On disease of the spine : causing posterior angular projection, abscess, and paralysis / by Richard Hughes.

Contributors

Hughes, Richard, 1836-1902.
Royal College of Surgeons of England

Publication/Creation

London : John Churchill, 1861.

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ON

DISEASE OF THE SPINE

CAUSING

POSTERIOR ANGULAR PROJECTION, ABSCESS, AND PARALYSIS.

BY

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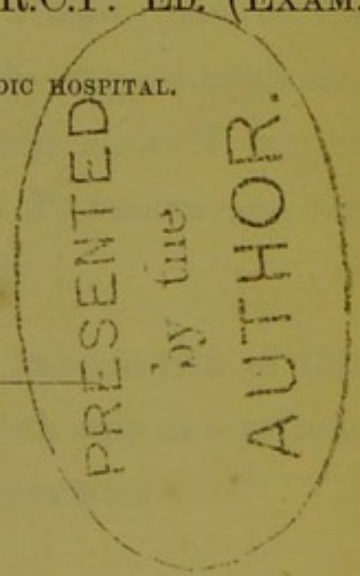

LONDON:

JOHN CHURCHILL, NEW BURLINGTON STREET;

AND OF ALL BOOKSELLERS.

MDCCCLXI.

M'GOWAN AND DANKS, GREAT WINDMILL STREET, HAYMARKET.

PREFACE.

I COULD wish to have deferred any publication on this subject until wider research and larger experience had enabled me to offer to the Profession an exhaustive work, in which all the points of interest should be fully discussed, and new light thrown upon such of them as needed it. But as day by day the conviction is more keenly forced upon my mind how utterly inadequate is the treatment, or rather absence of treatment, which is ordinarily afforded in cases of this disease; and, on the other hand, how great and sure is the success attainable by the means advocated in the following pages; I can no longer delay to communicate to the Profession and the Public the benefits these means afford.

I trust, therefore, that the great imperfection of this work will be excused; and I put it forth only as a prelude to a more extensive monograph on the subject.

CLIFTONVILLE, *Brighton*, 1861.

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ON DISEASE OF THE SPINE,

ETC., ETC.

CHAPTER I.

DESCRIPTION OF THE DISEASE.

NATURAL HISTORY OF THE AFFECTION—SPECIAL POINTS ABOUT THE DEFORMITY, PARALYSIS, AND ABSCESS.

In the course of the last century, the attention of the Profession was called by Mr Pott to a form of Disease of the Spine, the principal feature of which, in his eyes, was the peculiar form of paralysis of the lower extremities which invariably, in greater or less degree, accompanied it. Since that time this affection has been noticed in works relating to the Diseases of the Joints or Spine, as in those of Sir B. Brodie, Bampfield, and others, and has been made the subject of a few monographs. It has hardly, however, especially in the present day, met with the attention which, from its frequency and its distressing character, it well merits.

The natural history of the disease is much as follows:—In a few cases, pain, especially on percussion, at a particular point of the spine, is the first

symptom noticed; but, far more frequently, there is no such complaint. The first thing generally noticed in the spine, is a slight projection of the spinous process of one of the vertebræ beyond the natural line. More or less rapidly this projection increases; the vertebræ immediately above and below the first noticed commonly go with it, till by degrees a considerable angular curvature is formed—largest when in the dorsal region, comparatively small when in the lumbar or cervical regions. Concurrently with this deforming process, and sometimes even preceding it, a gradual loss of power in the parts below the deformity is observed, usually resulting at length in complete paralysis. In many cases an abscess is sooner or later found to exist in the groin, nates, loins, side, or neck, according to the situation of the curvature. All this time the general health is suffering; pain, radiating from the affected part round the chest or abdomen, or down the legs, is often complained of; and, unless relief is obtained, debility, emaciation, colliquative sweating and diarrhœa, and death, commonly close the scene. In a few fortunate instances, under the ordinary hygienic and medicinal treatment, the disease takes a favourable turn: the increase of the deformity is checked, the paralysis slowly departs, the abscesses are evacuated, and the patient recovers, though with a permanent and never-decreasing (indeed, increasing) deformity, and with the natural functions, and consequently the general health, permanently impaired.

Such is the general description of this disease. A few special remarks may be made on its three prin-

cipal symptoms—viz., Deformity, Paralysis, and Abscess.

1. *Deformity.*—The essential features of this are, that it is local, involving a distinctly limited part of the spine; and that its form is rarely rounded, but commonly abrupt and angular. There will generally be found, at the centre of the arch, one or more vertebræ so projecting as to destroy the perfect curve and give it an irregular form. The importance of these characters will be seen when we come to the diagnosis of the disease. If the deformity be in the dorsal region, the ribs lose their support behind, and the sternum is often thrust forward and the sides of the chest flattened, producing an anterior projection of the chest (commonly called chicken-breast), which may be nearly or quite as great as that existing behind.

2. *Paralysis.*—While the amount of deformity varies much in different cases, the degree to which the paralysis goes is by no means dependent thereupon. A large curvature may co-exist with but slight weakness of the lower limbs, while complete paralysis may occur while only one vertebra projects from the line of its fellows. The extent of the paralysis varies according to the part of the spine affected, and possibly, as we shall see, with the process of the destructive disease of the bones. Thus, if the primary projection take place in the lumbar region, paralysis of the lower extremities only will probably ensue. The sphincters may be affected, but this is not common. If the disease be in the dorsal region, and severe, the sphincters run a

greater chance of sharing in the loss of power. Extensive disease in the neck has been occasionally known to paralyse the upper extremities also: but these are far less liable to be affected than the lower. Disease of the atlas or axis rarely occasions paralysis by itself: but in these cases an incautious movement of the head is at any time liable to occasion (and has more than once occasioned) sudden death, by pressure on the spinal cord above the origin of the phrenic nerves. Lastly, the character of the paralysis is of much interest, especially in its bearing on nervous physiology. The muscles of the weakened limbs are not in that lax and flabby state in which they are found in ordinary paraplegia, but are somewhat tense and rigid, and subject to cramps and spasms. This remark, however, which was first made by Mr Pott, and has been confirmed by subsequent observers, does not apply to all cases. In some instances the muscles are entirely relaxed, and in these it will appear probable that the paralysis depends upon a cause or combination of causes different from those of the ordinary form. Sensibility is far less commonly lost in these cases than motion: but this is a remark true in all kinds of paralysis.

