Q. D. B. V.

DISSERTATIO INAVGVRALIS
MEDICO-CHIRVRGICA

DE

LVXATIONIBVS
ET SVBLVXATIONIBVS

QVAM
RECTORE MAGNIFICENTISSIMO
SERENISSIMO PRINCIPE AC DOMINO
DOMINO
ERNESTO AVGVSTO
DVCE SAXONIAE IVLIACI CLIVIAE MONTIVM ANGARIAE ET WESTPHALIAE RELIQVA
SVMMO TOTIVS CAESAREI EQVITATVS PRAEFECTO
LEGIONIS EQVESTRIS PARITER AC PEDESTRIS
TRIBVNO CAESAREO

PRAESIDE
GEORG. ERHARDO HAMBERGERO
PHIL. ET MED. D. ANATOM. CHIRVRG. BOTAN. ET PHYSICES P. P. O.
SERENISSIMORVM DVC. SAXON. STIRPIS ERNEST. CONSIL.
AVLICO, ACAD. CAES. NAT. CVRIOSORVM SODALI
AC MEDICO PROVINC. IENENSI

PRO LICENTIA
SVMMOS IN ARTE MEDICA OBTINENDI HONORES
IVRA AC PRIVILEGIA DOCTORALIA
DIE XXI. DEC. M DCC XLVI.
PVBLICO ERVDITORVM EXAMINI SVBMITTIT
AVCTOR
IOHANNES HENRICVS HIERONYMI
WESTHVSA-FRANCVS.

IENAE LITTERIS RITTERIANIS.

Hieronymi 1746

Dissertation on Dislocations and Subluxations

Section I

From pathology it is established that weakness of action may arise from an unnatural condition in the number, size, shape, and position of parts, to which both situation and connection belong. These are called morbid conformations. A dislocation, of which we now treat, consists in an unnatural position of bones joined by articulation, in the very place of the joint itself. Thus, dislocation, as a kind of unnatural constitution by reason of position, produces disease as its immediate cause. This disease has not received from physicians any peculiar name; therefore it must either be spoken of generally as an infirmity of conformation arising from unnatural position of bones in a joint, or described as a special disease of the office of the joints—that is, the inability either to move or to support suitably (although this may also arise from other causes quite different from dislocation). And often, by custom, the disease is designated by the same name as its immediate cause—that is, dislocation.

Although, indeed, to our condition are often added disorders of temperament, or relaxation of unity, yet since these are not primary diseases, but either symptoms of dislocation or accompanying ailments, and since they are not always joined with dislocation but sometimes only in complicated cases, no one rightly would refer dislocation to the diseases of temperament or of dissolved unity.

Section 2

The parts of our body chiefly affected in dislocation are the bones, namely their extremities, which in a healthy state, to a certain degree, should be contiguous and mutually movable. Yet even in simple dislocation, bones alone are not the subject of disease. Since the bones are joined by articulation and kept properly together by ligaments of various kinds, the ligaments likewise suffer. For the position of these bones cannot morbidly change without alteration of the ligaments. Nor can dislocation easily occur without injury to the mucous glands, which secrete synovia for the articulation, since they are of very soft texture, and therefore, when their vessels are ruptured, they pour out more synovia than can be absorbed by the ligaments or even by the cartilages covering the extremities of the bones.

Section 3

In the greater joints, sometimes also the external parts adjacent to the joint are affected by the displaced bones; so that muscles and their tendons are pressed and displaced, nerves compressed or torn, and even arteries and veins squeezed. Hence arise various conditions, not only increasing the disease but producing a new disease altogether different from dislocation. Such evils, both for prognosis and treatment, must be carefully considered.

Section 4

Yet these external parts, as they do not essentially belong to the joint, cannot give essential

differences of dislocation. For the essence of dislocation, apart from the subject, is in the position —that is, the place being changed. Thus, the essential differences of dislocations must be derived from those things which necessarily belong to any change of place, namely, space and direction. From direction dislocations differ according to the region; from space the degrees of dislocation are estimated.

Section 5

The regions, if considered in themselves, might be infinitely many. Yet for theory and practice it is enough if we say that, according to region, dislocations happen forwards, backwards, outwards, inwards, upwards, and downwards. It must, however, be noted that these are not to be understood as if in every joint sixfold dislocation were possible—for this would be contrary both to anatomical principles and to experience—but that these six directions apply to the whole complex of dislocations. For some bones, by their own structure or that of neighboring parts, are luxated only in this or that particular direction: for example, the lower jaw forwards, but not backwards; others, by reason of cause, are more often displaced from one region than from another, as the bone of the coccyx in women, which in childbirth is more frequently forced outward. To enumerate all the possible dislocations of all bones would exceed the bounds of this inaugural specimen; therefore I suppose these, as also the modes of connection and their various denominations, to be known from anatomy.

