SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

FRACTURES OF THE SHAFTS OF THE FOREARM BONES

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General Considerations

In no class of fracture is it more important to be able to recognize the distinction between the simple case in which mere reposition and splinting will give a good result and the difficult case in which a special kind of traction must be applied or a well-planned operation performed. This is because the integrity of the forearm bones is essential for the skilled movements of the hand. Recognition of the difficult case requiring special treatment should be made early—that is, within a week of the injury—because if once malunion or non-union has taken place it will be a much harder problem to restore the limb to usefulness, and operative treatment will be a much more difficult and uncertain remedy. To re-establish perfect function it is necessary not only to obtain correct length and proper alignment of both bones, but also to restore the outward bowing of the radius. This outward curve of the radius is necessary to enable the bone to be rotated round the ulna in the movements of supination and pronation. The fact that the supination muscles, of which the biceps is of much the most consequence, are all attached to the upper part of the radius makes it important to put up the forearm either in full supination or midway between pronation and supination. This is because the upper part of the radius will always be held in a supinated position by the biceps, and it is therefore necessary to bring the lower part of the bone into the same position of rotation. Throughout the whole stage of fixation the joints proximal and distal to the arm should be immobilized, but the muscle should be regularly and systematically exercised daily. The fingers and thumb must be left free, and also the shoulder. The digits must be exercised by active grasping movements and the shoulder by abduction and rotation.

Careful supervision is necessary during the period of immobilization. While it is true that in easy cases in young patients consolidation may take place within four weeks, if often happens that when there has been gross displacement originally, and especially in older patients, bony union is slow, and if the retentive cast is left off at the end of a month angulation and pronation may recur. Therefore it is wise to keep some form of retentive splint for a further period. After the first five or six weeks the complete plaster cast may be removed and replaced by a single slab of plaster extending from the palm of the hand up to the level of the deltoid, on the flexor aspect of the limb. This is removed daily for active movements of flexion and extension of the elbow and rotation of the forearm. It will be worn for a further period of about six weeks.

Greenstick Fractures in Children

In these fractures there is angulation of both bones, which are broken at the same level about the mid-point

of the shafts, but there is no actual separation of the fragments, which are held together by the envelope of periosteum. Treatment consists in manual straightening of the forearm and in applying two plaster slabs: (1) from the knuckles to the mid-point of the upper arm on the extensor aspect, and (2) from the palm of the hand to the mid-point of the upper arm on the flexor aspect. The plaster slabs are united by the turns of a roller plaster bandage. The elbow is flexed at a right angle, and the hand is midway between pronation and supination and is slightly dorsiflexed. The fingers and shoulder are exercised daily, and the plaster is removed in one month.

Fracture of Both Shafts without Much Displacement

In the typical case the ulna is broken in its lower third and the radius in its upper third, or if the forearm has been broken by direct violence both fractures are at the same level, about the middle. However obvious the fracture may be, a radiograph should be taken to show the exact relation of the fragments and the existence of any comminution. If for any reason the final manipulation and fixation cannot be done at once, a temporary splint should be applied. This is conveniently made by a piece of Cramer wire splint bent to a right angle and extending from the insertion of the deltoid to the palm of the hand, the elbow being at a right angle and the forearm supinated. Merely hanging the forearm in a sling across the chest is apt to increase the displacement. A general anaesthetic should be given when the fracture is put up. Local anaesthesia is not easy in this fracture because the bones lie deep in the soft parts and the solution will be diffused along the connective tissue planes. The method of reduction and fixation consists in traction on the hand and the application of a plaster cast. It is most useful to have a portable x-ray viewing-box, with which it can be seen in what position the bones assume the best line and also whether the upper and lower fragments of the radius are locked sufficiently to move together when the hand is rotated. Counter-traction is made on the bent elbow by one assistant while another pulls on the hand, which is held almost completely supinated. Two slabs of plaster are prepared so as to lie one along the flexor and one along the extensor aspect of the arm and long enough to reach from the palm of the hand or the knuckles to the insertion of the deltoid. These are applied direct to the skin without any padding and then joined together by circular turns of plaster bandages. A gap of about a quarter of an inch should be left between the outer margin of the slabs so as to facilitate the splitting of the cast. For the first twenty-four hours a careful watch should be kept for any evidence of swelling or ischaemia. For this reason the patient ought to remain in hospital or certainly be seen again within twelve hours. Evidence of interference with the circulation will be given by coldness or discoloration of the fingers or by increasing pain. On the first appearance of either of these signs there should be no hesitation in splitting the plaster. After the cast is comfortably settled, the patient should be instructed to carry out regular movements of the fingers and thumb and the shoulder. The cast is removed at the end of six weeks, or rather less if the position is good.