3. *Abscess.*—With regard to the abscess frequently met with in this affection, I need only notice the various parts of the body at which the matter points, according as the disease is situated in one or other region of the spine. Should the upper lumbar vertebræ be affected, the matter will find its way into the sheath of the quadratus lumborum or psoas magnus muscles, and will point accordingly either in

the loins, constituting lumbar abscess, or in the groin, producing psoas abscess. If quite low down in the lumbar or sacral regions, it will sometimes point at the fold of the nates. In the latter case, a careful diagnosis will be required, lest hip disease should be the real source of the matter. These three forms of abscess often become of vast dimensions. Disease of the dorsal vertebræ will direct its purulent matter towards the lateral part of the ribs, and its downward gravitation will usually cause it to present at their lower margin; while, if the disease attack the cervical region, the pus will find its way through some of the planes of muscles here attached to the spine, and present at the margin of the platysma towards the front of the neck. These are the general rules, but exceptions are occasionally met with.

Mr Pott remarks that abscess is most commonly present when caries exists with little or no curvature; and Sir B. Brodie considers it likely to appear earlier and more constantly when the bodies of the vertebræ are first affected, than when the disease primarily attacks the intervertebral fibro-cartilages.

Farther investigations are highly desirable to discover the relative frequency and connections of these three symptoms.

CHAPTER II.

MORBID ANATOMY OF THE DISEASE.

CONDITION OF THE VERTEBRÆ—OF THE INTER-VERTEBRAL FIBRO-CARTILAGES—OF THE SPINAL CANAL AND NERVE FORAMINA—OF THE SPINAL CORD AND ITS MEMBRANES.

The following are the appearances observed on dissection of the bodies of those who have died during the progress of this disease :—

1. There is always found more or less destruction of the bodies of the vertebræ, of their intervertebral cartilages, or of both, at the seat of projection. "The state of the intervertebral cartilages," writes Mr Pott, "I find to be subject to great variety; they being sometimes totally destroyed, while the caries" (*i. e.*, of the vertebræ) "is small in degree ; sometimes apparently but little injured, when the caries has done considerable mischief." And a similar remark is made by Sir B. Brodie.

2. The loss of substance is in ninety-nine cases out of a hundred confined to the spongy structure of the bodies of the vertebræ, the compact tissue of the arches and processes remaining entire.

3. In many cases tubercular matter is found deposited in the cancelli of the bodies of the vertebræ.

4. The calibre of the spinal canal, while sometimes slightly narrowed at the seat of projection, is never encroached upon by roughness or projections; its sides remain smooth and even. A similar remark applies to the foramina for the issuing nerves.

5. The membranes of the spinal cord are frequently affected with chronic inflammation opposite the seat of disease in the bones. In a few cases the cord itself has been found softened at the same spot.

CHAPTER III.

CAUSES OF THE DISEASE.

PREDISPOSING CAUSES—EXCITING CAUSES.

Predisposing.—By far the most common predisposing cause of this disease is the scrofulous diathesis. It is rare that in children—those most commonly affected with it—we do not discover other marks of this taint, either in conformation, or in actual disease of joints, cervical glands, &c. When occurring for the first time in adults, however, such evidences of struma are often absent; and in these Sir B. Brodie has often been able to trace the rheumatic diathesis.

Exciting.—The scrofulous diathesis, so frequently

the predisposing, is amply sufficient to act also as the exciting cause of the disease; especially when, from any circumstances, the general health in such subjects has been lowered. But the history of the case often speaks of a blow, or fall, or strain, as marking an epoch from which the symptoms, local and general, may be dated. And while such causes would be entirely inoperative to produce this disease in healthy persons, it is not improbable that in subjects of struma they may act by determining the local manifestation of the constitutional taint.

CHAPTER IV.

NATURE OF THE DISEASE.

A CARIOUS OR ULCERATIVE DISEASE OF THE SPINAL COLUMN—CAUSE OF THE DEFORMITY AND ABSCESS—PROBABLE CAUSE IN MOST CASES OF THE PARALYSIS—SUMMARY.

Having now ascertained the natural history, the morbid anatomy, and the causes of this disease, we are in a position to lay down with tolerable accuracy its nature.

The evidence of post-mortem investigation points to the existence, in all cases, of a process of destruction, commencing either in the vertebræ themselves or their intervening fibro-cartilages. Such

destructive disease in other joints, we call, in cartilage, ulceration ; in cancellous bone, caries. These diseases in other joints are frequently accompanied with the formation of pus; and thus the abscess which so often accompanies this curvature of the spine is accounted for. The loss of substance in the bodies of the vertebræ caused by the carious process will allow the vertebræ above and below to fall in and come in contact, while the arches and spines remaining uninjured will project backwards, thus forming the more or less angular projection characteristic of the disease. Lastly, the paralysis may arise from two causes: from irritation of the spinal cord propagated from the neighbouring disease of the surrounding bones, or from direct pressure upon the cord or its issuing nerves produced by the deformity of the spine. That in the great majority of cases the former cause is operative rather than the latter, seems probable from the following considerations :—1. The paralysis, as we have seen, bears no relation whatever to the deformity. It may be slight when the latter is extensive, and complete while the latter is small. It may come on before the deforming process has made any way, and will disappear with the subsidence of the diseased action, the deformity (as in treatment by issues) still remaining entire. And none of the curvatures of the spine unconnected with disease have this tendency to produce paralysis.—2. The peculiar nature of the paralysis, the muscles of the weakened limbs being tense and rigid rather than lax and flabby, points in the same direction. For

these states of the muscles are, as the late Dr Todd has shown (in the first volume of his 'Clinical Lectures'), eminently diagnostic between paralysis from irritation, and that from pressure. In cases of hemiplegia from cerebral hæmorrhage, if there be laceration of the brain or an inflammatory condition of the parts around the clot, the palsied limb will be rigid. In the absence of these conditions, it will be lax.—3. There is actual evidence afforded by autopsy of the absence, in most cases, of any such diminution in the calibre of the spinal canal as, considering how loosely the cord hangs therein, would cause injurious pressure; and, on the other hand, of the frequent existence of chronic inflammation of the adjacent surface of the membranes of the cord—a source of irritation to the cord itself amply sufficient to account for the phenomena.

