

TREATMENT OF TRUE WIDENING OF ANKLE MORTISE

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THE FOLLOWING ARTICLE will deal mainly with true widening of ankle mortise, associated with simple short oblique fractures of the inferior end of the fibula, and the rupture of the inferior tibio-fibular ligaments, usually both the anterior and posterior ligaments.

This type of injury is commonly seen amongst people participating in athletics and is extremely common in the ski circles, where the fracture of the fibula is a torsion, or twisting fracture and the inferior tibio-fibular ligaments are completely torn or avulsed by this twisting force. Invariably there is a great deal of œdema of the soft tissues in the region of the injury; and also a lot of hæmatoma in and around the mortise. It is not common to see discoloration of the skin three or four days after the injury extending almost to the knee on the affected leg.

It has been our experience in dealing with a great number of these injuries that it is a waste of time to reduce the diastasis before the swelling has gone down. The reduction in itself is quite simple, and easily accomplished, however, as the swelling goes down the plaster becomes quite loose, and the widening re-occurs. We have attempted to reduce this swelling by massaging the œdema to above the malleoli, and then applying an Esmarck bandage starting at the toes and extending to well above the malleoli. Following these procedures, the diastasis is then reduced; however, invariably the widening has re-occurred in from five to nine days.

True widening of the ankle mortise may occur (1) in association with fractures of the lateral malleolus and tearing of the inferior tibio-fibular ligaments and interosseous ligament. (2) In association with a fracture of the medial malleolus at or near its base. (3) In tri-malleolar fractures, where the above conditions are present on either the lateral or medial side of the mortise, or on both sides. (4) It may occur where there is a tearing of the inferior tibio-fibular ligaments, both anterior and posterior and interosseous ligament, without any fracture in the region of the ankle mortise.

The diastasis that occurs in type (1) is very easily reduced; but quite difficult to maintain by closed methods.

The diastasis that occurs in type (2) is quite readily reduced and maintained by closed methods in well over 50% of the cases, providing that there is not a large piece of tissue between the fragments, which is the exception rather than the rule.

The diastasis that occurs in type (3) is quite readily reduced by closed methods, but requires x-rays examination and may have to be reduced two or three times in the first twenty-one days before it can be maintained.

The diastasis that occurs in type (4) is readily reducible, but difficult to maintain by closed methods. We have seen two cases here in six years, where there was a posterior dislocation of the talus with rupture of inferior tibio-fibular ligaments and true widening of the ankle mortise without a fracture.

In dealing with fractures of the medial malleolus, and the posterior lip of the tibia, certain rules are generally accepted with respect to performing open reductions. One of the rules is, that the main reason for surgical intervention in a fracture involving the medial malleolus, is that there is soft tissue interposed between the fragments. The surgeon who has opened any number of these fractures knows that it is the exception rather than the rule to find any significant amount of soft tissue between the fragments, and that rarely one will be convinced that the amount of soft tissue he has removed would have prevented bony union, or a solid fibrous union.

In dealing with fractures of the posterior lip, it is generally accepted that if the fragment involves more than one-third of the articular surface, an open reduction with internal fixation is indicated. This is not so; and often larger fragments than this can be manipulated into good position, and held with the foot in thirty to forty-five degrees of plantar flexion, and then brought to a right angle at the end of two weeks.

Several methods have been devised for judging whether or not there is a diastasis of the ankle joint. One of the most common is to x-ray both ankles, and compare the A.P. views. We have found that unless the diastasis is readily visualized, it is of little significance. A partial tear of the inferior ligaments may give very slight, but not too evident diastasis, if a fracture is present

the ligament will heal sufficiently well to prevent further widening; during the time required to heal the fracture in plaster. If there is no fracture present, the sprain should be treated similarly to any other sprain, *i.e.* immobilization in a short cast for fifteen to twenty-one days or strapping with adhesive and partial or non-weight bearing on crutches.

