

## CHAPTER SIX

### FRACTURES OF THE SHAFT OF THE HUMERUS

**A** FRACTURE of the shaft of the humerus is perhaps the easiest of major long bones to treat by conservative methods. The humerus is a bone which generally unites quickly. If some shortening results it is of no significance. If some angular deformity persists it is usually concealed by muscle covering. If angular deformity persists it is concealed in the flexed position of the elbow and becomes revealed only when the elbow is fully extended (a position in which the elbow is rarely viewed in ordinary postures of the body). These are facts which must be remembered when any elaborate or operative method for treating this bone is under consideration.

#### **Sling or Collar and Cuff**

It is surprising how few people realise the fundamental difference in the mechanics of a sling and a 'collar and cuff.' Few realise that the two are diametrically opposite in their mechanical action on the humerus, shoulder, and shoulder girdle.

A sling elevates the point of the elbow and thus applies a vertical *compression* force in the length of the humerus and on the shoulder joint. It must not therefore be used when treating a fracture of the humerus because it will cause overriding and lateral angulation.

A collar and cuff allows the weight of the elbow to generate a traction force on the shoulder and it tends therefore to elongate the humerus.

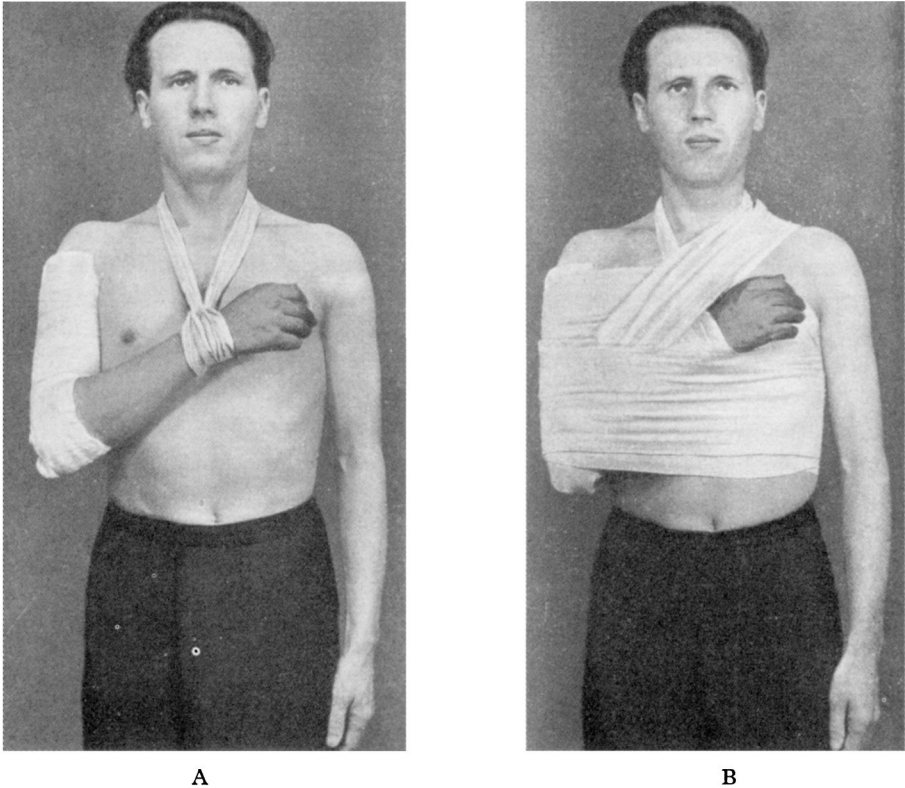
When treating fractures of the humerus a collar and cuff must be used. When treating fractures of the clavicle and dislocation of the acromio-clavicular joint, where it is necessary to elevate the shoulder, a sling is required.

#### **Oblique or Comminuted Fractures of the Humerus**

These can be adequately treated by nothing more elaborate than a U-shaped plaster slab, and a collar and cuff applied to the wrist with the arm bandaged to the side of the body with circular turns of a flannel bandage (Fig. 74, A, B). This simple method tends to be despised by those who fear permanent stiffness of the shoulder; but in young adults serious shoulder stiffness is not a frequent complication. This method of fixing the arm to the side of the chest was widely

## THE CLOSED TREATMENT OF COMMON FRACTURES

adopted in the Middle East Force in 1941 for gunshot fractures of the shaft of the humerus; for purposes of transport the whole arrangement was made even more compact by applying plaster of Paris over the flannel bandage. When first used in this way it was only intended as a first-aid measure, because the transport of wounded with the arm abducted in a plaster spica was found to be impossible,



A, First stage of treatment of a fracture of the shaft of the humerus. The U-shaped slab is bandaged in position and collar and cuff applied.  
B, Second stage. Encircling body bandage of domette applied.

but many surgeons continued to use it as a definitive method because the results were good and the method simple.

