SOME ERRORS IN FRACTURE TREATMENT

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Introduction
In the Army most of the unsatisfactory results, following skeletal injury, ultimately arrive at the Royal Herbert Hospital. Frequently the unsuccessful end result is due to the severity of the initial injury; but sometimes it is undoubtedly due to an error in early treatment.

Many surgeons have visited their patients here and have suggested that, as they themselves were able to see only the start of the race and so were ignorant of the outcome, some of these errors should be described as seen by the finishing post observer.

Hence these brief notes have been compiled, together with the plea that in awkward cases, the sooner they are referred the better.

Fracture Problems
The treatment of the acute fracture will determine the ultimate function. Secondary orthopaedic procedures are seldom better than salvage operations and if accurate reduction is difficult to achieve primarily, it will be impossible as a late secondary procedure when absorption of bone and callus formation have occurred (Fig. 1(a) and 1(b)).

1. Traumatic Shock
It is not my concern to write about resuscitation, head injuries, abdominal or thoracic injuries. The excellent recovery of many seriously injured patients attests to the surgical skill in these departments. The treatment of the patient’s fractures at the same time as his more serious injuries should not be forgotten, as it will not usually hinder his ultimate recovery. It is embarrassing to everyone concerned to find that fractured femurs have fallen into “Chaplinesque” external rotation while the patient’s life has been saved or that his Colles fracture is now quite impossible to reduce.

2. Skin Cover
Unless the skin is healthy and preferably intact, surgery on the bones must be postponed. The main object is to achieve healthy skin cover. This problem occurs most commonly with the fractured tibia. When simple measures of debridement, delayed primary suture and split skin grafting were used, definitive surgery was seldom delayed, but when complicated and ambitious measures such as rotation flaps, relieving incisions were used, these often lead to further skin loss and serious delays in skin healing (Fig. 2).
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Figure 1. Early open reduction would probably have achieved a far better reduction than was possible ten weeks after the injury. Nevertheless, from a completely stiff and painful elbow, a range of 80°–110° painfree movement was obtained after operation.

Figure 1(a). Before operation. Figure 1(b). After operation.

Figure 2. A badly planned rotation flap, based distally, was doomed to failure.

Figure 3. The lateral tibial cortex is more difficult to approach than the subcutaneous border. This plate, with three screws and three broken drills, added nothing to the stability of the fracture which went on to non-union.
3. Internal Fixation

Many fractures seen here had already been treated surgically and most of these required no further operations, uniting rapidly. However, a small number had developed non-union after operative treatment and the reasons for failure were usually inadequate fixation, some examples were:

(a) There was failure to engage both cortices with screws or the use of too small a plate with too few screws (Fig. 3).

(b) The Egger's plate is popular in certain Service hospitals and is usually used with four screws. A high proportion of the fractures seen here which had been treated in this way did not unite and it was necessary to graft them (Fig. 4).

(c) Intra-medullary fixation with the Kuntscher nail or Rush nail is a very valuable form of treatment for certain types of cases. However, in the tibia neither the Kuntscher nail nor the Rush nail can adequately prevent rotation and, particularly with the Kuntscher nail, angulation of the fracture may occur (Fig. 5).

4. Fractures of the Lower Limb

Plating on the lateral or posterior aspects of the tibia is sometimes necessary when scarring over the sub-cutaneous border is present. But mechanically the subcutaneous border is preferable, as the posterior soft tissue hinge balances the fixation on the sub-cutaneous border and it has the merit of being easy.

Internal fixation of fractures of the medial malleolus and diastasis associated with fractures of the malleoli is often necessary to secure good anatomical alignment and function. Diastasis as a single cause of symptoms is uncommon and widening of the mortice of the ankle joint is more often due to failure in securing reduction of fractures of one or both malleoli. Rupture of the strong inferior tibio-fibula ligament alone is extremely rare. The fractured medial malleolus should be fixed by a screw passing at a right angle to the fracture line and diastasis associated with fracture of the fibula by a screw having only a slight upward inclination.

Fig. 6 shows an almost horizontal self-tapping screw which cannot possibly achieve or hold a satisfactory reduction. A Lane's wood screw is preferable as it will compress the malleolus onto the tibia; but it must be at right angles to the fracture. Fig. 7 shows a screw placed at 45 degrees to reduce an isolated diastasis. Firstly this is a most unlikely lesion and, secondly, the screw should have only a slight vertical inclination and should be placed immediately above the ankle joint.

