SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

FRACTURE OF THE CARPAL SCAPHOID

BY

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Fracture of the scaphoid bone is by far the most common injury of the carpal bones and is also easily the most neglected fracture in the body. It is caused by a fall

FIG. 1.

FIG. 2.

FIG. 1.—Antero-posterior view: Scaphoid appears intact.
FIG. 2.—Oblique view: Line of fracture of scaphoid evident.

on the outstretched hand and is sometimes associated with a Colles's fracture. Fractures of the scaphoid bone are classified into three groups: (1) fractures of the waist; (2) fractures of the tuberosity; (3) polar fractures—these are chip fractures of either extremity.

The clinical signs are: tenderness over the scaphoid

may not be shown. An oblique view of the wrist will reveal the fracture (Figs. 1 and 2), as here the plate is held parallel to the long axis of the bone. It will be seen, therefore, how important it is to take an x-ray photograph of the oblique view as well as of the antero-posterior and lateral views as a routine in all injuries of the wrist-joint (Figs. 3 and 4). It is sometimes difficult

FIGS. 5 and 6.—Showing complete plaster for fracture of scaphoid.

to detect a recent fracture in an x-ray film, but the crack becomes more obvious after the first three weeks.

Differential Diagnosis

A simple sprain of the wrist may simulate a fractured scaphoid. It consists of tearing of the ligaments of the wrist-joint, generally the dorsal ligaments. There is usually an effusion into the joint and limitation of movements, but tenderness is not limited to the scaphoid, and the x-ray photographs are negative.

Treatment of Recent Fractures

This consists of immobilization of the wrist in plaster-of-Paris in a position of slight dorsiflexion and ulnar adduction until union has taken place. There is rarely displacement unless there has been a dislocation of the wrist-joint or of other carpal bones, so that reduction is usually unnecessary.

Two forms of splintage may be used. They are: the dorsal strip; the complete plaster (Figs. 5 and 6).

THE DORSAL STRIP

This consists of from twelve to sixteen layers of plaster-of-Paris bandage from five to six inches wide. It is first made on a table with a wet plaster bandage and is applied over a layer of stockinet, a small aperture being cut in the latter for the thumb. It should extend from the heads of the metacarpals to the elbow-joint, but should be trimmed so that its upper extremity does not impinge

FIG. 3.—Position of hands for taking oblique x-ray photograph of the wrist.
FIG. 4.—Position of hands for taking antero-posterior x-ray photograph of the wrist.

bone, particularly in the anatomical snuff-box, which may be obliterated by swelling or deformity; limitation of the movements of the wrist-joint, particularly of dorsiflexion; and weakness of the grip.

X-ray photographs should be taken in three planes. In the antero-posterior view the long axis of the bone is directed towards the plate, and as a result the fracture

against the biceps tendon when the elbow is flexed. The strip is bandaged on smoothly with a wet lint or domette bandage three inches wide. After the plaster has set the bandage may be removed and a dry one substituted, but this is not essential. The ends of the plaster are smoothed down by turning back the stockinet. The hand is secured to the plaster by three strips of strapping, half an inch wide by eight inches long, which pass from the strip over the dorsum of the wrist across the palm of the hand and back again to the strip. These can be reinforced by further pieces of strapping if considered necessary.

THE COMPLETE PLASTER

Unless constant supervision is available this is to be preferred to the dorsal strip. If the strapping is not frequently readjusted it will tend to slip, with resultant inadequate immobilization and possibly non-union. To make the complete plaster the dorsal strip is reinforced by an anterior strip three inches in width which is extended on to the palm. The palmar limit allows 90 degrees of flexion at the metacarpo-phalangeal joints. The proximal limit is the same as for the dorsal strip. It is maintained in position by a carefully applied circular plaster-of-Paris bandage. A bandage one inch in width is applied around the palm between the thumb and the index finger.

BONY UNION

Firm bony union cannot be expected to take place under eight weeks, with the exception of fractures of the tuberosity, which, being extra-articular, unite more rapidly. At the end of this time the plaster is removed and the wrist radiographed. If union has taken place bony trabeculae will be seen growing across the fracture line. It may be necessary to use a lens to determine this with certainty. A clinical sign that union has taken place is the return of strength of the grip. Before union has occurred firm approximation of the tip of the index finger to the thumb will cause pain even when the plaster is applied. This pain disappears after union. If this sign is present at the end of two months it is wise to maintain the plaster for another month. If after removal of the plaster both the clinical and x-ray signs indicate that the fracture has not united the plaster should be reapplied for another two months. If union has not taken place in six months operative procedures such as bone-drilling or bone-grafting should be considered. From the beginning of treatment active movements of the fingers must be encouraged and, if necessary, supervised by a massage department. The patient should also be encouraged to carry out his work as far as possible. The function of massage in all injuries of the wrist-joint is to preserve the mobility of the fingers, elbow, and shoulder. Full flexion at the metacarpo-phalangeal joints is 90 degrees, at the proximal interphalangeal joints 80 degrees, and at the distal interphalangeal joints 100 degrees. Massage of the wrist-joint itself will rarely be essential, but should be given when progress is slow.