METHOD OF CLOSED REDUCTION

Closed reduction of diastasis of the ankle mortise is a very simple procedure, not requiring a Bohler reducer, or any other form of mechanical device. Spinal anaesthesia is the anaesthetic of choice, and we usually use a unilateral spinal, given by placing patient on affected side, and maintaining him in this position for a few minutes after the spinal has been given. The patient is then turned on his back and the affected leg is allowed to hang over the end of the table. Cotton wadding is wrapped around the lower leg, going around the malleolar area two or three times. Eight 4-inch strips or slabs of plaster are then dipped in warm water, and placed in stirrup fashion down one side of the lower leg; under the heel and up the other side of the leg. A 6-inch roll is then rolled over the plaster stirrup, again going around the malleolar area two or three times. The foot is then brought up to a right angle with the lower leg, and maintained in this position by supporting it on the operator's knee. The fingers of both hands are then gripped over the Achilles tendon, which allows the thenar eminences to fall on the malleoli. The maximum pressure or compression that one can exert, and maintain on the malleoli, is then utilized to reduce the diastasis. This pressure must be maintained until the plaster has set, and moulded itself into the contour of the bony prominences of the ankle joint. This will take from seven to ten minutes with cellona or gypsona plaster. Then three or four more 6-inch plaster bandages are rolled over the lower leg; and as a rule a full length plaster of Paris cast is applied.

This method of reduction has been used successfully in two cases of diastasis of the ankle joint; one of which had gone untreated for 19 days following the injury; and one that had gone 17 days following the injury. If the above procedure of reduction is followed carefully, the true widening may be reduced in all cases, un-

less there is an intra-articular fragment blocking the reduction.

We have never had a skin slough from pressure over the malleoli, although invariably the ankle is very painful immediately after the reduction and may require elevation and sedation with Demerol for from eight to twelve hours.

We have never seen a true widening over reduced by closed methods. It may be possible to do this providing that the foot is not at right angles at the time of the reduction, hence throwing the narrowest diameter of the talus into the mortise, and allowing one to over reduce the diastasis. If it is possible for this to occur, then one should assume that ligamentous stretch later on with weight bearing, pushing the foot to a right angle, would correct the over reduction. We have seen three cases of over reduction with internal fixation by means of a Clay Ray Murray plate complaining of severe pain when the body weight was on the affected side. When the plate was removed, the pain disappeared. Probably these plates were applied with the foot in slight plantar flexion, and the narrow diameter of the talus in the mortise.

AN EFFECTIVE AND SIMPLE METHOD OF OPEN REDUCTION WITH INTERNAL FIXATION

We have found that the safest and quickest method of reducing and maintaining a true diastasis, associated with a fracture of the inferior end of the fibula in young people, is by open reduction and internal fixation with an inch and three-quarter stainless steel screw.

An incision is made slightly posteriorly to the posterior margin of the lateral malleolus and along the posterior border of the fibula. The skin and subcutaneous tissue are dissected from the malleolus, the periosteum is elevated from an area not any larger than the head of the screw. A drill hole is then made with a 9/64 bit, drilling upward and anteriorly through both cortices of the fibula and entering the tibia just above its articular surfaces. A 3/32 Kirschner wire is then inserted through the drill hole and into the medullary canal of the tibia. An A.P. film is then taken to be sure that the wire is not passing through the articular portion of mortise. Providing that the drill hole is in proper position, and that the lower end of the fibula is not being pried laterally increasing the widening, an inch and three-quarter screw is screwed through the fibula; watching again that this does not cause

