heinecke JD. Improved Quality of Life of in a Patient with Aicardi Syndrome Undergoing Chiropractic Care: A Retrospective Case Study. Journal of Pediatric, Maternal & Family Health – Chiropractic. 2015;2015(1):15-25.

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The **SOT Research Conference Proceedings** (Now fully indexed and searchable!)

All of the SOT Research Conferences have now been published in the Annals of Vertebral Subluxation Research and is available for searching through MANTIS (a major alternative healthcare search engine) and chiroindex.org (a major chiropractic search engine). All abstracts from the conferences will be published in the Quinquennial SOT Compendium of Peer Reviewed Research and full conference proceedings are offered free to every chiropractic college library nationally and internationally.

1st Annual Sacro Occipital Technique Research Conference Proceedings. Las Vegas, Nevada October 22, 2009. Annals of Vertebral Subluxation Research ~ Sept 29, 2011 ~ Pages 104-132.

2nd Annual Sacro Occipital Technique Research Conference Proceedings. New Orleans, Louisiana 2010. Annals of Vertebral Subluxation Research ~ October 17, 2011 ~ Pages 133-164.

3rd Annual Sacro Occipital Technique Research Conference Proceedings. Nashville, Tennessee May 19, 2011. Annals of Vertebral Subluxation Research ~ Nov 10, 2011 ~ Pages 165-182.

4th Annual Sacro Occipital Technique Research Conference Proceedings. Atlanta, GA May 3, 2012. Annals of Vertebral Subluxation Research ~ May 24, 2012 ~ Pages 41-59.

5th Annual Sacro Occipital Technique Research Conference Proceedings. Atlanta, GA May 2, 2013. Annals of Vertebral Subluxation Research ~ March 27, 2014~ Pages 22-48.

6th Annual Sacro Occipital Technique Research Conference Proceedings. Redondo Beach, CA May 15, 2014. Annals of Vertebral Subluxation Research ~ July 14, 2014 ~ Pages 129-144.

7th Annual Sacro Occipital Technique Research Conference, New Orleans, LA May 7, 2015. Annals of Vertebral Subluxation Research ~ June 8, 2015 ~ Pages 135-145

Many thanks go to the editors of the Annals of Vertebral Subluxation Research, Drs. Matthew McCoy and Anquonette Stiles. Their continued support of chiropractic clinical research and of SOT is greatly appreciated.

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At the inaugural 2009 Sacro Occipital Research Conference, Las Vegas, Nevada we had 28 abstracts accepted. At subsequent Sacro Occipital Research Conferences many of the submissions have led to paper submissions to various other research conferences and peer review journals. All SOT practitioners and allied healthcare partners are encouraged to be a part of our next research conference that will occur in 2018. Check the SOTO-USA website for the call for papers: www.SOTO-USA.org

Our ongoing commitment continues into the future with papers submitted to chiropractic and allied healthcare conferences and journals. One of the easiest ways research can be facilitated by a doctor in clinical practice is through the publishing of individual research papers and case histories. These lay the groundwork for future research directions and projects. If the need arises, we will be happy to assist the doctor in writing the paper or case history in order to get it submitted for publishing.

Please take a moment to review our landmark SOT and cranial research texts, which will eternally preserve SOT, related published research, which will have updated volumes every 5 years. These can all be purchased online at www.soto-usa.org or by calling (336) 793-6524.

1st Sacro Occipital Technique Research Conference Proceedings: 2009.

2nd Sacro Occipital Technique Research Conference Proceedings: 2010.

3rd Sacro Occipital Technique Research Conference Proceedings: 2011.

4th Sacro Occipital Technique Research Conference Proceedings: 2012.

5th Sacro Occipital Technique Research Conference Proceedings: 2013.

6th Sacro Occipital Technique Research Conference Proceedings: 2014.

7th Sacro Occipital Technique Research Conference Proceedings: 2015.

8th Sacro Occipital Technique Research Conference Proceedings: 2016.

Soon in Print - The Compendium of Sacro Occipital Technique: *Peer-Reviewed Literature 2005-2010.*

Soon in Print - The Making of a Chiropractor: The Biography of Major Bertrand DeJarnette by Ivan Beaumont

In Print:

The Compendium of Sacro Occipital Technique**: *Peer-Reviewed Literature 2000-2005.***

The Compendium of Sacro Occipital Technique**: *Peer-Reviewed Literature 1984-2000.***

The SOT Collection: *To the Year 2000.*

The SOT Collection: Supplement: *To the Year 2000.*

Sacro Occipital Technique
Research Updates Fifth Edition

By Charles L. Blum, DC

This is the fifth in a series of articles that will share various concepts of research with doctors in clinical practice. This one relates to chiropractic and dental interdisciplinary care as it relates to temporomandibular joint disorders (TMD).

