SURGICAL PROCEDURES IN GENERAL PRACTICE

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FRACTURES ROUND THE ANKLE-JOINT

BY

ERIC I. LLOYD, M.B., B.Ch., F.R.C.S.

Fractures round the ankle-joint are among the commonest of lower limb injuries, and their treatment is a matter of such overwhelming importance that every doctor should know as much as possible about it, so that he can either decide to treat these cases—with a full knowledge of his responsibility—or get such specialized assistance as circumstances permit. These fractures used to be treated in bed on a splint for six weeks with the minimum of reduction and the maximum of rest. Everyone now knows that a "walking plaster" is the proper thing, but the urgent necessity for obtaining and keeping exact reduction is less generally realized. There are still occasions when a patient's future is irreparably blighted by a good plaster worn for six or eight weeks on a very ill-reduced fracture. It is unfortunate that a patient in plaster can often bear weight with comfort on a fracture which is not in good position.

Classification

Pott's fracture was a term originally applied to fracture-dislocations of the ankle in which the foot was displaced outwards upon the leg. The advent of x rays has per-

EXTERNAL ROTATION FRACTURES

ABDUCTION FRACTURES

ADDUCTION FRACTURES

FIG. 1.—Ashurst's classification of ankle-joint fractures (after W. G. Campbell).

mitted more exact diagnosis and encouraged division of ankle-joint fractures into groups which were not recognized by Pott (1714-89). Ashurst's classification (1922) divides ankle-joint fractures, according to their method of production, into external rotation (61 per cent.), abduction (21 per cent.), and adduction (13 per cent.) fractures, the remaining 5 per cent., which include compression fractures, being atypical forms. Fig. 1 shows this diagram-

matically, and it may be noticed that first-degree fractures involve structures on one side of the joint only, whereas both sides are involved in those of the second degree. It also shows that when both bones are broken the line of fracture of the first break to occur is oblique in torsion fractures and transverse in abduction and adduction fractures.

Minor Fractures

Campbell (1938) has recently demonstrated that first-degree ("minor") fractures can be safely treated with a local anaesthetic and that immediate weight-bearing without plaster can then be allowed. It must be remembered, however, that some first- and second-degree fractures look identical on the radiograph, though there is risk of displacement in the second group and not in the first. Obviously it would be dangerous to treat second-degree fractures without plaster, and it is important to distinguish them at once by pushing the foot laterally or medially towards whichever bone is seen on the radiograph to be fractured. This is painful only when the astragalus presses against the broken bone, which does not occur if the ligament on the opposite side of the joint is intact. There is no necessity to test the ligament when the radiograph shows that both bones are broken, because the fracture is then obviously not first-degree. The test consists in a purely lateral movement of the foot on the leg, and is vitiated if a rotatory movement is accidentally added (Roberts, 1938). The important distinction between minor and major fractures depends, therefore, first on a radiological and secondly on a clinical examination, in that order.

Treatment (Campbell, 1938).—One side of the foot only is damaged in minor fractures, and the resulting haematoma is entered by a Record needle after anaesthetizing the skin. Ten to twenty c.cm. of 2 per cent. procaine or novocain is injected; this should relieve the pain completely and allow weight-bearing within a few minutes. The patient walks without splint or plaster and attends daily for the next two or three days, but the injection is repeated only if pain recurs. Radiographs may be taken after the first two days and subsequently at intervals of a week until consolidation is seen to have occurred, when no further treatment is necessary. In the fracture clinic of the Royal Northern Hospital it has been found possible to ignore many of these fractures and to dispense even with a local anaesthetic.

Major Fractures

Both sides of the joint are damaged in this group (that is, either both bones or a bone and a ligament) and displacement has already occurred or is liable to do so. Bone injury is seen on the radiograph and a torn ligament is diagnosed by the clinical test (Roberts) described above, which is, of course, only necessary when the injury is bony on one side of the joint and ligamentous on the other. A further deformity (not shown in Fig. 1) sometimes occurs in rotation fractures when the force continues to act until the astragalus breaks off a wedge-shaped piece from the back of the tibia, and the foot may then be displaced backwards as well as outwards. A similar fragment occasionally breaks off from the front of the tibia, but this is generally due to a hyperextension mechanism, which is unusual. The fracture is called third-degree

(Ashurst) if the whole lower end of the tibia is fractured in addition to the primary deformities.