Section 6

By degree, dislocations are divided into *perfect* and *imperfect*, the latter also being called *subluxations*. A perfect dislocation, which the Greeks call *ekthesis* and the Germans *Verrenkung*, is when no part at all of the surfaces by which the bones were naturally joined remains in contact. An imperfect dislocation, which the Greeks call *pararthrema* and the Germans *Verdrehung* or *Verstauchung*, is when the surfaces that ought to touch are still partly in contact, but not in their natural state.

Writers also enumerate another form of subluxation, called *diastasis* (separation, or lengthening). By this they understand a subluxation caused by stretched or wholly ruptured ligaments. Since, however, not only by ruptured ligaments but also by those too greatly weakened or elongated the head of the bone may slip out of its cavity, it is clear that diastasis can be said both of a dislocation and of a subluxation, and that it marks not so much a difference of degree as of cause.

Section 7

If we consider dislocations in general, their mode of production is single and universal: namely, motion. The general cause therefore is either some excessive force, or some diminished resistance. Excessive forces may be either external or internal. External ones will be described later (§10). Internal ones are either contractions of muscles beyond measure, or coagulation and increase of the synovia, or other such things (§9).

As to the resisting forces, these are not only the ligaments but the bones themselves, insofar as their surfaces are similar and adapted to contact. By this similarity it comes about not only that one bone may move decently beside the other, but also that it may rest quietly, although the bones are pressed against each other by muscles. A dislocation, therefore, from diminished resistance, may occur either by weakness of ligaments (arising from any cause), or by dissimilarity of the surfaces in which the bones touch—whether from birth or acquired afterwards. Yet we must note: dislocations do not always arise from one cause alone, whether increased force or diminished resistance, but often from both together. And sometimes the weakening of resistance is only the occasional cause, while the efficient cause is the weight of the limb or the natural contraction of the muscles. All the parts of our body so constituted that dislocation may occur from them are the proximate mediate causes of dislocation.

Section 8

As for more remote mediate causes, especially among non-natural things, belong here moist air, watery drinks (especially hot), excessive sleep, and likewise excessive rest. For these soften the membranes. Thin foods, insofar as they have few nutritive parts, and viscous or slimy foods, are not only difficult to resolve themselves but also render other substances taken with them unfit. If nourishment is not sufficiently resolved, the chyle is crude, and consequently the blood also. Therefore the fluids secreted from it err both in quality and quantity. Chief among these fluids are the spirits, serum, and lymph. Spirits impart vital strength, serum and lymph give nutrition and physical vigor to our parts. From serum and lymph ill-constituted, nutrition of the bones is corrupted, whence arises rickets of the joints, and the surfaces which should fit become dissimilar, and coagulation of synovia may result.

Section 9

From natural things, debility is easily admitted in infancy, in the female sex, in obese bodies, in phlegmatic temperaments, and in sedentary life. Infancy also, because of leaps and falls and other imprudent actions; and any laborious way of life, because of injuries and external violence, dispose to dislocations.

Among preternatural causes (called also internal), are:

1. Cachectic diseases, such as dropsy. In these, ligaments are often so weakened that they not only do not serve properly for motion but cannot even keep the bone firm in its cavity.
2. Tumor or contusion of the mucous glands, fractures near the heads of bones, and injuries of ligaments, whereby humors escape into the joint-ligaments, acquire a callous consistency, and by degrees thrust the heads of the bones out of their sockets.
3. Rickets (paedarthrocace), whereby the sockets become larger, and therefore the surfaces unlike, so that the heads, by increase, must slip out.
4. Muscles affected either with paralysis or spasm for a long time. If the whole limb is paralytic, then all the ligaments are weakened; if only one side or certain muscles are

diseased, then the antagonists, remaining sound, by bending the limb drive the bone from its cavity. Likewise, if some muscles are seized by spasm, they may bend the limb and thrust out the bone.

5. A former dislocation or subluxation, not perfectly healed, since ligaments, especially in the aged, retain some weakness.
6. Dissolved unity of tendons or muscles that have strong antagonists.
7. Malformation of bones about the joints from birth, as if the head be too small for its socket.

Section 10

Now as for dislocations arising from these internal causes, they occur less frequently than from external ones, and they are treated with less fortunate success. Their principal causes are:

1. Falls and heavy blows.
2. Rash or careless leaps.
3. Throwing, especially of heavy things, such as large stones, from which often results a dislocation or subluxation of the shoulder.
4. Excessive pulling of the limbs, which most often happens under torture, or when infants are suddenly lifted by the arm, or when children are raised by both hands placed about the ears—especially if the child resists strongly.
5. Chewing hard substances, yawning too widely, or immoderate laughter, by which the lower jaw is commonly dislocated.
6. Athletic wrestling and similar violent exercises.