Manipulation.—After the immobilization necessary to get union, particularly if it has been necessary to maintain the plaster cast longer than usual, the wrist may be left stiffer than normal, with restriction of movement and consequent pain. Usually time and active movements suffice to mobilize the joint. Manipulation should not be attempted while improvement is occurring, but it should be considered when the joint has limitation of movement and is painful three months after the plaster has been removed and the radiograph is normal. It can be performed under nitrous-oxide anaesthesia and consists in

putting the joint through a complete range of movement, at the same time exerting traction. The hand should also be rocked laterally and antero-posteriorly on the radius and ulna. Further treatment consists of heat, massage, and active movements.

Treatment of Sprain of the Wrist-joint

The wrist should be immobilized by a dorsal strip for from one to three weeks, followed by physical treatment. If symptoms persist another x-ray photograph should be taken to make certain that a fracture of the scaphoid is not present.

Old Fractures of the Scaphoid

Non-union is due to inadequate immobilization. In any event union of the fractured scaphoid is slow because the bone is mainly intra-articular and its blood supply is poor. In fractures of the waist the vessels have to grow from the distal into the proximal fragment. Established non-union is diagnosed clinically by weakness of the grip and pain over the scaphoid, and radiologically by widening of the fracture-line, even to cavity formation. There is a marked discrepancy in the texture of the fragments, the proximal fragment becoming much denser.

Treatment of Non-union

PLASTER IMMOBILIZATION

In a case of established non-union without arthritis it will be necessary to maintain the plaster cast for from three to six months, or even longer. If at the end of six months there is no change in the clinical condition or x-ray appearance operative treatment may be undertaken.

OPERATIVE TREATMENT

1. *Drilling of the Fragments.*—Under complete aseptic conditions an incision half an inch long is made over the scaphoid parallel to the tendon of the extensor pollicis longus. The wrist is placed in ulnar adduction and the distal fragment exposed. Two drill-holes are made through the bone, starting from the radial aspect of the distal fragment and drilling through the fracture into the proximal fragment. The direction and depth of the drill is determined by the fluoroscope. After-treatment consists of immobilization in plaster as before.

2. *Bone-grafting.*—This is more certain than either of the other two methods, and may be used if these fail or if for economic reasons the patient wishes to obtain union in the shortest possible time. A curved incision three inches long is made over the dorsal and radial aspect of the scaphoid, with its concavity towards the ulnar side of the hand. The extensor pollicis longus is retracted medially and the abductor pollicis laterally. The fracture is exposed and a three-eighth-inch electric drill is introduced into the radial aspect of the distal fragment and passed through the fracture into the proximal fragment. The wrist must be in ulnar adduction. It is wise at this stage to take an x-ray photograph with the drill in position. A bone-graft, three eighths of an inch wide and the necessary length as determined by the x-ray photograph, is cut either from the tibia or the lower third of the ulna and inserted, care being taken to see that it does not project from the distal fragment. Union should take place in from three to four months.

Non-union with Arthritis

Non-union will inevitably lead to arthritis of the wrist-joint, chiefly between the radius and the proximal fragment of the scaphoid. This causes gradually increasing pain and disability.

Palliative Treatment.—A light celluloid splint, similar to the dorsal plaster strip, may be worn. It should be made from a cast by a surgical instrument maker, and in limiting the movements of the wrist it will give considerable relief.

Operative Treatment.—Removal of the scaphoid bone alone gives a poor result, as the hand tends to go into radial adduction, with consequent stiffness and weakness of the grip. If the scaphoid is to be removed, it is better to remove the whole proximal row of the carpus. This results in a wrist and hand weaker than normal, but comparatively painless.

Arthrodesis of the Wrist

This is carried out by means of a large bone-graft extending from the radius to the base of the third metacarpal. Union takes place in four months and results in a strong painless hand, but, of course, with a stiff wrist. This is probably the treatment of choice in a comparatively young and active patient with arthritis as a result of non-union of the scaphoid.