The researches of Dr Brown Séquard upon the relative functions of the several columns of the spinal cord appear to indicate another means of diagnosis in this matter. They prove that the fibres along which the orders of the will pass to the muscles are, in the lower part of the cord, distributed throughout its anterior white substance; that the sensitive conductors run mainly in the central grey matter; and that the posterior columns have no share in motor or sensitive phenomena. The effect of irritation of the anterior part of the cord will therefore be to diminish or destroy the power of voluntary motion, and less frequently that of sensation; while affections of the posterior columns will have no such effect, but (as farther

researches prove*) will have similar destructive results on the reflex function of the same parts. Now, since the bodies of the vertebræ alone are affected by the diseased process, irritation propagated from them will evidently affect the anterior portion of the cord, leaving the posterior columns unharmed. We should thus expect to find voluntary motion (and in severe cases sensibility also) impaired, but reflex power undiminished, in these cases. Farther investigations are required to pronounce with certainty whether such is usually the case, but my own strong impression is that it is so. One of the most remarkable of Dr W. Budd's cases illustrative of reflex power in paraplegia† was a subject of this disease. On the other hand, I have seen a case in which the power of standing and walking (mainly due to reflex action) was entirely lost, and partially also that of the sphincters; and yet voluntary motion still existed, so that the whole leg could be raised from the hip to touch an object held some inches above it. The paralysis here was of the rigid kind, and could hardly, therefore, arise

* Dr Brown Séquard finds injury to the posterior columns invariably accompanied with loss of reflex power. He does not account for this, but it seems to me to arise in this way:—The researches of Schroeder Van der Kolk and Mr Lockhart Clark have shown that while the middle portion of the posterior sensitive roots passes directly into the grey matter, many superior and inferior fibres run for some distance upwards and downwards in the posterior columns before they enter the vesicular substance. If, as I believe, these latter fibres are those for conveying reflex stimuli, it is easily conceivable how injury to the posterior columns would impair that function.

† 'Medico-Chirurgical Transactions,' vol. xxii.

from pressure. Death ensued from tubercular meningitis (acute hydrocephalus).

But since post-mortem examination occasionally detects marked diminution of the calibre of the spinal canal, and since during life the paralysis is sometimes of the lax and flabby kind characteristic of paralysis from pressure, the probability is that these two phenomena are connected as cause and effect, and form exceptions to the general rule.

Angular curvature of the spine, then, with its accompanying paralysis and abscess, is the result of a destructive process in the spinal column, originating either in the bodies of the vertebræ or their intervening fibro-cartilages. The fact that the strumous diathesis is the most common predisposing cause, and childhood the most common age for the disease, would indicate that in the majority of cases the bodies of the vertebræ themselves were first affected. The frequent immunity from pain, even on pressure or percussion, which is noticed, points to the same conclusion. Caries of the spongy structure of the vertebræ will then be a chronic inflammatory process—sometimes caused, as in pulmonary consumption, by the deposition of tubercle therein, sometimes without such local irritation—soon going on to suppuration, ulceration, and disintegration of substance, which is carried away in the pus which is formed. Ulceration of the intervertebral fibro-cartilages may be suspected in cases where the patient is of adult age, rather of the rheumatic than the strumous diathesis, and where much pain is experienced from the commencement of the history.

CHAPTER V.

DIAGNOSIS AND PROGNOSIS OF THE DISEASE.

DIAGNOSIS FROM EXCURVATION WITHOUT DISEASE—FROM RICKETTY CURVATURE—PROGNOSIS UNDER ORDINARY TREATMENT—UNDER TREATMENT RECOMMENDED BY THE AUTHOR.

I. *Diagnosis.*—There are only two affections which require to be distinguished from angular curvature of the spine, when once the projection is established. The first of these is excurvation, or posterior curvature of the spine without disease. This deformity, though in its pathological character of the same nature as lateral curvature, agrees with the disease we are considering in the direction of its curve. But the diagnostic marks between them are—1. Excurvation is general, the whole spine forming one curve. Angular projection is local, confined to a particular region of the spine. 2. The curve of excurvation is rounded; that of projection from disease, more or less angular and pointed. These two points will generally serve to distinguish the two forms of complaint.

The second affection which might be confounded with angular curvature from caries of the vertebræ, is the deformity of the spine which sometimes obtains in rickets. Dr W. Jenner, in his admirable

lectures on the latter disease, published in the 'Medical Times and Gazette,' gives us the following means of diagnosis in such cases :—"If the child be held by the upper part of its trunk, the weight of the lower limbs will usually remove the ricketty curve ; and it may certainly be straightened, if the nurse holds the child by the upper part of the trunk, and the physician raises the lower limb with one hand, and at the same time places the other on the curved spine."—('Medical Times and Gazette,' March 17, 1860.)

Such a mode of diagnosis, however, must be resorted to with caution, and, should ulceration exist in the part, is not without danger.

II. *Prognosis.*—The natural history of this disease, when uninfluenced by treatment, is, as we have seen, to end in permanent deformity and weakness, or death. And so little power have the ordinary resources of medicine and surgery over its progress, that its prognosis, even when these are most assiduously tried, is confessedly bad.