Section 11

From this it is easy to perceive that the signs of a *perfect dislocation* are these:

1. Loss of natural function. The limb cannot be moved or supported in the usual way.
2. Change of situation and figure. This is most clearly seen in paired limbs, by comparing the injured one with the sound; and often from this it is plain toward which region the limb is displaced.
3. Change of length. The limb is longer if forced downward, shorter if forced upward.
4. Severe pain. And the more numerous, shorter, and stronger the ligaments are, and the more sensitive the neighboring parts that are stretched, the greater is the pain. This sign, however, holds only in sudden dislocations from external force; for the perception of pain requires that the nerves be not obstructed, and that the motion of spirits be sudden. But in dislocations arising from internal causes, such as dropsy or rickets, the tension comes on

gradually and little by little, and therefore is scarcely perceptible, and often the nerves also do not perform their office. Thus, in these cases, pain is not notable.

5. A hollow or depression in the place where the bone ought to remain, and a swelling or inequality in some neighboring place where the bone has been driven. Yet lest this mark be deceitful, I presuppose that the dislocation is:
   a. in a limb not covered with many or great muscles;
   b. recent, before swelling from inflammation has grown great;
   c. in a patient not excessively fat.
6. Sometimes paralysis of the limbs below the dislocation, from compressed nerves, which is seen especially in dislocation of the vertebrae.

Section 12

Concerning these signs, we must hold:

1. None of them should be used alone to recognize a dislocation already made. For the first and fourth signs also appear in bruises and fractures, indeed even in contractions and gout. The others also appear in fractures; the fourth and fifth even in severe contusions.
2. From these signs together, even, a dislocation cannot always be concluded. Partly because not all are always present in a true dislocation, especially the last three; and partly because the same signs occur in fractures, whether joined with dislocation or without it.
3. Therefore other things must always be brought in for confirmation. These are:
   a. The preceding cause. For dislocation never happens without such, and internal causes act slowly and gradually over long time, whereas external causes act suddenly and at once.
   b. The injuring body. Hard and narrow things break bones rather, while softer and broader things more often dislocate them.
   c. The mode of action. If the action was a continued pressure or a slower blow, it points to dislocation rather than fracture. But a blow, especially sudden and violent, more often produces fracture than dislocation.
   d. The degree of action compared with the strength of the joint's ligaments. If the force was too little to overcome the resistance of a joint defended by strong ligaments, we must conclude a contusion rather than a dislocation.
   e. The direction of the force. That which extends along the length of the bone seldom, if ever, breaks it, but easily dislocates it. That which acts perpendicularly across the bone more often fractures than dislocates it—if by blow. But a transverse pressure, the further from the joint it is applied, the more it stretches the ligaments and therefore more easily dislocates.
   f. The very nature of the joint. The more firmly the head is lodged in the socket, the more difficult is dislocation. Hence dislocations of the thigh are less frequent than fractures.
   g. The state of the joint at the time of injury. If the ligaments at the moment of the blow

were violently stretched, dislocation more easily happens. This is especially the case in subluxations of the vertebrae.

Section 13

If, therefore, the surgeon rightly informs himself from these, he may be certain of the dislocation present. Careful examination must be pressed, for through neglect of it many inconveniences have been brought upon the sick. For bones, especially of the ankle, moderately bruised have been mistaken for dislocated, and when surgeons attempted to relieve by extension, they aggravated the mischief.

Section 14

Since the surgeon is often in doubt, because of similar signs, whether the thigh bone is dislocated or fractured near its head, it is worthwhile to inquire into their differences. By sound reasoning it is more probable that the thigh is more often broken in its neck than moved out of its cavity, or that both may happen at once. Yet experience teaches us that dislocations of the thigh do occur, even without fracture; therefore its possibility cannot be doubted.

A fracture of the thigh near its neck differs from dislocation in these points:

1. The pain is especially in the place where the broken end of the bone lies; but in the acetabulum there is little or none. In dislocation, on the other hand, there is pain not only where the head of the bone is displaced but especially in the acetabulum itself, either from stretched or torn ligaments.
2. There is a sound or crepitation from the broken ends if the thigh is moved and the bones are still in contact.
3. If the bones are distracted and not in contact, then the pain is piercing where the broken part lies; but where the head is luxated, the pain is only pressing and stretching.
4. The fractured thigh can be moved by the surgeon without notable hindrance; but in dislocation, because of the resistance of ligaments, this cannot be done.
5. In fracture, there may be an elevation in the place into which the broken bone has slipped, but no hollow about the acetabulum; while in dislocation, a hollow is felt there. Yet this hollow is not found if the dislocation arose from an internal cause, such as stretched or weakened ligaments.
6. If no prior dislocation or subluxation had existed, the subject was healthy, and no disposing causes were present, and the ligaments are believed to be strong, we conclude fracture rather than dislocation. Still, the circumstances above (§ XII, b–e) must be well considered.
7. The fractured thigh is never longer; but in dislocation, sometimes it is.

