Observations

ON

THE TREATMENT OF SCOLIOSIS.*

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THE treatment of scoliosis is the subject of our discussion to-day. I should have preferred the title to be "the principles of treatment," and propose to dilate rather on this aspect, leaving others to fill in gaps.

Scoliosis has been one of the most difficult problems in orthopaedic practice from the beginning. Different authorities proclaim the merits of their own methods, and I fear you will say I am no better than the others. I cannot, however, honestly set the subject before this meeting unless I endeavour to present it as I see it and as I have discovered it for myself in practice. I trust, however, that I shall be able to show that all depends on following definite fundamental principles based on sound and established rules of anatomy and physiology. If sound basic principles can be established, any treatment which is in agreement with them cannot be far wrong, and any treatment which clashes with them calls for a revision either of the method of treatment or of the theory of principles, to discover where the fault lies.

More than twenty years ago Sir Robert Jones said to me: "You have grasped my principles of treatment of deformity by continuous retention of correct position while recovery of muscular function is taking place. You are interested in scoliosis; go ahead and see if you cannot find out how to apply the same principles to scoliosis."

If this discussion is to be of service to future workers we must endeavour to establish principles for the treatment of this deformity which are consistent with established principles which we know to contain a considerable measure of truth and have been proved to have some practical value.

Before I go further let me make acknowledgement and apology to all whose ideas I have borrowed; I may have forgotten some sources from which I borrowed. For example, when I wrote an essay on scoliosis in the *Robert Jones Birthday Book* I thought that the importance I attach to what I called unilateral lordosis was probably original. On looking through William Adams's lectures on curvature of the spine, I find he pointed out in 1854 that rotation is an essential part of scoliosis, and—for example, in the lumbar region—once rotation has occurred any increase in the lordosis increases the lateral displacement; so that idea is in no way new, though there may be something new in the application of it. In 1907 or 1908, when I was in some despair of mind about really getting any further with the treatment of scoliosis, I read an article by Dr. Michael Hoke, which, like everything else from his pen, proved illuminating. His observation was that during respiration a scoliotic patient expands the bulging parts of the chest more freely than the flattened parts, and that movement, owing to the articulation of the ribs with the vertebrae, tends to rotate the vertebrae further in the direction of the rotation deformity. The second part of his observation was that these bulges are at the ends of an oblique diameter—that is, that a right posterior hump is associated with a left anterior bulging in the front of the chest. Hoke's next point was that compressing these humps restrained their movement, that the flattened parts immediately began to move more freely, and that this increased movement helped to turn the vertebrae in a direction opposite to that of the rotation deformity.

So far as I personally am concerned, I count the publication of Michael Hoke's paper as the epoch marking the beginning of a new era of hope and of progress.

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For twenty years, therefore, asymmetrical breathing exercises as a voluntary effort, as well as jackets applied to enforce asymmetric breathing, have been an essential part of my practice. Next, in practising how to get asymmetrical breathing, it comes out that the body weight must be unevenly distributed on the two feet. To expand the right side of the chest more fully than the left the body weight is carried more on the right foot than on the left. This statement may sound new to some, but the fact has been known since the first oarsman handled a pair of sculls, for in order to turn the skiff we are taught, not to pull harder with one arm, but to press harder with one foot, and the corresponding shoulder will do the rest. The origin of this oarsman's precept is lost in the mists of antiquity, but it is in itself a tacit expression of belief that all our muscular movements are reflexly associated. It was while I was house-surgeon that Magnus, now a professor in Utrecht, was experimenting in reflexes in Professor Sherrington's laboratories. His work laid the foundation of the modern doctrine of the postural reflexes, which underlies our modern way of looking at orthopaedic problems—which are the same problems as those our forefathers faced.

The doctrine of the postural reflexes is, briefly, that every animal stands, walks, and generally controls its locomotive system by means of a complex reflex control of muscles which is so highly trained that it goes on automatically without conscious thought—that is, without brain lag or fatigue.

It was only three or four years ago, in the course of a casual conversation, that Professor Sherrington dropped into my mind two words which suddenly crystallized my rather mixed ideas on scoliosis, and helped me to set them in order. While discussing posture I had mentioned my idea that teaching of breathing exercises was much neglected or was often wrong. His reply was: "It is a curious thing that we should need lessons in breathing, for it is the oldest of these reflexes." The two words are "these reflexes."

First we learn to breathe and make a confused noise; then we learn to sit and balance and walk; we also learn to talk, to read, to write, and so on by automatic reflex without fatigue. The untutored savage reads the movements of animals as you and I could never hope to do, for he practises the art till it is absolutely subconscious. If he comes to a difficult passage he may have to stop to think and puzzle out the meaning of a mixed trail, but so do you and I, each in our particular station in life.

