LECTURES

ON THE

DIAGNOSIS AND TREATMENT OF HIP-DISEASE
IN CHILDREN.*Delivered at the Hospital for Sick Children.*

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LECTURE I.

GENTLEMEN,—Formerly, hip-disease was so imperfectly understood, that it commonly drifted on into the appearance of an intractable disorder, for which there was very little to be done. But in the last twenty or twenty-five years it has been carefully studied both in this country and in America.* It can now be detected while it is still incipient, and means have been introduced by which its early forms may be cured, and even the more grave results of its later stages averted, so that the patients may recover with a serviceable limb. Thus the subject is one of considerable interest and importance, and one on which I hope it may be useful to give two or three lectures, if I make them practical by means of illustrative cases, apparatus, and diagrams. Some allusion must be made to the pathology of the affection, and what it is necessary to say on this point may be best introduced at once. Hip-disease is placed, both by its clinical history and its morbid anatomy, in the same class as a number of chronic inflammations of the bones and joints, which, until a comparatively recent date, were indiscriminately massed together as scrofulous or strumous. This is not the occasion for a long discussion of the nature and affinities of scrofula, yet the question cannot be wholly put aside. For the present purpose, scrofula may be described as a defective condition of the general health, predisposing to chronic and obstinate inflammations of the lymph-glands, bones, joints, mucous membranes, and skin. All are agreed that there are near affinities between scrofula and tuberculosis; that frequently the offspring of tuberculous persons are scrofulous; and that scrofulous parents have tuberculous children; and, again, that, while some children in a family are scrofulous, others die of tuberculous phthisis or meningitis; but, as to the pathological relationship of the two diseases, or the tissue-changes that are produced in scrofula, observers are not yet agreed. Some assert that, from the stand-point of morbid anatomy, a scrofulous gland is a tuberculous gland, and that scrofulous abscesses are lined with milary tubercles; while others maintain that in the diseases usually termed scrofulous there is no specific material whatever; nothing besides the products of ordinary chronic inflammation. Thus it is not yet possible to speak of scrofula with common consent in terms more exact than those which I have used above. Certainly, we have no generally accepted test by which to establish or exclude its presence in any given case.

In the search after some touchstone for scrofula, it used to be customary to fall back on the doctrine of temperaments, such as the leucophlegmatic, the melancholic, the sanguine, the serous, or the bilious, which were supposed to be declared by certain types of external appearance; and, if a child could be placed under any of these types, sentence was passed upon him. Thus, if he had light or red hair, blue or grey eyes, and a transparent skin, through which his superficial veins could be seen, and if he were lively and bright, he was called scrofulous in the sanguineous type. If he were short, thick-skinned, and dusky, he was held to be scrofulous in the phlegmatic or bilious type. Lately, however, these views about serous and bilious or melancholic children have been discarded, as being not only vague but misleading; indeed, the very terms themselves have happily died out, and now the only ground on which, by common consent, a disease—for example, of the hip or knee—can be called scrofulous is that of family history. If there be similar diseases in the patient's blood-relations, or if the latter be tuberculous, I think all surgeons would consider any chronic inflammatory joint-disease as probably scrofulous. But a large number of cases are met with in which family history is silent. Respecting such cases, a

wide difference of opinion still prevails. Some teach that, speaking generally, all chronic inflammations of bones and joints, or of the spine, especially if they result from slight injuries or have seemed to be spontaneous, are scrofulous; while others, upon the grounds that, in their morbid anatomy, these diseases are simple chronic inflammations with no specific products; that they occur in children who have no other traces of defective health; and that they can be cured by appropriate local treatment, without any of a constitutional kind—believe them to be merely aggravated local injuries in children who are free from constitutional taint; and they add that the feeble general health so often indicated by pallor, wasting, loss of appetite, etc., is the result, and not the cause, of the local disease. No doubt the truth lies between these two extremes of opinion; that the diseases I have mentioned are frequently scrofulous may be easily believed; they occur in tuberculous families or in families in which similar chronic diseases prevail; and, though they are treated with perfect rest from the very outset, they linger for months and are very prone to relapse. On the other hand, there can be little question that a number of cases are simply aggravated local injuries. They are found in healthy families; their progress towards cure, when proper means are used, is steady and fairly rapid, and there is no subsequent relapse.

