position; the mechanical bearings being shown by the arrows in the figure (9). 2. It favours thoracic respiration (a very important point in severe cases). 3. It can be accurately adjusted and readjusted by the surgeon himself. No other apparatus that has yet been made generally known possesses these qualities, and all others have disadvantages which do not belong to this one.

Fig. 9.—Lateral view of the Splint in Position.

With regard to the adjustability of this splint, it may be observed that, although the spine may be fixed in a good position upon one day, it does not necessarily follow that it will be desirable to attempt to maintain it in that position until the disease has ceased, and the bones have become ankylosed. On the contrary, resolution is almost sure to be accompanied by a slight and gradual alteration of the position of the bones; and it is for the frequent adaptation of the splint to these alterations of the diseased spine that the skill and ingenuity of the surgeon are required.

Good results, as the reader well knows, are often obtained when the spine is fixed by other forms of apparatus than that which I have described, and in all cases a good result doubtless depends chiefly upon the care and attention which is bestowed upon the case, both in the

surgical treatment and in the nursing; but at the same time the more efficient the mechanical apparatus the greater chance will there be of a cure resulting, and, practically as well as theoretically, the splint described in this paper is, I believe, by far the best which we have at our disposal.

Dr. C. F. Taylor's antero-posterior support somewhat resembles in appearance the splint described above; but it differs from it in many important points. Dr. Shaffer's modification of Dr. Taylor's splint appears more likely to prove useful for controlling the spine; but both Dr. Taylor's and Dr. Shaffer's instruments are very inferior to the apparatus which is advocated in this paper. So long as the disease remains in an active condition, the patient ought to be kept constantly in a recumbent position.

The superiority of the prone position over any other was long ago shown practically by Verrall.

Mr. Chance has carried out this plan of recumbency ever since Verrall's time, and Mr. Erichsen has for many years recognised its value. The best proof which I can offer as to the superiority of this plan, is the fact that the patients almost invariably experience much more comfort in the prone than in any other position, especially if they be placed upon a suitably made prone couch. And at the present time I have a patient with a very severe degree of caries, who, when I first saw him, was resting upon his elbows and knees, and who had remained in that attitude (which he had assumed voluntarily) for more than six months.

THE EARLY DETECTION AND TREATMENT OF SPINAL CARIES.

By EDMUND OWEN, F.R.C.S.,

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AN affected spine too frequently receives no offer of therapeutic aid until its pathological bankruptcy is declared; whereas, judicious assistance, afforded at the proper time, might have spared a shameful collapse. In the early and comparatively obscure stage of spinal disease, the surgeon is too apt to assume a hopeful attitude, or to temporise; and then, later on, when a projecting spinous process appears, to say: "Tis as I feared; there is disease of the spine." So angular curvature has come to express spinal disease; and spinal disease is expected to manifest itself by angular deformity. Such an association of ideas is most unfortunate. Surely, the angular deformity is the one sign of spinal disease which our treatment itself should aim at precluding.

Let me give a parallel instance of a disease and diagnostic sign, with a similarly unhappy association. One's opinion is asked as regards the practicability of operative interference in mammary scirrhus, which has advanced so far that the mass adheres to the chest-walls, or the skin is bound down to the ribs. On suggesting that the case is past all surgery, one is told that the enlargement of the axillary glands—that confirma-

tion of the diagnosis of malignant disease—has only recently taken place. Unfortunately, the attendant has waited for the lymphatic invasion before deciding on the malignant nature of the breast-tumour: just as he might have waited for the angular curvature before diagnosing with certainty the spinal caries.

And I will now venture to institute another comparison—viz., between the spinal column and the knee-joint. In the latter cases, we have a short series of bony segments with intervening layers of cartilage; in the former, a long series. I will grant that the knee-joint is much more accessible, both for the purpose of examination and treatment, than are the spine-joints: for, in the lumbar and dorsal regions, the joint-segments lie well within the ventral and thoracic cavities, the better to support the superimposed weight; indeed, one can only just get at the tips of the spinous processes between the masses of the erector spine. Side by side let us trace through the various stages, from their very beginning, a case of knee-joint disease and one of spine-disease.