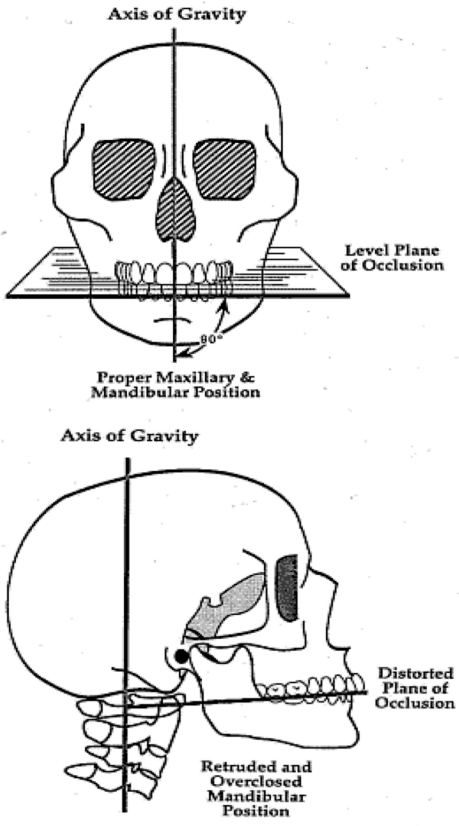
To better understand how chiropractic and dentistry often can function in an integral manner to treat patients presenting with TMD, it is important to grasp the dynamic nature of how body posture affects dental occlusion, condylar position, and airway space, and likewise how dental occlusion, condylar position, and airway space affects body posture. A couple of recent studies exemplified this relationship by showing how placing a heel lift under one shoe to affect pelvic torsion caused the teeth to contact primarily on the side of the heel lift. Likewise, changing dental occlusion had an effect on the stability of a patient's posture.[1,2]

The interrelationship between head and neck position and body posture is affected to some degree by the visual and vestibular righting mechanisms. What goes on below the head and neck will cause the head and neck to accommodate like a gyroscope in order to maintain a horizontal-level position to the horizon for the eyes and ears. If the head and neck are compromised and cannot properly accommodate, then the pelvis and lower spine will be compelled to modify their positions.[3]

Therefore, it is not unreasonable to find intertwining of body relationships with the body's kinematic chain from distally, such as between the feet or knees to the craniofacial regions.[4-6] Also of importance, the pelvis, spine, and TMJ have also demonstrated functional interrelationships.[1,2,7] An association has been found between sleep apnea, airway space, and forward head posture (FHP) that will allow dental chiropractic co-treatment to be viewed from beyond just a pain relief aspect.

While the effect of sleep apnea on public health is becoming well known[8], what is not readily understood is the effect of airway space or apnea on head and neck position.[9]

Studies are finding that the position of the mandible[10] affects airway space, tongue position, and can lead to FHP. So, before chiropractors attempt to treat a patient's FHP, we may need to factor in the question: "Does this patient have TMD-related issues that might be compromising his or her airway space?"[11]



> "Studies are finding that the position of the mandible affects airway space, tongue position, and can lead to FHP."

The following are some studies from the SOT Research Conferences that help illustrate how chiropractic and dental co-treatment might play an effective part of interdisciplinary care of TMD patient presentations.

SOT Cranial and TMJ therapy for unresolved BPPV[12]

Introduction: Vertigo accounts for about six million clinic visits in the US every year, and 17 to 42% of these patients eventually are diagnosed with benign paroxysmal positional vertigo (BPPV).

Case History: A 37-year-old female was seen for BPPV, referred by her allopathic physician for chiropractic care. The patient had two to three months of constant vertigo, unresponsive to medications, and it prohibited her from driving or walking without difficulty.

Methods/Results: Evaluation determined a sacroiliac joint hypermobility syndrome (category two), right temporal bone restricted in external rotation, and significant malocclusion with clenching. Category two protocols for the pelvis were applied along with cranial and TMJ therapies. Dental co-treatment was necessary to sustain the cranial and TMJ corrections. By the seventh office visit (three to four weeks of care), the patient's vertigo had resolved, her category two stabilized, and TMJ translation had improved without pain.

Implications: Since it is not uncommon for cranial trauma to affect cranial nerve function, it is possible that low-level sustained cranial stress or trauma could contribute to clinical presentations such as BPPV. The patient's rapid response to chiropractic and dental care suggests further investigation is warranted into this method of treatment for a subset of patients presenting with BPPV or unresponsive vertigo.