But, although the pathology of many of these cases is thus obscure, the doubt is practically of very slight importance; for, in respect to treatment, whether they are scrofulous or whether they are not, one law must be rigidly observed—that is the law of absolute rest. Formerly, it was supposed that a scrofulous disease was amenable only to constitutional remedies, and that local means were both unnecessary and inoperative. The dogma was that a constitutional disease could be cured only by constitutional remedies. But opinion on this point has now become changed. Nothing seems more certain in surgery than that a scrofulous joint must be kept at complete rest. The more plainly scrofulous the disease, and therefore the more inveterate, the more urgent is the necessity for rest. Constitutional means, change of air, cod-liver oil, chemical food, etc., are often called for, and they will almost invariably do good; yet they need not be used as a mere matter of routine. Many children maintain apparently good general health all through the period of local disease; they eat, sleep, digest, and look quite well. Hence the safe plan will be to judge each case on its own merits: by its family history and by the appearance of the child; and to prescribe or withhold constitutional treatment, according to the result.

DIAGNOSIS.

In examining a child suspected to have hip-disease, be careful to place him on something firm and flat: a table covered with a blanket, a leather couch, or the floor. If you use a soft bed, he will sink into it, and you will perhaps overlook even a considerable deformity. Do not be content with anything short of a thorough examination. Do not pretend to say whether a child whom you have examined with his trousers on has or has not hip-disease. Let him be undressed, so that you can move his limbs without being hindered by his clothes. Girls past early childhood may be fully examined if you use a shawl or a loose sheet to cover them.

1. You must look for abnormal posture of the limb or of the pelvis.
2. For stiffness at the joint.
3. Observe whether the glutei or the muscles of the thigh are wasted, and whether any, especially the adductors, are rigid.
4. Or whether there is any swelling about the joint or in the thigh or the iliac fossa.
5. Notice the relation of the trochanter to the side of the pelvis as compared with that of the opposite side.
6. Look to the length of the limb as compared with that of its fellow.
7. See how the patient walks, if he be able to do so.
8. If he have pain, learn its situation and its character.

Abnormal Posture.—If there be any affection of the joint, however recent or slight this may be, there is usually, though not invariably, some fault in the child's posture; there is flexion of the thigh, forward arching of the lumbar spine (lordosis, as it is called), abduction, adduction, rotation of the limb, or slanting of the pelvis. In the later stages of disease, faulty posture, as you know, often depends on structural changes at the joint, on absorption of bone with displacement of the trochanter; but, in the earlier period, it is due to abnormal contraction of some of the surrounding muscles. Mr. Hilton, in his lectures on Rest and Pain, has explained how the rigidity of the muscles that surround an inflamed joint is produced. He has pointed out that the same nerves that supply the capsule and synovial membrane of the joint with sensory twigs send motor filaments to the adjacent muscles, and that, when the interior of the joint is inflamed, the

* Much in these lectures has been learned from Mr. Holmes (*Surgical Diseases of Childhood*), Mr. Barwell (*Disease of Joints*), Dr. Lewis Sayre (*Orthopaedic Surgery*; Churchill, London), Dr. Fayette Taylor (*Mechanical Treatment of Disease of the Hip-Joint*; New York), and Mr. Thomas (*Diseases of the Hip, Knee, and Ankle*; Dobb and Co., Gill Street, Liverpool).

resulting irritation of the nerve-filaments distributed within it is conveyed to the spinal cord, and is thence reflected along the motor branches that supply the muscles, which are thus thrown into a condition of abnormal contraction.

Any set of muscles around the hip-joint may fall, either alone or in combination with other groups, under the sway of this reflex irritation, and be thrown into a condition of contraction, with the effect of holding the limb in some fixed posture. Flexion and abduction, often combined with slight external rotation, generally predominate in the early stages of this disease; but in rare cases you may find the limb extended or adducted. Thus, about two years ago, Mr. Callender showed me at St. Bartholomew's Hospital a boy aged 9 with recent hip-disease, in whom the limb was not only fully extended, but carried beyond this, so that its long axis, compared with that of the trunk, was downwards and distinctly, though slightly, backwards. This is the only instance in which I have seen a limb carried backwards past full extension. I cannot say that the position was due simply to muscular action; how it had been produced was not clear. I have seen another case in which extreme adduction of the limb followed fright. A young lady ten years old, while in the early stage of hip-disease—it had been in progress about three months, and had been attended with no severe symptoms—was terrified by her father, who, after joining the Volunteers, came into her room in the dusk of the evening in his uniform and playfully ran at her with his cocked hat. She screamed violently and buried her head under the bed-clothes, but was soon pacified, and, after about half an hour, fell quietly asleep. Next morning, the limb looked two inches and a half shorter than the opposite, and the pelvis was extremely twisted. (I shall presently show that this twisting of the pelvis, with apparent shortening, really depends on adduction of the limb.) The surgeon who was called in told her father that it would probably soon return to the nearly natural position in which it was before the fright. This, however, did not occur, and, when I saw her, two years afterwards, the deformity still remained.

