ON THE DIAGNOSIS OF CARIES OF THE SPINE, IN THE STAGE PRECEDING ANGULAR CURVATURE.

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To say that a patient has cirrhosis of the liver, phthisis, or stricture, is to give a direct name to his disease. But, to say that he has jaundice, cough, or retention, is to name, not the disease itself, but one of its features or results.

There are many instances in medicine and surgery in which diseases are named according to this latter method, or, so to say, at second-hand. The name was originally given when, though some particular symptom was plainly marked, the disease which produced it was unknown; afterwards, when the nature of the disease was ascertained, the old name was still retained. Some names that have thus come down to the present time, though they are not scientifically correct, are so well understood in the sense in which they are used, that it is not worth while to change them. But, there are others which are open to the serious objection, that they tend to divert the mind from the disease under which the patient is suffering, and to fix it on some single symptom or result, which is perhaps inconstant in its appearance, or which may be developed only when the disease has made considerable progress, and when the period during which treatment would be most effectual has passed by. This delay, in diagnosis and treatment, sometimes results in the case of caries of the spine, from the fact that the disease goes by the name of "angular curvature".

If disease be suspected, the patient is examined for angular curvature; and, if none can be detected, it is sometimes concluded that the spine is sound. Angular curvature, however, cannot be formed till, in the course of inflammatory disease, some absorption of one or more of the bodies of the vertebrae has taken place; and, therefore, to wait for this symptom, is to allow the disease to advance to what may be termed its second stage before attempting to arrest its progress. It is obvious that, when caries has gone so far as to lead to curvature, its treatment will be much more tedious, and the result more doubtful, than if it is taken in hand while the disease is still incipient.

It may be useful to recall the fact, that, although angular curvature is proof positive that caries is or has been present, and although no other single sign has the same force, there are other symptoms, variously combined in different cases, which are quite sufficient to establish the existence of caries before any trace of angular curvature has been developed. The first of these symptoms consists of pain. This varies widely in different cases, both in the form which it takes and in the degree of its severity. Sometimes pain is constant and severe, either at the seat of the disease, or radiating to more or less distant parts. In some cases it is paroxysmal, and resembles severe cramp; while in some it is slight in its amount, and is suggestive only from the situation in which it is felt, and its combination with other symptoms. In disease involving the first two cervical vertebrae it is referred to the occipital region of the scalp, where the suboccipital and the great occipital nerves are distributed. Pain in this situation, if it be persistent, and associated with any stiffness or altered manner of carrying the neck, must always raise a suspicion, not to be lightly dismissed, that cervical caries is present. In other regions of the spine, pain, when it is present, is felt either at the affected part itself, or below it. It is very rarely indeed, I believe, situated at a higher level. If a patient complain of pain above the suspected spot, the presumption is either that it depends on caries at some point higher up, or (and this will often prove to be the case) that it is not due to caries at all, but to some other cause. Pain attending caries in the lower cervical region radiates over the shoulders, and down one or both arms; and sometimes also over the front of the upper part of the thorax. When the dorsal spine is affected, pain is felt round the sides of the thorax—sometimes on one side only, sometimes on both—or at the middle line in front. When the lumbar spine is involved, pain spreads over the loins and pelvis, and down the lower limbs—sometimes as far as the knee, sometimes even to the feet. The true meaning of pain, in these various situations, is apt to escape notice. A child, aged 5, was lately seen, who had been treated for several weeks with alteratives and restricted diet for pain "in the stomach", thought to be due to indigestion, but which really depended on caries of the fifth and sixth dorsal vertebrae. On examination, it was ascertained that the digestive organs and the excretions were healthy, and that pain was not increased after meals; that the child was always relieved while he was lying down, and