Section 15

A *subluxation* is recognized:

1. By motion being impaired or painful, and sometimes abolished;
2. By slight change of situation and figure;
3. By length of the limb being sometimes increased;
4. By pain generally milder than in dislocation, unless grave symptoms accompany it.

Yet all these are uncertain signs, except the first. Therefore we must also consider:
5. The degree of the acting force;
6. The nature of the joint.

For a lesser force produces rather subluxation than true dislocation. Joints such as the elbow with the arm, or the wrist, or the ankle, with broad and almost flat surfaces and strong ligaments, are disposed more to subluxations than to complete luxations. For bones whose surfaces are broad and less rounded yield indeed to a first impulse, but cannot be moved far, unless the force be extreme, rupturing the ligaments; for the neighboring bones which ought to move together yield but little and thereby weaken the force, and increase the resistance.

Section 16

Having discussed diagnosis, I come to the prognosis. For both the patient and his attendants wish to know the outcome and its time, and the physician must provide for his reputation. That prognosis may be rightly formed, we must look to the causes and the symptoms. This prognosis can and must be threefold .In view of the treatment, whether it can be improved or not? And whether a perfect or imperfect cure is to be expected? In view of the time of treatment, and in view of the danger, In view of the treatment, restoration can always be hoped for, if it is bad.

As to cure: restoration may always be hoped for, if

1)the cause is external (section 10)

2)the injury is recent and help is sought before callus has formed;

3)the case is not complicated, with fracture, wound, contusion, or rupture of ligaments;

4)the patient is otherwise healthy, especially if young or in full vigor.

On the other hand, the contrary is to be feared if

1) the cause is internal, especially one that cannot be removed;

2) the disease is inveterate;

3) grave symptoms are present;

4) diseases of dissolved unity are joined;

5) or if there is a bad conformation of the bones. Even in this last case, if cure is possible, it is only palliative.

6) Neither in cachectic patients nor in the aged, especially when the ligaments are much stretched, can a perfect cure be promised; for membranes so distended, especially in old or ill-conditioned persons, scarcely ever regain their natural strength.

Section 17

The time of recovery is various, according to the degree of injury. If the disease arose from an internal cause which can be removed, no precise time can be fixed; only this, that it is longer than when from external violence. In general:

- In small bones, such as fingers and toes, 5–6 days;
- In greater bones, such as tibia or elbow, 20–25 days;
- In still greater, such as shoulder or thigh, 40–60 days;
- Subluxations are always cured more quickly than true dislocations of the same bone.

But the time also varies with the age, strength, and obedience of the patient, and with the changes of season.

Section 18

No dislocation, considered by itself, is necessarily dangerous, except those of the ribs, which hinder breathing and may cause suffocation or pleurisy. In others, since no vital function is directly injured, they are not fatal. Yet when contiguous vital parts are hurt, such as the spinal marrow, great nerves, or large arteries and veins, then dislocations may by accident become dangerous, even deadly.

Thus:

- Dislocations of the ribs are dangerous, as said, by impeding respiration.
- If great nerves are compressed or torn, paralysis follows.
- If large vessels are compressed or ruptured, gangrene or mortification may ensue unless help is swift.
- Most perilous of all are dislocations of the vertebrae, though usually they are subluxations rather than complete. For vertebrae not only contain the spinal cord but also allow passage of arteries. In dislocation the foramina are narrowed or closed, and the spinal cord is compressed; whence paralysis of the parts below instantly follows.

Section 19

Among vertebral dislocations, those of the neck are most dangerous, those of the thorax less, and those of the loins least; for the higher the vertebra displaced, the more nerves and vessels are compressed, and the more important organs are paralytically affected. Thus death quickly follows, unless help be immediate. Our learned President himself observed in a woman that from subluxation of the innominate bones with the sacrum, the bladder, vagina, uterus, and rectum being ruptured, slow death with diabetes ensued.

In general, the prognosis of subluxations is more favorable than of true dislocations, being more easily cured.

Section 20

Nothing now remains but to treat of cure. What belongs to particular dislocations, requiring special handling, will be explained later; but first, in general.

The indications are:

1. The bone must be restored to its natural place, the obstacles first being removed.
2. It must be retained in place.
3. The tone of the ligaments must be restored.
4. Symptoms must be either averted or, if that cannot be, mitigated.

Section 21

The first indication, to restore the bone to its natural place, is obtained either by the surgeon's hand alone or by extension. By the hand alone it is sufficient, when the ligaments and the muscles that retract are already weakened, or when there is only a slight subluxation. In other cases, extension is required.

Extension is the more difficult, the stronger the patient's muscles are, and the further the bone's head has been displaced from its cavity. Yet extension should not always be attempted at the very first moment; sometimes it cannot succeed, sometimes it aggravates the disease. Obstacles, therefore, must first be removed, as far as possible.