Flexion.—Although this posture is in many cases so well marked that it is obvious at a glance, in others it is so slight that it is very apt to be overlooked. But you must take care that it does not escape your notice; for, as all who are familiar with hip-disease will tell you, slight flexion is not only a valuable symptom of early mischief, but it is often the only symptom besides slight stiffness of the joint that can be detected. And let me give you a further caution. When you have detected flexion, you are very likely to come to a false conclusion as to its degree. That the limb can be brought down into a horizontal posture, so that it is perfectly parallel with its fellow, is no proof at all that it is not flexed upon the pelvis. It may be thus brought down, and yet be flexed at an angle of 120 deg. with the trunk. The explanation of this circumstance—this seeming paradox—is very simple. In hip-disease, the joint is stiff, so that the femur and the pelvis are locked together and move as one piece. If you move one you move the other. When, therefore, you bring the femur down, it carries the pelvis with it by turning it on its transverse axis. The pelvis is easily thus rotated, because it is connected with the trunk through the medium of the flexible lumbar spine, which readily arches forwards.

And here a point is raised which must be considered, not only in relation to flexion, but also to other abnormal postures that result from hip-disease. When the joint is stiff, its lost movements are transferred to the lumbar spine, so that compensation is secured for deformities which otherwise would entirely disable the patient. Let me illustrate this by reminding you of what occurs under parallel circumstances at another part of the body. You know that the arm remains useful for many purposes after the humerus and scapula have become fixed to each other by ankylosis at the shoulder-joint; for movements lost here can be transferred to another "joint" in the neighbourhood—to that, namely, between the scapula and the trunk. A patient with a stiff hip has the same alternative. Movements lost at the hip can be performed at the lumbar spine. Compare for a moment the anatomy of the upper and lower extremities. Both these members consist of jointed levers arranged to act in a variety of combinations. These levers are connected with the trunk, not directly, but indirectly, by means of, in the one case, the scapula, in the other the pelvis, each of which constitutes a movable fulcrum. This arrangement necessitates a second joint contiguous to the first. Now, this mechanism of the skeleton—this double-jointing of the extremities to the spine—is an arrangement that adds largely to their functional endowments. Among other things, it provides that, if the joint by which most of the movements are usually performed be disabled, the patient can fall back on the vicarious action of the second. Imagine a patient who, along with a stiff shoulder-joint, should also have his scapula fixed upon his

trunk; or, what is equivalent, suppose that the arm were connected with the trunk by a single joint, and that this joint became stiff; his upper extremity thus fixed, like the branch of a tree, would be almost entirely useless. In the same way, were his spine stiff, if his lower limb became fixed in flexion on the pelvis, he could not bring his foot to the ground. He could only carry it in the air. But observe the resource he has in his movable lumbar spine. Since his pelvis and femur are locked together, any movement of his pelvis will be at once imparted to his femur. When, therefore, the direction of his femur has become oblique by its flexion on the pelvis, so that his foot is drawn off the ground, he is able, by curving his lumbar spine, to rotate his pelvis on its transverse horizontal axis, and so to make the femur vertical and bring his foot to the ground again. This curvature of the spine is merely assumed, merely vicarious. Even when it has existed for years, it can be immediately and completely removed, either as the patient stands or as he lies, if you will, by raising his femur, turn the pelvis back to its normal posture.

But to return to the examination of the patient: it will be obvious to you from what has just been said that, before you can tell whether the limb is flexed, you must see that the lumbar spine is straight, otherwise you may mistake curvature of the spine for extension of the thigh. The best method of proceeding is first to flex both limbs upon the trunk to an angle, say, of 120 deg., or till you find that the spine is flat; then, keeping the suspected limb still flexed, to bring down the sound limb into full extension; and, thirdly, having placed the fingers of the left hand between the spine and the couch, with the right hand to bring the suspected limb very gradually down. If, without disturbing the outline of the spine, you can bring it into the horizontal posture, so that its whole length is in contact with the couch, you may be sure there is no flexion; the long axis of the limb corresponds with that of the trunk. But if, as you bring down the limb, you find that the spine is assuming an anterior curvature, you will have come to a point at which the hip-joint is locked against further extension. If you go further, you will be mistaking a compensatory curve of the spine for movement at the hip. Having thus determined the question of flexion, see whether the pelvis is "square"; that is, whether, as the patient lies on his back, a line drawn through the two anterior superior iliac spines is horizontal, *i.e.*, at right angles to the long axis of the trunk (see A B in fig. 1), or whether the pelvis is oblique, or, to borrow an expressive term from mechanics, "can eu", so that the iliac spine of the affected side is either lower, so that the limb appears longer; or higher, so that it appears shorter than its fellow.

