COLLES'S FRACTURE.

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Colles's fracture is an injury of frequent occurrence which most practitioners have at some time or another to treat. This article is not intended as an exhaustive treatise on the subject but as an attempt to set out the principles which govern whatever kind of treatment is adopted in these cases, and to explain in some detail the treatment practised by the writer, which is based on that first elaborated by Dr. Böhler and published by him. It is, of course, quite appreciated that these fractures can be and are very successfully treated by other methods.

Étiology and Symptoms.

The injury is caused by a fall on the outstretched hand, usually in women over the age of 45. It is an interesting and unexplained fact that the same type of violence produces fractures at different levels in the upper limb at different ages; and that in each age group the site of fracture is remarkably constant. In the typical Colles’s fracture, the radius is broken about one inch above the level of the wrist joint. The styloid process of the ulna may or may not be broken. The lower radial fragment is usually impacted into the upper: the deformity is made up of three components—

(1) A backward displacement;
(2) A radial displacement;
(3) A backward rotation of the lower fragment.

In the normal radius, the articular surface at the lower end is not exactly at a right angle to the shaft but is directed slightly forwards. After a Colles’s fracture the lower fragment is so tilted that the lower articular surface is directed backwards in relation to the line of the shaft. (Figs. 1a and b.)

Signs.—(1) In many cases there is gross deformity ("dinner fork").
(2) The radial styloid process is on the same level as or higher than the ulnar, instead of being at a lower level.
(3) In less severe cases there is well localised tenderness over the radius about one inch above the joint. Both in the case of a Colles’s fracture and of a simple sprain there is an effusion into the wrist joint and diffuse tenderness over it: but localised tenderness over the bone both on the dorsal and radial aspects is almost diagnostic of a fracture.

Radiograms.—It is very desirable to obtain an X-ray picture of the wrist before attempting reduction: it is absolutely essential to obtain one after reduction. In all cases where it is convenient or easy radiograms both before and after reduction must be taken: but if circumstances are such that a radiogram can only be obtained with difficulty, it is more important that the position of the fragments should be known after attempted reduction rather than the position before. Direct examination of the wrist can give nearly complete knowledge of the former, but after the application of the splint a radiogram is the only means of discovering the position of the fragments.
FIG. 1.—COLLES'S FRACTURE.

(a) Antero-Posterior View.  
(b) Lateral View.

Note triple displacement of lower fragment. It is displaced directly backwards, and to the radial side; it is also rotated backwards. Note also that in a true lateral view the radius and ulna are in the same plane. Many so-called lateral views are in fact oblique: from these it is impossible to see the exact displacement of the lower fragment.
The aim of treatment is to restore the injured limb to such a state that in both shape and function it is indistinguishable from normal. Many cases result in a condition of very fair function with no inconvenience to the patient although not reaching to this strict standard, but this ought not to permit, as it has done in the past, a complaisant attitude towards such a result. It is a useful check to record such results as "very fair", in contrast to those which can properly be labelled as "perfect". It is also honest to note that a number of cases cannot even be recorded as very fair. It is convenient to analyse the lines of treatment under two headings, namely, the maintenance and restoration of function, and the reduction of the bony deformity and the subsequent maintenance of the fragments in the corrected position. It is a principle of universal application in the treatment of fractures, that where some form of fixation of the fragments is necessary, it should be such that while holding the bony fragments firm, it limits the mobility and use of neighbouring joints and muscles as little as possible. It is therefore a useful plan in considering the kind of fixation which is to be used, to see first what would be ideal from the point of view of allowing mobility of the remainder of the limb, and then to see what is the least modification of this ideal necessary to preserve unimpaired the immobility of the fragments. This is admittedly a reversal of the usual plan in discussing a fracture, in which the reduction and fixation are first described, followed by an account of the "after treatment".

The Maintenance and Restoration of Function.

