REFRESHER COURSE FOR GENERAL PRACTITIONERS

COLLES'S FRACTURE

BY

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In 1814, more than 80 years before the discovery of x rays, Abraham Colles, a distinguished Dublin surgeon, described a fracture in the region of the wrist-joint. No more accurate or vivid account of this fracture has since been written, and to this day it is known as Colles's fracture in almost every country. In youth the corresponding injury, much less frequent, is "separation of the lower radial epiphysis." Though so described, it does not occur through the epiphysial line—it is a fracture through the metaphysis immediately adjacent to the epiphysial line.

Of all bony injuries, Colles's fracture is by far the commonest, forming about one-eighth of the indigenous fracture material in any large community. It occurs twice as frequently as all other fractures in the region of the wrist-joint. Women from middle age onwards are most often affected.

FIG. 1.

Anatomy and Mechanism

Colles's fracture is a fracture through the radius within 1 in. (2.5 cm.) of its carpal extremity, produced usually by a fall on to the palm of the outstretched hand. The distal quarter of the radius, though its broadest portion, is actually the weakest, as it is composed mainly of cancellous bone.

Comminution often occurs, and varies from gross fragmentation of the distal fragment to slight crumbling of the cortex on the dorsal aspect of the fracture. The line of fracture frequently involves the inferior radio-ulnar joint and occasionally the wrist-joint. In about half the cases the styloid process of the ulna is also broken.

The common displacement conforms to a more or less constant pattern and is illustrated in terms of the distal fragment in Fig. 1. A combination of backward displacement and rotation of the distal fragment (Fig. 2) is the most frequent happening. It is important to notice how this alters the inclination of the distal articular surface, which then looks distally and backwards instead of distally and forwards. If such a displacement is allowed to persist the wrist will be unsightly in appearance and its function may be impaired.

In the older writings there is considerable controversy concerning the occurrence or not of true impaction of the fragments. In many of these fractures there is not the slightest doubt that the dorsal cortex of the proximal fragment becomes entangled in the cancellous network of the distal fragment. The realization of this fact is important in determining the manoeuvres necessary to effect reduction.

Diagnosis

The clinical picture is extremely characteristic and varies in different patients only in degree (Fig. 3). To quote Colles: "The posterior surface of the limb presents a deformity; for a depression is seen in the forearm, about an inch and a half above the end of this bone (radius) while a considerable swelling occupies the wrist and metacarpus. Indeed the carpus and base of the metacarpus appear to be thrown backwards, so much

FIG. 2.—Common displacement in Colles's fracture: lower fragment displaced and rotated backwards. Note inclination of distal articular surface compared with normal.

as on first view to excite a suspicion that the carpus has been dislocated forward. On viewing the anterior surface of the limb, we observe a considerable fullness, as if caused by the flexor tendons being thrown forwards. This fullness extends upwards to about one-third of the length of the forearm, and terminates below at the upper edge of the annular ligament of the wrist. The extremity of the ulna is seen projecting towards the palm and

FIG. 3.—Colles's fracture: typical dinner-fork deformity.

inner edge of the limb; the degree, however, in which this projection takes place is different in different instances."

Tenderness and loss of function are well-marked features. An alteration in the relationship of the radial and ulnar styloid processes, whereby the former comes to lie at the same or at a higher level than the latter, sometimes takes place, but it is plainly obvious only in those comparatively rare fractures in which lateral displacement and rotation are pronounced. Of far greater significance is the loss of the normal anterior concavity of the lower third of the shaft of the radius. The slightest amount of backward displacement or rotation of the distal fragment in Colles's fracture is sufficient to obliterate this concavity—a fact which is readily verified by comparison with the uninjured limb.

The x-ray picture confirms the diagnosis and gives useful additional information concerning the exact amount of displacement, the degree of comminution, etc.

Treatment

As this fracture is so common among housewives, and as imperfect treatment of it can result in much discomfort in the performance of ordinary domestic duties, it is important that treatment should be adequate. There is a common but quite mistaken belief that Colles's fracture is the easiest of all fractures in which to obtain a perfect cosmetic and functional result. Fortunately, the persistence of some deformity is sometimes compatible with satisfactory function, for even in the best-organized fracture clinics and in the most experienced hands some 10 to 15% of patients are left with a certain amount of deformity.