TMD – Chiropractic and Dental Cross-Referrals[13]

Case Report: In conditions where a chiropractor or dentist has reached a therapeutic impasse with a patient's temporomandibular/craniomandibular disorders (TMD/CMD), co-treatment may be indicated. These two cases discuss two patients with sacroiliac joint hypermobility syndrome (category two) and cervical intersegmental restricted motion that necessitated craniomandibular balancing therapeutic interventions and dental appliance therapy. One initially was treated by the chiropractor and referred to the dentist for co-treatment, and the other initially was treated by the dentist and referred to the chiropractor for co-treatment.

> "The patient's rapid response to chiropractic and dental care suggests further investigation is warranted into this method of treatment"

Methods/Results: With SOT and craniomandibular therapies, along with dental appliance therapy, both cases showed a reduction of pain and improvement of TMJ function and/or symmetrical joint translation without crepitus. General relaxation in cervicocranial and craniomandibular musculature was noted by the patient, chiropractor, and dentist.

Implications: A main obstacle for chiropractic/dental co-treatment is the lack of awareness and knowledge of each other's professional treatment and diagnostic focus, as well as terminology. This case report illustrated a relationship between ascending/descending postural dysfunctions and TMD. It appeared that with these cases optimal outcomes appeared contingent upon chiropractic and dental co-treatment.

> "A main obstacle for chiropractic/dental co-treatment is the lack of awareness and knowledge of each other profession's terminology and treatment"

Complex Patient Presentations and Chiropractic Dental Co-Treatment[14]

Case History: A 42-year-old female presented with an unsteady Parkinsonian-type of gait diagnosed as psychogenically driven. She also was diagnosed with an atypical version of a complex regional pain syndrome called "complex pain syndrome" due to its whole body generalization as well as her history of migraines.

Methods/Results: Initially the patient was co-treated with a dental night- and day-time appliance, sacrotrochanter belt, and treated with SOT category two protocols, sutural cranial/temporomandibular joint (TMJ) interventions, T8 chiropractic manipulative reflex technique (CMRT), and supportive nutritional modifications to support liver function and reduce inflammation. At the first office visit with the dental appliance, trochanter belt, and category two treatment, all of her shaking stopped when standing and her pain was significantly reduced. This allowed for the patient's medications to be notably decreased.

Implications: It is interesting that a relationship appears to have been found with this patient's severe tremors, migratory joint pain, and migraines that appeared to be associated with her pelvis and TMJ function. The patient's tremors could be eliminated by having a trochanter belt placed around her pelvis and they would return when the belt was removed. The future challenge is developing a predictive group of tests to determine what subset of patient with severe tremors, fibromyalgia, and migraines would be responsive to this type of chiropractic and dental co-treatment.

There is much to learn about interdisciplinary care and how chiropractic and dentistry can function as partners in optimizing patient outcomes. Developing relationships of trust between our professions and knowing when referrals to one another are necessary will be an important first step.[15,16]

Learning each other's terminology and how we each view relationships between the stomatognathic system and body posture, as well as the far-reaching implications of sleep apnea on our patient's health, will assist chiropractors to better help patient outcomes in the future.

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Charles L. Blum, DC is in private practice Santa Monica, California, director of research for Sacro Occipital Technique Organization – USA, adjunct research faculty at Cleveland Chiropractic College and teaches the Sacro Occipital Technique (SOT) elective class at Palmer College of Chiropractic - West and Southern California University of Health Sciences.

SACRO OCCIPITAL TECHNIQUE

Its Past, Present and Future

By Charles L. Blum, DC

Sacro Occipital Technique (SOT) is an assessment and treatment method of chiropractic developed by Major Bertrand DeJarnette, DO, DC in the late 1920s. Prior to beginning a career in chiropractic, a nineteen-year-old DeJarnette embarked on a career as an engineer within a group of elite engineering students hired by the Ford Foundry for research and development. One day not long after beginning his employment at the foundry, he was walking up the steps to his work when an explosion occured in the building. He was thrown nearly 30 feet and barely survived his injuries, everyone else was killed.

During that era in American history, anyone involved in an explosion was considered "bad luck" by potential employers and society at large. He felt despondent about his future engineering career, confused as to why he alone survived, and in excruciating pain due to the injuries he sustained. Contemplating suicide while standing on the highest bridge in town, he felt something touch him and tell him that he had important things yet to accomplish. At the time he was not an especially spiritual person, but he was shaken enough by the experience to get down to the bridge. He walked around aimlessly until he collapsed in front of a house, exhausted. In the morning the homeowner, who fortuitously happened to be an osteopath, discovered the young DeJarnette asleep on his front steps and offered to help him[1].