One of the factors which lead to a bad end—result after a Colles's fracture is limitation of movement in one or more joints of the limb. It is clearly impossible to fix the fragments in this fracture without at the same time immobilising two joints, namely the wrist joint itself and the inferior radio-ulnar joint. The following joints should be allowed to be free:—the inter-phalangeal joints, the metacarpo-phalangeal, the elbow, and the shoulder-joints. If all these joints are constantly used, they cannot become stiff. Limitation of the inter-phalangeal joints is fairly easily prevented, but too little attention is often paid to the joint between the metacarpals and the first phalanges. Limitation here is not at all uncommon after a Colles's fracture, and if those cases in which the grip is deficient are carefully examined, it will usually be observed that it is in the metacarlo-phalangeal joint that the limitation of movement is situated. The gravest defect of Carr's splint is that it does not allow of the fist being completely closed. Stiffness of the elbow after these fractures is not common as the patients usually move this joint of themselves, but stiffness of the shoulder is far from uncommon. The causes are two-fold. In the first instance, the original injury sometimes causes a sprain of the shoulder joint. Secondly, it is not sufficiently appreciated that in an elderly patient the wearing of a sling for two or three weeks of itself will lead to stiffness of the shoulder. The ideal splint will, therefore, be so light that a sling is not needed except when the patient is afraid of knocking the hand, as for instance when walking in crowds or in trams, etc., or if so light a splint cannot be devised, it should at least be light enough to allow the patient to put the shoulder actively through a full range of movement several times a day.

It should be noted that emphasis is throughout laid on the necessity of active movements being possible. In the maintenance of function, active movements are in every case far more effective than passive or assisted movements, and in the ordinary case no physio-therapeutic treatment is applied. It must, however, be emphasised that the patient must be seen to perform the movements.
In some cases this may necessitate seeing the patient every day, but the more intelligent patient will usually perform these himself if it is explained to him what is required, and if the traditional attitude towards fractures, with the association of "setting", "splinting", "sling", "massage", can be prevented from crystallising.

It has been stated above that the wrist and inferior radio-ulnar joints are of necessity fixed and the problem of the restoration of movement to them next arises. Formerly it was held that it was important to remove the splints daily at an early stage and to begin active and passive movements in order to prevent stiffness. There is, however, often a real danger in doing this, as in a certain number of cases of Colles's fracture the deformity will recur if the fixation is removed too early. A more prolonged period of fixation is therefore now adopted. The feared delay in the return of movement of the wrist joint has been found not to occur, provided that the function of all the other free joints of the limb has been actively maintained during the time of fixation. If, on the other hand, the fingers are not used, the wrist becomes stiff. The explanation of this fact is not clear, but it in part may result from the maintenance of a normal circulation in the arm and hand by active movements. The principles of treatment involved in the restoration of function, outlined above, are so important as to justify summarising. The fixation must be adequate to control the fragments. Within the limits allowed by the fixation, the patient must actively and constantly use the whole limb.

Reduction of the Deformity.

It can be stated quite dogmatically that, except in ill or very old patients, an attempt should always be made to correct the deformity. There is no doubt that if proper treatment on the lines described above is carried out, a very good functional result can be obtained even if the fracture is allowed to unite in a position of gross deformity. A good functional result is, however, more certainly obtainable if the fragments are in their proper alignment, and the patient is further spared the persistence of a very ugly deformity. There is also a slight risk, if the deformity is not corrected, of complications developing a long time afterwards, as for example osteo-arthritis of the wrist. The former acquiescence in allowing the deformity to remain uncorrected was founded on the sound observation that some cases treated as sprains were followed by better results than others treated by fixation. The reason for this was that the fixation was bad, but with modern methods of fixation combined with active movements, the bogy of stiff fingers and "adhesions in the tendons" does not arise. A further objection to reducing the deformity was founded on unwillingness to submit old patients to the risk of an anaesthetic. This problem will therefore be discussed next.

Use of an Anaesthetic.