On the other hand, under the use of the means advocated in the following pages, the prognosis is good. The co-existence of tubercular disease in some vital organ, as the lungs or brain, or the bursting of an abscess into the peritoneum or bladder, are alone likely to vitiate our prediction as to a favourable result.

Upon the application of the support to which I allude as the chief feature of my treatment, comfort and a sense of security are immediately experienced. Instead of the fear of movement, the sunken cheek,

the pallid, anxious, and distressing appearance which so commonly obtain, the patient soon acquires the feeling of safety and protection; the cheek speedily assumes the hue of health; the look of distress disappears, and, instead of it, is quickly manifested a smile of satisfaction, confidence, and comfort, which delights the grateful parents, and gives joy to all who have watched and waited upon the sufferer. The disease is checked; the paralysed parts speedily regain their power; and the matter of abscesses, when formed, is sometimes quietly absorbed, and sometimes safely evacuated by art. That amount of deformity which depends upon simple giving way of the vertebræ above and below the seat of disease may be removed, while that which arises from loss of substance may be, with careful management, greatly diminished, though rarely entirely removed. In growing children, in particular, the operation of the support, when nicely managed, in reducing existing deformity, is very striking and highly satisfactory.

CHAPTER VI.

TREATMENT OF THE DISEASE.

CONSTITUTIONAL TREATMENT—LOCAL TREATMENT—INDICATIONS—INADEQUACY OF HORIZONTAL AND PRONE POSTURES, CRUTCH-SUPPORTS, LEATHER SHIELDS, ETC., TO MEET THEM—TREATMENT ADOPTED BY THE AUTHOR—TREATMENT OF THE ABSCESS—ISSUES AND SETONS.

I shall arrange my remarks on the treatment of this disease under two heads: I. *Constitutional;* II. *Local.*

I. The constitutional treatment of this disease will, in all cases, include such measures as are generally fitted to improve the health, and sustain the powers of the constitution. Regular exercise in the open air; nutritious diet, with moderate proportions of malt liquors and wine; avoidance of all depressing causes, mental and physical—are indications in every case. In the very numerous class of cases, however, in which a strumous diathesis is the predisposing cause of the disease, special measures must be adopted against this taint of the system. I find nothing so beneficial here as a short course of alkalies and a light bitter—as soda and calumba, with an aromatic—to neutralise the excess of acid so generally present in scrofula, and to improve the tone of the digestive organs; which should then be followed up with from ten to twenty drops of the syrupus

ferri iodidi, taken three times a day in a small quantity of cod-liver oil. While this course of treatment is being continued, the state of the bowels should be regulated by occasional mild and antacid aperients; the hygienic influences of good air, sunlight, and pure water brought to bear upon the patient as much as possible; and the diet carefully proportioned to the powers of digestion. The advantage of sea-air is well known, and cannot be over-estimated, in all diseases dependent upon a scrofulous state of system. The best local treatment will be more successful when carried on under these influences than without them.

II. My remarks on the constitutional treatment of this disease are necessarily brief, as they simply resolve themselves into support of the general health and removal of any scrofulous taint; upon which sufficient has been written by other authors. The local treatment, however, requires a more extended consideration.

The spinal column is not one bone, but a congeries of some twenty-four bones, jointed together by their bodies and their arches. It is obvious, therefore, that diseases of the spinal column come under the head of diseases of joints, rather than those of bones. And, accordingly, we have seen that the two most common forms of spinal disease—those commencing in the cancelli of the vertebræ and in the fibro-cartilages respectively—have their exact analogues in two similar diseases of other joints. It will, therefore, follow that the treatment of vertebral disease must be conducted on principles

similar to those which guide us in the treatment of affections of the joints.

Now, the grand principles of modern surgery in the treatment of arthritic affections—which have already saved many an amputation, and will yet avert many an excision—are these: to separate as far as possible the opposing diseased surfaces, and to preserve them at perfect rest in their separated position. In the first we only imitate Nature, who, by the flexed position into which she brings the diseased joints of the extremities (in which posture their opposed surfaces are most separated or relieved from pressure), shows that such is her mode of relief and cure. We therefore flex and adduct a diseased hip, flex a diseased elbow or knee, &c. But we also endeavour to keep the parts thus separated at perfect rest by various arrangements of splints, bandages, and other mechanical appliances. We thus protect the parts from friction one upon another, and from external injury, and place them in the most favourable position for that check of the morbid process at which Nature is ever aiming, and in which we endeavour, by our constitutional treatment, to aid and support her.

It is obvious that these principles must be our guide if we would attain to any satisfactory results in the treatment of diseases of the spine. We must there, as elsewhere, endeavour to separate the diseased surfaces, and preserve them in a state of local rest and apart, while at the same time we are improving the general health and removing constitutional taints. The only difference here is,

that as the usual mode of healing in these cases is by anchylosis of the diseased bones, by which the spinal cord is preserved from injury, we must not separate the opposing surfaces too widely, lest by so doing we should prevent this process from taking place.

In considering the modes usually resorted to for obtaining relief and local rest of diseased surfaces of the vertebræ, we must bear in mind that whatever is found to be injurious to the general health tends to increase the local disease, and whatever increases the local disease tends indirectly to injure the health. Upon this principle let us consider the advantages of continual preservation of the recumbent posture, whether supine or—as Mr Verral and Mr Erichsen recommend—prone. And first, the horizontal. Doubtless, the continual maintenance of this position, by diminishing the friction and pressure of the diseased surfaces, retards in some measure the progress of the disease : but still, in the great majority of cases, the diseased action continues, and the deformity increases sometimes very rapidly. And this is not wonderful. Would a surgeon, let me ask, tolerate so imperfect a mode of obtaining local rest in the treatment of any other joint in a state of disease ? Does he not know well that the involuntary and irrepressible movements of the patient must cause some amount of friction between the diseased bones, and a corresponding retardation or prevention of the cure ? And if so in the joints of the extremities, we may fairly infer the same with the highly-flexible spinal column, which moves with every motion of the frame. Besides which, no adequate separation of the diseased surfaces is obtain-

able by this method. But a still greater objection to this mode of treatment is the injury to the general health which the confinement within-doors and to the horizontal posture must produce. Even were it likely to cure the disease—which it is not—this alone would suffice to render it our last resort.