The two children, who are the subjects of them, may have been healthy; they may have been strumous; but, some months ago, one of them fell from a cart: that is the spine case. A few days ago, a boy was pushed down and hurt his knee. Let us watch this patient. He does not run about as he used to do, because his leg (not necessarily his knee) aches. He does not know exactly where the chief trouble is; children are not clever at locating pain; but, when he stands, he bears all his weight upon the other leg. The boy with the traumatic inflammation of the spine also complains of obscure aches and pains, which are very probably ascribed by his parents to "rheumatism", and perhaps even treated as such. It may be that the pains are referred to the chest, belly, or limbs, from irritation of the trunks of the nerves as they are passing out from the spinal cord. He does not care to run about, but complains of feeling tired, and lies near his mother, or on the hearth-rug. When he stands, he eases the inflamed joints by resting his arms over a chair, or anything else that may support him; and when he sits at meals, regardless of manners, he plants his elbows on the table, and supports his chin on his hands. If he be a little mite, he hooks his chin over the edge of the table. Very likely he cries when he is lifted off his chair or taken out of his bath. As he stands, he props himself up by grasping the thighs, just above the knees. But, as yet, there is no definite spinal projection.

Let us now return to the knee. Later on, its function becomes impaired. It refuses to work during progression, remaining always slightly bent, so as to save pain and jarring—and the patient limps along on the tips of his toes. Effusion has taken place; and the flexor muscles are assuming a condition of permanent contraction, partly because the flexed state of the joint minimises the intra-articular pressure, partly that there may be the least chance of a jarring together of the inflamed synovial or osseous surfaces.

So also with the spine, does flexion eventually come on: partly from muscular action, partly as the result of disintegration of the vertebral segments. But the definite angular deformity, as in the case of the diseased knee, is but a late sign of the occurrence of inflammatory changes. Now, what should we think of a student who was unable to diagnose knee-disease before the joint had permanently assumed the appearance of a fiddler's elbow?

If still we have not made up our mind as to the presence of the spine-disease, let us watch the little patient come down stairs, noticing how he eases himself down by the rails; let us see if he will jump from the bottom stair, or if he can touch his toes without bending his knees. Or, let us find out what has become of his hoop, top, or marbles, according to the season of the year: for children's out-door games succeed each other in regular chronological order. He has not lost his active appreciation of boyish delights, simply because he has "growing pains" or "rheumatism". Indeed, when he is eventually placed on his back in bed, he will have his whip or top put where he can watch it.

It may possibly be thought by some that much of this which I am now detailing is irrelevant to the subject of the early detection of spinal disease, or, at least, of so trivial a nature as to be unworthy of serious attention. I must, however, insist upon the urgent necessity of giving heed to these little matters. They are the straws which show the direction of the on-coming breeze; when the pathological storm is raging, almost any one can read the weather. To those who interest themselves in the ways of healthy as well as of sick children, these little matters are full of indications and suggestions. Unlike adults, children cannot often afford the surgeon much direct aid in making a diagnosis; but they are not, on the other hand, malingersers. The art of shamming illness does not usually manifest itself before they begin to experience the obstruction of the fifth proposition of the first Book of Euclid; or, until, in some way, their little educational burden is becoming intolerable. Therefore we must never refuse to listen to, and search out the cause of their oft-repeated complaint: "Oh, mammy, my belly does ache!" or

"My neck is so sore." Such phrases should rather make the mother, or at any rate the surgeon, apprehensive; and the child should be stripped stark naked and thoroughly examined, on several occasions if necessary; for, as Howard Marsh says, although angular curvature may not be detected in a suspected case, still it must not be concluded that the spine is sound.