When the osteopath realized how injured DeJarnette was, he suggested that he attend an osteopathic college where he could learn and continue to receive care. After graduating with an osteopathic degree, he later attended chiropractic college. Upon graduating, he established his chiropractic practice in Nebraska City, Nebraska. He always felt there was a reason why he survived, and that he had a duty to make his life meaningful by improving the welfare of others[1,2].

DeJarnette had a photographic memory and could read a full page, rather than a single word, at a time. His abilities likely led to why he was able to write over 140 books and articles. For DeJarnette, research was an essential part of being a chiropractor, and essential to the future of the chiropractic profession. As early as July 1935, he was a featured speaker at the 40th Anniversary Convention 1895-1935 of the National Chiropractic Association, presenting clinical research. Always,

Photo: ***Major Bertrand DeJarnette, DO, DC***

research was his passion. In an interview in 1982 DeJarnette reiterated, "As far back as chiropractic college, I saw the need for a more scientific basis for chiropractic theory. My own personal physical problems had not been solved by medicine, osteopathy, or chiropractic; so I began experimenting on myself. I'm still at it, and I can see no end of the need for continuous research in chiropractic[3]."

When Dr. DeJarnette began to study the treatments he rendered, he realized that if any meaningful information was to evolve from his experience, he would have to resolve it himself. He realized that explaining how his discoveries evolved was more difficult than the process of developing new diagnostic and therapeutic interventions[4].

"Research is a study of what you have, and what you need to make it better, and how to make it better is the final research step[5]." "Research in Chiropractic must go on forever. Someone must do this type work, for it simply will not take care of itself.

A profession cannot stand still. Momentum must constantly be generated. Chiropractic research needs many things it does not now have[6]."

Three Novel Concepts[1,7]

DeJarnette utilized concepts of evaluating the body's presentation as a three dimensional holograph which is affected by a matrix of integrative activities. He investigated how sustained stressors to the body create distinct retained patterns of distortion in the neuromusculoskeletal system. He ultimately used his experiences to develop methods of categorizing three specific primary body distortion patterns.

1. He factored Osteopathic principlies relating to cerebrospinal fluid (CSF) circulation, dural membranous tensions, and cranial bone dynamics into chiropractic analysis and treatment.
2. He determined that there are two parts to the sacroiliac (SI) joint, a posterior weightbearing supportive hyaline structure and an anterior synovial membranous joint that allows for joint nutation.
3. From an engineering standpoint he realized that the majority of the weight or stress from structures above the SI joint rests upon the posterior SI joint, whereas inferior to the SI joint the stress is spread 50% to each hip joint.

DeJarnette's three novel concepts led to the development of three specific categories of analysis:

Category One: relates to the anterior synovial SI joint's nutation and its relationship to dural tension and CSF circulation.

Category Two: relates to the posterior SI weightbearing joint.

Category Three: relates to the body's adaptation to the inability to distribute weight through the posterior SI joint and its subsequent transmission (via iliolumbar ligaments and sacrospinalis muscles) to the lumbar discs and spine.

Integrating Viscerosomatics and Cranial Biodynamics into SOT

Utilizing the categories of analysis and treatment, DeJarnette found specific ways of incorporating treatment relating to viscerosomatic and somatovisceral reflexes, and specific organ manipulation into an indicator based system of care entitled Chiropractic Manipulative Reflex Technique (CMRT)[8].

Incorporating cranial, meningeal, and CSF analysis and treatment[9] into a systematized methodology of care was also integrated into his category system. This allowed the doctor to use pre- and post-adjustment indicators to assess when and where care is needed and whether the care rendered was successful. His cranial system of analysis involved palpation for pain, functional assessments, and palpation of cranial compliance[9]. This allowed for a generalization of patient presentations into a system of analysis and care that followed a logical and reproducible progression[7].

With persistent extremity imbalance due to trauma, asymmetrical function, and various other possibilities, DeJarnette developed a system of extremity analysis and treatment relating to the feet, ankle, knees, and hips as well as from the scapula, shoulder, and elbow. Since imbalanced function can be specific to a joint or factors, distal or proximal, the whole kinematic chain of influence is considered with SOT extremity analysis and treatment[7].

Therefore while SOT is considered a chiropractic technique, it is more an inclusive paradigm of health that attempts to integrate whole body function, nonmusculoskeletal interrelationships, and preventative care.

