Commonly missed orthopaedic injuries

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CROSSING the road is safe enough—but only for those who always take care. The child who relaxes his vigilance is heading for disaster. The Casualty Officer is in a like condition. Most bone injuries are obvious even to the patient and are easily confirmed by the doctor; but without constant care errors are inevitable and, as with crossing the road, the penalty is high. The object of this short article is to mark the Accident Black Spots: those areas where routine methods of examination must be amplified by a high index of suspicion. But first a few guiding principles—The Casualty Officer's Highway Code.

Of course a careful history and thorough clinical examination are essential in every case. This statement, constantly made, is true but full of clichés and, therefore, ignored. The history really *does* matter, and the doctor must listen patiently as if he had all the time in the world. And when he begins his clinical examination it is a mistake to pounce on the injured part; assessment of the general condition needs to come first; and the local examination which follows must be gentle, systematic and meticulous. Finally X-rays may be needed for diagnostic precision or medico-legal protection. With reasonable care and a strict routine all the injuries described below can be correctly diagnosed—and yet the long list of insurance claims testifies to the frequency with which they are missed. The list is not complete—it never could be—but it contains the most persistent offenders.

The shoulder region

Dislocations

Dislocations anywhere in the body are usually easy to diagnose: the patient feels the joint go out of socket, he holds it immobile, and deformity is obvious. Anterior dislocation of the shoulder is almost never missed (except perhaps in mental patients and epileptics) — in fact, the first-aid worker diagnoses it through a rugby jersey. But posterior dislocation is much less obvious. The deformity may not be apparent unless both shoulders are viewed from above (an unusual but useful method of observation). Even the X-ray is not unambiguous and is often reported as normal;

but some gleno-humeral incongruity is usually visible and the humeral head is abnormal in shape—it often looks curiously like an electric light bulb. The secret in doubtful cases is to demand a lateral film; subluxation or dislocation is then unmistakable (Fig. 1).

FIG. 1. Antero-posterior and lateral views of posterior dislocation of the shoulder.

Fractures

Most fractures of the neck of the humerus present no diagnostic problem; but if the fracture is impacted it can be missed. The patient, often an elderly woman, has fallen and is reluctant to move her shoulder; but with persuasion she can move it, and because it is impacted no abnormal movement is detectable. The temptation is to dismiss the injury as a sprain, and not to bother with X-ray films. What happens? A few days later the patient returns with a reproachful look and an enormous bruise. Because the best treatment is active use, failure to diagnose the fracture is not necessarily serious. Nevertheless ignorance is a poor foundation for treatment. The patient should be X-rayed and told that though the bone is 'cracked' she must at all costs keep her shoulder moving. The sling which she needs for comfort is not to be regarded as a badge signifying immobility but as the starting point for increasingly vigorous use.

Torn supraspinatus

The supraspinatus tendon never tears unless it is degenerate. But in most people aged over 45 years areas of degeneration are present, and a fall or lifting a heavy weight may tear the tendon near its insertion. The patient presents with a painful stiffish shoulder. There may be a little tenderness just below the tip of the acromion process but the X-ray is normal. Again, the condition is often diagnosed as a sprain, despite the fact that the shoulder joint is virtually incapable of being sprained.

The patient's subsequent fate depends upon whether the tendon is partially or completely torn. Differentiation between these is easy: local anaesthetic is injected into the tender area. With a partial tear active abduction is then possible, with a complete tear it is not: the attempt produces no more than a useless shrug, although the arm can be passively (and painlessly) lifted by the doctor. Providing the patient with a partial tear exercises the shoulder he will eventually recover, though the process may take many months. But if a complete tear is missed (and the possibility of repair, therefore, not considered) the situation is quite different. Pain soon subsides; this fortifies the doctor in his error, and he is liable to make reassuring promises of early recovery of power. Such optimism is unfounded. In the absence of operation (though this is by no means always indicated) the weakness will be permanent.

The elbow and forearm

Fractured medial epicondyle

Many elbow fractures need expert treatment, but most are easy to diagnose. An important ex-

ception is fracture of the medial epicondylar epiphysis. When the epicondyle is merely avulsed from the humerus there is also no diagnostic problem, especially if the normal elbow is X-rayed for comparison (always a useful manoeuvre with epiphyseal injuries). Difficulty arises when the epicondyle is not merely avulsed, but is trapped inside the elbow joint. A child presents with a swollen elbow whose movements are considerably restricted, and an X-ray in which no fracture is obvious. But on careful inspection the films show that the elbow joint harbours a 'loose body'—in reality the trapped epicondyle (Fig. 2). If other

FIG. 2. Antero-posterior and lateral views of trapped medial epicondyle.

clues were lacking the diagnosis would be even more frequently missed. The two clues which alert the doctor to scrutinize the films with exceptional care are: (1) the child, aged between 9 and 15 years, has an elbow which is much stiffer than would be expected in the absence of bony damage, and (2) there is usually tingling or numbness along the distribution of the ulnar nerve. Any doubt is immediately resolved by inspecting X-ray films of both elbows in comparable positions.