Fig. 1.

Fig. 2.

I have just explained the manner in which a patient whose limb is locked in a position of flexion can, by curving his spine, bring his foot to the ground. But suppose that his limb, instead of being flexed, is, by abnormal muscular action, either abducted or adducted. Both these are postures, equally with flexion, in which the foot, travelling at the circumference of an arc, recedes farther and farther from the ground, so that the patient can neither stand nor walk on his limb. What is his resource? It is to do now as he did when he had to meet the difficulty of flexion. Take, first, the case in which the thigh is fixed in a position of abduction, as represented in fig. 2 by the line B D (A C indicating the sound limb, and A B the line connecting the two anterior superior iliac spines). Having lost the power of moving the limb at the hip-joint, so as to bring it again towards the middle line, he transfers this lost movement to the lumbar spine. In other words, being unable to adduct the femur on the pelvis, he, so to speak, adducts the femur and pelvis together on the spine. To do this, he raises the pelvis on the sound side by means of muscles passing to it from the ribs and spine, with the result of bringing the affected side down and the femur back towards the middle line; so that the lines referred to in fig. 2 will now occupy the direction shown in fig. 3. To correct adduction, he raises the pelvis on the affected side, and so makes the

limb parallel with its fellow, and thus the lines A B and B D in Fig. 4 will have the position drawn in fig. 5. The movements, therefore, to counteract the results of abduction and adduction are very similar to

Fig. 3.

Fig. 4.

Fig. 5.

that for correcting flexion, except that the spine, instead of being curved forward, is curved laterally—towards the affected side to correct abduction, towards the sound side to correct adduction. You may easily prove that this is the case by examining patients with a twisted pelvis. You will invariably find they have also lateral curvature of the spine.

There are, then, two distinct forms of distortion resulting from hip-disease: first, those that are original; the direct result of abnormal muscular action produced by the disease—flexion, abduction, adduction, or some combination of them; these have their centre at the hip-joint: next, those that are secondary or compensatory, consisting of rotations of the pelvis by curvature of the lumbar spine, either antero-posterior or lateral. These latter belong to the almost numberless instances that might be given in which functions suspended or lost at one part or in one organ of the body are vicariously performed by some other part. In examining your patient, then, if you find the pelvis lower on the affected side, you must abduct the limb till the pelvis is square. If it be higher, you must adduct the limb. By so doing, you remove the secondary and develop the primary distortion, be it abduction or adduction, and are thus able to ascertain what is the real position into which the limb has been brought by the disease.

Stiffness of the Joint.—Next, see whether movement at the joint is impaired, whether the joint is in any degree stiff. And your examination must be of the most searching, though of the most gentle, kind; for what has been already said about flexion must be repeated now. Stiffness of the joint is one of the most valuable signs of hip-disease, one of the earliest; sometimes it is the only one that can be detected. It is valuable also in an altogether different and contrary sense; for, in many cases, as I must point out presently, diseases around the joint simulate hip-disease, and the absence of stiffness in the joint itself is the only sign by which a correct diagnosis can be made.

As the patient lies on his back, place the thumb of one hand on the anterior superior iliac spine and with the other hand slowly and gently flex and extend the limb, and observe whether the femur moves freely in the acetabulum while the pelvis remains at complete rest, or whether the pelvis and the femur move together, the femur carrying the pelvis with it. Remember that this test has not been so applied as to negative the presence of hip-disease till you have carried the limb first to its extreme degree of natural flexion, and then into the opposite position of complete extension. Not rarely, although the joint is diseased, movement of the femur will appear, to all but the most careful examination, free in all its middle range between flexion and extension. It is only at the two extremes, or even at one of them alone, that limitation of movement can be detected. And let me observe that you may sometimes have your suspicions aroused by finding that, as you flex the limb, it does not move straight up to the ribs, but that it gradually assumes a position in which abduction is combined with flexion, so that, when you have flexed it as far as the joint will permit, the limb has also become considerably abducted. This peculiarity of posture is rendered the more obvious if you compare it with the opposite limb. The latter you will find may be fully flexed and at the same time adducted, so that the knee crosses the umbilicus.