Sacro Occipital Technique Organization (SOTO) – USA was formed in 1999 to disseminate the teachings of DeJarnette, and bring SOT into the evidence based chiropractic community. That involves responsibly performing research to support the findings of SOT doctors, being circumspect about our claims, and modifying SOT to fit the current research. SOTO-USA has been able to teach SOT according to DeJarnette's completed works, while bringing his work into 21st century language.

SOTO-USA focuses continuing its SOT certification program, with systematized syllabi, books, lesson plans, and certified instructors, along with written and practical SOT and cranial certification examinations. One aspect that SOTO-USA believes is important for the future of SOT is researching its clinical outcomes as well as its reliability and validity. Another crucial aspect for the future of SOT is interdisciplinary care.

Certification Program

In 2014-15 SOTO-USA is presenting SOT and Cranial Certification Programs at the University of Western States, Palmer College of Chiropractic Davenport, Palmer College of Chiropractic Florida, Southern California University of Health Sciences, and in Northern California. Our annual SOT and Cranial Certification examinations will be given this year at the SOTO-USA Clinical Symposium May 7-10, 2015 in New Orleans.

Research

> DeJarnette analysis and techniques helped stablish chiropractic as more than just a spinal based therapy but a wholistic method of spinal care incorporating cranial bone, viscera, meningeal, and extremity interrelationships.

SOTO-USA has a three-pronged focus with regard to research publication: (1) regularly presenting research at chiropractic (ACC/RAC[10], WFC[11], ECU[12], IRAPS[13] COCA[14] and ACH[15]) and interdisciplinary research conferences, (2) having annual SOT Research Conferences[16] (May 7, 2015 will be the 7th) that give doctors the ability to become familiar with submitting, preparing and presenting SOT related research in a professional and collegial manner, and (3) submitting research for publication in peer review journals.

Interdisciplinary Relationships

Pioneering dental/chiropractic co-treatment of temporomandibular joint disorders (TMDs), SOTO-USA is a member of the Alliance of TMD Organizations[17], a group of predominately dental based groups totaling 14,000 members that specialize in treatment of temporomandibular joint disorders. SOTO-USA has regularly been presenting research at the Interdisciplinary World Congress on Low Back and Pelvic Girdle Pain18, at the North American Brain Injury Conferences and John Hopkin's Integration of Complementary and Alternative Medicine into Clinical Practice Conference. Multiple papers have been presented at many chiropractic research conferences sharing how SOT care can integrate with various interdisciplinary fields such as dentistry, medicine (e.g., cardiology, neurology, gastrointestinal, gynecology, etc.), osteopathy, optometry, acupuncture, ayurveda, pediatrics, and pregnancy.

At this time, SOTO-USA is not just about furthering the work of DeJarnette, but about helping chiropractic and chiropractors move forward. This is accomplished by aiding doctors in clinical practice to share their findings in the research community, as well as sharing up to date findings from the research community with doctors in practice. Developing an understanding of chiropractic's role in nonmusculoskeletal therapies and how to integrate with allied healthcare providers, will ultimately offer patients improved therapeutic low risk options. Expanding chiropractic's role in healthcare delivery through education of our allied healthcare partners will also facilitate care of patients with secondary head, neck and back pain conditions associated with oncology, menstrual syndromes, pregnancy, brain trauma, TMD, and other conditions/syndromes.

SOT is an inclusive chiropractic paradigm of care that easily integrates various adjusting methods and methodologies. DeJarnette's life's work offers chiropractic an indicator based system of analysis and treatment to expand and enhance any chiropractors current practice. Please consider becoming a member of SOTO-USA, attending an SOT certification series or our annual symposium May 7-10, 2015, or simply becoming more familiar with SOT by visiting the SOTO-USA website at www.SOTO-USA.org.

Charles L. Blum, DC is in private practice Santa Monica, California, director of research for Sacro Occipital Technique Organization – USA, adjunct research faculty at Cleveland Chiropractic College and teaches the Sacro Occipital Technique (SOT) elective class at Palmer College of Chiropractic - West and Southern California University of Health Sciences.

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Effective Scientific Posters: Quick Reference

George R. Hess
[http://www.ncsu.edu/project/posters/NewSite/documents/QuickReferenceV2.pdf]

A poster is a visual communication tool.

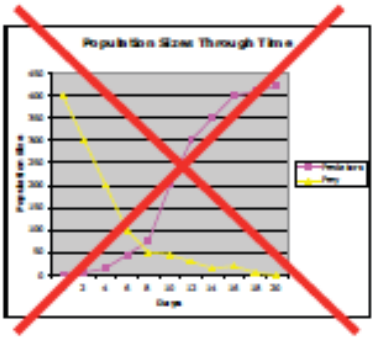
An effective poster will help you …
… engage colleagues in conversation.
… get your main points across to as many people as possible.