It is true that in the prone posture the diseased surfaces may be more relieved from pressure than in the horizontal. But this relief cannot be graduated; the surfaces may be separated too far to allow of consolidation of the diseased bones: and though the evils which pressure and friction occasion may be better prevented by the prone than by the horizontal position, the health and strength suffer from confinement in the house as much from one as from the other.

We require, then, for the treatment of this disease of the spine, some apparatus to be worn by the patient whereby we can relieve the diseased surfaces from pressure, and prevent them from rubbing on each other; and, at the same time, give the patient the advantage of exercise with impunity in the open air, either active or passive, as the state of his disease or the condition of the parts may indicate: and not only so, but such instrumentality as will enable the surgeon, in connection with these advantages, to diminish, by judicious management, any existing deformity resulting from the disease, whether in the spine or chest, or both. Let us consider how this end is to be attained.

The diseased spinal column may be roughly represented by a rod, jointed so as to allow of limited flexion and rotation between its joints; from

which a wedge-shaped piece, corresponding to two of the jointed pieces, has been cut thus (*a*). Now,

it is obvious that in this position the opposed cut surfaces of the jointed pieces from which the wedge has been taken are liable to fall together, and to grate one upon another at every rotatory motion of the rod: while, on the other hand, if the still entire projecting part is pressed upon at *b*, and the parts above and below (*c*, *d*) drawn towards *e* and *f*, the cut surfaces will be separated, and, the pressure at all points being kept up, all lateral or other movement of the rod will be prevented. By keeping up the pressure as above indicated, all increase of the curve of the rod, which, supposing a weight to bear upon the upper end, would take place, will be hindered. And since the parts of the rod left entire (*b*) would bear the superincumbent weight, there would be no yielding of the rod towards the cut surfaces.

By setting up, therefore, as above indicated, some continuous and easily-regulated pressure upon the posterior aspect of the projecting vertebræ, and drawing backwards the parts above and below, we shall separate the diseased surfaces, fix them apart, and, while thus allowing the disease to heal under the most favourable circumstances, shall prevent any increase of the projection from the mechanical influence of the superincumbent weight of the parts above, and gradually diminish, if we cannot altogether remove, such amount of deformity, whether in the diseased bones or in those above and below, as may already have taken place.

We ought also, by such an apparatus, to be able to command any part or any number of parts of the spine suffering from disease, and likewise to prevent deformity of the chest, or to remedy any which may already have taken place in consequence of the spinal projection.

Let us now see what are the means in common use, and observe how far they are calculated to answer these indications.

The "crutch-support," as it is called, is an apparatus commonly employed in these cases. It consists of a padded hoop of steel placed round the pelvis so as to rest mainly on the crests of the ilia, and fastened in front. From this on each side is extended a jointed lever, which is made long enough to reach to the armpits when the apparatus is applied. At the top of each of these levers is placed a padded piece of steel transversely, fitted to lie under the armpits in the manner of crutches. Sometimes a portion of soft material is fixed to the side-levers, and passed round the diseased part of the back from side to side. The objects proposed by this apparatus appear to be, to support the spine upon the principle of extension, which it is intended to keep up by means of the side-levers which pass from the pelvis to the armpits; and, by pushing up the shoulders, to take off from the spine the superincumbent weight of the parts above. Also, when soft material connecting the levers together posteriorly is used, it is intended to give support to the diseased parts behind. Besides the distress caused to the patient from pressure on the hips and armpits, and the deforming effect on the shoulders by thrust-

ing them up towards the ears, this instrument is quite inefficient—first, because its action upon the spine, so far as it goes, is purely in the longitudinal direction, or nearly so, for the soft material sometimes used, as stated, is of little or no benefit; and, secondly, because it has neither means for checking the deforming process in the chest or back, nor materially hindering the deadly progress of the disease. It does not answer any one of the indications that have been pointed out. The only benefit it can produce is the slight traction it exerts upon the spine between the hips and armpits, by which it may be that the pressure and friction of the diseased surfaces on one another is somewhat diminished.

The only other mode of treatment which to my knowledge is now in use for the answering of these indications, is the application to the back of a hollowed shield of wood, leather, or gutta percha, which is fixed in its place by bandages passed round the body, or by straps round the hips and shoulders. The rudeness and inadequacy of such a contrivance must be so evident, that I need spend little time in pointing out the various items of objection to it. It exerts little or no beneficial pressure upon the projecting part; there are no means for keeping the trunk at rest; traction, when made at all, is only exerted at the extreme ends of the spine; and the compression of the chest, when bandages are used, must be very injurious. Its use is found most irksome to the patient; and I have never seen or heard of a case in which its use has been productive of the least benefit.

The apparatus I am in the habit of using for the

fulfilment of these indications, and the only one by which I believe they can be met, is that invented and used by Mr Amesbury for the treatment of this disease, of which, by his permission, I will give a general description :—It consists essentially of two levers—one, composed of a single steel spring, made to lie along the sternum and middle line of the abdomen ;—the other, consisting of two springs, adapted to the sides of the spinal column immediately over the transverse processes. These springs are encased and connected by soft material, passing from one to the other round the sides of the chest and abdomen, and their bearings on the spine and chest regulated by a series of straps and buckles placed along the front or back of the apparatus, on each side of the springs. By tightening these straps above and below the seat of projection, traction is made in the transverse direction upon the corresponding parts of the spine, so as to draw them from behind forwards. This traction, when the disease is high up, may be increased at the upper end of the spine by padded straps, passing from behind forwards from the back springs round the shoulders, and thence meeting behind in a buckle and strap. Special pads are fastened on the inner aspect of the back springs opposite the seat of projection, so that the action may be exerted specially there, and the parts of the spine above and below be freed from any special pressure.

