Fractures of the Ankle Joint

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A Complex but interesting group of fractures, a deeper knowledge of which will stimulate the student's interest and enhance the quality of care given to the patient.

THE ANKLE is a hinge joint formed by the articulation of the lower end of the tibia and fibula with the talus (Fig. 1). Note that the fibula is on the outside (lateral) and the tibia is on the inside (medial). The lower end of the fibula is expanded forming a small prominence of bone named the lateral malleolus. The lower end of the tibia is also expanded and has a small downward projection named the medial malleolus. Posteriorly at the lower end of the tibia is an enlarged portion of bone sometimes termed the posterior malleolus.

The articular surfaces of the bones are covered by hyaline cartilage. This is clearly shown in Fig. 1. The ankle joint is often referred to as the ankle mortise ; this is comparing its similarity with the mortise and tenon joint used by carpenters. Just above the ankle joint, the tibia and fibula meet forming a fibrous joint, the inferior tibiofibular joint which allows no movement. Looking at the ankle joint from the side, lateral view it can be seen clearly that the concave articular surface of the tibia articulates with the convex articular surface of the talus.

The bones forming the ankle joint are held together by ligaments. For the purposes of this article it is best to think of these ligaments as follows :

(A) The lateral ligament on the outer aspect holding the fibular to the talus.

(B) The medial or deltoid legament on the inner aspect holding the tibia to the talus.

(C) Holding the inferior tibiofibular joint together.

These ligaments are of great importance when considering these fractures. Upon their integrity often hinges the patient's treatment. When viewing X-rays of the ankle the bones should not be thought of in isolation. A mental picture should be made of the abovementioned ligaments ; the patterns of fracture will then be more easily understood.

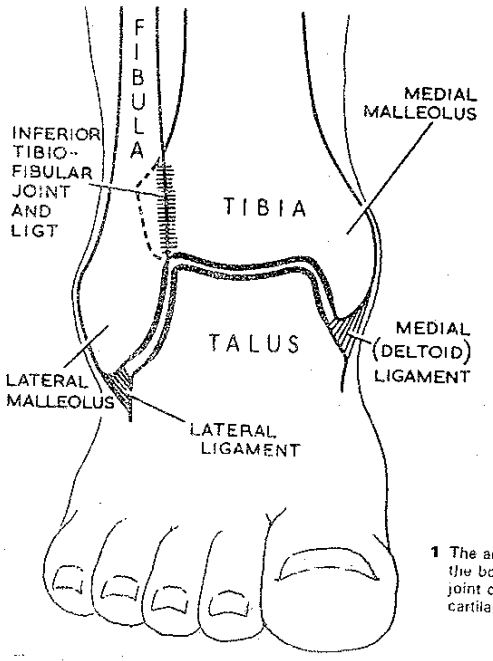
The bones near the ankle joint are very superficial, but despite this the majority of the injuries are closed. However, many are accompanied by overlying cuts and grazes making the fracture 'technically compound' ; in these instances the wounds should be treated with great respect lest they cause trouble later. Movements of the ankle are plantar flexion, moving the foot downwards ; and dorsi flexion, moving the foot upward. Other movements of the foot such as invasion and eversion are made at the subtalar and mid-tarsal joints. The blood vessels surrounding the joint are rarely injured but occasionally suffer because of severe trauma or swelling under a plaster of Paris splint ; hence the importance of testing the circulation frequently.

CAUSES OF THE FRACTURES

Causes of fractures can be catching a foot in the carpet, playing football, slipping on ice, road traffic accidents, jumping, getting off a bus, falling while drunk, skating and so an and so on. There is no end to the variety of ways in which a person can have that all too familar twisting of the ankle. To cause the fractures there must be either an adduction, abduction, rotation or vertical compression force applied to the ankle mortice. This force is ably supplied by any of the aforementioned accidents. Usually the fractures are isolated but they can be part of multiple injuries (for instance, a pedestrain hit by a car) : or they can be associated with one other injury, for example, for putting an arm out to save one self when one falls thus fracturing the arm or wrist.

CLASSIFICATION OF THE FRACTURES

There are different ways of classifying these fractures. Here the method is based on the type of force causing the injury. The four groups of fractures caused by different forces are namely : external rotation, abduction, adduction and vertical compression. A minor force will cause a crack fracture of one of the malleoli without displacement of the talus. A more severe force in the same direction



1 The articular surfaces of the bones of the ankle joint covered by hyaline cartilage

will cause fractures of both malleoli with displacement of the fragments and the talus Fractures of the posterior malleolus also occur with the more severe forms.