In contrast to this method, the more popular 'hanging cast' method is open to serious mechanical criticism. In the first place the *hanging cast readily produces over-distraction of the humerus* (Fig. 75, A, B), though it would be more correct to say that it reveals the extensive tearing of soft parts which is impossible for distraction and for delayed union. In the second place the upper margin of the plaster, lying between the chest wall and the inner side of the arm, acts as a fulcrum and tends to induce lateral bowing at the fracture. *Lateral bowing can be prevented by bandaging the arm against the side of the chest*, a procedure which

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tends to cause medial bowing (Fig. 76, B). The hanging cast does not allow the shoulder joint to be exercised through any significant range, therefore exercise of the shoulder cannot be argued either in its support or against it.

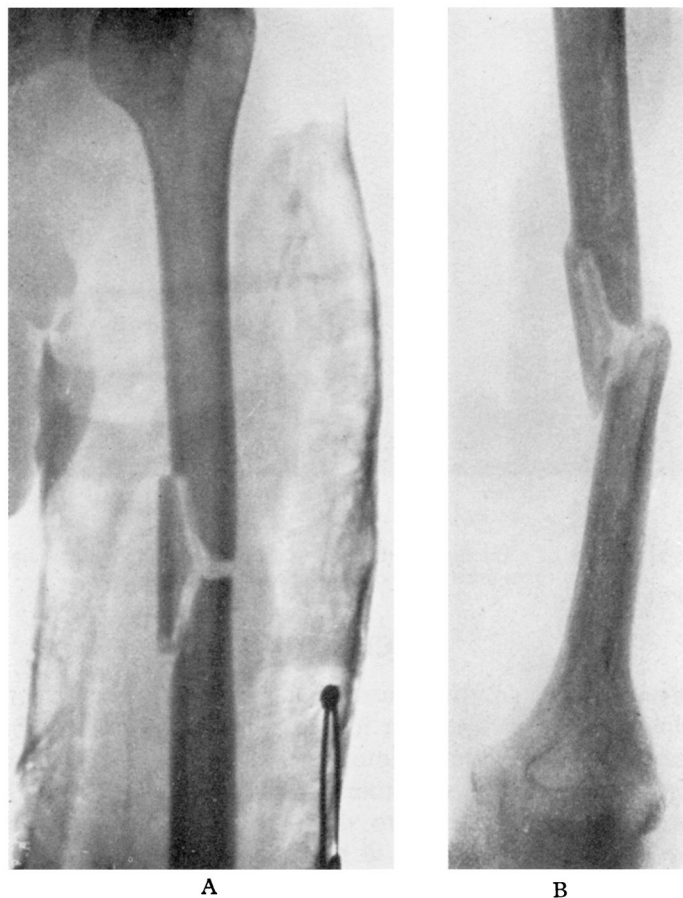


FIG. 75

A, Over-distraction of a fracture of the humerus produced by a hanging cast. This indicates extensive tearing of soft parts and delayed union can be predicted.

B, Result at four months showing complete absence of callus and late deformity.

### Transverse or Blunt Oblique Fractures

These fractures of the humerus, unlike the oblique fractures, will usually require manipulative reduction; in doing this two details of technique are important, namely :

1. Synergic use of gravity, obtained by putting the patient in the sitting position.
2. Local anæsthesia, in order that the patient is able to sit.

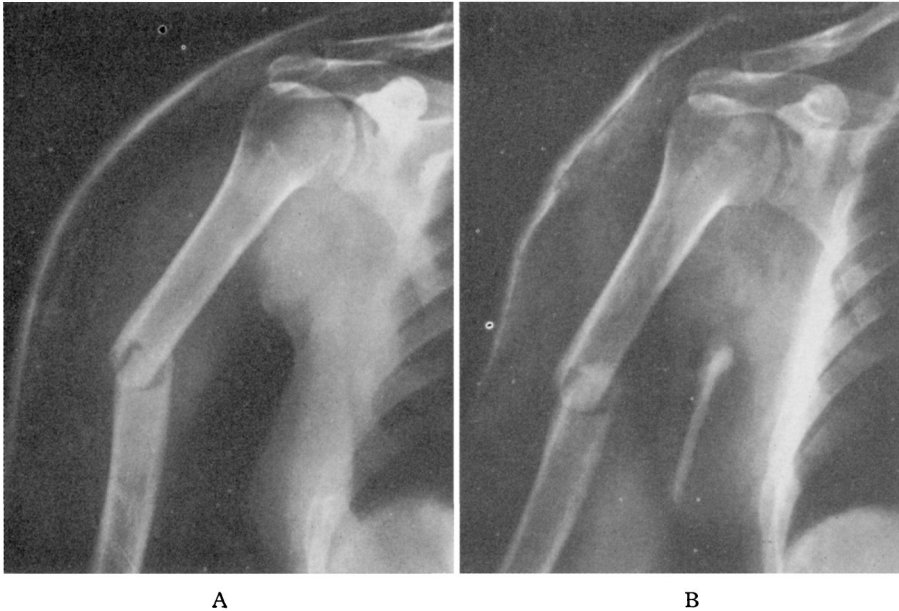


FIG. 76  
 Showing lateral bowing of a fracture of the mid-shaft of the humerus, and how bandaging arm firmly to the side improves position.