When significant displacement is present, and it usually is, reduction should be effected as soon as possible under anaesthesia—preferably general anaesthesia if the patient's

condition permits. The fragments must be disentangled, reduced, and splinted. The following steps in sequence usually prove successful in fulfilling these requirements:

1. Grasp each fragment firmly, one in each hand.
2. Exert strong traction and counter traction to disentangle the two fragments.
3. Steady the proximal fragment and push the distal one towards the volar aspect and then towards the ulnar side, maintaining traction all the while. This procedure has corrected the deformity when the wrist looks normal and when the normal anterior concavity of the radius has been restored.
4. The final manoeuvre is to force pronation to restore the normal alignment of the inferior radio-ulnar joint.

5. Over a *thin* layer of padding apply a light plaster-of-Paris strip extending from the elbow to the knuckles on the dorsal aspect, encircling two-thirds of the circumference of the limb, and mould it closely around the site of fracture (Fig. 4). The splint is completed by a few circular plaster-of-Paris bandages. If there has been marked radial displacement or if comminution is severe the thumb should be included as far as the proximal interphalangeal joint. During the application of the splint, and while it is drying, the fracture is controlled by the individual who has reduced it. The hand is maintained in slight palmar flexion and ulnar adduction—that is, a position which opposes recurrence of the deformity. The arm is supported in a sling for the first twenty-four hours. Occasionally there is considerable swelling of the fingers. In these circumstances the hand should be elevated and a very close watch kept on the circulation. Plaster splints applied too tightly or which become too tight as the result of swelling cause pressure sores and even severer vascular catastrophes.

A radiograph should be obtained as soon as possible to confirm the efficacy of the reduction (Fig. 5). When the plaster is dry (in about twenty-four hours), and if the circulation in the fingers is normal, the sling is discarded and the patient carries out full movements of the fingers, elbow, and shoulder constantly. But it is important to demonstrate what is meant by *full*, because many patients are too scared to do more than keep the arm always at the side and simply "twiddle" their fingers. The fingers must be fully extended, adducted, and abducted; the finger-tips must be curled into the palm to flex the interphalangeal joints, and they must reach the thenar and hyperthenar eminences to keep the metacarpo-phalangeal joints supple. The elbow is flexed and extended. The shoulder is kept mobile by elevating the arm alongside the head, by touching the back of the neck (external rotation), and by trying to touch the back of the shoulder-girdle with the tips of the fingers (internal rotation). It must be insisted that these movements are carried out for five minutes every waking hour in addition to the performance of the simple tasks of everyday life. In fact, many housewives are

FIG. 4.—Plaster-of-Paris splint for Colles's fracture, well moulded around the fracture site and allowing free movement of elbow and fingers.

able to do most of their household duties throughout the period of treatment.

At the end of ten days a fresh plaster-of-Paris splint is applied, for by then the swelling of the soft parts has disappeared and recurrence of deformity can occur because the original splint no longer fits the limb accurately. This second and any subsequent plaster may be applied directly on the skin. Another radiograph confirms the maintenance of the correct position of the fragments. Radiographs are taken every ten to fourteen

splint as the soft-part swelling subsides. It is wise to reapply the plaster at the end of ten days and again in another ten days, because it is about the third week after reduction that deformity tends to recur. Minor degrees of displacement are best accepted only if repeated radiographs show that the deformity is not gradually increasing. If the deformity is increasing a further manipulation is advisable.

Non-union of the Ulnar Styloid.—The styloid process of the ulna rarely unites by bone and sometimes causes discomfort for several months. None the less, the discomfort is usually only temporary, and there is no justification for pegging or grafting operations. Very occasionally it may be necessary to excise the loose fragment for the relief of persistent localized pain and tenderness.

Post-traumatic Osteodystrophy (Sudeck's Acute Bone Atrophy).—The common cause of stiff fingers after Colles's fracture is disuse—hence the importance of constantly urging the patient to keep all his joints supple. Sometimes within a few days of the injury, however, the fingers become swollen, mottled, and shiny, and severe pain is complained of when active or passive movements are attempted. In a short time the swelling is replaced by atrophy of the subcutaneous tissues, excessive sweating, and other trophic changes in the skin and nails. Radiographs show osteoporosis of extreme degree affecting chiefly the cancellous portions of the radius and ulna, the carpus, metacarpus, and phalanges. Indeed, these changes may extend to the elbow and shoulder. The cause of this syndrome is by no means clear. Some believe it is merely an extreme example of disuse. Others suggest a sympathetic-nerve disturbance—a local axon-reflex initiated by the injury. Whatever the cause, no specific remedy is available. The wrist must be splinted until the fracture is united and the fingers kept as mobile as possible by active exercises every hour. In time the bone atrophy disappears, but if the syndrome has been at all marked some limitation of wrist and finger movement is permanent.