By this instrument all our indications are met, and many collateral advantages likewise obtained. The steady pressure and traction necessary to relieve the diseased surfaces, and to keep them in a state of

local rest, as well as to check the increase of the deformity, are set up; the shoulders, sternum, and abdomen being the fixed points from which the back levers take their bearing. On the other hand, making the spine the fixed point, a pressure is exercised by the front standards, and regulated with the utmost nicety, so as to prevent or remove the projection of the chest which so often obtains in these cases. In short, the levers may be regulated so as to produce pressure and counter-pressure behind or before, as the surgeon may require or the state of the parts may indicate. No injurious compression is made upon the ribs, and the sense of support afforded by the apparatus is always gratefully acknowledged. By dividing the back standards into two, and thus bringing the pressure to bear upon the thickly-cushioned transverse processes, we run less risk of ulceration than if we were to bear directly upon the thinly-covered and projecting spinous processes. When there is disease in the upper dorsal or cervical vertebræ, a head-piece is added by Mr Amesbury to the upper part of the support, to relieve the spine from the weight of the head, which can be regulated in its action as circumstances may require.

Not only does this instrument answer the theoretical indications, but its practical value is immense. The patient begins to improve from the day he puts it on; one by one, under careful management, the symptoms disappear, and health and strength ere long replace an exhausting and deadly disease.

The paralysis, being purely symptomatic, disappears as the carious process is checked. When the

diseased action has quite subsided, and the healing process by anchylosis may be considered to have taken place, much may be done in reducing the amount of any existing deformity by the continuous use of the support under careful regulation and management. The improvement which is obtained in the figure of the spine and chest under the influence of the support is sometimes very great. But it is necessarily slow, as alteration in the form of bones can only be commensurate with interstitial changes going on in the part, during the growth of the body and subsequently. These changes are most rapid in early childhood, and accordingly improvement in the figure is more speedy at that period than after adult age. The treatment in this stage will require much nicety of management on the part of the surgeon, who must watch the effects of the support in order to make such changes in its bearings as the altered condition of the parts may indicate from time to time. Without such careful watching and management, no reduction in the deformity of the spine or chest can be reasonably expected.

The treatment of the abscess, should any exist, alone remains for our consideration. If this be small, it may sometimes be quickly absorbed after the application of the support. But if (as is always the case with psoas or lumbar abscess) it is large, the matter must be let out by art. The mode I recommend and practise for doing this is a slight modification of that originally proposed by Abernethy. A small puncture is made with a lancet—not in the most dependent part of the abscess—and

the pus allowed to escape as long as it flows freely under steady but gentle pressure. When the stream begins to diminish, the puncture is closed up with a layer of lint covered with plaster, over which are laid two other layers of lint also secured with plaster. By this means the wound is sealed up at once, air is prevented from getting into the cavity of the abscess, the pus preserved healthy, and all danger of irritative fever—from inflammation of the pyogenic surface, decomposition of the pus, or excessive drain of matter—is avoided. In two or three weeks, or as soon as circumstances may demand, another puncture is made, and the matter allowed to flow as before, always closing up the wound as soon as the stream slackens. By this means, the largest abscesses may be safely evacuated of the great bulk of their contents, and what remains behind may at last be left to the forces of Nature, who rarely fails to absorb it. Should one of the punctures, as is sometimes the case, at this advanced period of the treatment ulcerate, and a drain be set up, the abscess will have so far contracted, that the risk of hectic, if the patient be well supported, is very slight. It is a great advantage in Mr Amesbury's apparatus, that the abscess, when costal or lumbar, can be treated without interfering with the restorative influence exercised by it.

It may be noticed that I have said nothing concerning issues, and other counter-irritants and drains, which from the time of Pott have been supposed so highly beneficial in this disease. I have no personal experience of this mode of treatment, and am too well satisfied with the result of the combined consti-

tutional and mechanical means I have adopted to resort to such objectionable measures. Even had I been disposed to do so, the testimony of Sir Benjamin Brodie would have amply sufficed to deter me. "In the early part of my professional life," he writes in the 5th edition of his work 'On Diseases of Joints,' "I was led to follow the practice which was then generally adopted, of treating caries of the spine by means of setons and caustic issues, one on each side of the diseased vertebræ. A more enlarged experience has satisfied me that, in the very great majority of cases, this *painful and loathsome mode of treatment* is not only not useful, but actually injurious. For many years past I have ceased to torment my patients who were thus afflicted in this manner, and I am convinced that the change of treatment has been attended with the happiest results." To the same effect testifies Mr Fergusson: —"It is a prevailing custom in caries to persist in various forms of counter-irritation; but, in my opinion, the advantage of the practice may be doubted. Issues and setons are exceedingly common, especially over the back; but here I must repeat my opinion, that they are of questionable utility: indeed, I believe that they often add greatly to the patient's distress." ('Practical Surgery,' 3rd edition, pp. 180, 182.) Mr Amesbury tells me that he has a great objection to drains of all kinds in spinal disease, and never resorts to them in his practice.

CASES.

THE following are Cases with which I have been favoured by Mr AMESBURY, and which I have seen in his practice from time to time. They well illustrate the effects of the treatment I have advocated, and for this purpose will suffice without any additions from my own practice.

CASE I.

Master H. O. F., æt. eighteen, whose father had diseased knee-joint when a young man, which ended in bony anchylosis, was healthy up to eleven years of age.