Fracture-dislocation of the forearm

Fracture of either the radius or the ulna is easy to diagnose and usually easy to treat by closed methods. But the diagnosis may be incomplete: the injury may be more than a fracture—it may be a fracture-dislocation. Unless the dual nature of the injury is recognized treatment is bound to fail.

Two distinct fracture-dislocations, each with Italian eponyms, form a splendidly matching pair.

(1) *Monteggia*: the upper ulna is fractured and the superior radio-ulnar joint dislocated (Fig. 3).

(2) *Galeazzi*: the lower radius is fractured and the inferior radio-ulnar joint dislocated (Fig. 4).

FIG. 3. Monteggia fracture-dislocation—the dislocation was originally missed because the elbow joint was not included in the film.

FIG. 4. Galeazzi fracture-dislocation.

Fracture-dislocation is a strong possibility if only one forearm bone is broken and is considerably angulated—indeed, much angulation is otherwise impossible. But there is only one safe rule—never accept X-ray films of an injured forearm unless they include the entire length of the radius and ulna.

The wrist

Only two wrist injuries are diagnostically difficult, but between them they provide much grist for the medico-legal mill.

Fractured scaphoid

Most doctors are familiar with the patient who hurts his wrist and whose X-ray shows an old ununited fracture of the scaphoid. With prompting he recalls an injury many years previously which he or his doctor ignored, supposing it to be merely a sprain. He may even have been X-rayed but told there was no fracture.

Unfortunately the clinical signs of a fractured scaphoid (pain on wrist dorsiflexion, tenderness in the snuff box, and weakness of grip) can all be mimicked by a sprain; unfortunately it is not always easy, unless the X-rays are of high quality, to detect a hair-line fracture in the scaphoid; and still more unfortunately the symptoms usually subside, allaying suspicion.

To avoid these mistakes there is only one safe rule: the diagnosis of wrist sprain should never be accepted until a fracture has been excluded by adequate radiography. Antero-posterior and lateral views are not enough—the fracture may show only in oblique projections (Fig. 5). Even if these fail to show a fracture the patient should be re-examined 2 weeks later; if any abnormal signs persist further films are taken. Only if these show no fracture is it safe to assume that the wrist was merely sprained.

Dislocated lunate

This is a puzzling diagnostic pitfall, because once they are pointed out the signs are so obvious. Two features combine to mislead. First, the wrist is too swollen for displacement to be clinically apparent; and second, there is usually no associated fracture. How many doctors can recall the precise shape and relations of all eight carpal bones? and even the radiologist may nod. In fact, the X-rays are unmistakable. In the antero-posterior view the normal lunate has a roughly quadrilateral appearance; the dislocated lunate looks pointed and almost triangular. If the normal wrist also is X-rayed the difference is immediately obvious (Fig. 6). Lateral films not only confirm the diagnosis but also differentiate a dislocated lunate from a perilunar dislocation of the carpus.

FIG. 5. The fractured scaphoid shows clearly only in the oblique film.

FIG. 6. Dislocated right lunate compared with the normal.

A presumptive diagnosis of dislocated lunate can usually be made on clinical grounds. The displaced bone projects into the carpal tunnel, so that median nerve tingling or numbness is common and finger flexion is restricted. With these signs and X-ray films of both wrists the diagnosis should never be missed.

The hip region

Fractured neck of femur

The old lady who stumbles, falls and is then unable to lift her leg almost certainly has fractured the neck of her femur; there is no diagnostic problem (though frequently a geriatric one). But if the fracture is impacted, she may well be able to lift her leg and to walk. She may not even see a doctor, and if she does the paucity of signs is deceptive. Unless the hip is X-rayed this injury is undiagnosable. Does missing it matter? It used to be thought that these impacted fractures always joined without treatment—but this is not the case. A few days later some disimpact and then become displaced. Treatment at this stage is more difficult. Consequently all hip injuries, however trivial, should be X-rayed and if there is an impacted fracture it should be fixed internally without delay.

Almost the reverse problem is posed by the patient with a story of hip injury, unable to lift her leg, but whose X-ray shows an intact femoral neck. If careful study of antero-posterior and lateral films rules out even the possibility of a fractured neck, the ischio-pubic ramus should be scrutinized. The detection of a fracture in this region is a satisfying solution to the puzzle; and the patient can be reassured that within a few days she should be able to walk perfectly well.