Section 22

Among obstacles, the most frequent is callus filling the socket. This occurs not in recent dislocations, but in those arising from tartarous concretions or long neglected, especially if fracture accompanied. This is recognized partly from preceding causes, partly from the fact that when the bone's head is brought to the cavity it cannot be lodged there.

If the callus is from tartar or from nutritive juice of a fractured bone, experience teaches it can never be dissolved, and the dislocation never cured. If it arises from synovia inspissated by mere rest in a healthy man, and not too inveterate, it may sometimes be removed. This is done by emollient and resolving remedies, applied in cataplasms or fomentations: roots and herbs of marshmallow, mallow, wallwort, melilot, wormwood, chamomile, boiled in wine or water with wine. Afterwards fumigations from resinous gums, such as galbanum, ammoniacum, assa foetida, are added to strengthen and resolve. Some authors commend frictions especially. Internally, bezoardics and laxatives are prescribed, to prevent influx, and to make the humors when resolved more apt to dissolve the callus. The patient should avoid nourishing foods, keep a

thin and sparing diet. If by these means the callus yields to the bone being replaced, then cautious motion by the surgeon will complete the cure.

Section 23

Other obstacles are hard swelling, pain, and inflammation, arising from compression of veins, or from injury to muscles or tendons, whether by external blow or by spicules of fractured bone. If from mere contusion, venesection is proper, and repeated according to strength and urgency. If hardness is not great, fomentations with warm wine, with myrrh added, are to be applied constantly for 24 hours. If greater, decoctions of aristolochia, hellebore, angelica, agrimony, betony, horehound, wormwood, southernwood, scordium, chamomile, tansy, elder flowers, boiled in wine or water, are used. If wounds exist, especially in tendons, reduction must be delayed until healing; but if pain is from bone spicules, or swelling from compressed veins, or nerve compression, then immediate reduction must be made, since these cannot otherwise be removed.

The compression of great veins is known partly from the direction of the dislocation compared with the anatomical course of the veins, partly from the tumor beginning at the extremity of the dislocated limb. Likewise, paralysis or numbness of the limb with the direction of the dislocated bone shows nerve injury or at least compression.

Section 24

The patient is to be treated as though seized with fever, which sometimes really arises. Therefore aqueous drinks, light mucilaginous food, rest, temperate air, and bezoardic medicines are prescribed, mixed with temperants—such as powdered pearl, coral, citron, crab's eyes. To these may be added drops of Laudanum dulcified, tinctures of scordium, Hoffmann's anodyne, simple mixture, etc.

Section 25

When the obstacles are removed, extension must be attempted. This is done either by the surgeon's hands alone—in small bones such as fingers, toes, wrist, lower jaw, clavicle, and even in shoulder of infants or weaker subjects—or by instruments and appliances in larger bones.

For extension of the spine, round barrels or drums are used. For elongating the shoulder, thigh, tibia, and such, bandages, straps, and other apparatus are employed, that several assistants may draw together. Thus extension is more moderate, equal, and less injurious to the extenders. For if made by men's hands only, as much force is exerted on their own joints as on the dislocated one.

But care must be taken in applying the bands that other joints be not injured, lest dislocation be caused elsewhere. Therefore the cloths must be applied close above and below the luxated joint, not too remote; e.g. if the elbow is dislocated, not below the wrist but above it, and above the arm near the shoulder, lest the shoulder joint be hurt.

Section 26

Many authors commend machines of various kinds—Paré, Scultetus, Hildanus, Petit, etc.—but rash use of them is not advisable. For, as the illustrious Heister testifies, the strength of assistants with cloths is usually sufficient, and they are always at hand; thus aid can be given more promptly. Moreover, machines often apply too great force, and thus ligaments suffer severely, and vessels may be torn, causing serious harm. Many tragic cases of this are on record.

Besides, one machine is not suitable for all dislocations, nor even for all of the same limb. Hippocrates' famous ladder, for example, succeeds only partly, when the thigh is moved inward or outward. If, however, machines are used, they should be so constructed that the muscles are extended equally, as in the instrument for the shoulder shown by the celebrated Platner.

Section 27

To avoid harm by extension, its degree must be determined. Since extension is made to overcome the resistance of muscles and ligaments, and allow the bone to return to its socket, it is enough when the limb has been drawn so far that the head of the bone can be easily guided to its place.

Then gentle shaking and manipulation of the bone, combined with suitable movements, help to direct it. Sometimes a sudden strong push is needed at the right moment to make it slip in. Signs of successful reduction are: the sound of the bone returning, sudden relief of pain, restoration of function, and equality of length and form with the sound limb.

Section 28.

