POSTERIOR MALLEOLAR FRACTURES


From the Department of Orthopaedic Surgery, St Mary's Hospital, London, and the Portsmouth Royal Hospital

The management of ankle fractures involving the medial and lateral malleoli is well described. Both conservative management (Platt 1926) and operative management (Denham 1964) can give excellent results. The problems of posterior malleolar fractures have in comparison been neglected. Denham (1964) wrote: "The posterior fragment will move with the lower end of the fibula because of the strength of the inferior tibio-fibular ligament." This is certainly true with small posterior fragments but may not be so with larger ones.

The aim of this paper is to describe a new technique for reducing and fixing vertical posterior malleolar fractures by the use of a special clamp.

EARLIER METHODS

When the posterior malleolar fragment involves more than one-third of the articular surface of the tibia it affects the area where weight is borne. Reduction by closed manipulation is difficult. The fracture line is usually vertical (Figs. 1, 4, 7, 9, 13 and 15) and it is impossible to hitch the fragments together. Reduction is not easily maintained by external means, and even with forced dorsiflexion of the ankle the reduced position may not be held in plaster-of-Paris.

In 1933 Dickson suggested that posterior malleolar fractures should be treated by skeletal traction through the calcaneus. The traction should be maintained until the fracture is reduced, up to three weeks, after which a plaster cast is applied and the limb immobilised in it without weight-bearing for a further eight weeks. Figure 1 shows the radiographs of a patient who had been treated by this method. In the lateral radiograph, taken two weeks after injury, a gap is still to be seen in the articular surface of the tibia. Twelve weeks later the ankle was still stiff and painful.

Open operation is sometimes undertaken for posterior malleolar fractures and reduction is held by screws. Successful results are achieved but reduction is difficult and fixation with screws across the fracture site may not be firm. After operation the ankle has to be protected by plaster-of-Paris until the fracture is united, and taking weight on the leg is not allowed. The lengthy immobilisation without weight-bearing may lead to osteoporosis and to stiffness of the ankle and subtalar joints which may take many months to recover.

CONSTRUCTION AND APPLICATION OF THE CLAMP

The clamp was originally designed by Mr G. E. Dunkerley. It consists of two parts each freely moveable on the other. The longer of the two parts (Fig. 2) is threaded below the
upper knob and carries two smaller knurled knobs. At its lower end it is again threaded. The second part of the instrument consists of a cannulated rod which carries a side arm. Figure 3 shows the instrument assembled. By twisting the two moveable knobs on the longer part, the tubular connection with side arm can be lowered and fixed. The instrument is therefore a pushing clamp.

**TECHNIQUE OF OPERATION**

The fracture is approached through a postero-lateral incision with the patient prone. The flexor hallucis longus muscle is stripped from the lower end of the tibia and retracted laterally, exposing the posterior surface of the tibia and the fracture site.

A 5-millimetre hole is drilled perpendicular to the tibial shaft through both tibial cortices about 2-5 centimetres proximal to the fracture line. The assembled clamp is applied by introducing the longer part into the drill hole and screwing it down until it is firmly in place and engaging both tibial cortices. By twisting the two small knobs the side arm is then lowered, pushing the posterior fragment into place. Over-reduction is prevented by the intact posterior periosteum.

Radiographs are taken to confirm that anatomical reduction has been achieved. A plate is then bent to conform with the tibial surface and applied medial to the clamp. It acts as a buttress plate in the manner of the Ellis plate used in the treatment of Smith’s fracture of the radius (Ellis 1965).

**CASE REPORTS**

Case 1—A woman aged forty-two suffered an unusual plantar-flexion injury of the ankle. She fell backwards while climbing a ladder, her foot being caught in a rung. Radiographs showed a posterior malleolar fracture involving about half the articular surface (Fig. 4). The fibula was intact. Figure 5 shows the clamp in position at operation with the fracture reduced. Figure 6 shows the plate in position. The patient was allowed up without weight-bearing on the affected limb for six weeks. The joint line was restored anatomically and ankle movements returned to normal.

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**Fig. 2**

The clamp before and after assembly. The overall length of the instrument is 23 centimetres.

**Fig. 3**

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**Fig. 4**

Case 1. Figure 4—About half the tibial articular surface is involved. The fibula is intact. Figure 5 shows the clamp in position and anatomical reduction has been achieved. Figure 6 is the final radiograph showing the position held by a six-hole Denham plate.
Case 2—Figure 7 shows the radiographs of an extensive trimalleolar fracture with a vertical fracture of the medial malleolus as well as a large posterior malleolar fracture. Figure 8 shows the posterior plate holding the posterior fragment. An additional screw in the medial malleolus has increased stability.