Anaesthesia.—Local anaesthesia may be used, but it is not always satisfactory even in recent cases. The skin is painted with iodine and anaesthetized and a Record needle passed into the haematoma and into the ankle-joint. Ten to twenty c.cm. of 2 per cent. procaine or novocain is injected, and the same procedure is repeated on the opposite side of the limb. A general anaesthetic is, however, usually preferable, and gas and oxygen after preliminary morphine $1/6$ grain, or omnopon $1/3$ to $2/3$ grain with scopolamine $1/150$ grain, given hypodermically, is satisfactory.

Treatment of Major Fractures

If there is damage on both sides of the joint but no displacement the limb is put in plaster without either anaesthetic or manipulation. Displacement, however, is more common, and necessitates both anaesthesia and manipulation, preferably under radiological control.

OPERATION

The patient is in the dorsal position with the affected limb hanging over the end of the table and the knee bent

pressure inwards or outwards (depending on the type of fracture shown on the radiograph) while maintaining the forward position of the foot. Firm steady pressure is required, and there need be no fear of producing over-correction unless the internal malleolus is broken at exactly the joint level. The ankle is held in the corrected position and reduction confirmed by screening in two planes with a shock-proof portable x-ray set, but the foot-piece of the operating table must be removed before the antero-posterior view becomes possible.

When reduction is perfect in both planes the two plaster slabs are prepared by an assistant as follows. A six-inch plaster bandage six yards long is put in water and rolled backwards and forwards upon itself to make the lateral (stirrup) slab the required length. Only one bandage is used, and the slab is folded longitudinally upon itself and fixed to the inner and outer sides of the limb next the skin with a six-inch gauze bandage six yards long. The posterior slab is made in the same way from one plaster bandage, but its width is not halved by folding, and it is held in place by a plaster bandage (6 inches by 6 yards). Both slabs are put on very wet with three ends resting on the felt strip and the fourth hooked round the dorsal surface of the toes (Fig. 3). The margins of the posterior slab are cut by a knife for a distance of half an

FIG. 2.

FIG. 3.

FIG. 4.

at a right angle to relax the tendo Achillis. The surgeon sits on a low stool at the end of the table with the patient's foot on his knee and the most recent radiographs in full view. A felt strip a quarter of an inch thick and three and a half inches wide is stitched round the upper third of the leg (Fig. 2) and the proper length for two plaster slabs is then measured with a gauze bandage or tape. The first slab will run like an elongated stirrup down each side of the leg and across the heel, and the second will pass from the middle of the felt strip round the back of the heel to the tips of the toes.

The fracture-dislocation is now reduced by taking the back of the heel in one hand and pulling the whole foot forward, while the other hand acts as a fulcrum and pushes against the front of the leg just above the ankle (Fig. 2). The lateral displacement is corrected by steady

inch at the point where it passes round the heel, and both slabs are moulded smoothly on the limb by the surgeon, who has shifted his grip to include the plaster, but continues to hold the fracture fully reduced. The foot is held at a right angle and midway between varus and valgus, while the fingers and thumb press closely behind and below the two malleoli. The common practice of putting the foot in varus (inverted) is a mistake, and though the heel may be pressed into slight varus the forefoot should be, if anything, in valgus.

The fractured limb is now screened or radiographed in both planes, and anything short of perfect reduction necessitates removing the plaster and repeating the procedure. The plaster reaches the tips of the toes below and supports their plantar surface, but is cut away dorsally so that each toe is visible and movable (Fig. 4).

AFTER-TREATMENT

The patient is returned to bed with his plastered limb on a soft pillow and the knee slightly flexed under a cradle, which supports the bedclothes. A rubber heel is applied to the plaster next day with an elastoplast bandage, and the patient is encouraged to bear weight on the injured limb with the help of crutches or sticks, which he discards in a day or two. Böhler's iron heel is very good, but it has to be applied with a plaster bandage and interferes considerably with subsequent radiographs. On the other hand, a rubber heel necessitates the wearing of a felt or leather boot in any but the driest weather, as it soaks up moisture and then has to be changed. Rubber sponges can be bought for sixpence, and these cut in half transversely make excellent heels.

Walking is encouraged from the first, and the distance covered should be increased daily from a hundred yards to several miles. It is usually best to split the distance into three short walks rather than to take one long one, and to elevate the limb on a couch or stool during part of the intervals. Some swelling of the foot is common, and is perhaps useful in diminishing the risk of redisplacement. Circulatory troubles are rare in these fractures, but cyanosis or pallor of the toes must be treated by elevation of the limb or splitting the plaster. Pain is generally present for the first day or two and is disregarded if circulation and sensation remain normal, but the plaster must be split or removed and subsequently reapplied if pain persists or recurs. Bivalving the plaster is not advisable.