Vertical compression fractures are out on their own as they are caused by a force smashing the talus against the tibia. The pattern here is completely different ; the lower end of the tibia is comminuted and the talus is displaced upwards. Epiphyseal varieties of the fractures occur (not illustrated) through the epiphyseal plates in youngsters.

CLINICAL FEATRUES

Pain and tenderness will be present, centred over the affected malleolus. In most displaced fractures the clinical diagnosis is fairly obvious, the whole foot being pushed to one side and sometimes rotated. Swelling will tend to be far more diffuse than is seen in a sprain ; but be wary of the undisplaced fracture seen during the first few minutes after injury showing little if any swelling. It is kinder to await X-rays than to subject the patient to a full examination of the joint when he first arrives in casualty.

TREATMENT OF THE FRACTURES

Isolated undisplaced fractures of the lateral malleolus only require immobilization until the fracture if healed.

The most common method is by a light below-knee walking plaster or Paris splint although, 'like women choosing clothes' every consultant has his own preference such as crepe on wool, Viscopaste, Elastoplast or Tubegrip, all of which have their place.

During the first week the patient will be on crutches with no weight-bearing until the pain abates enough for him to get his foot to the ground. The plaster will remain on for four to six weeks approximately. Similar treatment is given to isolated undisplaced fractures of the medial malleolus, that is, a below-knee plaster of Paris splint ; but the periods of immobilization and non-weight-bearing are extended.

Any fractures with displacement of the talus must be perfectly reduced, otherwise eventually there will be complications. Here an attempt at closed reduction under general anaesthetic is first attempted. The surgeon manipulates the ankle in the reverse direction to the force which caused the fracture. While the plaster is still wet and malleable, he carefully moulds the plaster to hold the ankle in the reduced position, hence the plasters of these patients do not look like the textbook plasters. Following reduction, check-X-rays are taken. If the fracture has been correctly reduced all is left alone and the patient is left in plaster for eight to 12 weeks, probably with the occasional intermediate change to allow for reduction of swelling and late assessment.

If, on the other hand, the X-ray is not perfect another attempt may be made using conservative methods, or recourse may be made to surgery.

SURGICAL METHODS OF TREATMENT

Fractured medical malleolus : In many cases closed treatment fails. Often this is because a piece of periosteum becomes interposed between the fragments. At operation the medial malleolus is exposed, the periosteum removed and the fracture held reduced by a screw. The limb is then usually held in a below-knee plaster of Paris splint until change of plaster and removal of sutures at about two weeks.

Diastasis of the inferior tibio-fibular joint : In this condition the anterior and posterior tibio-fibular ligaments are torn allowing the two bones to separate. Occasionally a small piece of bone from the tibia is avulsed by the ligaments. With diastasis, plaster does not hold the corrected position very well and a transverse screw is therefore the best method of treatment.

Posterior marginal fracture of the tibia : The accurate re-positioning of the fragment is, in some instances, not necessary. This is the case if the fragment is displaced upwards and constitutes less than about a third of the articular surface. If the fragment is large, however, it will have to be reduced to make the articular surface intact. It is then held in place by a screw driven into the tibia through the posterior aspect of the fragment.

Transverse fractures of the fibula : These are sometimes treated by the insertion of a long screw up the shaft of the bone.

Vertical compression fractures : These fractures are usually comminuted and it would therefore be impossible to replace all the pieces accurately. If displacement is minimal, treatment is by the application of a well-padded of Plaster of Paris splint. If, however, there is much displacement, skeletal traction will have to be applied through a Steinmann's pin in the calcaneus. The limb could then be nursed, for example, on a Braun's frame. Arthrodesis might be necessary at a later date to give a pin-free stable ankle.

NURSING CARE

First to be considered will be the patient who has had an open reduction of his fracture. He will, in all probability, return from theatre a below-knee plaster of Paris splint. The foot of the bed should be raised as a routine precaution to prevent or ease postoperative swelling.

A substantial tilt will really aid venous and lymphatic drainage and produce vast improvement within hours. As well as having the foot of the bed raised, the patent will be more comfortable if the plaster is rested on a pillow thereby flexing the knee a little. Let your patient be your guide. Like customers in a shop, patients are nearly always right when it comes to their own comfort. A monkey-pole or handles from a Balkan beam are remarkable aids to patients and nurses alike. The patient can do more for himself, and the lifting that a nurse does is cut to a minimum.

Exercise will benefit muscles, circulation, swelling and, not least, the patient's own peace of mind, knowing that he is doing something, no matter how

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