was worse after exercise; that he was unable to stoop, and held his dorsal spine stiff; and, on careful inspection, a slight, though quite evident, angular curvature was detected. The same oversight may sometimes occur in the case of adult patients. A man, aged 30, applied to the hospital on account of pain in the left hypochondrium, of two months' duration, which was often so severe that it "doubled him up", and for which he had been ordered brisk aperients and hot fomentations, and the persistency of which had at length raised the suspicion that he had cancer of his descending colon. On examination, it was found that he had caries in the middle of the dorsal region. In both these instances, pain quickly and entirely subsided when the patients were placed in the recumbent posture. In a patient, with disease of the lumbar spine, pain, passing through the hip to the back of the thigh, had been attributed to sciatica—no doubt with the less hesitation because it was limited to one side. In other instances, again, pain, complained of in one knee, and accompanied by an altered gait, has led to the belief that the patients had hip-disease. The feeling of constriction—as if a cord were drawn tightly round the abdomen—which is put down in books as a common symptom of spinal caries, though it is occasionally met with, is, so far as I have observed, so comparatively rare that its absence is worth nothing as evidence that the spine is sound.

When the patient has given his own account of the degree and situation of his pain, there are certain questions to be put to him, the answers to which may be trusted to help very materially in making a diagnosis. These are: Whether it hurts him to cough, to sneeze, to travel in an omnibus or train, to make a false step in walking, to lift any heavy object? These questions apply chiefly to cases in which the dorsal or lumbar spine is suspected. They are of less value in respect to the cervical spine, though even here they may afford considerable light. In many cases of disease in the middle or lower part of the spine, they elicit very characteristic answers. The patient, at the mere mention of coughing or sneezing, looks uneasy and apprehensive, and says that these acts hurt him dreadfully, or that he is afraid to perform them. As to a false step, he says (almost with a shudder at the very thought of it) that it jars him terribly. The uneasiness or pain, caused by driving or railway travelling, is often very suggestive. Some patients who can walk slowly and cautiously without pain, suffer severely from the jarring of a vehicle. The explanation of the fact probably is, that, in the effort of walking, the surrounding muscles brace up and steady the spine; while, in the sitting posture, they are more relaxed. In the same way, it is occasionally seen that a patient, who is severely hurt by the jar of a false step, by a cough, or by a sudden turn in bed during sleep, may be able to stamp his foot with some force on the ground, or even to hop on either leg without very much inconvenience. In short, the most searching tests are those in which the spine is jarred when the surrounding muscles are relaxed.

The second order of symptoms by which caries of the spine, in its incipient stage, may be recognised, refers to the degree in which the column retains its natural mobility. These symptoms must be brought out by various exercises, which the patient is made to perform. It must be ascertained whether, while standing with his heels together, and keeping his knees straight, he can stoop without restraint, so as to bring the tips of his fingers towards his toes; whether he can stoop freely, and raise himself freely, in the act of picking up some small object from the floor; whether he can raise himself easily from the recumbent to the sitting or upright posture; and whether, when he lies on his back, he can turn readily on either side; and whether, in these various exercises, all parts of the spine are seen to contribute their proper share of movement; or whether any part is kept rigid, while movement is free above and below it. If the cervical region be suspected, in addition to the usual flexion and extension movements, the patient's power of nodding or rotating the head must be observed, in order to test the joints between the occiput and atlas, and between the atlas and the axis. The patient's manner of walking must also be scrutinised for the same purpose—of seeing whether the spine is movable in all its parts, or whether any region is stiff. Especial attention should be paid to the manner in which he turns round. A defect, either in movement or in the posture in which the spine is held, is sometimes perceptible during the act of turning round, which is not apparent while the patient is going straight forward. Sometimes, again, it will be found that the column is defective in its natural steadiness—that it seems insecure, and difficult to balance. The test of picking up some small object, difficult to seize—such as a coin or a pencil—is a very telling one, especially in the case of children. If the spine be sound, the patient will stoop and raise himself without a pause, without hesitation, and without restraint. But, if mischief be present, his proceedings are often very characteristic; and, in almost every case, peculiar enough to afford some information. A glance will show that he is

calculating how to manage so that he can keep his spine still. If his disease be acute, he will probably give up the attempt, and say that he cannot stoop. If he persevere, he will probably place himself so that the object is at his side; he will then cautiously bring his hand towards the ground, not by bending or inclining his spine, but by flexing his knees, while his spine is kept rigid and nearly perpendicular; having at length succeeded in grasping the object, he will pause, so as to be sure of his balance, and will then raise himself by straightening his knees; while, as before, he keeps his spine rigid and upright.