Case 3—An extensive trimalleolar fracture is shown in Figure 9. In Figure 10 the radiograph after the initial operation shows it to have been inadequate. A large step can be seen in the tibial articular surface. The radiograph in Figure 11, at the further operation using the pushing clamp, shows anatomical reduction. Figure 12 shows the plate and the final position.

Case 4—In Figure 13 the radiograph after an attempt at reduction shows it was unsuccessful. Figure 14 shows that the posterior malleolar fragment has been well reduced. Case 5—Figure 15 is the radiograph of the extensive trimalleolar fracture. Figure 16 shows that the reduction has been successful.
Case 2—A man aged seventy-three suffered an extensive trimalleolar fracture (Fig. 7). The patient was unable to describe exactly how the injury occurred. The posterior malleolar fragment involved about two-thirds of the tibial articular surface. The fracture was reduced and fixed in position with the clamp. Figure 8 shows the final position with the plate applied. On this occasion an additional screw was used to fix the medial malleolus, so increasing stability. Good reduction was achieved. After operation ankle movements were encouraged for two weeks before sutures were removed and the leg placed in a plaster-of-Paris cast. This was necessary because the patient was too old to walk with crutches.

Case 3—A woman aged sixty sustained a forced plantar-flexion injury of her ankle by falling forwards over her foot while descending a flight of stairs. Figure 9 shows the extensive trimalleolar fracture. Operation was performed to reduce and secure the medial and lateral malleoli (Fig. 10) but a step was clearly seen in the lateral radiograph of the ankle and the position was unacceptable. Re-operation using the pushing clamp was done (Fig. 11) and anatomical reduction was achieved (Fig. 12). The ankle was supported in a walking plaster and the patient was discharged home taking weight on her injured limb three weeks after injury.

Case 4—A woman aged forty-eight tripped while going upstairs, sustaining a comminuted fracture of the lower tibia and fibula with a large posterior malleolar fragment. Initial treatment was by reduction under anaesthetic and a full-length plaster cast was applied (Fig. 13) but the upward displacement of the posterior malleolar fragment was not corrected. Eight days after the injury operation was performed. Using the clamp the fracture was reduced and held with a six-hole buttress plate (Fig. 14). Active movement was started two weeks after operation and full weight-bearing was allowed less than two months from the time of injury.

Case 5—A woman aged forty sustained a forced inversion injury of her left ankle (Fig. 15). Closed manipulation failed and operation was therefore undertaken. The fibular fracture was secured with an intramedullary screw, but radiographs showed that the posterior malleolar fracture was still displaced. The patient was turned and, using the postero-lateral approach, the fracture was reduced with the clamp and secured with a four-hole plate (Fig. 16). Active movements were started when the swelling allowed, and less than two weeks later the patient was fully weight-bearing. A month later movements of the ankle were virtually full.

Case 6—A man aged twenty was involved in a road traffic accident in which he sustained multiple injuries, one of them being a fracture-dislocation of the left ankle. At operation soon after admission

![Fig. 17](image1) ![Fig. 18](image2)

Case 6. Figure 17—The fractured medial malleolus is held with a screw but there is still a tendency to subluxation. Figure 18—The final position is not good because of the delay before reduction but there has been some improvement.

the fractured medial malleolus was reduced and secured with a screw and the leg placed in a plaster cast (Fig. 17). Unfortunately, backward displacement of the talus could not be prevented in plaster and therefore two months after injury re-operation was carried out. The displaced posterior marginal fragment was reduced by the clamp and secured in place by means of a three-hole plate (Fig. 18). The final radiological position in this case is not good because of the time interval between injury and operation but the displacement was corrected and did not recur.
DISCUSSION

Two trimalleolar fractures, three comminuted fractures of the lower tibia and one unusual isolated posterior malleolar fracture were treated. In only one case (Case 6) was the reduction unsatisfactory, and this was almost certainly caused by the delay of over two months before operation.

In Cases 2 and 3, plaster-of-Paris was used to support the ankle while the patient was mobilised. The patient was then allowed to take full weight on the injured leg. The other patients were encouraged to move their ankle joints fully and plaster was not used. These patients were allowed to take full weight two months after operation.

SUMMARY

1. A method of treatment of posterior malleolar fracture is described which restores the proximal surface of the ankle joint to its normal position.
2. Reduction is achieved with a special clamp and the position held with a strong plate. Early ankle movements may therefore be encouraged without fear of redisplacing the fracture.
3. Perfect reduction is necessary to avoid the later onset of arthritis, and this was achieved in five of six patients reported.

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REFERENCES


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