THE ART OF ORTHOPAEDICS I.

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I have been asked to write a series of articles dealing with orthopaedic conditions and diagnosis suitable for post-graduate readers. In this first article I am going to define what is the science of orthopaedics, how that science has gradually evolved, and where it may lead us.

Recently it has been suggested that any would-be specialist should have a two years' apprenticeship at a specialised hospital, and then he is fit to set himself up as an expert in that speciality. I think that in such a subject as orthopaedic surgery one cannot hope to secure the very wide knowledge that this speciality entails without having previously had a fairly wide experience of general surgery, together with an apprenticeship under various orthopaedic masters for at least five years before the intending specialist is in any way fit to set up on his own.

Definition

Orthopaedic surgery used to be defined as the surgery of congenital disease affecting the locomotor system. Such a definition can no longer apply in this limited form. The orthopaedic surgeon has got to be familiar with both congenital, traumatic, and neoplastic conditions affecting the whole of the skeletal system. A wide knowledge of pediatrics is essential, as many of the orthopaedic conditions manifest themselves soon after birth and may be coupled with dietetic and other specialised children's complaints.

In the early writings of Robert Jones and Tubby, orthopaedic surgery consisted of manipulation and tenotomies of the various congenital malformations. To-day orthopaedic surgery has gone a long way from these early beginnings and is rapidly going further. Since the last war the orthopaedic surgeon has gradually encroached upon the field of the general surgeon in taking over the treatment of fractures—in itself a very wide subject. During the period between the two wars the orthopaedic surgeon has entered the field of rheumatology which embraces a knowledge of vaccine treatment, gold therapy, and physiotherapeutic treatment of the various types of arthritis. A knowledge of plaster technique is in itself a subject which is wide-embracing, needing not only a knowledge of the pathological deformities which the surgeon is setting out to treat and correct, but also a knowledge of stresses and strains

which come more under the scope of the expert carpenter.

During this war orthopaedic surgery has expanded in two other directions. Already the British Orthopaedic Association is advocating that the orthopaedic surgeon should enter the realm, if not take control, of the new sub-division of traumatic surgery which embraces a wide knowledge of shock, skin grafting and other matters which in themselves are a specialist art. Rehabilitation, which now is an adjunct of physiotherapy and which consists of physiotherapeutic methods applied through games and handicrafts, is part of the knowledge that the orthopaedic surgeon must now have. Thus it would appear that during every war the speciality of orthopaedic surgery further expands. Hence my previous remark that a long apprenticeship is essential is well borne out.

The Differences of the Orthopaedic Outlook

This depends on a number of factors. Orthopaedic surgery is a recent branch of the science of surgery. Its members regard themselves as rather up-to-date. They are ready to discuss their problems with one another and to put forward an exposition of their new methods, both at meetings and in print. The science of orthopaedic surgery bears a great relationship to the other special branches, such as neurology. The operative science of orthopaedic surgery used to be likened to that of carpentry, but nowadays in his treatment of fractures the orthopaedic surgeon is rapidly becoming an engineer, so varied are the various ingenious splints, pins, and traction apparatus which he now handles and expects his nursing staff to be familiar with. Indeed, at one U.S.A. hospital where a large number of fractures are treated in one ward the surgeon's right-hand men are not fellow colleagues but a couple of mechanics who go up and down the ward for 50 fractures tightening up the various nuts and bolts—part of his surgical craft!

Orthopaedic Surgery is Not Simple

Because orthopaedic surgery encroaches upon and embraces a knowledge of, other systems, the orthopaedic surgeon has always got to consider two sides of every problem. How has such a curvature or malformation developed? If he corrects such a curvature will some other part be thrown out of balance? If he corrects the malalignment of a fracture and secures perfect bone position will he have so damaged the soft parts that the limb is no longer a functioning limb?