There are exceptions, of course, to this automatic learning. The deaf-mute does not learn to talk because there is a flaw in the nervous cycle, but he can be taught by the lip-reading process. The child with a congenital spastic paralysis does not learn to walk, but if you can get him in an erect posture with the soles of his feet on the ground you may be able to teach him to acquire postural reflexes and to walk, and the earlier we set about this re-education the better.

All athletic training is training of reflexes. I go further, and say that training of inhibition is often more important than training of contraction, for it is the quick relaxation and recovery which makes for speed and alertness—that is, delicacy of co-ordination.

Scoliosis has been defined as a rotato-lateral curvature of the vertebral column. It is often spoken of as lateral curvature to distinguish this deformity from round back and hollow back. To think of scoliosis as a lateral curvature is fatal to successful treatment. Personally I made no progress till I put rotation first. Scoliosis, to my mind, is a twisted asymmetrical trunk, and this twist is inevitably associated with lateral deviation, with asymmetrical kyphosis, and asymmetrical lordosis. This necessarily means an upset of all that symmetrical muscle balance by which the posture of the body is maintained.

The cause of scoliosis is any disturbance which upsets the symmetrical co-ordinate reflex action of muscles controlling posture. A transitory broncho-pneumonia may cause a visible scoliosis in a few weeks, due to asymmetrical breathing (as Biezalski pointed out nearly twenty years ago). I have repeatedly seen the deformity associated with appendicitis. One girl attributed her own deformity

to a sore heel. Inquiry showed that two years previously she had an inflammation of the epiphysis of one os calcis, confirmed by contemporary *x* rays, fortunately of both feet for comparison. Two years later the girl still prefers to walk more firmly on the sound heel, and I am trying to teach her to reverse this habit as the first factor in correction.

METHODS OF TREATMENT.

The treatment of scoliosis must therefore mean the restoration of symmetrical postural balance, or as near it as we can attain, first by eliminating every extraneous factor which may have originated an asymmetrical balance; secondly, by re-educating all postural reflexes, including the respiratory, after correcting gross deformities if this can be done. The methods of treatment at our disposal are:

1. Exercises and training in posture and balance. This method comes first and last and all the time.
2. Assisting postural exercises by twisting the trunk into a more correct position and retaining it by means of splints or jackets while the postural reflexes are being trained.
3. Operative methods of treatment.

I will take these three methods in reverse order.

Operative Methods.

Ninety years ago Guérin of Paris made a practice of "dividing the muscles on one side of the back." To-day, in cases where skeletal position cannot be maintained in corrected position, bone fixation of the vertebral column is being practised. I have no personal experience of spinal fixation except in cases of osseous disease. In paralytic cases I have up to the present contented myself with using jackets. Such operations are chiefly for cases not amenable to curative treatment and therefore outside my main argument on principles of treatment.

Maintaining the Body in a Corrected Position while Training the Postural Reflexes.

It is in the second group that my personal interest has been most engaged—namely, in endeavouring to hold the body in a corrected position while balance and postural reflex is being restored, and perhaps some measure of adaptive change in the osseous structures takes place. The question is, What can we try to do by means of jackets and what do we actually achieve?

1. By forcibly correcting the shape of the trunk and then applying a plaster jacket we may hope to produce some real correction of deformity or of disability.

2. By jackets and supports we often hope to prevent the deformity from getting worse. These jackets are generally made by instrument makers, and to these is too often left the preparation of the casts from which they are made. It is in my experience extraordinarily difficult to get a cast made on which a removable jacket can be modelled which will put the patient in a position in which postural reflexes and respiration will help further to cure the deformity. Sometimes it can be done. There are also jackets made of steel with pads whose tightness of fit can be adjusted. Of the use of these I have little personal experience, but I have seen improvements in deformity produced by such apparatus when controlled by expert hands. Such apparatus is expensive, and I think more applicable to the more or less hopelessly deformed adult than to the young and the growing.

3. In too many instances jackets do harm. They are wrongly designed, and put the patient in the wrong posture, so that they assist rather than prevent increase of deformity or relapse in cases in which some correction of deformity has previously been obtained.

I would therefore divide jackets or apparatus into two classes: (a) those intended primarily to produce correction of deformity, which we may call corrective jackets; (b) those merely intended to retain shape and position already secured. Such retentive jackets to be really successful must have incorporated in their shape and construction some of the elements essential to corrective jackets.