Typical Mid-shaft Fractures with Gross Displacement

These are fractures which may exercise the patience and resource of the surgeon to the utmost. The traction needed for reduction will have to be much more powerful and be sustained for a longer time than in the last type considered, and it may have to be supplemented by some other form of corrective force to keep the two bones from sagging together. Patience and perseverance are more essential to success than any feat of legerdemain. The portable x-ray viewing-box will be of the greatest use. Traction may be applied in various ways, but it is essential that it should be maintained for a considerable period, not only in order to overcome the muscular resistance, but also to keep the arm in good position while the plaster is being applied and is setting. The lower part of the arm above the elbow is protected by a surrounding cuff of adhesive felt four inches wide. A long strip of four-inch webbing is passed round the felt cuff and the two ends are fixed to a staple in the wall or to the post at the head of the bed. A wooden spreader is placed between the two limbs of this band, so as to leave

FIG. 1.—Traction applied to forearm before applying the plaster cast. A = Webbing band, surrounding the arm above the elbow and attached to a fixed point. B = Wooden spreader to keep the back of the arm free. C = Adhesive felt cuff round the arm. D = Traction band attached to thumb and index finger. E = Traction band attached to the three inner fingers.

the back of the arm free: this provides for fixed counter-traction. Traction on the hand should be arranged by applying strips of adhesive plaster along the back and front of the hand and digits, one strip doubled over U-fashion, taking the thumb and index finger, and another strip taking the other three fingers. These strips extend about one inch above the wrist and are fixed by circular turns of adhesive plaster. The ends of the longitudinal strips form projecting loops beyond the fingertips; each loop affords an efficient form of traction, and, moreover, the amount of traction on the radius and the ulna can be controlled by having separate traction bands on the outer and inner parts of the forearm. Now that both traction and counter-traction are provided for, it only remains to apply these forces. Either immediate traction may be made under an anaesthetic or continuous traction may be applied through the attachment of weights. When the fluorescent screen shows that the full length and proper position have been obtained, the traction bands on the fingers are tied by cords in the loops to a post at the bottom of the operation table and the arm and forearm are encased in plaster. If continuous traction is used the patient is kept in bed with the arm abducted at the shoulder and the elbow bent to a right angle. Traction is made on the forearm by weights and cords running over pulleys. At least 10 lb. will be necessary in the case of an adult—about 6 lb. on the radial and 4 lb. on the ulnar side of the arm.

This continuous traction is kept up for about twenty-four hours, after which the plaster is applied. When this is in position the wrist must be kept in some dorsiflexion and the back of the hand is protected from pressure by a pad of adhesive felt. The whole plaster cast is applied before the traction or counter-traction is removed. This removal is effected by cutting off the webbing above the elbow and the adhesive plaster from the fingers. If there is a decided tendency for two bones to sag towards one another this may sometimes be corrected by pressure between the middle of the shafts of the bones. The effectiveness of this can be observed by means of the fluorescent screen, using at first the tips of the fingers and thumb to produce the separation of the bone, and then, after the plaster slabs have been applied, placing longitudinal wooden rods about four inches in length and one-third of an inch wide along the long axis of the plaster, back and front, pressing them in and fixing them by circular turns of a plaster bandage (Böhler).

If the forearm has been pulled out for the full length and the hand kept in almost full supination with dorsiflexion of the wrist a very useful limb will probably result, even though the radiographs show some irregularity at the site of fracture. It may happen, however, that secondary displacement occurs a few days after the

FIG. 2.—A: Diagrammatic section of forearm, surrounded by a constricting bandage, which has pressed the two bones together. B: Forearm fracture with plaster slabs on flexor and extensor aspects; the bones have been separated from one another and this position maintained by placing two wooden rods front and back in the groove between the bones and fixing these by the turns of a bandage.

fracture has been put up. This is due to shrinkage of the limb, allowing of retraction within the plaster. Under these circumstances the plaster case has to be removed and traction reapplied; two stout Kirschner's wires must then be used to transfix two points: (1) the ulna, just below the olecranon, and (2) the lower ends of the radius and ulna. The plaster case is now reapplied, incorporating the transfixion wires, which are then cut short.

I have thought it well to indicate the possibilities of efficient treatment of difficult cases without operation, but I think it should be strongly urged that cases be sent to a fracture clinic of repute if they should prove refractory. In these cases timely open operation by an expert is often the simplest and best solution of the difficulty, if it be done at an early date. Sometimes it is only necessary to make a simple exposure of the bone ends, when they can be accurately interlocked; otherwise plating, wiring, or pegging will be satisfactory when done by an expert.

Fracture of Shaft of Ulna Only

As a rule this causes no difficulty as the displacement is so slight. It should be treated by traction and the application of a plaster cast, the forearm being put up in a position of mid-rotation. But if it is complicated by a simultaneous dislocation of the head of the radius at the elbow, the matter is entirely different. This fracture-

dislocation requires to be treated on the same lines as the fracture of both bones with displacement—that is, by a special form of traction with double transfixion. I am very doubtful whether it is ever justifiable to allow such a case to be treated by closed methods, especially if the patient is a skilled manual worker. The ideal method, in my opinion, is first to reduce the fracture and dislocation by traction and then to operate, uniting the ulna by a plate or wire, and following on by exposing the head of the radius and repairing the torn orbicular ligament. If conservative methods are used it is important to check the position by weekly x-ray examination, because of the great liability to secondary displacement.