There is, however, another point of view from which limitations of movement must be studied. It must be remembered that affections in the neighbourhood of the hip-joint may produce rigidity of the limb, closely resembling the rigidity caused by disease of the joint itself. Thus, in cases of disease of the spine in which abscess has tracked its way down under the glutei, or in cases of disease—periostritis, etc.—of the back of the pelvis, the limb cannot be completely

flexed; while, in other cases—disease of the spine with psoas or iliac abscess, or abscess within the pelvis—the limb is maintained in a flexed posture and cannot be extended. The diagnosis, however, is easily made, although, if the truth be told, errors are very commonly committed.

In many of these cases that simulate hip-disease, the mischief being confined either to the back or to the front of the joint, only one set of muscles (either the extensors or the flexors) are rigid; and, therefore, although movement in one direction is limited, in the opposite it is free. For instance, in cases of psoas or iliac abscess, although extension is interfered with, flexion is free, and the limb can be carried completely up to the trunk; while, in abscess under the glutei, though flexion is prevented, extension is unimpaired. Secondly, if you carry the limb into that position in which its movement is still free—in psoas-abscess flexing, in abscess behind the joint extending it—so that the affected parts are relaxed, and then, having flexed the leg on the thigh, you grasp the knee and rotate the femur in the acetabulum, you will find the movement of rotation perfectly free. This is a delicate test and must be carefully applied. If the child be alarmed, or if there be any suddenness or roughness in your manipulation, all the muscles will be roused into contraction and will hold the limb as rigid as if the joint were really stiff. But, if you will begin by rotating the limb gently, lightly turning it through an arc of less than a quarter of a circle, you may gradually go on to test it in its full natural range. Then, if the disease be outside the joint, this rotation-movement will be perfectly facile and smooth. It may happen, however, that, although the disease is entirely outside the joint, both flexion and extension are limited. Thus, a few weeks ago, a child was sent here from the country in whom an abscess had opened and was now discharging just over the great trochanter. He was said to have hip disease. On moving the thigh either towards full flexion or full extension, the pelvis was carried with it, and so far the diagnosis of hip-disease seemed correct. But, when, as he lay on his back, the femur was placed midway between flexion and extension, so that both sets of muscles were, as far as they could be, relaxed, rotation of the femur in the acetabulum was found to be perfectly free. It was now clear that the joint was sound, and further examination showed that he had disease of the lumbar spine, and that the abscess at his trochanter, which, by the irritation it produced, had rendered the parts about the joint rigid, had burrowed down from this source.

I have seen many cases similar to this—cases in which it was unsafe to judge of the amount of movement at the joint by the degree to which you could flex and extend the thigh. To avoid error, you must also ascertain whether the femur is restricted in its rotation in the acetabulum; and remember that rotation is a better test of the state of the joint than flexion or extension. In other words, the hip is both an enarthrodial and a ginglymoid joint. The ginglymoid or hinge-movements are frequently interfered with by conditions external to the articulation, the enarthrodial, or ball-and-socket movements, much more rarely. A safe rule, therefore, is always to test both forms of movement. If you find the enarthrodial perfectly free, you may be sure the joint is healthy and that flexion and extension are limited by conditions not in, but around the joint.

Another method by which you should test the freedom of movement at the joint is by seeing whether, while the limb is semiflexed, complete abduction is free and can be performed without pain. In acute disease, even slight abduction frequently causes severe pain.

SELBY.—Dr. Parsons says that much has been done in the town of Selby for the public health during the last twenty years, so that the average annual death rate during successive periods has been reduced from 29.3, 25.0, to 22.6, per 1,000 inhabitants. During the last three years, it has been 22.7; but this increase has been caused by the excessive mortality in the last quarter of 1876, owing to as many as 99 deaths from scarlet fever. The drainage of the town had got out of order; but Dr. Parsons does not attribute much influence to this, as he believes the chief cause to have been the large number of children then alive who were susceptible to the disease, in consequence of the comparative rarity of cases during some years past. The population is estimated at 6,193. The number of births registered in 1876 was 216, and of deaths 153, which are equal to a birth-rate of 34.9 and a death-rate of 24.7 per 1,000 inhabitants. There were 37 deaths of children under one year, which afford a mortality of 17.1 per 100 births, which is very high; but this is accounted for by the fact that 16 out of the 37 were hand-fed, and 5 died soon after birth. This very large proportion of deaths amongst hand-fed children seems to indicate great neglect as well as want of proper food. The arrangements for the water-supply are not good, as the supply for the closets is drawn direct from the mains.