Dr. Lorenz Böhler, who has done so much to re-establish interest in fractures, invariably uses a local infiltration of novocaine in Colles's fracture for performing the reduction. In his hands, and used on patients apparently more used to suffering pain than those in this country, it is successful. Experience here has not been so uniformly satisfactory as might be expected from the writings and practice of Continental surgeons. The following points may be taken as summarising the experience of the present writer in the application of novocaine anaesthesia in the reduction of Colles's fracture.
(1) In cases seen within twelve hours of the fracture perfect anaesthesia and relaxation can be obtained.

(2) After this time, success is less likely and no attempt is made to use novocaine unless there is some strong reason, e.g., age, or bronchitis, which contraindicates an inhalation anaesthetic.

(3) The risk of infecting the fracture must be considered but no case of this complication has been seen or reported.

(4) Novocaine is more tedious than gas, but in those cases where it is difficult to arrange for an anaesthetist, the advantage of being able to treat the case single-handed is very great.

The technique of the injection is not difficult. With extreme care as to asepsis, 2 per cent. novocaine is injected from the dorsal aspect directly into the fracture. The radius is triangular in shape at this point. The needle is directed first towards the interosseous membrane; it is then withdrawn partially and the outer surface of the bone is injected. The needle is then completely withdrawn and a fresh puncture is made to inject the volar aspect of the bone. If the needle is kept close to the bone, there need not be the slightest fear of damaging the radial artery. The total quantity used is about 40-50 c.c. A separate injection of 5 c.c. is made over the ulnar styloid.

Nitrous oxide gas is convenient but has one great disadvantage, namely that if the anaesthetist is not skilled the period of relaxation is too short. It is adequate for the reduction of the deformity, but it is very desirable that the patient should remain relaxed until the splint is applied. Otherwise there is a grave risk of the deformity recurring while the splint is being applied to a struggling patient. For this reason, gas and oxygen or ether anaesthesia is preferable if it is available; in cases of two or more days' duration which require reduction, ether is essential. One of the great advantages of novocaine is that it allows of plenty of time and deliberation throughout the reduction and fixation.

Sufficient experience is not yet available as to the merits of evipan in this type of case, but it seems possible that this preparation might be extremely useful as it is supposed to give relaxation for twenty minutes.

The Method of Reduction.

This is done exactly as described by Böhler, and although this method is especially valuable in cases where local anaesthesia is being used, it is of general application. The patient lies on a couch. The injured arm is abducted to a right angle and a broad band of webbing or bandage is passed round the arm and is fixed to the wall behind the patient's head (see fig 2.). In hospitals a hook can be permanently fixed in the wall in the most convenient position: in private houses the bed or couch can usually be so moved that it is possible to attach the bandage to a door handle or radiator. With the upper arm supported in this way, the elbow is then flexed to a right angle and traction is applied to the fingers. The band round the upper arm, fixed to the wall, supplies the counter traction. If a local anaesthetic is being employed, the following procedure is adopted. The details have been found to be important. Traction is applied by
pulling with one hand on the thumb, and with the other on the middle three fingers. The little finger is left free. If it is included, the dorsum of the hand is compressed laterally. The pull is maintained for five minutes. This overcomes muscular spasm. The impaction is then undone by hyperextension and the deformity is corrected. After correction, the pull is maintained, while a plaster is applied. It will be seen that by this method it is possible for the operator without any skilled assistance to deal with the case single handed, for after the reduction of the deformity, the task of maintaining the traction can be relegated to an untrained assistant.

FIG. 2.

To illustrate mechanical counter-traction by means of a band around the upper arm. A spreader is inserted between the two bands to prevent squeezing of the arm. Note also that the little finger is left free when the hand is being pulled. The dorsal plaster slab has just been applied.

If some other anaesthetic is used, the employment of mechanical counter-traction by a band attached to the wall is a great improvement over a manual grip on the upper arm, and the continuance of the traction after reduction during the application of the splint can still be safely entrusted to an assistant.
Fixation.