The following are some examples of the snag

well-known to every orthopaedic surgeon which can be quoted here as examples of how one disease or deformity depends upon an underlying factor, both of which must be considered in the diagnosis and treatment.

A tight heel tendon may throw out the whole mechanism of walking. It may cause limp; may cause back-ache; may cause flat-foot troubles. A short tendon in the neck may cause tilting of the head, distortion of all the features of the face, curvature of the spine and even limp.

CLINICAL METHODS

Before proceeding to a discussion of the various orthopaedic diseases, I propose making a few comments upon the methods of examination of a patient, pointing out the two-sided outlook that the orthopaedic mind has to have in the examination of his patient.

OBSERVATION

A patient may present himself complaining of one limb or one joint giving rise to pain or being swollen. The orthopaedic mind must not only recognise the abnormality but must know more precisely than the average general surgeon about the treatment of that abnormality and how it may affect other neighbouring joints or systems, since often one more deformity produces secondary ones which are not complained of by the patient, but which are nevertheless present all the same and must be treated often by a different method to that of the primary complaint. The orthopaedic surgeon must recognise why such a primary complaint causes these secondary complaints. For example, why should a tight sternomastoid tendon in the neck give rise to a curvature of the lower part of the spine and to ocular troubles? It is no good merely to lengthen the contracted tendon unless suitable methods of treatment are also employed to correct the accompanying secondary deformities. A dislocation of the cervical spine often presents itself, following injury, by the patient noticing pins and needles of the hands, yet that symptom would lead the examiner back to the region of the vertebral column where he would then notice that the head was not set squarely upon the shoulders. Finally, he would notice that the cervical spine was abnormally twisted, and thus he would localise the sensory phenomena of the hands to a shifting of a particular part of the vertebral column—a partial dislocation causing root pressure.

In sciatica, especially in that type caused by pressure or irritation of the roots of the nerve, the patient sub-consciously endeavours to protect and to relax that part of the nerve by putting the

lumbar and gluteal muscles into spasm, giving rise to a homolateral scoliosis of which the patient himself may be totally unaware, and yet when looked for and seen by the examiner it at once shows that he is dealing with a high sciatica and not a low peripheral type—a point which the patient's symptoms in no way indicate.

A patient may complain of back-ache, and when the examiner views the spine he may see a prominent vertebral spinous process indicative of deep seated bone lesion, such as an old fracture, or collapse due to a carcinomatous secondary: on the other hand it may be nothing more than a little prominence due to slight wedging, often seen in early degrees of arthritis in middle and late life. He may fail to see anything abnormal in a patient's stance, and yet that patient will place his hand quite accurately on the site of a lesion. During this war the author has seen many cases, especially in women, of back-ache in which there are no abnormal physical signs and where the posture of the patient on the whole is good, and yet the patient will accurately inform him that the site of the pain is the sacro-iliac joint. Further consideration of the patient's mode of life will reveal that their job entails, under war-time conditions, long hours of standing or long hours of sitting, whereupon the normal vertebral muscles become fatigued and strain is thrown on the normal ligaments which, like any other ligament under strain or stress, gives rise to pain—chronic sacro-iliac strain.

LIMP

A patient often presents himself complaining of limp, or the examiner may himself detect a slight limp. The causes of limp are manifold and its evaluation involves a knowledge of the various diseases which may affect the whole of the skeletal system. In examining a patient with limp it is essential to have that patient completely stripped of clothes and to see whether that limp is caused by a deformity of one or other limb, a shortening of one or other limb, failure of the muscles to control that limb, or a protection by the muscles of that limb against movement of the limb or neighbouring part. In analysing a limp I always walk the patient the length of a room several times, noting the above points. Then having the patient face the examiner, notice whether there is any obliquity of the pelvis as shown by the level of the anterior superior iliac spines. If one spine is lower than the other, that patient must have some shortening of the limb due either to disease or damage of the bone or dislocation of one of the joints; though, that limb is also wasted, an old-standing partial paralysis in the growth period will cause a hemi-