Rupture of the Extensor Longus Pollicis Tendon.—This complication can follow any fracture of the lower end of the radius which involves the floor of the groove in which the tendon lies. It occasionally happens after Colles's fracture, and occurs any time from the third week onward—most commonly in the second or third month. The tendon is gradually frayed through by constant friction on the irregular fracture line. Eventually it gives way suddenly, often accompanied by a sensation of something snapping, and the patient is unable to extend the tip of the thumb, which remains in a flexed position. The best treatment is to transplant one of the two extensors of the index finger to the distal end of the ruptured extensor longus pollicis rather than attempt to suture the frayed ends of the damaged tendon.

Malunited Colles's Fracture

Even though there may be considerable deformity after a neglected Colles's fracture has united, the function of the wrist and hand is often surprisingly good, and treatment is not required. Occasionally an operation is necessary because of severe restriction of movement, for the relief of persistent pain usually in the region of the inferior radio-ulnar joint, and for cosmetic reasons in younger patients. The operations most often performed are osteotomy through the site of the old fracture (best done by the Jackson Burrow's method) or excision of

FIG. 5.—Illustrating standards of complete reduction of Colles's fracture. The fragments are in normal apposition and the radial articular surface is inclined correctly.

days, so that recurrence of deformity can be appreciated early and corrected if need be.

At the end of six weeks the fracture is invariably united, the splint is discarded, and a confirmatory radiograph obtained. Elderly apprehensive patients appreciate the support of a few turns of crêpe bandage for a week or so until they have gained confidence in the wrist. A few weeks later full movement of the wrist is restored by constant use, with or without the aid of physiotherapy. A competent masseuse is a great help, particularly in demonstrating the active movements necessary to mobilize the wrist and inferior radio-ulnar joints, and in encouraging patients to perform these exercises regularly.

Complications

Impairment of the Circulation.—It is of the greatest importance to observe the circulation and the sensation in the fingers at least twice a day for the first four or five days. If there is any doubt the plaster splint should be split; if this procedure is not followed by an unquestionably satisfactory circulation within half an hour the splint must be removed. The fracture can be re-reduced, but circulatory changes, once firmly established, tend to be irreversible, with tragic results—for example, local pressure sores, stiff numb fingers, or even gangrene of the fingers.

Recurrence of the Deformity.—This unfortunately occurs more often than surgeons think—or like to think. It is sometimes unavoidable because of the severe comminution of the cortex on the dorsal aspect of the fracture. In many patients it is due to failure to renew the

the lower end of the ulna. Correction of deformity by manipulation is not usually possible after about one month.

Reversed Colles's Fracture

In this injury, more correctly known as Smith's fracture, the radius is involved at the same level as in Colles's fracture. The lower fragment is, however, displaced forwards instead of backwards, and the manœuvres employed to reduce it are the reverse of those described for the more common injury. As a rule the wrist is best immobilized in the dorsiflexed position.

HEALTH SERVICE COSTS

[FROM A SPECIAL CORRESPONDENT]

Some months ago it might have been possible to regard the estimates for the cost of the Health Service in 1951-2 with less uneasiness than had been felt in the past. Last spring the presentation of an enormous supplementary estimate for the year 1949-50, and the proposed further increase in the estimated cost for 1950-1, provoked the justifiable conclusion that the cost of the Health Service had got completely out of hand. The limit placed last April by Sir Stafford Cripps on Health Service expenditure has, however, proved this time to be enforceable. He then said that no increases over the estimates could be made in one branch of the Health Service without corresponding economies in other branches. No supplementary estimate was necessary for the year just ended, and in the new year, 1951-2, the increase in the estimated cost of the Health Service is only £5m. The comparative figures are shown in the following Table:

	£m.				
	1949-50		1950-1		1951-2
	Original	Revised	Original	Revised	Original
Net cost to taxpayer (i.e., after allowing for appropriations in aid) ..	260	359	393	393	398

The Ministry of Health's establishment of control over the Health Service's finances has, it is true, had unpleasant side-effects. General practitioners hardly need reminding that discussions on their claim to a higher capitation fee have still not begun. Other practitioners in the Health Service have had their fees reduced—in some cases justifiably. What all will deplore is the method used to control the expenditure by hospital boards and management committees, which has whittled away much of their independence in administration.