When sufficient extension has been made, the limb is restored to its natural position—this is called *reposition*. This may be done:

1. By pressing and moving the dislocated extremity directly towards the glenoid cavity; and thus it is moved inward if the dislocation has occurred inwardly, and upward if the bone has been dislocated downward;
2. If the head is directly opposed to the cavity, by gently and successively applying traction (extension), and by slowly guiding the head into the cavity. Here the surgeon must take great care that the lateral muscles, during the relaxation of the extension, do not pull the limb in another direction; for then the upper part of the glenoid cavity is easily injured, which indeed often happens if pressure is applied to the limb towards the cavity (as in number 1) too violently, especially if the extension has not yet been sufficient.

I class such reductions among the violent ones when they are not performed by the surgeon's hands but are completed using a bandage and suspension by the neck: although in strong patients I would not entirely reject this method, provided the surgeon also decently applies his hand.

Section 29.

In certain limbs, besides the ordinary method of reposition, a particular technique is also employed—for example, in the lower jaw, when dislocated laterally, by a slap (which, however,

is not delivered with a closed, but with an open hand, so that, due to unequal pressure from the fingers, greater pain may not arise). Likewise, in the wrist and hand, and similarly in the tarsus and metatarsus, reposition is accomplished by placing these parts upon a support, and by applying firmer pressure, whether it be with the hand of the surgeon, with the foot, or by means of a shoe removed, &c. &c.

Section 30.

That a limb has been legitimately and rightly repositioned may be known:

a) from the shape of the joint and the length and position of the limb, which should resemble the natural form;
b) from the motion, which can be performed by the surgeon without great discomfort to the patient;
c) from the disappearance of symptoms, if the dislocation was simple.

If, however, pain still persists, the dislocation may not have been completely reduced (section 14, 3). In such cases, it is reasonable to suspect that nerves or ligaments are compressed, and thus it must be judged that the reposition was not properly effected—whence it should again be extended slightly and reset.

Section 31.

But in order that the repositioned limbs may not again be dislodged, care must be taken that they are firmly maintained in their place, according to the second stage of treatment (section 20). To accomplish this, **bandages** (splenia) must be applied, prepared according to the condition of the limb, as well as **straps** or **splints**, sometimes quite long, and sometimes **braces**, all of which must be ready beforehand as part of the extension apparatus.

In their application, care must be taken:

1. that any irregularities of the limb are properly corrected by the bandages;
   —the wrinkles in the bandages, especially at joints or complex parts, must be removed beforehand, lest unequal pressure cause pain;
2. where splints are used, they should be applied with padding underneath;
3. the bandages must enclose the limb with equal compression; and
4. they should be neither too loose nor too tight.

—For if this indication is not properly observed, pain and inflammation often arise due to excessive pressure.

One must carefully judge the proper degree of tightness: if the patient complains only of the sensation of compression, and not of pain, and if the limb below the bandage becomes only slightly swollen, then the dressing may be considered proper.

Section 32.

In the application of bandages (*fasciae*), another judgment must be made—whether they should, before application, be moistened with stimulating or strengthening liquids, or with drying and astringent ones. This belongs to the third indication (soon to be discussed), but must be briefly mentioned here in anticipation, as it bears on what was previously said.

For if they are applied when moist, the bandage remains looser; when they dry, they first tighten. (As taught by the principles of physics.) Both conditions cannot be satisfied at once: if applied dry, they stay dry; if moistened, they soon tighten and compress the part.

However, if applied dry, they do not conform well to the contour of the whole limb with its various circumductions—thus, the spirituous liquids could not easily be poured over the intact fasciae.

And because all the fluids of the body cannot be turned aside into the fasciae by this method, and it is not permitted in all limbs or types of dislocation, this so-called *deligationis modus* (method of bandaging) must be carefully selected.

The best practice will be:

1. In **milder dislocations**, or even in more severe ones where the joint lies **so deep beneath fat and muscle** that applied liquids cannot reach the ligaments (e.g. in hip dislocations with involvement of the acetabulum), the bandage should be applied **dry**. The fasciae can remain dry, since liquids—except in necessary cases—would offer no benefit, and might be applied with or without reason.
2. The **bandage should also be dry** when plasters are used whose power lies in strengthening and supporting the affected parts.
3. But **where external medications are needed** and plasters alone do not suffice, or are at times even prohibited, there the fasciae must be impregnated with spirituous solutions **before bandaging**. Yet care must be taken that they are not thereby loosened too much—rather, they should be applied somewhat more tightly, and the moistening continued **at least until the second stage of treatment**, which may proceed either rapidly or slowly, depending on the case.