atrophy. If the iliac spines are level, turn the patient round and view the back. Ask him to stand first on one leg and then on the other, and note the position that the gluteal folds adopt—in other words, test for that old friend Trendelenberg's sign. In student days one was taught to associate this sign mainly with displacements of the hip in childhood, but it should be remembered by the expert that any abnormality or weakness of the muscles or bones about the hip joint causes this sign. Ask the patient to run the length of the room, ask him to hop first on one leg and then the other and note as to whether he complains of pain or produces evidence of limp. One teacher of mine used to preach that if a child could run, hop, and jump without complaint or showing limp it was unlikely that there was any disease in that limb. The truth of this dictum I have proved continually at my out-patients of a large children's hospital where every week I am confronted with mothers complaining that their child has had a pain in the leg or does not walk as it should.

A limp may be caused by one of the joints of the limb being out of order due to sprain, disease, or displacement. Usually a patient knows which joint is not functioning correctly. Many limps are caused by weakness of muscles due either to disease or to atrophy. An early case of infantile paralysis will walk with a very slight limp and yet the examiner will not notice any wasting or any loss of muscle strength. Yet, when that child is seen three months later both are obvious. Surely this is on account of the fact that there is already some dysfunction or protective spasm of these muscles, which may at a later date become obvious. Any person who sustains an injury to a joint very rapidly suffers from wasting of the muscles working that joint, and this wasting persists for a long time after the disablement of the joint has been corrected. I recently saw a man whose hip had been stiffened operatively for osteo-arthritis, but the girth of that man's thigh muscles was two-thirds of his other side, and yet he had been leading an active life and walked with little limp, so good was his compensatory spinal mechanism.

As noted above, a patient with sciatica often has a limp. That limp may well be due to actual weakness of the muscles of the buttock or leg due to the neuritis. It may, as noted above, be due to spasm of those muscles protecting the nerve, and then these muscles will show little wasting, only that of slight disuse.

WASTING

Examination of the stripped patient is most useful for detecting minor degrees of wasting which would not be noticed if that patient only

exhibited one limb, and standing at a distance or alteration of the examiner's light will often reveal wasting that would otherwise not be seen. Wasting of muscles may be due to disease or disuse, and is very often a key sign in the early diagnosis of what later is going to be a serious disease.

A knee joint which has been slightly swollen for many months may first show its true character—that of a tubercular joint—by the persistent wasting, in spite of the fact that these muscles have been given physiotherapy to strengthen them. Wasting of the gluteal muscles is a very useful early sign of a tubercular hip, when the patient is seen at that stage and when the X-rays show little signs of the disease. Perthe's disease of the hip will cause limp and pain, but there will not be much muscle wasting as compared with an early tubercular hip. Wasting is, thus, often a useful sign in differential diagnosis where the disease is too early to be shown by an X-ray. Often at first sight a knee joint appears swollen both to the examiner and to the patient, and yet if that patient is examined at a distance it will be seen that this swelling is apparent and that really the patient has slight wasting of the muscles of the thigh. The finger joints may be swollen due to trauma and are thereby not used, but there will be little wasting. On the other hand, should there be wasting of the muscles of the clefts of the fingers one may be dealing with an early case of rheumatoid arthritis when the trauma is merely incidental. Thus wasting is seen to be something much more important than merely a sign which is present or absent, and often leads the examiner to examine some part other than that of which the patient was complaining.

COMPARISONS

As noted above, in discussing wasting very often an examination of both sides of the body will help the examiner to come to a true diagnosis. If a patient presents himself with a swollen finger joint the probability is that one is dealing with a joint which has been injured by trauma or is the seat of a toxic infection. On the other hand, though the patient may only be complaining of one joint, the other hand reveals similar swellings of the finger joints, then it is much more likely that the patient is suffering from a rheumatoid arthritis, though the degree of the swellings of this hand are such that the patient himself has not as yet had his attention drawn to them on account of pain.

