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TREATMENT OF FRACTURES OF THE SHAFT OF THE HUMERUS

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Under the present system we have had the opportunity of seeing patients on whom primary reduction and fixation of a fractured shaft of humerus had been performed elsewhere. Many of these cases have had time and care spent on elaborate methods of fixation, with disappointing results. Commonly, some form of abduction splint or plaster has been used. We have also heard from individual surgeons, who express dissatisfaction with these and other popular methods of treatment.

The three-splint method, with collar-and-cuff sling, which will be described later, has given consistently good results for many years, and would appear to have considerable advantages over methods which employ the abducted position. Before describing the method and the principles which underlie its use it is interesting to review the more usual ways of treating the fractured shaft of the humerus.

Usual Methods of Fixation

Methods of fixation may be divided into two types: (1) abducted or semi-abducted positions, where gravity acts adversely on the position of the fragments; (2) arm-by-the-side positions, where the force of gravity assists in reduction and in maintaining position.

Abducted or Semi-abducted Positions

The shoulder spica, abduction frame, and Thomas arm-splint all fall into the first group. The shoulder spica is not easy to apply while maintaining accurate reduction of the fracture. It does not always hold reduction when applied for an oblique fracture, and it is unnecessarily inconvenient for the patient and surgeon when simpler methods are as efficacious.

The abduction frame requires constant attention, and should it slip or sag considerable displacement of the fracture will occur. In the case of oblique fractures skin traction is not to be relied upon, and skeletal traction, by means of a pin or wire through the olecranon, is often used with the abduction frame. Such traction has been shown to cause non-union and, if a pin is employed, elbow stiffness or worse. It is hard, under any circumstances, to justify skeletal traction in the treatment of a fresh fracture of the humeral shaft.

The Thomas arm-splint requires recumbency, which of itself is a disadvantage. With this splint traction must be used, and may lead to non-union or malalignment if the carrying angle is not watched carefully.

All of the above methods may give excellent results under the care of the individual surgeon, but in present circumstances, when evacuation of casualties is often essential, they are cumbersome and frequently fail to hold the fragments in a reasonably good position. The Thomas arm-splint is especially difficult to manage in transport, as the arm must stick out at right angles to the patient.

Arm-by-the-side Positions

Arm-by-the-side methods, where advantage is taken of the force of gravity, include the hanging cast, the U-shaped plaster

slab and sling or collar and cuff, and the three-splint method with collar-and-cuff sling.

Use of the extension hanging cast is discouraged for two reasons—its very weight may succeed in producing non-union, and there is less immobilization in a hanging cast, which extends only to the axilla, than in a simple sling. Constant rotary and lateral strain must occur at the fracture site.

The U-shaped slab of plaster, extending from the axilla over the elbow and on to the shoulder, has a superficial resemblance to the three-splint method, but differs in two respects. The slab of plaster is usually closely moulded round the arm without padding, and the ultimate alignment of the humerus is determined the moment the plaster hardens. Metal splints can never be in such intimate contact with the arm, but, being straight, they encourage the normal straightness of the humeral shaft during healing of the fracture. The other essential difference is the support afforded by the continuation of the plaster around the elbow. The amount of support obviously varies with the firmness of the bandage round the upper arm, but in many cases where the bandage is reapplied at intervals it is thought to be considerable.

Three-splint Method

Figs. 1 and 2 illustrate two cases of fracture of the humerus treated by the three-splint method. The materials required

FIG. 1a.—Fracture of shaft of humerus five weeks after injury. Position on admission in Thomas arm-splint. Two unsuccessful attempts at reduction had been made, using an arm plaster to the axilla and a thoraco-brachial cast, before resorting to the Thomas arm-splint. FIGS. 1b and 1c.—Antero-posterior and lateral views of the same fracture a few days after adoption of the three-splint method. A grafting operation was necessary to secure union.

are: three metal gutter splints—approximate sizes, 3 in. by 20 in., 3 in. by 8 in., 2 in. by 5 in.; wool padding and adhesive strapping; two 6-in. calico bandages; collar-and-cuff sling. The splints may equally well be replaced by Cramer wire or plaster.

The splints are suitably padded and applied as in Fig. 3. It should be noted that the longer splint, on the lateral aspect, is twisted so as to lie away from the lateral epicondyle, and bent so as to lie over the acromion process. The splints are first fixed with two encircling bands of adhesive tape, and then

use of an ordinary arm sling to avoid the occurrence of non-union.