Section 33

When the limb has been bound in this way, it must be further taken care that it is not damaged by external force or by careless movement; that it be by a legitimate placement, which also inserts the third indication. The limb must be placed in such a way that it is free from all tension and pressure. This is achieved if we place it, wrapped in softer linen, or even in cotton, paper, glue folded several times, or a box, in a secure member corresponding to it, and secure it with a suspensory device, which should be done in dislocations of the shoulder, elbow, wrist and metacarpus. In dislocations of the femur, tibia and foot, the bound foot is wrapped in a large linen, secured on both sides with two sticks (Stroblade).But the dislocated fingers are tied with sound fingers.

Section 34

The third indication does not always require new remedies, but, in subluxations of healthy and robust men, rest alone, obtained by the measures mentioned (sections 31 to 33), is sufficient to recover the necessary strength. However, it will be quicker if the patient drinks little, avoids hot drinks such as decoctions, herbal tea and coffee, and, even after the bandages have been removed, does not undertake any more strenuous activities with the help of the dislocated limb for several weeks.

Section 35

In cases of complete dislocations, mere rest and regimen of diet are not sufficient to obtain the necessary strength of the ligaments. This is especially true in those who are debilitated or cachectic; for not only are the fibres too greatly expanded and thus little able to contract, but they are also more moist than natural, so that, being separated by external force, they admit weakness more readily. Unless their strength be increased, or at least preserved from further diminution, recovery is hindered.

Accordingly, internal remedies of an *incisive* and *strengthening* nature are of benefit — for example, a draught of wine, carminative medicines, and those which evacuate abundant serum, such as laxatives. If at once the ligaments lying beneath the skin are found enfeebled, then the most refined and spiritual rectifying waters should be employed — spirits of scordium, scurvy-grass, chamomile, rosemary, wormwood, marjoram, absinthe, cedar, caryophyllum, cinnamon, and the like — which may also be applied outwardly with balm of Mecca.

In place of these, strong red wine may serve, in which flowering herbs or roots of strengthening plants have been infused, such as tormentil, bistort, agrimony, sage, rosemary, marjoram, absinthe, scurvy-grass, wild thyme, bay leaves, and the like. If the ligaments lie deep beneath the flesh, external medicines cannot penetrate so directly, so that such outward applications may be omitted, and internal means used instead, together with diet (as was prescribed in section 34).

Yet, for those who fear the censures of the malevolent or the ignorant, even in such cases external medicaments may be employed; for from the vessels of the skin exudations arise, and mingle with the sanguine mass, thereby affecting the part in question.

Section 36

Those, however, are delighted with plasters, who apply them before the binding up of the limb: such as a plaster of oxicrocus, or another common ruptory plaster, or one composed of galbanum, mastic, camphor, and balsam of Peru. Take rectified oil of amber, six drops in a compound, and the same may be applied externally. But one must take heed, lest in subjects of a cacochymic constitution, by reason of obstructed transpiration, there should arise itching and pustules; for in such cases, the plasters subsequently laid on ought to be discarded. The applications of spirituous remedies, even after the member has been restored, ought to be continued, and may with advantage be combined with gentle frictions.

Section 37

The symptoms which sometimes follow are swelling, pain, inflammation, an excessive stricture of the fasciae; likewise itching and eruptions of millet-like pustules beneath the fasciae, arising from the application of plasters to parts not sufficiently clean, or not properly treated with splenia; also rigidity of the limb, when the synovia tends toward coagulation, and when the ligaments, from too much rest, are contracted.

In the first case, the bandage must be changed to one less strict; and, unless the symptoms cease of themselves in short time, the method above prescribed (§ 23) must be followed. In the second case, the fasciae are to be loosened, the itching skin sprinkled with the seed of hyssop, anointed with an ointment of white lead, and the bandage renewed with clean fasciae and splenia.

The third symptom may be conveniently prevented, if the surgeon — and especially the patient himself — before every new bandaging gently move the limb, so that the synovia may be diffused and the flexible ligaments preserved. Very useful also is a fomentation prepared from a freshly slain animal, dissected, in which the rigid member is immersed even within the still warm viscera; for in this way the ligaments admirably recover from their stiffness.

Section 38

At times, moreover, other diseases occur together with luxations and subluxations; and then the luxation or subluxation is said to be *complicated*. Such are those morbid states wherein the unity of the part has been dissolved (§ 1), in particular—

1. Fracture,
2. Wound,
3. Contusion.

Yet, before these matters are to be handled, I must again give warning concerning *subluxations*: in such cases, the same signs are present, and therefore the same indications and the same treatment are to be observed — except only that at times the reduction may be undertaken without the aid of extension.

Section 39

If a fracture be present together with a luxation, it must, as is taught in the schools of surgery, be treated. The only question is, whether the fracture or the dislocation ought first to be reduced. The best course is, if it can be contrived, that by one and the same act of extension both the luxated and the fractured bone be replaced together — which, as experience testifies, can sometimes be effected.