Often one is consulted by patients on account of foot troubles or corns, and when the foot is examined it is noted that the toes are clawed and that the arch of the foot is higher than normal. The other side should be examined. If the condition is confined to one foot only, a fairly correct

assumption may be made that the cause of the clawing is due to a mild infantile paralysis in early youth. If, on the other hand, the condition is found to be bilateral then it may be indicative either of hereditary deformity of no consequence, or it may be an indication of a more wide-spread and more deep-seated nervous disease such as disseminated sclerosis. Again, wasting of the cleft between thumb and first finger, indicative of wasting of the interossei muscles, may be caused by an unilateral ulnar neuritis or a one-sided cervical rib. But should the examiner find evidence of wasting of the other side also, then at once his mind must shift to a more deep-seated disease such as syringo-myelia. Thus it is seen that comparison is a most important subject in the diagnosis of orthopaedic conditions, not only to note whether one side or other is abnormal but, as demonstrated above, the nature of the underlying disease may be entirely altered.

TOUCH

Much may be learnt by touch of the examiner's hand. By this I do not mean such simple things as the diagnosis of inflammation, but often a patient complaining of a slight limp or having slight clawing of the toes and complaining of foot strain may, on examination by the examiner's hands, reveal a slight difference in temperature of the two limbs. Thus the diagnosis of infantile paralysis is established instead of a diagnosis of foot strain, flat foot, or some other symptomatic diagnosis. Difference of temperature, moisture of the skin, may give the examiner much useful information as to the degree of recovery of a nerve after suture or damage. The examining hand rubbed over a limb can appreciate the tone of the underlying muscles, and often the patient may complain of tiredness and pain in a foot and yet, when the examiner asks him to perform individual joint movements, the power of movement is normal and there is little wasting to be seen. Yet that skilled hand will appreciate a slight diminution of tone which again may be indicative of anything from over-use or to some nervous disease.

Often the examining hand can appreciate that one part of a large muscle, such as the gluteal mass, may have more tone than the rest of that muscle. Such hypertonus often exists around a deep-seated

patch of rheumatic fibrositis. Many patients presenting themselves on account of trouble with joint will inform the examiner that that joint creaks. By dint of practice the sensitive hand of the examiner can elicit on moving the limb whether that creak is inside or outside the joint. He can tell whether that creaking is due to the rough bone surfaces rubbing one over the other, as in arthritis or whether the creaking is due to one dry inflamed layer of synovial membrane separating from its neighbouring fold, as in some types of synovitis. Often, in examining a knee joint which has sustained an injury, the examiner can detect a slight click on flexing or rotating the knee, which the patient had not noticed himself; and yet, when the patient's notice is drawn to it by the examiner, his power of concentration and deep-seated feeling can recognise that click as being different from that which he had previously called a "creak." Thus slight tears of the posterior end of an internal cartilage can be differentiated from the accompanying synovitis which has given rise to the creaking of which the patient may have complained.

Recently I was consulted by a patient who complained that when she flexed her hip she got one noise, and when she extended it she got two noises, both different in sound and feel. The examining hand was able to demonstrate that one click was due to the common slipping of a gluteal tendon and the other two were intra-articular creaks due to osteophytic formation in an osteoarthritic hip.

SUMMARY

Briefly above I have endeavoured to outline what the orthopaedic examination of a patient is more interesting and more widespread than the examination of a patient suffering from, shall we say, tonsillitis or an acute appendicitis. Such conditions have their own signs which are typical and recognition of which is usually easy. In any case the differential diagnosis is concerned with one system of the body only, whereas the diagnosis of such an orthopaedic condition as limp involves a widespread knowledge of muscles, joints, and nerves.

In later articles I propose to deal with the individual joints and discuss their diseases and diagnoses in an abridged manner.