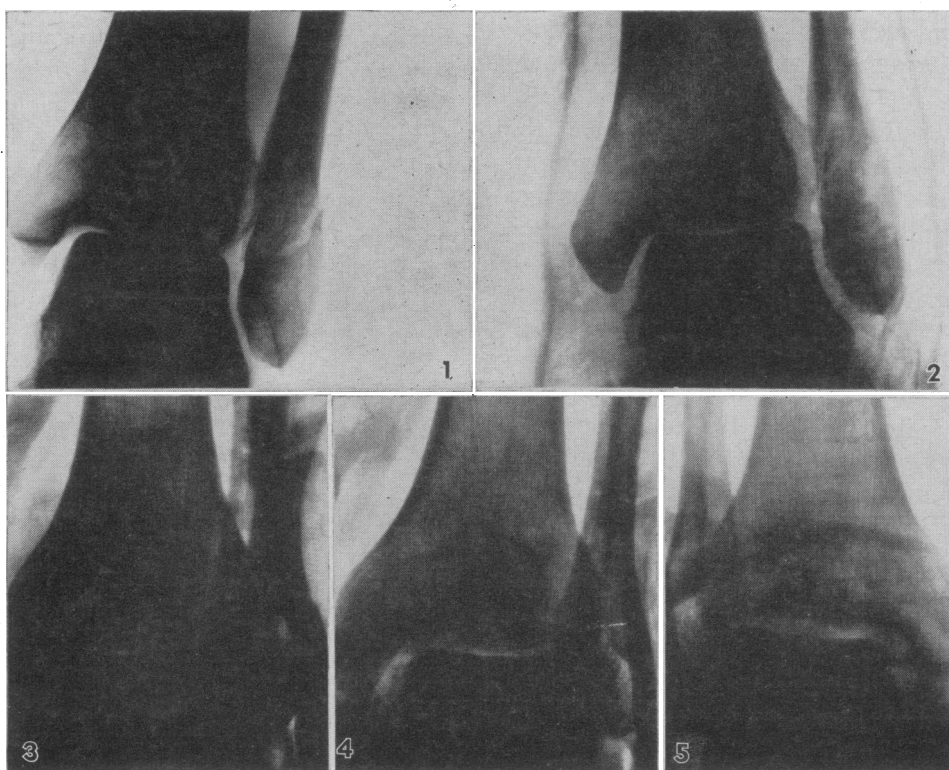
lower end of the fibula to move laterally. The screw is then driven into the tibia running superiorly and toward the anterior cortex.

Recently it has been advocated by some groups, that a short screw be used to fix the fibular fragments; before the lower screw is inserted, and that this shortens the healing time. We feel that this is not necessary since we immobilize for at least ten weeks without a caliper, and have never seen a non-union in an oblique fracture of the fibula in this area. During this procedure the foot is maintained at right angles at all times. As a rule a full length plaster of

physeal plate at the level of the superior margin of the talus.

CASE 1

A male, aged 24, who obtained a fracture of the lateral malleolus with a minimum amount of widening of the ankle mortise. This leg was immobilized in a non-weight bearing short plaster cast for a period of three weeks, at which time a walking iron was applied. No attempt was made to reduce this widening. At the end of five weeks the cast was removed and weight bearing commenced. I saw this man one year later on the ski hill with no disability and complete range of motion without pain or swelling even after a full day of skiing. Fig. 1. The original film. Fig. 2. In a plaster cast with no attempt to reduce the widening.



Paris cast is applied for at least three to four weeks. A short non-weight bearing cast is then applied for a further six to eight weeks. Many surgeons apply a walking caliper at the end of one month. It seems that the only type of complication that one could have in this type of an injury would be from axial pressure driving the talus up into the mortise, and causing a re-occurrence of the diastasis. One would think that a good way to obtain this would be to apply a walking boot or caliper.

We have seen four cases of non-union of the fibula where the fracture is a transverse fracture of the fibula, through the area of the old epi-

CASE 2

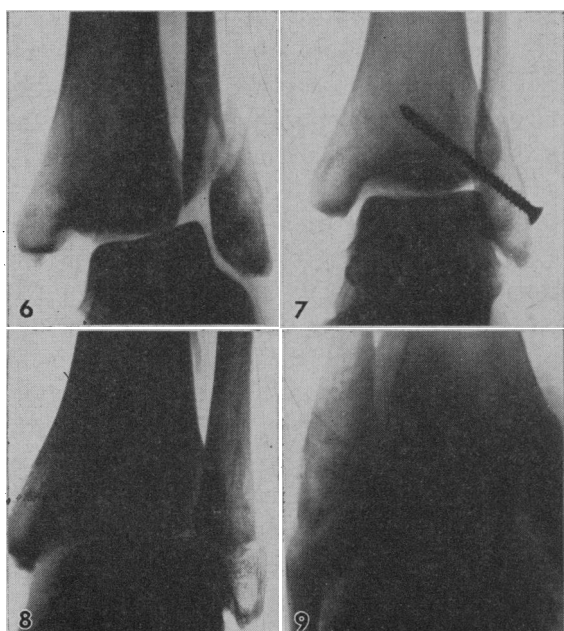
A male, aged 21, who sustained a fracture of the lateral malleolus and a fracture of the posterior malleolus with a true widening of the ankle mortise, while skiing December 1, 1951. He was admitted to hospital and the ankle was compressed and elevated for a period of four days. On December 5, under spinal anaesthesia, an Esmarch bandage was applied in order to reduce the swelling. The widening was then reduced by closed reduction in the manner described above. Fig. 3 shows the post reduction films with the true widening having been reduced. Fig. 4 taken on December 12, shows that the widening has recurred in the plaster cast. Fig. 5 taken on December 19 shows the widening has re-occurred. At this time we decided to keep his ankle immobilized for a further six weeks and then to start weight bearing.