If this, however, cannot be obtained — especially if the fracture be near the head of the bone — then, contrary to the faulty practice of certain surgeons, the dislocation must first be reduced, and afterwards the fracture. And the reasons are these:

1. Because the luxated part may be extended and replaced without extension and without further lesion of the fractured portion; for if the fracture lie below, the assistants may

sustain it, and keep it steady. But if the dislocated part were situated below the fracture, then the fractured portion, without injury to the ligaments of the luxated joint, could not be extended.

2. Because the luxated part, after it has been replaced, may be firmly supported either with fasciae or by the surgeon's hands, and in the subsequent extension requisite for the fracture, the luxation is not disturbed. On the contrary, if the fracture were first replaced, it would scarcely be possible to avoid that, during the extension and binding required for the luxated bone, the parts already united by contact should be torn asunder afresh.
3. Moreover, if one were to delay the reposition of the luxated bone until the fracture be healed, the synovia in the interval would coagulate, and is thereby produced, and thus the replacement of the dislocated bone becomes exceedingly difficult, if indeed it is not altogether prevented; consequently the movement of the limb, and with it also its practical use, is for the most part lost.
4. Furthermore, if one were to attempt to replace the luxated bone after the fracture were in part healed, then in the course of extension and reposition the recent consolidation of the osseous parts would easily be broken anew; for no surgeon can be assured of the exact degree of adhesion already accomplished. Hence no true benefit could result from such a delay.

Section 40

If, however, the dislocated bone be near the head of the bone, and both cannot by a single extension be restored together, then the fracture must first, as far as possible, be replaced and secured. Care must be taken, as has been mentioned above (section 22), that the generation of callus in the acetabulum be not hindered. When the fracture is united, then the reduction of the luxation may be undertaken.

Section 41

But what is to be done if a great wound, or a transverse one, or a grievous contusion, be joined with the luxation? That has been spoken of before (section 23). If the wound be slight, yet running longitudinally, then it may be possible, with careful extension and reposition, to act without lesion of the wounded part. The wound, however, must be managed in such wise that the injured part be not torn by the splints or by the bandages which must enclose it. For, according to the strict rules of the art, every wound must once at least be laid open and inspected, and the necessary dressings applied; but this must be done with care that the splints be not disturbed more than needful, nor the limb handled often. The particular treatment of wounds themselves does not properly belong to my present purpose.

Section 42

Having thus satisfied the promise I made in section 20, I will now proceed to set forth briefly certain peculiarities of luxations in particular regions, receding a little from the general method, and commencing with the maxilla—

Let me begin with the inferior jaw. If the patient, seated in a moderately elevated chair, has his head firmly grasped by an assistant, the surgeon, placing his thumbs—well secured and guarded lest they be injured by the patient—upon the molar teeth, and pressing them downwards with notable force and skill, while the remaining fingers are applied without, along the jaw and upon the chin, then by moving first backwards and then upwards, he replaces the luxated maxilla. After this is done, bandages are applied, and if the ligaments be much weakened, even a special rule or splint may be placed, prepared from parchment stiffened with glue, which, being bound together with a bandage commonly called the *Cheveliere* or "head band," supports not only the jaw itself but also restrains the patient from too much speaking and mastication of hard foods.

Section 43

When the vertebrae of the neck are displaced, the surgeon, with his own hands, carefully supports the patient's head, raising it gently, and by various motions seeks to restore it to its natural quiet and repose, the neck meanwhile being strengthened by splints and especially supported by spirituous embrocations. The remaining vertebrae are replaced by laying the patient upon a round cask or padded roller, the linens covered with soft pillows, the chest and hips being somewhat depressed; then he is raised up gently, so that by artifice the vertebrae spontaneously return, since the subluxation is commonly slight. Weak ligaments are fortified with splints, imbued with spirits, and strengthened by a girdle or by a suspensory band. The motion of the coccyx when displaced outwardly is pressed back by the hand; when displaced inwardly, a finger or certain smooth and well-anointed instrument is gently inserted. The outer parts are pressed down, and the patient must be made to sit in a perforated chair, lest the bone, unless restrained by stronger splints and the "T" bandage, should again relapse under the strain of greater motions.

Section 44

The extension of the clavicle is performed while the assistant of the patient, seated on a lower stool, places his knee upon the back and seizes both shoulders, drawing them sufficiently backwards. Often the clavicle of its own accord returns to its place; but if it should not thus follow, then the surgeon reduces it with his hand, afterwards binding it with a splint fashioned from rolled linen in the form of a cylinder, one placed above and one beneath the clavicle. Over these, and crosswise upon the breast, he places a broad flat splint of wood or of iron, or another instrument prepared in the likeness of a cross; and all are at length bound firmly together with bands, lest by motion they should be separated. A wooden or iron instrument was often presented for this purpose (see Tab. viii, fig. 13, ad Institut.).

Translated by Dr Gary Bovine, assisted by ChatGPT Aug.30, 2025