First Attack.—When at school, he received at play a blow on the back, about the middle of the spine, which caused at first a sensation of sickness; and the next morning the head was found drawn down towards the right shoulder, and he could not raise it. For six weeks his complaint was treated as rheumatism, with embrocations, &c. After this, another medical opinion was that his complaint was inflammation of the spine. He was now ordered to lie down. When he did so, he was easy; but when he moved, he felt pain at the back of the neck, near the head. He returned from school, and was immediately taken to the sea-side, in consequence of his health having become much impaired. He subsequently went to Walton-on-the-Naze, where he remained for four months. There he was ordered to maintain the horizontal posture, his complaint being considered to be inflammation of the spine. He had leeches, blisters, and setons applied to the back of the neck, as he suffered sometimes great pain at that part, increased on movement. He took nourishing diet, with iodine and sarsaparilla. His appetite improved, but his general health only slightly. The remedies produced no diminution in the pain, or in the rigidity of the muscles of the neck, and the treatment, local and general, was discontinued, except the horizontal posture, which was continued after his removal home. He now took cod-liver oil for four months, at the end of which time he was so far improved that he was able to skate. Still, however, he was weak upon his limbs. His

health was then pretty good, and after a little time he was able to skate freely. At this time he fell through a hole in the ice, and no one being near to help him, had to exert himself to the uttermost to get out of the water. Next day, the consequences of this disaster were much pain in the spine, with fever, and much increased contraction of the muscles at the side of the neck. He was now treated as for rheumatic fever, and gradually improved.

When Master F. was about twelve years of age I first saw him. At that time the muscles of the right side of the neck were contracted and rigid, and he suffered pain at the upper part of the back of the neck, but the spine was not deformed. His health was then very delicate. His health improved, and the pain in the neck diminished, but the rigidity of the muscles continued the same. I ordered, subsequently, one of my spine-supports with head-apparatus for him, to support the spine, at the lower part of which he felt pain, and to enable me to remove the contraction of the muscles of the neck. His general health improved, and the contraction at the side of the neck was gradually overcome.

Second Attack.—At the end of 1857 I was again requested to see him. I now found that diseased action had been set up at the lower part of the spine, and the fifth lumbar vertebra had begun to project backwards, and that an abscess was forming in the left groin. He was now very weak on his legs, but never at any time lost the use of them altogether. I ordered for him a gentle aperient, to remove the constipated state of bowels which existed; also small doses of bicarbonate of soda in a mixture of infusion of calumba, tincture of ginger, and cinnamon water, twice a day. By this means his health was much improved. The abscess, however, continued to increase, till May 15th, 1858, when I took from it a pint of healthy pus. The wound was closed with a single layer of lint, covered with adhesive plaster, by which the cut edges were drawn together; and over this was placed for further security two other layers of lint, well secured by plaster;—a mode of dressing which I have introduced and long practised with the best results, and one, therefore, which I can strongly recommend to be followed by others in all such cases. He was desired to remain quiet in

bed or the couch for four or five days, at the end of which the puncture I had made with the lancet was firmly healed. The abscess gradually filled again, and was again punctured at about a quarter from the bottom; and on this occasion I evacuated about three-quarters of a pint of healthy matter, and closed the puncture as before, which healed under the first dressing. The abscess again filled, and was again opened, and the puncture dressed and healed as before; a result which has always taken place in my practice under the first dressing. He suffered a good deal of pain at the back of the left hip, and down the thigh of the same side in particular. He continued the use of his spine-support during the whole of this period, and also his medicines, and was allowed to walk about in the open air as far as his strength would permit, without producing fatigue. His health improved, and became very good. He looked well, and grew fat. His strength also increased, so that he was able to take long walks without weariness; but he felt a little stiffness in the left hip, which impeded slightly the movement of the limb in walking, but gave him no pain. The abscess continued stationary for some months after the third puncture, and then gradually disappeared. The projection of the spinous process of the fifth lumbar vertebra remained much the same, the part having been protected by the action of the support.

Third Attack.—Master F. became so strong and well, that I rarely saw him for many months. On the 15th of March, 1860, however, Mrs F. found her son was suffering from pain in his side, and she again requested me to see him. On examining the spine, I found that disease had commenced and was making progress in the dorsal region, and that the spinous processes of three of the dorsal vertebræ already projected beyond the line of their fellows. The pain extended round towards the front of the body. Some tenderness on pressure was felt on the side, about two inches from the seat of disease, but none in the diseased bones. He had experienced pain in his sides some time before he told his mother, and felt stiffness in the back, and sharp, shooting pains round the sides, on turning himself in bed or rising from his chair.

He was ordered to recline until a spine-support could be made

to check the progress of disease and deformity. When I last saw him after the third attack, he looked well, and experienced no particular weakness or pain in the limbs. The support was applied and regulated from time to time as the case required, and he was desired to recline a good deal; but as the back was now supported and protected by the action of the support, he was permitted to walk out or take a ride in a chair daily. He is taking the same medicines as before.

Remark.—I have seen on various occasions spinal disease going on in the dorsal and lumbar region at the same time; but the disease rarely occurs in the same individual at three successive periods, and in three different parts of the spinal column.

Case II.

Master S., æt. ten. In December, 1854, while residing in London, he had an attack of pain at the top of the spine, which was shortly afterwards accompanied with diminution of power in the right arm and lower extremities. His health at the time was not good; his bowels were disordered, and the power of retaining the evacuations greatly diminished, so that the fæces passed at times without his being able to prevent it. His health as an infant was delicate, his parents healthy.

Sir B. Brodie saw the child at the time of the attack, and prescribed a blister at the back of the neck, which was repeated three or four times in the course of about six months. He was placed in bed, and confined for the most part to the horizontal posture for about four months. Tonics, consisting of sarsaparilla, cod-liver oil, steel wine, &c., were prescribed from time to time, with a generous diet. His appetite, however, which was very bad at the commencement, was not improved by these means.

In June, 1856, he was removed to St Leonard's, between blankets, in a very weak and delicate condition, but the pain at the top of the spine had nearly or quite left him. It returned, however, in about three weeks, which led to his having another blister applied to the back of the neck, which was kept on

twelve hours, and then had risen but little. It had the effect, however, of removing the pain from the top of the spine, which has not since returned.

He was at St Leonard's five months, and under the influence of sea-air his health improved. He took no medicine during this time, but the horizontal posture was continued, except for about a week, when he was permitted to crawl a little on the floor for a few minutes daily.