Now what are the points essential to a corrective splint? Here I beg leave to go back to the beginning and deal with splints as I was taught to use them in Liverpool. Take

for argument a straightforward case of dropped wrist. The treatment is to put the wrist and hand in such degree of dorsiflexion as can be obtained without leaving the patient in pain from overstretching of flexor structures, and to maintain this position till the tight structures get looser. I used at one time to think of this as "stretching shortened muscles"; to-day I prefer to think of it as restoration of the inhibitory reflexes in the habitually contracted muscles. Now comes the important point. When I was house-surgeon in Liverpool, in the days when Sir Robert Jones handled his out-patients with his own hands, I was taught that the splint and bandages must be so applied as to prevent flexion, but not in any way to obstruct further extension. This is a point often overlooked or omitted.

In applying a splint or plaster jacket to correct scoliosis the same rule must be followed. The splint or jacket must in no way impede movements in the direction of correction of deformity, but must absolutely prevent relapse towards the original deformity, and must conform to our known standards which control postural reflexes.

For the purpose of argument and illustration of principles, I shall assume we are dealing with the usual right dorsal left lumbar deviation; also, for the purposes of our present argument, that there is no gross disease of bone and no paralysis.

A woodcut of the post-mortem appearances of scoliosis which differs in no material respect from those in modern books may be found in the works of Fabriccius Hildanus, who practised in 1500. It shows the rotation of the vertebrae, the lumbar lordosis, the dorsal kyphos, and the consequent lateral deviation.

I have already said that scoliosis must be regarded as a distortion of the whole trunk—a distortion of ribs and vertebrae and of co-ordinated muscular balance. In arriving at my present point of view I recognize three masters.

First, Dr. Michael Hoke, who in 1904 taught us that the asymmetrical excursion of the ribs in scoliosis is a dominant factor in maintaining and increasing the rotation deformity in the thoracic region.

Following up this idea, from 1908 onwards I was getting some results, and was clumsily groping for some means of getting more flexion of the trunk, when Dr. Abbott published his two papers in which he laid stress on the importance of full flexion in combination with breathing windows, which are essentially Hoke's idea. Now to my mind the great value of Abbott's method is that in fully correcting the lumbar lordosis we indirectly correct some of the lateral deviation in the lumbar region. As Adams pointed out in 1854, lumbar rotation combined with lordosis means lateral deviation.

The third master is Professor Patrick Haglund of Stockholm. His principle is to correct the lateral lumbar curve by pushing the trunk right over to the left, and the patient's own sense of balance will make him correct the dorsal curve by his own effort. In this I recognize the respiratory reflex as part of our postural reflex system. The scoliotic with a left lumbar right dorsal scoliosis generally stands more on the right foot than on the left. Professor Haglund pushes the patient bodily over on to the left foot and lets the patient's postural and respiratory reflex complex do the rest.

The jacket I now employ combines, I think, elements borrowed from all three of these authorities, and is consonant in principles with the teachings of Sir Robert Jones and with at any rate my present ideas on postural reflexes.

Exercises and Training in Posture and Balance.

I shall make no attempt to go into details of exercises. Classifying cases of scoliosis by the apparent deviation of the tips of the spines from the middle line is vicious. To try to apply routine exercises to cases classed as C or S curves is dangerous. The C curve often has a double rotation, one to left and one to right, and is really what is commonly called transitional. If this diagnosis is missed and a mere routine treatment adopted the case may rapidly develop into a really bad double curve. I have made this mistake more than once. Therefore to-day I do not accept any curve as a simple C curve. It is the rotation or twist

of the trunk that matters, not the apparent deviation of the tips of the spines of the vertebrae. One must therefore take the long view, and be ready to adopt a line of treatment which anticipates the oncoming deformity, and not be deceived by the apparent deformity. We have to deal with the same fundamental principles, whether we are dealing with early cases in which the patient can by voluntary effort correct the apparent deformity—the type of case sometimes called “postural,” but this word is here used with a meaning wholly different from that attached to it in the phrase “postural reflex”—or with more advanced cases in which the patient cannot voluntarily correct, but the surgeon, by using external force, can correct the apparent deformity which some would call “early structural”; or with cases of a third type with gross bony changes or paralysis of nerves supplying muscles.

The first type may be cured by any intelligent system of exercises which helps the patient to correct the deformity automatically and not only by a conscious effort of will.

The second type may be corrected if the surgeon can first correct the deformity by external force which holds the patient in corrected position by means which prevents relapse but in no way impedes further correction. This must be followed by re-education in posture by means of exercises, which must become automatic to be effective.

The third type can only be pushed into some sort of vertical position and sometimes held there, so that the patient can hold an erect posture with one gross deformity more or less compensating another; but the main line of the centre of gravity falls pretty well between the feet, and not in a lopsided manner away over one foot with a steady tendency to get worse. With this last type the practitioner of experience may make some sort of a patch-work. For the purposes of this discussion they are of no interest to us, for if our modern movement towards finding our physical defectives early by properly staffed orthopaedic clinics grows and succeeds, few cases will ever be allowed to pass into this stage in another generation.