Posters serve as …
» a source of information
» a conversation starter
» a summary of your work
» an advertisement of your work

Tips for Effective Poster Presentations

- Get your message across with effective visual displays of data and small blocks of supporting text. Think of your poster as an illustrated abstract.
- Tell readers why your work matters, what you did, what you found, and what you recommend. Avoid excessive focus on methods – it's the results and implications that count!
- Overall appearance. Use a pleasing arrangement of graphics, text, and colors. Your poster should be neat and uncluttered – use white space to help organize sections. Balance the placement of text and figures.
- Organization. Use headings to help readers find what they're looking for: objective, results, conclusions, etc. A columnar format helps traffic flow in a crowded poster session.
- Minimize text – use graphics. Keep text in blocks of no more than 50-75 words – don't create large, monolithic paragraphs of prose.
- Text size. All text should be large enough to read from 1-2 meters, including the text in figures. Title should be larger, to attract attention from far away.
- Use color cautiously. Dark letters on light background are easiest to read. Stick to a theme of 2-3 colors. Avoid overly bright colors – they attract attention but wear out reader's eyes.
- Don't fight reader gravity, which pulls the eyes from top to bottom (first), and left to right.
- Include full contact information. You want to be found – the reader should not have to look up anything to find you.

Clean graphs show data clearly!



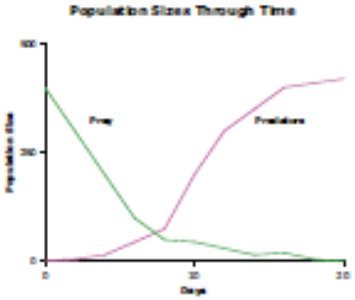
Desired message: Prey decreased as predators increased. Focus on relationships – exact values are usually not important.

Eliminate "chart junk" to keep focus on data. Grid lines, detailed ticks on axes, data markers, and grey backgrounds are not needed.

Label data directly, when possible.

Legends force reader to look back and forth to decode graph.

Message is now loud and clear!



Sample Case Report Poster Presentation

Names of Authors and Affiliations

INTRODUCTION

In the introduction section you describe the purpose of your poster presentation. Describe the importance of the topic, why the reader should bother to read this poster, and briefly summarize the poster's focus.

CASE REPORT INFORMATION

This is the place where you share the patient's gender, age, and any pertinent information. Why did they come to you for treatment, is there any unusual information about this patient, and any prior or current treatment they received?

INTERVENTION/TREATMENT

What treatment did the patient receive at your clinic? How long and how many treatments were rendered? Were any unusual tests performed and did they guide treatment?

RESULTS

What was the patient's response to your treatment? Can you objectively quantify their response with outcome assessment pre and post forms? Were there pre and post laboratory, imaging, or other type of findings?

A brief caption under a picture is helpful.

DISCUSSION

Can you give a research or "evidence" basis for why you think your treatment had the purported effect on the patient discussed in this poster?

DISCUSSION (Continued)

Why do you think that the patient would not have gotten better on their own without treatment or that some other treatment they received was not the reason for their response to care? What are the limitations to your study?

CONCLUSION

Summarize your whole poster in a sentence. How could future studies be improved and how is this one a call for further research?

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Call for Scientific Submissions
Sacro Occipital Technique Organization - USA
10th SOT Research Conference 2018

This call for scientific submissions invites the submission of original research that will promote the dissemination and discussion of new information. The categories for the 2018 conference are:

1. **Research (Integration)** integrated/integrative healthcare, integration related research topics (e.g., policy, healthcare programs, quantitative/qualitative research, etc.)

2. **Research (Basic Science)** (e.g., experimental trials, quantitative basic science research, etc.)

3. **Research (Clinical/Health Care Systems)** (e.g., experimental clinical trials, quantitative clinical research, case reports, qualitative clinical research, public health, etc.)

4. **Research (Innovative)** (e.g., experimental sacro occipital technique or cranial integrative methods assessed with reliable and valid assessment tools, etc.)