After he had been at St Leonard's six weeks, a slight projection was noticed of one of the vertebræ between the shoulders. Previous to this time the spine had maintained its natural figure. The deformity gradually increased, involving altogether the vertebræ from the fourth to the tenth dorsal, inclusive.

He was removed to Cliftonville, Brighton, in the autumn of the same year, where he saw an eminent practitioner, who agreed in the treatment prescribed by Sir B. Brodie—namely, the horizontal posture, tonics, and nourishing diet. This treatment was continued at Cliftonville till December, 1856, when his strength was so far recovered that he was allowed to crawl a little daily, and could walk a few steps at a time. This was continued for about a month, when his legs became paralysed, and he was again confined to the horizontal posture. At that time he had hooping-cough, and then the projection in the back increased rapidly. At the commencement of the complaint he could retain his urine, but at this time he had much difficulty in passing it. The deformity of the spine between the shoulders increased rapidly, and at the end of the month he was taken to London to see Mr Skey, who recommended the treatment advised by Sir S. Brodie to be continued.

The heels now became drawn up so as to retain the fronts of the feet nearly in a straight line with the legs. Splints were applied; and under their influence the contraction of the muscles was diminished, and the natural position of the feet partly restored.

At the end of August, 1859, I saw Master S. for the first time. At this period the dorsal vertebræ from the fourth to the tenth were protruding, and produced a great amount of deformity. The child was confined to the horizontal posture, and was in a

weak state of health. The muscles of the calf were contracted so as to form *talipes equinus*. The sphincter of the rectum was weak, and some difficulty of passing his water existed. His appetite was capricious and indifferent, his bowels irregular, with a tendency to constipation.

I prescribed gentle aperients to remove the constipation, and the stomachic mixture of soda and calumba (as in the former case) to restore a healthy condition of the digestive organs. I also ordered my support for spinal disease, with the necessary apparatus for the head attached, and commenced the restoration of the natural movement of the feet.

By manipulations of the weaker muscles of the legs, and by pressure with the hand, I was enabled to remove the contraction and restore the feet to their proper movement in about six weeks. The support was applied, and he was permitted to leave his couch, and to move a little on his feet with assistance as he was able. His health recovered rapidly, and also the strength of his limbs. He was soon able to walk and get up and down stairs without assistance. His health is now (September 25th) good, and his muscular power so far recovered that he can walk, run, and play freely; though the movements of the limbs show that the restoration of the natural power of the muscles is not quite complete.

I am now treating him specially for the reduction of the deformity, which is already greatly diminished.

Case III.

Master H., æt. ten, was brought to me in November, 1857, suffering from disease of the spine of long continuance. The projection of the spine between the shoulders was very great, from the destruction which the disease had made in the bodies of the dorsal vertebræ at that part; the chest also was much deformed in front, in consequence of the disease and deformity of the spine. He had an abscess of considerable size proceeding from the seat of disease, which presented itself at the edge of the ribs on the left side. The lower limbs were paralysed, so

that he required to be carried wherever he wished to go, but not so as to render them entirely powerless. His countenance was very pale, and had a distressed appearance ; and his health was very bad.

I prescribed for him small doses of the mixture above described twice a day. One of my spine-supports was applied, so as to relieve the diseased surfaces from pressure, and to reduce the deformity of the chest. He experienced immediate relief and comfort from the operation of the support, and a feeling of confidence of being able to move without injuring himself or increasing his suffering. His countenance soon assumed a healthy and cheerful appearance, his health improved rapidly, the strength of his limbs gradually returned, and in the course of a few weeks he was able to walk freely about the house and out of doors.

The support was made so as to allow of any increase of the abscess, and to treat it as might be necessary without its removal. But, instead of any increase in size, the matter became gradually absorbed, and at last all signs of the abscess disappeared.

He became strong on his legs, the deformity of the chest was greatly diminished, but both it and the deformity of the spine were too great when the child was brought to me to admit of their complete removal.

Case IV.

Mr A., æt. twenty-six, of a scrofulous diathesis, consulted me for spinal disease in May, 1857. The vertebræ between the shoulders were projecting considerably backwards. His health was very delicate, and the strength of his lower extremities much impaired. He was able to stand and walk a little, but it distressed him much to do so. The treatment adopted had been embrocations and frictions of the diseased parts, maintenance of the horizontal posture, and the use of the crutch-supports.

I prescribed for his general health, and applied one of my spine-supports suited to his case, and regulated it from time to time as the state of the parts required. He immediately derived

much comfort and a sense of security from the support. I recommended him to take exercise in the open air, active and passive, to be regulated with caution, and to assume the horizontal posture chiefly when in the house. Under this treatment his health and strength improved rapidly.

This gentleman continued under my care for a few weeks, at the end of which time his bodily condition was in every respect altered greatly for the better. He was now from circumstances obliged to return home, his residence being in the North of England. I saw nothing of him again until December of the same year, when he again came to consult me. I found that the support from which he had derived so much comfort and benefit under my hands had been mismanaged,—so much so, indeed, as to render it almost inoperative. The consequence was, that the disease in the spine had again become active, his health much impaired, the sphincters of the bladder and rectum greatly weakened, so that the natural discharges passed from time to time without his knowledge, and the lower extremities paralysed to such an extent that he could not stand alone. The sense of feeling was also greatly diminished, especially on one side. He suffered much pain in the back below the seat of disease, and the appearance of his countenance indicated much bodily weakness and distress.

I regulated the support immediately in such a manner as to relieve the diseased parts from pressure and friction, and ordered him to take the usual mixture of soda and calumba twice a day. He also took bitter ale, and a generous diet. Under this treatment he soon began to improve, and in a few weeks his health was quite restored. The pain in the back subsided, and also the numbness of the limbs. The power of the latter in standing and walking was gradually restored, and so also that of the sphincters. He gradually acquired flesh, and at the end of seven months looked strong, plump, and well.

Remark.—It is gratifying to observe that the deformity of the spine has not only not increased since December, 1858, but has gradually diminished under the careful management of the support.

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