CHILDREN WITH DEFECTIVE HEARING

REPORT OF COMMITTEE OF INQUIRY

The publication of the Report¹ of the Committee of Inquiry into Problems relating to Children with Defective Hearing brings to an end a task of great complexity and difficulty extending over a period of four years. The terms of reference assigned to the Committee—"To inquire into and report upon the medical, educational, and social aspects of the problems attending children suffering from defects of hearing not amounting to total deafness"—indicate the wide field the committee had to cover.

Classification by Grades

The first step undertaken was the classification of children with defective hearing. It was considered best that this should be done on an educational basis rather than on grounds of hearing loss or other factors. The Committee showed great wisdom in eliminating the familiar but vague and almost meaningless terminology used hitherto. Indefinite terms, such as "hard of hearing," "partially deaf," "semi-mute," "semi-deaf," and so on, have always meant one thing to one observer and something different to another, and were bound to give rise to confusion. In place of these terms a system of "grading" is recommended in which all children suffering from hearing defects fall within Grades I, II, or III; Grade II is also subdivided into Grades IIA and IIB. Each grade defines the type of child suitable to come within its embrace. It provides a standard for hearing and understanding the conversational voice, and for the range of hearing as tested by both the gramophone and pure tone audiometers. Other qualifications are given, and an estimate of the number per thousand children in average attendance at elementary schools has been made for each grade. This is a scientific classification permitting no misunderstanding and should be welcomed by all.

Problems of Causation

The second chapter of the report deals with the causation, prevention, and treatment of defective hearing. The various diseases which cause defective hearing, most of them in varying degree infectious, are set out. Tables are given showing the relative numerical importance of these

conditions in the production of the defect. Table III (p. 8), for example, shows the greatly reduced incidence of congenital syphilis as a cause of acquired defective hearing. In 1919 congenital syphilis was responsible for 9.2 per cent. of the total acquired cases among the school children of London, as compared with 1.5 per cent. in 1936.

The importance of suppurative otitis media as a cause of defects in hearing is stressed. The incidence in infants and children under 5; the incidence in children of school age; otitis media in public boarding schools; the relation between otitis media and the various infectious diseases; environmental and dietetic factors in the aetiology of otitis media; and other relevant matters are discussed. Emphasis is laid on the importance of suppurative otitis media in the early months and years of life; its incidence is greatest then and gradually diminishes as age advances. Attention is also drawn to the frequency of middle-ear catarrh as a cause of defective hearing.

Prevention and Treatment

Agencies for the prevention of defective hearing are discussed in detail and classified thus: (1) natural immunity to the diseases most usually complicated by infection of the ear; (2) artificially acquired immunity; (3) general resistance, increased by diet, good environment, fresh air, etc.; (4) limitation of infection; (5) treatment of streptococcal infections by drugs; (6) prevention of recurrence of infection of the ear; and (7) maintenance of hygienic conditions in the nasopharynx. The view is expressed that the use of sulphonamide compounds should greatly reduce the incidence of complications following throat infections (otitis media, mastoid disease, and septicaemia), especially if the treatment be administered early. Experience so far is hardly sufficient to support this view, but it seems likely that this opinion will prove correct.

In discussing the maintenance of hygienic conditions in the nasopharynx the Committee recommend that nasal hygiene and breathing exercises should be adopted in all schools. It suggests as an ideal that the first two minutes of both morning and afternoon sessions should be spent in this way. The nose should first be cleared in the correct manner—which need take no longer than about half a minute—and the remainder of the time should be spent in deep breathing *in* and *out* through the nose. This is important. In the first place it would detect at once children who have difficulty in, or are incapable of, clearing the nose or breathing properly; such children should forthwith be referred to the otologist. Secondly, the children would tend to be more alert and capable of greater mental effort with a clear nose and well-ventilated lungs. It might be mentioned, however, that no strain whatever should accompany the breathing exercises, and correct posture should be maintained.

So far as treatment is concerned, in discussing the organization of an aural scheme the need for co-operation between the school medical service and the maternity and child welfare service in the ascertainment and treatment of ear defects is emphasized, as is the need for linking up the aural scheme with arrangements for the control and treatment of infectious diseases. Various special methods of treatment are referred to, including zinc ionization for chronic otorrhoea and diastolization for certain nasal defects and their sequelae, both of which have proved of great value.

Testing Hearing

Chapter III of the report is concerned with methods of testing hearing. The Committee recommends routine group testing of all children in ordinary schools with the gramophone audiometer as being essential to any scheme for the ascertainment and treatment of children with defective hearing. The use of the pure tone audiometer, too, is recommended so that the acuity of hearing

¹ Report of the Committee of Inquiry into Problems Relating to Children with Defective Hearing. H.M. Stationery Office. Price 2s. 6d. net.