On hearing that a child has slight and obscure pains, which we may attribute to the result of an injury to the spine, one must be particularly careful not to treat the case lightly. One is inclined to say to the mother: "I do not think it serious." But, often, rest is as necessary as if one could see with the naked eye incipient osseous changes.

The earlier the treatment is begun, the better. Better even that two boys should be treated for spinal disease, where, after all, no disease existed, than that treatment should be delayed for a third boy, because the symptoms of the disease were not unequivocal.

And now a few words as regards treatment. In my opinion, the best method consists in placing the child at once on his back, on a firm flat horse-hair mattress, without a pillow. And there he must be kept, lying in absolute rest—by means of armlets, if necessary—for an indefinite time. If the disease be taken at the onset, that is, in the stage of inflammatory osteitis, a few weeks' rest may have the effect of causing the surgeon to wonder if his original and early opinion was, after all, correct. So much the better. But, if it be a matter of months, the small mattress may be carried out into the garden as a litter, or put upon an easily going wheel-chair. Later on, a plaster-of-Paris jacket should be carefully moulded over the trunk, from just above the great trochanters high up into the arm-pits; but no suspension need be used.

There is, in my opinion, no better splinting than that afforded by a Sayre's jacket, though that may be a matter for discussion. But I will insist on this: that, if a jacket be put on the child with early spinal disease, the patient must still be kept in bed, or else we are not obtaining for it that near approach to absolute rest of which we all talk so much. Little children do not fret, or become thin, because they are kept in bed; they are, when well managed, as patient as those of maturer years. The head of the bed may be raised by blocks beneath the legs, so that the inmate may get a better view of what is going on around him.

The treatment of the later stage of spinal disease, I do not here discuss. Indeed, if the early stage receive its proper attention, its discussion will happily include also that of the later stage.

I may go so far, perhaps, as to deal with the disease when the little spinal boss is making its earliest appearance, but no further. Of a permanent angle produced by caries, I will say nothing. It is not found in the early stage. I have heard disciples of my friend, Professor Sayre, lay claim to an ability to straighten such an angle; but I could never admit that even the enthusiasm which they displayed in the question was sufficient palliation for their pretentious and misleading assertion. Hence, at the meeting of the International Medical Congress in London, it afforded me the sincerest satisfaction to hear Dr. Sayre deliberately refuse to entertain the notion, as it also did to hear him admit that suspension is not an essential part of his method.

For the future, let us all recognise this fact—when we are encasing the body of a child whose spine is inflamed or carious—that we are simply treating the diseased vertebrae as we should treat the tarsal or carpal segments when similarly affected, viz., by securing for them the nearest approach to that absolute physiological rest of which our Hilton was the High Priest. And let us stretch our hand across an Atlantic ocean, which, under the influence of science and scientific gatherings, is yearly becoming less worthy of the adjective "wide", to give fraternal greetings to Professor Sayre—a fellow-workman, who has systematised and has brought to us a practical means of helping those countless children whom we had almost begun to regard as surgical outcasts.

THE TREATMENT OF LATERAL CURVATURE OF THE SPINE.*

By BERNARD ROTH, F.R.C.S. Eng.

A MOTHER notices that a shoulder or a hip is beginning to grow out in a child, generally a girl at the onset of puberty. The family doctor is called in; the patient is stripped, and the trunk flexed. If there be no decided or marked irregularity in the bent spine, the parent is assured that the patient "will grow out of it"; and that nothing special need be done, except, perhaps, lying down daily for a short time. I have heard this story frequently when examining a case of incurable spinal curvature which had developed in the course, of one, two, or more years. It is, however, precisely at the time when there is no decided

or marked osseous deformity, that complete cure is possible. Before pronounced osseous lateral curvature can occur, it must gradually pass through many intermediate stages from the time when the patient first began to assume a temporary vicious position of the trunk. The position of writing, as generally practised, is, more frequently than anything else, an initial cause of lateral and other curvatures not due to caries. The much larger proportion of girls than of boys affected, is due to the fact that girls do not enjoy, as a rule, one-fourth of the usual amount of physical exercise allowed to boys. Their muscles become weak; and, although they sit no worse than boys at their lessons, they have not sufficient strength to hold themselves erect, and to restore the balance of their curved backs out of school-hours.