Usually a patient is able to walk unaided in a few days and can even resume his occupation during the period of fixation, which should last for a minimum of six weeks and be continued for ten or twelve weeks in severe fractures or in old patients. Radiographs are taken at fortnightly intervals until the plaster is removed. It is then replaced by a four-inch elastoplast bandage, which extends from the base of the toes to the tibial tuberosity and which is worn for three weeks. All bandaging may be then discontinued unless oedema persists, when another elastoplast bandage should be worn for three weeks. Movements of the ankle are encouraged as soon as the plaster-of-Paris has been removed, but no other treatment is necessary, and no good purpose is served by wedging the shoe or by the use of an outside short iron. The patient's desire for massage must be diverted to simple rehabilitation exercises (rowing and bicycling) which he has to perform himself.

Excellent results may be expected from this treatment, and most of the patients should ultimately regain painless movement of approximately normal range. The average period of disability after Pott's fracture in adults was reported to be forty-seven weeks when treatment was not given by an organized fracture clinic and eleven weeks when it was (B.M.A. Report, 1935). These figures probably do considerably less than justice to the first group, but there is now no doubt that segregation of fractures cuts the disability period to a minimum and almost abolishes what was previously a high rate of permanent incapacity after Pott's fracture. Good results are, however, less frequent when treatment has been delayed, when fixation has been insufficiently prolonged, or when the patient is old. Anything short of perfect reduction will of course militate against a good result, however careful the subsequent treatment.

Difficult Recent Fractures

Open operation is nowadays hardly ever necessary, though it is occasionally justifiable when a fractured

internal malleolus can be seen on the radiograph to have rotated through 90 degrees. In such cases Böhler (1935) advises that the surgeon should be content to expose the fragment and replace it in position without any metallic fixation, though he doubts the necessity for doing even this in all cases. There are, however, some fractures which cannot be reduced by the above methods but which can be successfully treated by skeletal traction. This may be applied in one of two ways:

(a) *Gradual*, by inserting a Steinmann's nail through the os calcis and applying traction of from 10 to 30 lb. by means of a Böhler stirrup with the limb on a Braun splint. This method may take several days to accomplish its purpose, after which the weight should be gradually diminished and the limb left on the splint for a week or ten days and plaster then applied round the nail, which is removed in a few days if the radiograph still shows good position of the fragments.

(b) *Immediate*.—A Steinmann's nail is inserted through the os calcis and the limb extended on a Böhler screw-traction apparatus. Reduction is assisted by the hands, and the malleoli are compressed with an os calcis redresseur or Thomas wrench if necessary. The fracture is screened while the limb is still on the screw-traction apparatus and before applying plaster-of-Paris. The nail is removed when the position is seen to be satisfactory, and walking begins on a rubber heel as already described.

Old or Neglected Fractures

These offer considerable difficulty, and it is often hard to know whether to attempt reconstruction of a fracture or to arthrodesis the ankle-joint at once. It is sometimes worth attempting correction up to about six months after the original accident in young patients, though this may entail an open osteotomy of the fibula. The osteotomy is performed in the line of the old fracture; the wound is sutured and the limb placed on a screw-traction apparatus with a Steinmann's nail through the os calcis as already described. Traction is applied and a redresseur (Böhler) compresses the malleoli. Position is checked by the x-ray screen and plaster is applied with the limb still on the traction apparatus. Subsequent procedure is the same as that described above.

Long-standing deformities which cause much pain are best treated by arthrodesis of the ankle. The joint surfaces have then been too much damaged by traumatic osteo-arthritis for a good result to be expected from reconstituting the fracture, and "there is no doubt that a well-arthrodesed ankle is infinitely superior to one in which a moderate result has been obtained by means of a reconstruction operation" (Ollerenshaw, 1929).

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Chronic Rheumatism.—The signs and symptoms of various forms of arthritis of the hip-joint and sciatica are discussed. Important points in treatment are said to be: (1) the prevention of haemorrhages after gold therapy by control of the platelet count, which should not be allowed to fall below 150,000 per c.cm.; (2) the administration of iodides; (3) the use of vitamin B₁; and (4) intradermal injections of histamine in cases of sciatica. The indications for surgical treatment are also considered.—*Chronic Rheumatism* in 1938. F. Françon.—*Rev. Médecine*, May, 1939, 56, 272.