In children, the spine may be further tested by watching how the patient rises from the recumbent posture. It may often be observed that he moves himself slowly round till he is on his hands and knees, and then carefully gets up. Another plan is to make the child climb upon a sofa, or from a chair on to a table; for the movements required in these acts are good tests as to the mobility of the spine. This description of what may be observed in these cases is intended to be general, and, as far as it can be made, typical. In practice, numerous differences will be met with; but, in almost every instance, some of the defects of movement here alluded to will be apparent. Thirdly: especially in children, in whom the diagnosis of disease must often be made, not by observing two or three conclusive signs, but by fitting together numerous small fragments of evidence derived from different sources; the suspicion that caries is present is strongly confirmed by the observation, that the patient has some device for relieving the spine of part of the work of supporting the weight of the head and trunk. Thus, in disease of the cervical spine, he may be seen to rest his chin on his hand, or to support his head with his hands, especially in the effort of rising from the recumbent posture. Some children, with cervical caries, will sit for hours with their elbows on a table, and with the hands supporting the head. Others, who have disease in the dorsal or the lumbar region, have the habit of making their way to a chair, on which they place the palms of their hands, and over which, with their arms straight, they lean—so as to give themselves "high shoulders"; and so that weight is taken off the spine and transmitted through the arms. Another posture, very suggestive of mischief, is that in which the patient, having slightly flexed one knee, so that his limb rests on the toe, places his hand on the middle of his thigh, and then leans over to that side—so as to convey weight from the shoulder through the arm, and so to the thigh. These schemes for the "collateral transmission of weight" are always worthy of very careful attention.

On the other hand, I should like to remark that there are some tests of spinal caries in use, which seem so untrustworthy, that I feel justified in offering a strong caution against their use. These are: (1) the plan of tapping with the knuckles, or dealing a slight but sudden blow with the closed hand, on the spinous processes of the suspected vertebrae. This proceeding is very likely to make a child or an hysterical adult shrink, even though the spine is perfectly sound; while, on the other hand, as the blow is struck at right angles to the long axis of the spine, it can have very little effect in bringing vertebrae which may happen to be tender into firmer contact with each other, so as to produce pain by their sudden mutual compression. Moreover, the force of the blow, as it is transmitted through the spinous processes, laminae, and articular processes, is apt to be dissipated before it reaches the bodies of the vertebrae—the parts in which disease is so commonly situated. Some surgeons, I am aware, deal the blow on the top of the head; but this may assuredly be dangerous in disease of the cervical vertebrae; while, owing to the formation of the spine as a series of blocks, and to the elasticity of the intervertebral discs, the effect of any slight concussion is lost before it can reach the lower regions of the spine. I have frequently seen patients wince under this test, although their spines were quite healthy. I have also often found that it produced no complaint in cases in which angular curvature was plainly marked. This test of jarring the spine is, in fact, as deceptive, and therefore as bad, as is that of tapping the knee or the heel in suspected disease of the hip-joint. Children, with hip-disease, may very often be seen, who make no complaint whatever when the hip is thus even forcibly jarred; while, on the other hand, the jar causes, in some cases, severe and quite unnecessary suffering—unnecessary, because painless and more reliable signs are within reach. (2). Another symptom, on which some observers lay much stress, is tenderness, or increased sensitiveness, found over the spinous processes, corresponding to the carious vertebrae; and I have seen this over-sensitiveness searched for by means of a hot sponge. I believe this test is quite untrustworthy. Tenderness, or over-sensitiveness, is a very common feature in cases of hysterical spine; and certainly tenderness is often absent when caries is distinctly in progress.