Submission Requirements

1. **Blinded submission for peer review - due electronically January 31, 2018**

a. The submission must be a completed study. Incomplete work (e.g., concept proposal, a proposed idea for a research project that has not begun yet, a project has started but no data) will not be considered. If you are uncertain or have any questions about this, please contact the Peer Review Chair prior to the submission deadline.

b. Word limit: submission may be up to approximately **2000 words** (but may be shorter). The 2000 word count allows authors to demonstrate the data/results of their findings and the scholarship quality of their completed work. One file in Word or rich text format (RTF), 12-point type font, double-spaced, maximum 2MB.

c. Do not include author names or institutional affiliations anywhere in title or text.

d. The submission must include appropriate sections such as: Title, Introduction (e.g. Background, Objectives, Purpose), Methods, Results, Discussion, Conclusion, and References sections. References are expected, but are not included in the word count.

e. Due to file size limitations, it is preferred that you submit up to 2 of any combination of the following embedded in the Word/RTF document: diagrams, figures, pictures (JPEG, TIFF or BMP), graphs or tables (e.g. one graph and one table.) Only submit these if they are essential for the peer reviewers to evaluate the proposal. Do not submit tables,

graphs or pictures as separate files. Do not submit other visual aids (no videos or power point).

f. Your accepted paper will be published in the Sacro Occipital Technique Research Conference Proceedings 2012 but you will not sign over copyright to this conference and reserve the right to publish your article at another research conference or journal.

2. **Abstract for proceedings if accepted and author information - due January 31, 2018**

a. The abstract should be a structured abstract and include appropriate sections such as: Introduction (e.g. Background, Objectives, Purpose), Methods, Results, Discussion and Conclusion sections.

b. Word limit: **200 words maximum**. No pictures, tables, figures, or references are included in the abstract.

c. Do not include author information or institutional affiliations in the abstract.

d. The abstract will be published on the *SOTO-USA.org* website and within the SOT *Compendium of Peer Reviewed Literature 2010-2015* if submission is accepted.

3. **Signatures of all authors - due postmarked or faxed by January 31, 2018**

a. Signatures of all authors shall be submitted on the authorship statement form

b. Presentations of accepted works are expected. Presenting author(s) must register and attend the conference to present. Only authors may present the study. All presenters must register for the conference. We strongly recommend that funding is secured or confirmed in advance of submission. Submission is a commitment for presenting authors of accepted submissions to attend the conference and be present at the scheduled session.

4. **For studies involving human subjects – a copy of IRB/Ethics approval, expedited, or exemption letter – due postmarked or faxed by January 31, 2018**

a. All studies involving human subjects must go through appropriate IRB/ethics review and state these processes in both the blinded submission and abstract. Case reports are exempt. Any questions should be directed to your institution's IRB or Ethics Committee.

b. For studies involving human subjects research, provide a photocopy of the approval, expedited review or exemption to the peer review chair. For studies not involving human subjects, this document is not required.

Submissions that do not meet the above requirements will be returned to the submitter.

Submission Information

All paper submissions shall be submitted electronically via email to Dr. Charles L. Blum – drcblum@aol.com. A website link relating to the SOT Research Conference and registration for this conference will be posted on the website www.soto-usa.org. The primary author is responsible for proper submission of all items. Non-authors (e.g., staff) are not allowed to submit or query about submissions.

Important Information:

1. If the submission does not meet the submission requirements (e.g., not a completed research study, missing items), the SOT Research Conference Peer Review Chair will contact the authors. If however the paper cannot be accepted for this conference then notification will be sent to the submitting author. Concept proposals and incomplete works will be returned to the authors and those authors can contact Dr. Blum at drcblum@aol.com for further information.

2. It is the responsibility of the primary author to ensure that all requirements are met. The primary author will be the contact person responsible for submission of all required materials and all correspondence. Do not send communications through a third party, staff member, or co-author.

3. If the Peer Review Board confirms that there is an inappropriate submission, it will be disqualified. Examples of inappropriate submissions include but are not limited to: one that has been presented before at this conference, incomplete submissions, concept proposals, duplicate submissions, no human subjects/ethics review when one was necessary (includes expedited review), non-authors listed as authors, plagiarized work, etc.

4. Only electronic submissions will be considered. No faxed or mailed submissions will be considered.

5. Presentations of accepted works are expected. Authors must register and attend the conference to present. An author who does not register and present an accepted work will be disqualified from submitting/presenting for the following 2 years. It is the author's responsibility to find funding to register and attend the conference. We strongly recommend that funding is secured or confirmed in advance of submission. Presenter information and registration for the conference is required or the invitation to present will be revoked. Only authors may present their work at the conference.

6. Due to time and space limitations, and ability to cover poster presentations, there may be a limitation for the number of poster presentations per primary author/presenter.