Yet the stability of Health Service expenditure might have been a cause for some satisfaction were it not for two inter-related factors: the new defence programme, which will make new demands on people's pockets, and the rising tide of inflation. It is possible that this year the Chancellor of the Exchequer will be able to finance the new burden that the defence programme will impose without big increases in taxation. He may, that is, rely on rising prices, particularly food prices, to cut people's purchasing power so that they have less money to pay for other things. Next week, when the Budget is introduced, the answer to this financial problem will be known. But in two years' time the amount of real resources to be absorbed by the new defence programme will be some £1,000m. to £1,200m. more than was absorbed in the financial year just ended. Since the total resources of the community cannot be increased by anything like the amount necessary to cover these extra demands of defence, it follows that the other claims on the national resources must be reduced. Of these other claims, the civil expenditure of the Government and the personal consumption of the people ought to bear the brunt of the economies.

Social Services

By far the largest part of the Government's civil expenditure is for the social services. Only about £600m. of the "ordinary" Budget expenditure in 1950-1 went on civil expenditure that also offers scope for economies—as distinct from the payment of interest on the National Debt. By contrast the social service expenditure, including the food and housing subsidies, that falls on the Budget is of the order of £1,500m. In addition there is some social service expenditure that falls outside the Budget and is met from the National Insurance Fund or out of the rates. The next Table shows the estimated cost of all the social services in 1950-1, including the amount that is financed outside the Budget:

	£m.
National Insurance benefits*	427†
Industrial injury benefits*	14
National assistance	91
Family allowances	62
Food subsidies	410
Housing	69
Child care	16
Education	356
National Health Service	411
	1,856

* Actual expenditure 1949-50. † Including contribution to cost of Health Service.

If the £40m. contribution from the National Insurance Fund to the cost of the Health Service is deducted from the figure given for national insurance benefits, it will be seen that the National Health Service is now the costliest of all the social services. This in itself makes it a target for economies. In addition it should be pointed out that, with the exception of the Health Service, child care, and education, the 'social services are what is generally known as transfer payments. They do not, that is, represent direct expenditure by the State on goods and services but transfer income from the pockets of some people to the pockets of others—or to other pockets of the same people. It will be generally agreed that this transfer involves all sorts of inequalities, distortions, and absurdities. But in a defence economy it is the consumption of goods and services that matters most, because what has to be done is the freeing of more goods and services for defence without recourse to the most painful way of doing it—that is, allowing those responsible for the defence programme to outbid all competitors.

The following analysis of Health Service expenditure should be read with this object in mind. It might have been possible, at least for a year or two, to have kept a ceiling on the expenditure on the Health Service and other social services without raising taxes or imposing a specific charge on the public who use the Service. But this possibility has been completely upset by the Korean war and the need for rearmament.

Cost of Main Branches

It is clear that, when the estimates for 1951-2 were framed, the Ministry of Health was still hoping that the *status quo* could be maintained. A 7% increase in the cost of the hospital service and an 8% increase in the cost of the pharmaceutical service are offset by reductions in the supplementary ophthalmic and dental services. The changes in the estimated gross cost of the main branches of the Health Service are shown below:

	1949-50*	1950-1†	1951-2‡
Grants to local health authorities ..	15.4	18.4	18.6
General practitioner service ..	47.0	48.2	48.4
Pharmaceutical service ..	35.3	32.0	34.6
Supplementary ophthalmic service ..	24.1	28.1	18.6
Dental service ..	48.2	46.9	39.9
Grants to hospital boards ..	220.7	256.0	273.4
of which maintenance and running costs§ ..	210.0	244.3	259.7

* Actual expenditure except for hospitals' maintenance, which is estimated. † Estimates. ‡ Less "direct credits" (mainly recoveries from staff for board, lodging, etc.).