Fractures of the Radial Shaft Alone

In many cases these present no special difficulty and the arm should be put up in a plaster case following traction. But three special conditions require careful consideration. They are:

(a) *Fractures Above the Middle of the Shaft.*—These must be put up in full supination, because the upper fragment will be supinated by the biceps and the lower fragment must therefore also be supinated to be in correct rotary orientation.

(b) *Fractures at the mid-shaft* are very liable to non-union because the tendon of the pronator radii teres slips between the fragments. If, therefore, after apparent reduction and splinting the radiograph (in two planes) shows there is a persistent gap between the ends of the radius the case ought to be submitted to an open operation before bone sclerosis takes place.

(c) *In fractures at the junction of the middle and lower thirds* there is a great tendency for the lower fragment to be pulled over towards the ulna by the action of the pronator quadratus and the thumb muscles. An attempt may be made to correct the displacement by pulling on the thumb and forefinger and by lateral deviation of the wrist towards the ulnar side. But if this does not succeed it is far better to operate without undue delay. At an early stage, open reduction and fixation by a peg, plate, or wire is very simple and satisfactory.

Open Fractures of the Forearm

In cases where there is only a slight wound this should be immediately excised and sutured and the fracture treated as above described. In cases of severe crushing, such as when the arm has been caught in machinery, immediate and efficient treatment will be required if the limb is to be saved. If it is practicable to transport the patient to a reliable fracture clinic within a few hours this should be done. The only circumstance which demands immediate treatment is haemorrhage, but this is unusual in the ordinary type of machinery accident. Bleeding must be stopped and 500 units of anti-tetanic serum injected, and the decision then made as to whether the case is to be treated on the spot or be sent elsewhere. If the latter is impossible the wound toilet must be made. It is unnecessary to give details of this. The essentials are: the toilet should be performed within six hours of the injury; all contaminated surfaces, including an eighth of an inch of the skin edges, and all dirt and foreign bodies should be removed; swabbing over the surface with 1 in 1,000 flavine solution; and immediate suture of the skin edges with interrupted stitches of silkworm-gut. The arm is placed in a plaster cast after as accurate a reposition of the fractures as is possible, and windows are cut in the plaster over the wound.

The most important consideration is the indication for amputation. In general terms, no arm, hand, or finger

should be amputated if the circulation is sufficient to maintain life. Only if the main vessel has been divided and the distal part of the limb is cold and pulseless should immediate amputation be done. The occurrence of gas gangrene, indicated by swelling, crepitation, and a characteristic odour, may require amputation one or two days after the accident.

PSYCHOTHERAPY CONGRESS AT OXFORD

The tenth International Medical Congress for Psychotherapy was held at Oxford from July 29 to August 2. On the first evening H.M. Government held a reception of delegates in Christ Church Hall, with Mr. Robert Bernays, M.P., as host. The congress sessions were held in the Taylorian Institution.

Presidential Address

Professor C. G. JUNG, the President, opened the proceedings on July 30 with an address in which he explained the "fourteen points" of agreement between the various conflicting schools which had been reached by the efforts of the Swiss branch of the congress. The motive behind this enterprise was, he said, to lay a basis for practical work and to abandon futile discussion of theory. The points were, first, that psychotherapy used medical technique: for diagnosis it used a relation by the patient of his difficulties, together with a study of his symptoms. Forms of illness were observed which had nothing to do with bodily disturbances, but were only intelligible in terms of the psyche. This method of diagnosis therefore focused on the general psychic disposition of the patient. It considered all possible means of expression: associations, fantasies, dreams, symptoms, and demeanour. It found an aetiology reaching down into the depths of the personality below the conscious mind. Investigation led first to the discovery of unconscious fixations on situations and persons significant in the patient's childhood. These fixations had both a causal and a purposive aspect, and set tasks for future fulfilment. One of the tasks of psychotherapy was to illuminate the factors out of which the illness developed and continued, and its method was the analysis and interpretation of all forms of expression. The therapeutic development of the patient depended on his relationship with the physician, and this was the basis of his relationship with society. It took the form of a transference neurosis—the projection of unconscious contents. This neurosis was laid down in the unconscious fixations of childhood, behind which collective unconscious fixations were assumed. The new contents must be realized as parts of the personality, because only so could the patient feel his responsibility towards them.

Psychological Mechanisms in Childhood

Dr. A. GROENEVELD (Amsterdam), in a paper on early childhood and some of its mechanisms, pointed out the two extremes in the psychic reality of the child: an appreciation of concrete realities and a tendency towards unbounded and diffuse fantasy. The child showed too easy acceptance of empiric reality; magic reactions, such as premature deification of banal facts; and a tendency to homogenize a world of conflicts, and thus to escape from unbearable reality. He searched for increase of potentiality in excitement and explosive relief. He was inclined to catastrophe and sudden transition; he was handicapped by "canons," such as the craving for symmetry, perfection, and constancy. The formulae of homogeneity and canonotropy might be valuable in the understanding of adult neurosis.

Dr. F. KÜNKE (Germany) introduced the basic concept of "We" as a suggested solution of educational difficulties. The child was born into a "We"-conditioned environment, in which he could not distinguish himself from the mother, but every unfavourable experience of adult behaviour broke