All submissions will be evaluated for completeness, strength of contribution to the profession and relevance to the SOT research conference. Submissions will be reviewed by the peer review committee based upon the following criteria:

1. Practical significance
2. Originality
3. Theoretical/conceptual framework
4. Quality of experimental or descriptive design
5. Discussion/findings/results - clarity of presentation of findings
6. Conclusions, interpretation of results, implications for chiropractic education, theory, research, or practice
7. Citation of appropriate literature
8. Applicability for: the chiropractic profession, classroom use, further research, current/critical concerns, etc.
9. Completed study
10. Overall rating of the paper.

Notification: Primary/corresponding authors will be notified of peer review results by April 2018. If accepted, an acceptance communication and other information of the presenting author must be returned to the peer review committee. For submissions that are accepted, an author is required to register and present the work at the conference. If you have any questions or would like to request forms please contact the Peer Review Chair: Dr. Charles L. Blum at drcblum@aol.com

OTHER INFORMATION:

If accepted, the **200 word** maximum *abstract* will be printed on the SOTO-USA.org website and within the *Sacro Occipital Technique Compendium 2010-2015. The paper will be published within the proceedings of the* SOT Research Conference 2018. This will still allow you to publish your completed paper in any journal you wish.

Email a pdf or jpeg scan to drcblum@aol.com by **January 31, 2018** to:

SOT Peer Review Committee 2018
Attn: Charles L. Blum, DC Peer Review Chair
Email: drcblum@aol.com
Multiple authors involved with one submission may send their forms in separately

The following two submission forms can all be found on the SOTO-USA website by going to www.SOTO-USA.org and clicking on SOT Research Conference Proceedings Submission box.

Authorship Signatures Form

Sacro Occipital Technique Research Conference VII

2018

INSTRUCTIONS: This form must be completed, signed, and submitted by **January 31, 2018**
Submission title (print):

_____

By signing this form:
1. I/We confirm that each of us qualify as an author of this submission, am/are responsible for all of its content, and give permission for: 1) its presentation if accepted to the SOT 2013 research conference, 2) the publication of the *abstract on the SOTO-USA.org* website and within the SOT *Compendium of Peer Reviewed Literature 2010-2015*, 3) your accepted paper to be published in the Sacro Occipital Technique Research Conference Proceedings 2018 but you will not sign over copyright to this conference and will retain the right to publish your article at another research conference or journal, and 4) am/are capable of presenting/defending all of its content (for information about authorship visit www.icmje.org)

2. If accepted, I/we understand that registration and presentation of this work at the conference is required and that funding should be secured or confirmed in advance of submission. Submission is a commitment for presenting. Authors of accepted submissions must attend the conference and be present at the scheduled session. I/We understand that withdrawing after acceptance may prevent us from submitting to future SOT Research Conferences.

For studies involving human subjects – a copy of IRB/Ethics approval, expedited, or exemption letter – due postmarked or send to drcblum@aol.com by January 31, 2018.
Evidence of IRB or ethics review approval/exemption is required for all research studies involving human subjects. It is recognized that projects that use human subjects are expected to follow appropriate human subjects review procedures depending on the type and nature of the research (more information about human subjects review/ethics review/IRB can be found at http://cme.cancer.gov/c01 and http://ohrp.osophs.dhhs.gov/irb/irb_guidebook.htm).

Primary Author Print name Email address Signature Date
Other Authors Print name Email address Signature Date

_____

_____

_____

If more authors, please sign and date on an additional form. If multiple authors, each may send in their completed forms separately (need not be on the same form).

Patient Case Consent for Publication and Presentation

Title of case study/series: _____

Author(s) names:_____

As the patient in this case study/series, I hereby give my consent for clinical information relating to my case to be reported at a scientific conference, in a conference proceedings, and/or published in a scientific journal.

I understand that my name, initials, and/or any protected health information such as my identification number, billing information, address, etc. will not be published and that efforts will be made to conceal my identity, but that anonymity cannot be guaranteed.

I understand that the material may be published in a journal, a website of a journal, and/or in products derived from the publication. As a result, I understand that the material may be seen by the general public.

_____ _____

Name of patient (print) Date

_____

Signature of patient (or signature of the person giving consent on behalf of the patient if patient is a minor or deceased)

If you are not the patient, what is your relationship to him or her? (The person giving consent should be a substitute decision maker or legal guardian or should hold power of attorney for the patient.)

_____

Why is the patient not able to give consent? (e.g., is the patient a minor, incapacitated, or deceased?)

_____

If images of the patient's face or distinctive body markings are to be published, the following section must also be signed in addition to the section above:

As the patient stated above, I give permission for images of my face or distinctive body markings to be published and recognize that I might therefore be identifiable even though my name and initials will not be published.

_____ _____

Signature of patient (or signature of the person giving consent on behalf of the patient) Date

Please keep a copy of this completed form for your records.