After a careful examination, before the patient is allowed to dress, it is essential to ascertain to what extent the spine can be restored to its normal position, by a voluntary effort with the help of the surgeon. Although attention is first directed to the improvement of the lumbar curvature, any position that increases the upper lateral curve, if present, should be avoided. One arm directed and held upwards or outwards at a higher level than the other, is very frequently useful in helping to restore the symmetry of the trunk. Sometimes the best result is obtained by both arms being raised vertically by the side of the head, while avoiding undue elevation of the scapulae. This best position of the patient's trunk and arms for improving the spine, is the "key-note" of the exercises to be practised during treatment. It is extremely important to note whether any article of dress is too tight across the front of the chest, when the patient is holding himself in an improved position; the stoop of a scoliotic patient is often confirmed by closely fitting garments. This remark applies not only to the clothes worn by girls and women, but also to the shirt-collars, waist-coats, braces, buttoned coats, and overcoats of boys and men.

The treatment of lateral curvature should embrace the following points. *a.* The spinal muscles should be sufficiently strengthened, so that the patient can maintain an erect or improved position for an indefinite time, whenever required, without extra effort. *b.* The thorax should be developed by systematic breathing and methodical exercise acting directly on the ribs. *c.* All causes increasing or perpetuating the spinal curvature must be removed; that is, bad positions must be avoided, and good ones prescribed. *d.* The general health should be improved by attention to diet, by a daily morning bath, by tonics if necessary, and by as much open-air living as possible. The spinal muscles are strengthened by means of "medical gymnastics" (Swedish movements)—a scientific system of gymnastics based on anatomy and physiology. By them it is possible to bring any desired group of voluntary muscles of the trunk and limbs into regulated contraction, as slight or as severe as may be required. In many of these exercises, the position of the limb or of the trunk assures a sufficient amount of resistance to be overcome by the contracting muscle; while in others the resistance is given by the surgeon. The erectors spinæ muscles can be easily and thoroughly brought into action while the patient is either lying, sitting, or standing. Space does not permit me to describe more than two or three such exercises in detail. Let a patient lie prone, with the pelvis and legs supported, and the heels fixed on a padded table, while the head and trunk to the level of the iliac crests project beyond the edge of the table. The back-muscles must contract forcibly to enable a patient in this position to slowly raise his trunk into the same horizontal plane as his legs and pelvis, and to maintain that position for ten or twenty seconds, and then as slowly to allow his trunk to be flexed again by its own weight. The surgeon can easily increase the exertion, if required, by more or less pressure with one hand at the back of the patient's head or neck. During this exercise, which is repeated from four to eight times, the trunk and arms may be in any required posture. A less severe exercise for the erectors spinæ muscles is for the patient to lie prone on the floor or on a table, and, while the trunk is immovable, to describe slowly a circumduction, first of one hip and then of the other, while the knee is kept fully extended. The contraction of the erectors spinæ can be felt by placing the finger on them; they are forced to contract to steady the pelvis. The amount of exertion can be increased by a pressure of the surgeon's hand on the heel. If the back-muscles be very weak, and the weight of the leg be too great, the surgeon can partially support the limb during the circumduction. A third exercise for the same muscles is for the patient to sit erect, astride a narrow table. The surgeon, with one hand against the back of the patient's head, gently presses him forwards, he having been previously requested to yield gradually in the lumbar vertebrae. As soon as the trunk is flexed at an angle of 50° or 60°, the patient stops, and then returns slowly to the previous erect posture; the surgeon in his turn gently resisting with the hand at the back of the patient's head.

The following is a prescription of exercises, which, with a few modi-

* Portion of a paper read at a conjoint meeting of the East and West Sussex Districts of the South-Eastern Branch.