The orthopaedic surgeon of the next generation must prevent the third stage from occurring, except in rare cases. For example, tuberculous disease of bone and joint to-day is not allowed to produce the gross deformities which occurred when I was a student. In many areas public opinion has been so educated that the mothers of the village will insist that every lame child must go to the orthopaedic clinic which is to be found in the nearest market town. That point has been already proved in the county of Shropshire. Dame Agnes Hunt has seen to it that in that county no new preventable deformity shall occur.

Reverting to the second group of cases—those in which the surgeon can, by the use of external force and control, produce a correction of the deformity of the trunk as a whole. Three essential factors must, I believe, be recognized and acted on.

1. That in the thoracic region rotation deformity is the dominant difficulty to be overcome; and that Hoke has shown that the ribs are a lever rotating the vertebrae. This factor of deformity can be corrected by training in breathing, which can be reinforced, if need be, by suitable splinting.

2. That in the lumbar region correcting the lordosis helps materially to correct the lateral deformity and indirectly corrects the rotation. In this connexion extending the pelvis on one thigh exercises a correcting influence on the lumbar twist, and this correction can be obtained even in the sitting position. The flexed plaster jacket compels the patient to exercise the extension of the hip-joint for postural purposes, and therefore secures this action, as is done in an Abbott's jacket.

3. Deviation of the body weight on to the foot which the patient is not in the habit of using, taken either as a system of training or as part of posturing by jackets, alters the whole postural reflex habits of the patient and helps to correct the deformities, if properly applied. This is the foundation of Haglund's jacket.

Finally, gymnastic treatment serves only two purposes: (a) To loosen joints—that is, to increase the range of inhibition and movement of muscles. All ordinary move-

ments in the gymnasium contribute to this. Such exercises are not corrective, but only preparatory. (b) To re-educate the patient in habitual posture so that the postural reflexes which are automatically used by the patient in ordinary life shall tend to correct, not to perpetuate, the deformity. This training must be done outside the gymnasium by the patient's own will power. For this reason I have never allowed myself to run a gymnasium for curative exercises. Also in my practice these exercises are entirely devoid of arm and leg wagging: they consist of correct balancing and breathing when lying, sitting, or standing, and can be practised habitually on ordinary school or nursery furniture, in buses or trains, and walking down the street without doing anything conspicuous.

This training is entirely psychological, and I hold it as a matter of prime importance that the patient should have all ideas connected with corrected breathing and posture associated with the ordinary occupations of life, not with some gymnasium or other. For this reason I hold that the gymnast must train the patient in her own home surroundings to get the best results.

My best results have not been obtained in hospital patients; the psychological environment of the ordinary life of the patient is not conducive to the highest form of success.

To conclude. I would suggest that more attention should be paid to rotation deformity, that apparent deviation of the spines of the vertebrae be almost disregarded, for this deformity is often deceptive and never an accurate measure of the real distortion.

Lastly, do we treat our cases with sufficiently powerful means of correction in the early stages?

THE TRAINING OF THE GYNAECOLOGIST.*

BY

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WHEN a physician's labours are confined largely to one sphere of activity he is often prone to think that his is the only field worth while. It is essential for him to mingle frequently with his colleagues of other branches. For years it has been my good fortune to be associated with that master gynaecologist Howard A. Kelly, and to him I owe an eternal debt of gratitude. Over a period of ten years I made frequent visits to a hospital in a remote part of the State of Maryland. Here I found many poor people who needed urgent attention, and in this small institution it became incumbent on me to do all kinds of surgery. I believe that it was this experience that did more than anything else to convince me that every gynaecologist must be an abdominal surgeon. In other words, when he opens an abdomen he must be prepared to deal with any condition that he may find, whether or not it be gynaecological in the strict sense.

One practitioner may prefer to do stomach and gall-bladder surgery, and another pelvic surgery in the female, but when either has an abdomen open it is only fair to the patient that every lesion found in that abdomen be treated at the time if it be humanly possible. It is no excuse for one to say that the lesion is out of his line, or that he is not capable of doing the operation, and then close the abdomen. In the short time at my disposal I shall attempt to amplify this viewpoint.

Naturally a fundamental knowledge of medicine is absolutely essential. In the next place, every surgeon, if he is to get the most out of his work, must have a thorough grounding in general pathology, and also in the surgical pathology of the particular branch which is to become his life-work.

Let me state the method of training that the men who are going to be gynaecologists receive at the Johns Hopkins Hospital. Each year five of the graduating class are

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