Slipped epiphysis

Whereas a fractured neck of femur is only occasionally overlooked, a slipped upper femoral epiphysis is regularly missed. In one published series the average delay between onset of symptoms and correct diagnosis was no less than 17 weeks. The fat, undersexed, pre-pubertal child is such an excellent candidate for this important injury, that, no matter how trivial the symptoms (and the only one may be an occasional ache in the thigh or knee) X-ray films of the hips are essential. Of course if the leg is short, externally rotated, and has limited abduction and internal rotation, there is no diagnostic difficulty. But in most patients the slipping is gradual and in the early stages the signs are minimal. The all-too-familiar story of a 'sprain' after running or jumping bedevils diagnosis, and the apparent recovery which follows invites procrastination. It is never

safe to diagnose a hip sprain which, like a shoulder sprain, is very rare (if, indeed, either ever occurs). Any hip complaint in the pre-pubertal period, even if the child's build is quite normal, demands X-ray. Even then the diagnosis is frequently missed because, in the early stages of slipped epiphysis (when it is easy to treat successfully) the changes in the antero-posterior X-ray are by no means obvious. It is imperative not only to include both hips on the film for comparison, but also to insist upon lateral views of both hips (Fig. 7). These are devoid of ambiguity and only if they are insisted upon will the sad sequel of severe slipping be avoided.

FIG. 7. Antero-posterior and lateral views of slipped left femoral epiphysis.

The knee

The locked knee

Surprisingly enough the diagnosis of locked knee is often missed. The fact that the knee has been injured is obvious enough, but the vital point that it still is locked may pass unnoticed. The explanation is partly semantic and lies in the meaning of the word 'locked'. A locked door is fixed and immobile. A locked knee is not; it bends fully (or almost fully) but lacks extension. Moreover, it sometimes lacks only the last three or four degrees of extension. The normal knee can be straightened fully with a convincing snap; even slight loss of extension is easily recognized by the springy elastic feeling when passive extension is attempted. The impression that something is jammed in the joint is quite accurate, because the usual cause is a torn meniscus jammed between femur and tibia. The diagnosis can usually be confirmed by localized tenderness over the joint line. It should not be supposed that because loss

of extension is slight the diagnosis of locking is mere clinical pedantry. The knee must be unlocked; and if closed manipulation is inappropriate or ineffective, operation is needed with the least possible delay.

There are, of course, other causes of locking, so that an X-ray is necessary. One condition which mimics the torn meniscus is a fractured tibial spine; this is revealed by the X-ray but unless specifically sought for the abnormality can elude detection.

Dislocated patella

While a patella is actually dislocated the diagnosis is manifest. The patient, usually a young girl, falls to the ground quite unable to save herself. As a rule the knee is considerably flexed; it is held quite immobile and looks the wrong shape. The patella lies on the lateral aspect of the knee. The prominence caused by the uncovered medial femoral condyle can mislead the observer into supposing that the patella has dislocated medially.

Often, however, the dislocation reduces spontaneously or with the help of a bystander. Then the true diagnosis may easily be missed. The history that the patient could not save herself from falling should be sufficient to alert the doctor; confirmation is obtained by the 'apprehension test'. The patient's knee is flexed with one hand while the patella is gently pushed laterally with the other; if this manoeuvre causes the patient apprehension the test is positive. During the test the patient recognizes the unpleasant sensation of a patella about to displace and is naturally apprehensive that dislocation may follow.

Ruptured tendo achillis

The weakness which in Achilles himself was attributed to his having been held by the heel

while being dipped in the protecting waters, exists in all of us. The tendon is so thick that its centre is liable to be avascular; through the avascular area rupture may occur, especially in people aged 40 years or over. A favourite occasion is the Father's match at school. The patient is convinced that he has been struck just above the heel and may be aware that the tendon has ruptured. But the doctor may assure him that the rupture is only partial, or that only the plantaris tendon is torn. It is doubtful whether the tendo achillis ever tears only partially, and even more doubtful if the plantaris can be torn; with the characteristic history the patient has either torn the soleus muscle in the mid-calf, or has completely ruptured the tendo achillis just above the heel.

Why is the diagnosis of complete tendon rupture so often missed? The likely explanation is that blood fills the gap between the ruptured ends, and the patient by using his long toe tendons is able (though weakly) to plantarflex the foot. But the gap about 1½ in. above the insertion can usually be palpated, and weakness of plantarflexion always detected. Simmonds' test, however, establishes the diagnosis beyond doubt. The patient lies prone on a couch with both feet protruding beyond its end. On the uninjured side the calf is squeezed; this results in the foot plantarflexing. When the calf on the affected side is squeezed no movement of the foot takes place because of the tendon rupture. The test also differentiates a ruptured tendon from a torn soleus. This muscle tears at its musculo-tendinous junction causing tenderness in the thickest part of the calf; consequently squeezing the calf is distinctly uncomfortable. Moreover, the gastrocnemius is still intact, so the foot does plantarflex when the calf is squeezed. It is important to differentiate the two conditions because a torn soleus is treated conservatively whereas a ruptured tendo achillis needs operative repair.