Plaster of Paris is the only material used for splintage. A plaster bandage 4 inches wide is rolled backwards and forwards on a board to form a slab about 10 inches long. This is applied directly on to the skin on the dorsal aspect of the forearm and hand, the latter being in a position of pronation. The lower limit of the plaster reaches to a point just short of the heads of the metacarpals. The hand is in a straight line with the forearm. The splint is moulded carefully on the forearm and the dorsum of the hand, so that it fits quite smoothly without any wrinkles. It is then bandaged on to the hand and arm with an ordinary bandage. When the plaster has set, the traction is released. On the following day, if the radiographic appearance is satisfactory, a plaster of Paris bandage is wound round the whole to fix it firmly on to the forearm and hand. The purpose of delaying the application of this bandage for 24 hours is to guard against the risk of swelling developing inside a rigid unpadded cast. The encircling bandage should be as light as possible (see Fig. 3.).

A case of Colles’s fracture one week after reduction. To show the range of active movements possible in the fingers, and the importance of the lower limit of the plaster being just proximal to the heads of the metacarpals.

Maintenance of fixation. The plaster remains in place untouched for three weeks. During this time active movements of the fingers, elbow and shoulder are constantly performed. A sling is unnecessary except at night and occasionally for comfort. The arm should be used for such actions as the splint allows, e.g., eating, writing, dusting and holding light articles.

After the removal of the plaster, the wrist and inferior radio-ulnar joints will be found to be limited in their range. Active movements designed to restore to them their full mobility are constantly practised and after a further period of three weeks, their range will be found in most cases to be full. In a number of cases, however, there is a delay in the return of movement for a further week or two.
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The extent to which active movements are practised by the patient while the splint is still on, varies with different temperaments. Some cases require more encouragement than others. If after the removal of the splint there is still some limitation of movement at the metacarpo-phalangeal joints, the application of heat, preferably in the form of paraffin baths, followed by active movements, is found to be the most effective way of restoring mobility.

The position of fixation. Most cases can be treated with the hand in line with the forearm, as described above. In some cases, however, it is found that, although the reduction is easily performed, the deformity easily recurs. The correct position can in all cases be maintained if the wrist is flexed and is maintained flexed. This position is not adopted as a routine because the fingers cannot be so fully used and because it results in a delay in the return of movement in the wrist yet it must of necessity be sometimes adopted. No hard and fast rules can be laid down as to when to use the flexed position, but with experience it is possible to judge at the time of reduction whether the deformity is likely to recur, or whether the corrected position can be maintained by a plaster with the hand straight.

Failures in Treatment.

If an extremely critical attitude is adopted towards the results of Colles's fracture, it is found that in elderly patients a perfect wrist, indistinguishable from normal is not usually attained. There often remains a limitation of a few degrees of full flexion and extension of the wrist, which can only be detected on careful examination but of which the patient is unconscious. But if the mobility of the fingers is perfect, a quite considerable degree of limitation of movement at the wrist is no handicap. The purpose of these remarks is not to excuse such results, or to suggest any slackening in effort to obtain the perfect wrist, but to emphasize the supreme importance of encouraging the patient from the first day to perform full finger movements, and of seeing that they are performed. If the doctor is confident that finger movements can be performed, it is not difficult to communicate that confidence to the patient.

As in the treatment of all fractures, a detailed knowledge of the methods and technique is important: but it is even more important to grasp the general principles of fracture treatment, viz.:—that successful functional end—results depend on reduction of deformity and on the maintenance of the correct position by the minimum fixation, which nevertheless must be adequate and combined with constant active movements of the whole of the rest of the limb.

THE DIAGNOSIS OF DISEASES OF THE URINARY TRACT IN GENERAL PRACTICE.*

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My object in choosing this subject for my lecture is largely to remind ourselves that when we suspect disease in the urinary tract, we will more quickly come to the right conclusion, if the various steps of the examination of the patient are carried out in a certain definite order. I hasten to add that whether the patient complains

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