Femoral fractures do not often give trouble. The majority of fractures in the femoral shaft are satisfactorily dealt with by intra-medullary nailing unless the fracture is in the supra-condylar region or lower third of the shaft. Difficulties here are far less common and can usually be ascribed to the use of too narrow a nail. A nail with a diameter of 3/16" is usually required and anything smaller than a 3/16" nail in the average adult is liable to bend or fracture. Fig. 8 shows that too short a nail does not secure three-point fixation.

A number of cases have occurred where flexion of the knee was seriously impaired by adherence and fibrous change in the vastus intermedius. The worst cases of this
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Figure 4. This fracture of the tibia was ten years old and four operations had already been performed. The Eggers' plate shown did not provide secure fixation. The fracture eventually united after the insertion of a further bone graft, supported by an eight-hole Lane's plate.

Figure 5(a). The fractured tibia has taken up the curvature of the Kuntscher nail.

Figure 5(b). Same case as (Fig. 5a). One year later, union on the medial side of the cutex is delayed.

Figure 5(c). A Rush nail cannot fix the fracture without plaster support.
Figure 6. An unsatisfactory screw for a fracture of the medial malleolus. See text.

Figure 7. This screw is badly placed for the correction of a diastasis. See text for recommended procedure.

Figure 8(a). A ¼ inch Küntscher nail was inadequate to support this fracture.

Figure 8(b). Even when a ½ inch nail was substituted, the nail fractured six months later.
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condition so far have occurred with anterior exposure of the femur. It seems reasonable to minimise the damage to the quadriceps by employing a lateral exposure.

Fractures of the neck of the femur were not often seen in young people; but occasional cases of non-union do occur, even when the initial pinning of the fracture appears to have been faultless. A case occurred (not in a Service hospital) where pinning was performed though preliminary reduction had not been achieved, and here the pin was instrumental in preventing union. This case was dealt with by further reduction which was held by a Charnley compression screw (Fig. 9).

Dislocation of the hip without fracture can usually be reduced without difficulty by the method of circumduction. Fracture dislocation requires open reduction if the acetabular fragment is large. Lateral X-rays of the hip are notoriously difficult to read but if the AP view shows a femoral head which looks small in comparison to the acetabulum or appears to stand out from it; then the reduction is incomplete and the head usually lies posteriorly. Fig. 10 shows such a case. It was twelve weeks before this case was evacuated home and by then the chance of successful surgical reduction was lost.

5. Fractures of the Upper Limb

The serious nature of fracture dislocations of the interphalangeal joints with avulsion of flexor tendon insertion is not always realised. Unless early open operation is performed and the small fragment replaced, a permanently stiff and painful finger is likely to result.

Ruptures of collateral ligaments in the fingers or of the ulnar collateral ligament of the thumb are not difficult to repair if operated on early. Late repair, however, is seldom successful and arthrodesis sometimes has to be resorted to.

Dislocation of the lunate of the peri-lunar variety may be missed on a radiograph but the severe disability of the wrist joint should make the surgeon realise that this is not just a sprain. Two patients with this condition were evacuated months after the original injury, when the hope of a good result had gone and arthrodesis had to be performed on one case.

Fractures of the head of the radius have been treated with commendable conservatism. However one case was received where an intact head of radius had been excised to reduce an anterior Monteggia fracture-dislocation. While excision of the radial head is justifiable in an old unreduced Monteggia, to sacrifice a normal head of radius in an acute case is counsel of despair (Fig. 11).

Fractures of the shaft of the humerus usually give little trouble. Two cases, however, were seen with non-union both resulting from the use of a heavy "hanging-cast".

Summary

This account is intentionally brief and not a synopsis of fracture treatment. I have only covered the more common errors in technique seen. I would like to reiterate that the cases mentioned above are not representative of the majority of those evacuated—they are the exception. But if they illustrate the points I have tried to make, they will have served their purpose.
Figure 9(a). This fractured femoral neck was fixed in displacement.

Figure 9(b). The nail was removed and after reduction, the fracture was secured by a Charnley Compression Screw.

Figure 10. This fracture-dislocation of the Left hip is not reduced. The femoral head appears smaller than normal and stands out from the acetabulum. Early open reduction should have been performed.
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Figure 11(a). Fracture-dislocation of the elbow with an intact radial head.

Figure 11(b). Even after the sacrifice of an intact head of radius and introduction of a Rush nail into the ulna, the fracture-dislocation has not been reduced.