The period at which angular curvature becomes apparent, in the course of spinal disease, varies with the form that caries takes. In instances in which inflammation involves the general substance of the

body of one or more of the vertebrae, and is attended with rapid softening and absorption, angular curvature very soon results. But, in some cases, inflammation is limited to the external surface of the bodies of the vertebrae and their investing ligaments. Here, extensive ulceration may take place, and even lead to the formation of a large abscess, before angular curvature ensues. Several examples have lately been seen, in which iliac abscess, due to caries of the vertebrae, was present before angular curvature was perceptible, although it was developed at a later stage.

FAURE'S SECONDARY OR STORAGE BATTERY ALSO, SWAN'S ELECTRIC LIGHT, IN SURGERY.

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THE recent invention of M. Faure has rendered electricity available for surgical use, in a way it has not been before. The secondary battery as he calls it, might better be called a storage battery; seeing that it stores up or accumulates electricity generated in an active battery, to almost any amount. It consists of a cylindrical vessel of lead, nine inches high and five inches in diameter, with a leaden bottom, but open at the top; into this is packed a kind of cushion, of a material which has the power of absorbing electricity. To this vessel are attached the two poles of a working battery; and, as long as the connection is maintained, the vessel accumulates the electricity flowing into it. When charged, it can be detached from its connection and kept for a long time, or carried from place to place, like the jars of compressed carbonic oxide, used for anæsthetic purposes.

When required for use, the cushion, which should always be kept moist, is wetted with dilute sulphuric acid; and wires connecting are attached to its poles, when it is converted into a powerful battery.

On June 3rd, I removed a naevoid tumour from the tongue. The naevus was situated on the anterior half of the right side of the tongue of a young gentleman 11 years of age. It had been in existence for many years, but latterly it had frequently been scratched, and then bled freely. As the growth was very vascular and invaded the tongue almost to the middle line, I determined to remove it by the thermocautery. Having occasion to see Sir William Thomson the day before the operation, he offered me the use of a Faure's battery, which had been sent from Paris only a few days before, and on which he was engaged in experimenting to test its value. He was so enamoured of its powers that he said, "It is a witch". And now it has the name of the "Electrical witch" at the University.*

In diving to my patient, I called at Sir William's laboratory, and got with me a battery which can easily be carried in one hand, and without the least difficulty. After having put the patient under chloroform, I attached its poles to a platinum wire-écraseur, and removed the tumour without a drop of blood.

This contrivance, which enables one to carry stores of powerful electricity in a jar no bigger than an ordinary preserved meat tin, will render the use of electricity much more extended than heretofore.

Supplies of these cumulative jars are being sent from Paris, and can be charged by any kind of battery to which they are attached.

Swan's Light.—This light is specially useful in examining parts of the body or tumours, which we wish to test by transmitted light. I have under my care, just now, a man who is compelled to be in the recumbent posture, from a severe fracture of the thigh. He has also a tumour in the scrotum with all the characteristics of a hydrocele; but it was almost impossible to judge of its translucency in consequence of its being bound down to the groin; and being of very old growth, was intersected by bands which made it more or less opaque. It was impossible, in the man's fixed position, to get a candle or lamp placed so as to judge of its translucency. At the same time as Sir William Thomson offered me the battery before alluded to he suggested that Swan's Light might be used for surgical investigations. He kindly provided me with a very powerful battery of the ordinary kind; sent his mechanic assistant to fit it up in my ward, and gave me a Swan's electric light lamp. This is a globe of glass about 1½ inches in diameter, containing a filament of carbon wire twisted into a loop, which, when rendered incandescent by the battery, gives out a powerful light. This globe, which is held by a handle of glass tube about four inches long, can be placed in any position, and, as it is not heated beyond what can be

* Notices of this extraordinary invention will be found in *Nature* for 19th May and June; also, in the *London Times* of 16th May, and in a letter from Sir William Thomson in the *Times* of June 8th.