I saw this boy five months from the date of the original accident. He now has a markedly swollen ankle with a considerable amount of pain after he has been

standing on it for a short time. It is my plan now to operate and reduce the widening with internal fixation, and probably plastic repair.

CASE 3

A female, aged 35, sustained a fracture of the lateral malleolus with true widening of the ankle mortise on January 3, 1952. An open reduction was performed on January 6, 1952. The widening was reduced and held with a 1¼ inch screw. A full length plaster of Paris cast was applied for a period of one month, at which time the plaster was removed and a short non-weight bearing cast was applied for a further period of seven weeks. The cast was then removed and she was started on physiotherapy and allowed to bear weight. She now has full range of movement and is pain-free with no swelling, after being on her feet for long periods of time. Fig. 6. Original film. Fig. 7. The postoperative film.



CASE 4

A male, aged 19, who sustained a fracture of the lateral malleolus on December 14, 1946. On December 20 the swelling had gone down, the widening was reduced under spinal anaesthesia and a full length plaster of Paris cast was applied. Fig. 8 shows the original injury. Fig. 9 is a post-reduction film.

On January 7, 1947, this ankle was again x-rayed and the widening had re-occurred. At this time open reduction with internal fixation was carried out. This boy obtained an excellent ankle with no disability following surgery.

CASE 5

A female, aged 26, sustained a fracture of the lateral malleolus on April 15, 1951, with a true widening of the ankle mortise. On April 25, ten days after the injury, an open reduction with internal fixation was performed. This young lady went back to her position as a ski instructress and first aid assistant on the ski hill in Banff, the following year. Figs. 10 and 11 show x-rays taken with the internal fixation in place, one year following her accident. She has full range of movement with no disability.

SUMMARY

1. True widening or diastasis of the ankle mortise associated with a fracture of the inferior end of the fibula is commonly seen in torsion fractures at this level.

2. We have found that in dealing with young active people, open reduction and internal fixation with one screw is the surest and quickest method of obtaining a stable, non-painful weight bearing ankle joint.

3. This one screw method has been used in over twenty-five cases during the period of five

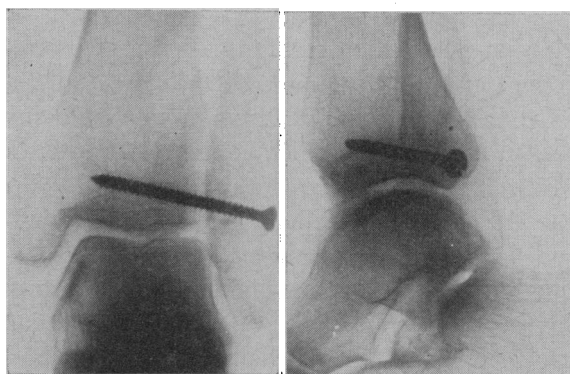


Fig. 10

Fig. 11

years, and in not one case have we found it necessary to remove the screw at a later date, because of pain, even though the greater number of these people have returned to the ski slopes.

"At mid-century, as one scans 50 years of medical progress, it is the phenomenal growth of the natural sciences that stands out clearly as the driving force responsible for the extraordinary advances that have been made in medicine. It has led to an enormous increase in man's understanding of his physical constitution and to effective measures for treating a host of diseases that beset it. This is common knowledge. We tend to see less clearly, at least we tend to forget, how the phenomenal growth of science has complicated the teaching of medicine, yet the medical curriculum has not evolved to meet these changes. On the contrary, the curriculum continues to adhere to a pattern that was designed in different times and under different circumstances."—George Packer Berry, *J. Med. Education*, 28: 17, 1953.