Unreduced Fractures Several Days Old.—Inevitably, in the present war, we will be faced with fractures that have not received adequate surgical attention for some days. The shaft of the humerus, without other injuries to prevent the erect posture, will come to little harm in a sling, but if the patient is recumbent considerable angulation and shortening may occur. We have seen several such fractures, and reduction has been impossible without some form of traction. A 3-lb. weight, held immediately beneath the olecranon process in a few turns of plaster bandage, has been

FIG. 2a.—Fractured shaft of humerus on Cramer wire abduction frame, with wire traction through the olecranon. Position on admission. FIGS. 2b and 2c.—Final result following immobilization with three splints and collar-and-cuff sling.

FIG. 3.—Front and back views of splinting for fractured shaft of humerus before application of bandage. Note method of bending the lateral splint.

bandaged over. Finally, a bandage in the form of a shoulder spica is applied, and the wrist is suspended by the collar and cuff, with the elbow at right angles. On no account should an ordinary sling be used, as this prevents the weight of the arm from acting on the fracture. For the same reason care should be taken to see that the shirt or other garment is not so arranged as to have the effect of a sling. No special attempt at reduction is made beyond the correction of any gross deformity. The patient is not confined to bed, and for the first two weeks he should be well propped up at night so that the arm is constantly vertical. Radiographs taken immediately after the application of splints will probably be disappointing, but five days later excellent position will have been obtained in the vast majority.

Cause of Displacement at Site of Fracture.—Importance is usually attached to the deforming influence of the adductor and abductor muscles attached to the upper part of the humerus. In practice, using the three-splint method, this consideration has been found to be largely theoretical. The reason advanced to account for this finding is that muscle spasm, which can never be continuous for long, disappears as soon as the fracture is immobilized. Should the fracture receive a sudden jolt within the first few days, muscle spasm reappears with its deforming influence for a few minutes, but position is soon corrected by the continuous action of gravity. In the abducted position the arm is much more liable to receive many minor jolts, and any displacement which is caused thereby is not subject to the same corrective force which now acts at right angles to the humeral shaft. Mention must be made of the oblique or unstable fracture of the shaft of the humerus. This is the type of fracture that led to the use of active extension, which is not only unnecessary but dangerous. A successful result following on treatment in abduction with skeletal traction is a matter for congratulation; treated in three splints with a collar-and-cuff sling, it is a matter of course.

Compound Fractures.—The method described is equally suited to compound fractures. Following the usual primary excision, a wound pack may be covered with a few turns of elastic adhesive bandage before the splints are applied. Wound-healing has been just as satisfactory with this form of "no-dressing technique" as with the more usual plaster cast. An exception to the use of a collar-and-cuff sling may be made when a portion of the humerus has been completely shot away. Actual shortening should be encouraged by the

very effective in obtaining full length in these cases. It should not be left in position longer than the two or three days necessary to obtain reduction.

Summary

An account of the three-splint method of treating fractures of the shaft of the humerus is given.

The success of this simple and well-tried method is considered worthy of rediscovery at the present time.

Other methods in vogue are compared unfavourably.

TUBERCULOSIS IN THE MERCHANT NAVY

BY

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Tuberculosis workers who deal largely with patients from a certain occupational group are naturally interested in the incidence of and mortality from the disease in that particular group. These figures, however, are generally difficult to obtain, and especially so in the case of the seafarer. Owing to the wide distribution of British seamen of the Merchant Navy, both afloat and ashore, there seems to be no way of obtaining actual incidence figures for the occupation as a whole, and only within the last decade or so have serious attempts been made to ascertain the mortality rate with reasonable accuracy.

At this critical time, when so much depends on the men of the Merchant Navy, closer attention has been drawn to the adverse conditions of their life. It is therefore appropriate to consider the prevalence of tuberculosis among them and discuss what steps can be taken to limit the number of victims. Proper incidence figures being unobtainable, investigations on the mortality rate are here briefly reviewed.

An annual return of deaths at sea is made by the Registrar-General of Shipping, but this of itself is insufficient, as it leaves out of consideration the much larger number of seamen ashore who are sick, are unemployed, or have left the sea entirely on account of sickness, age, or other reasons. As already