### TECHNIQUE

A transverse fracture of the humerus is particularly suitable for reduction under local anæsthesia, provided that it is not more than two or three days old. The local anæsthetic is introduced into the fracture site (20 ml. of  $\frac{1}{2}$  per cent. Procaine) after entry into the hæmatoma has been checked by the re-aspiration of bloodstained anæsthetic back into the syringe. It is important to secure confidence by *giving this injection with the patient lying flat*, so that he has no inclination to faint; the subsequent painless manipulation, instead of being an ordeal, becomes a pleasant surprise when he sits up.

The patient is made to sit on a low stool, while an assistant steadies the shoulder by applying counter-extension with a looped towel passed under the patient's axilla; this towel may be conveniently hitched to a wall hook and the assistant thereby eliminated. An assistant now holds the patient's hand so that the forearm is horizontal and the surgeon applies a downward pull to the distal fragment by holding the epicondyles (Fig. 77). After moulding the fracture he tests whether the fracture is 'hitched' by its behaviour on applying an upward telescoping force on the lower fragment. If telescoping shows that overriding has not yet been overcome, the method of reduction by first increasing the angulation can be tried. The initial angulation in this fracture is concave posteriorly, owing to the superior tone of the triceps, and therefore the manipulation is to be based on the supposition that the soft-tissue 'hinge' lies on the

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dorsal aspect of the bone. All these manipulations should be done carefully to avoid damage to the musculo-spiral nerve.

If a reduction is obtained the surgeon maintains his hold of the epicondyles while an assistant applies a U-shaped plaster slab to the arm and a collar and cuff to the wrist; and the whole upper extremity is then bandaged to the side of the

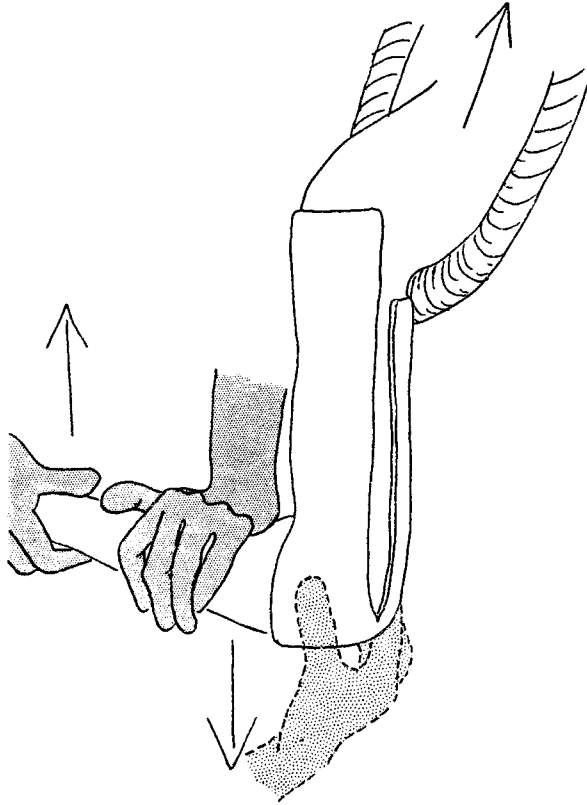


FIG. 77

Reducing a fracture of the humerus by downward traction and counter-traction against a loop of towel in the axilla. The circular wet gauze bandage is applied over the wet slab in this position and the limb adducted when the cast has set.

chest for four weeks (Fig. 74, B). It is important during the application of the U-shaped slab that the forearm should be held across the front of the chest, because the U-slab will not fit well if applied with the forearm externally rotated.

### Post-operative

After four to six weeks the circular turns round the body are discarded and shoulder movement is started. A close-fitting U-slab is retained as a guard for the next two or three weeks.

*Distraction*

If a fracture of the shaft of the humerus shows distraction of the bone ends under the gentle traction of conservative methods it is evident that soft tissues have been seriously torn and delayed union can be suspected. It is therefore wise to proceed with a bone-graft without undue delay if the fracture is still freely mobile at eight or ten weeks.

**RADIAL NERVE PALSY**

In fractures of the humerus complicated by paralysis of the radial nerve, except in those cases caused by the penetrating missiles of warfare, complete recovery without operative treatment is likely. It is important, however, that



A



B



C

FIG. 78

'Lively' splinting (Capener) of fingers in radial palsy. This improvised method, using plaster and Kirschner wire, suffices until a detachable Brian Thomas splint can be obtained.

the fingers should be kept mobile during the period of recovery, and to do this some form of 'lively' splinting (Capener) is *essential*. A convenient method of applying this in default of specially constructed apparatus is illustrated (Fig. 78, A, B, C). The springs are made from Kirschner wires of appropriate thickness.