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Single Oblique Incision for Simultaneous Open Reduction and Internal Fixation of the Posterior Malleolus and Anterior Syndesmosis

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ABSTRACT

Several surgical approaches to the posterior malleolus have been described. However, these approaches may make it difficult for fixation of associated lateral malleolar and anterior syndesmotic fractures. A single incision approach is described that allows safe access to the posterior malleolus while also facilitating access to the lateral malleolus and anterior syndesmosis.

The optimal management of posterior malleolar fractures remains controversial among orthopedic surgeons (1). The criteria for fixation of these fractures have traditionally focused on the size of the fragment. Fixation has generally been recommended in cases in which 25% to 33% of the articular surface of the tibial plafond is involved (2,3).

Indirect reduction of the posterior malleolus with fixation by an anteroposterior screw remains the most common method of fixation of the posterior malleolus (4). However, recent efforts by a number of investigators have focused on achieving direct reduction and fixation of the fragment.

Several approaches to the posterior malleolus have been described (5–8). A longitudinal posterolateral approach with the patient in the prone position has become popular (9,10). This approach exploits the interval between the flexor hallucis longus muscle and the peroneal muscles. More recently, a modification of this approach using a single oblique incision has been described that also facilitates simultaneous fixation of the lateral malleolus (11). In the present report, a different technique for the exposure and fixation of the posterior malleolus, which also allows access to the anterolateral aspect of the ankle joint, is described.

Surgical Technique

The patient is placed in a lazy lateral decubitus position on the operating table. A pneumatic tourniquet is applied to the ipsilateral thigh to ensure a bloodless operative field. Proximally, a single oblique incision is made through the skin overlying the peroneal tendon sheath. The incision is continued for approximately 12 cm and runs anteriorly and distally across the anterior half of the tip of the fibula (Fig. 1). The incision can be placed more anteriorly or posteriorly depending on the fracture pattern and degree of exposure required. Sharp dissection is continued to expose the underlying peroneal tendon sheath and distal fibula. An interval is then developed between the tendon sheath and the lateral malleolus by sharp dissection along the posterolateral aspect of the fibula. Care must be taken when continuing dissection distally to avoid incising the peroneal retinaculum (Fig. 1). Damage to this structure can potentially result in chronic subluxation of the peroneal tendons. Once mobilized, the peroneal tendon sheath is then retracted posteriorly. The muscle fibers of the flexor hallucis longus are then visualized on the posterior aspect of the distal tibia. Using a periosteal elevator, the muscle is gently stripped off the underlying periosteum. Care should be taken to remain superficial to the periosteum to avoid damage to the posterior inferior tibiofibular ligament of the syndesmosis. The posterior malleolus is now exposed, and open reduction and internal fixation of the posterior malleolar fracture fragment can be performed (Fig. 2).

Posterior malleolar fractures can be fixed with either a cannulated screw or a plate used in an antiglide fashion, depending on surgeon preference and the specifics of the fracture itself. Once satisfactory reduction and fixation has been achieved and confirmed by examination using a C-arm, the wound is irrigated and closed in the usual fashion.

Access to the anterior aspect of the syndesmosis is possible by tissue dissection anterior to the distal fibula (Fig. 3). The superficial branch of the peroneal nerve crosses the ankle joint in this region, and care must be taken to avoid injury to the structure. Gentle

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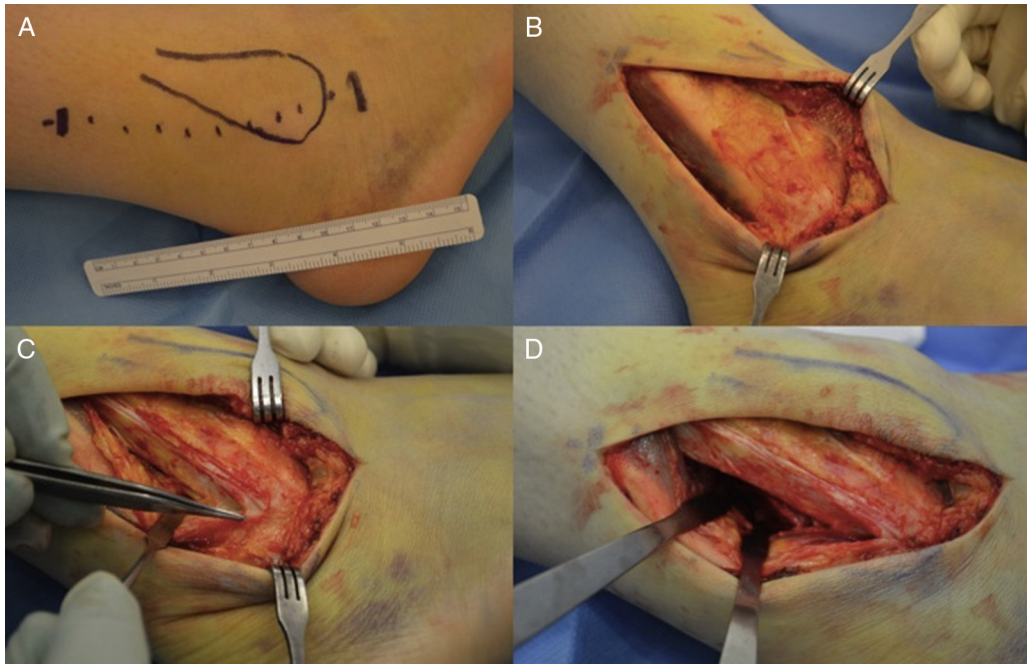

Fig. 1. Surgical approach to the posterior malleolus. (*A*) Planned oblique incision over the lateral malleolus. The surface marking of the distal fibula is highlighted. (*B*) Sharp dissection to expose the lateral malleolus and peroneal sheath. (*C*) The peroneal retinaculum (tip of forceps) should be preserved to prevent risk of peroneal tendon subluxation. (*D*) The posterior malleolus is accessible with retraction of the peroneal and flexor hallucis longus muscles.

retraction will allow exposure of the anterior aspect of the joint, and fixation of fractures of the anterolateral aspect of the distal tibia is possible using this approach. Because the distal fibula is exposed, fixation of a lateral malleolar fracture is possible through the same incision.

Discussion

Although controversial, most orthopedic surgeons will consider fixation of a posterior malleolar fragment that involves >25% of the articular surface of the distal tibia (2,3). In cases in which the distal fibula is also fractured, reduction and fixation of the lateral malleolus will facilitate indirect reduction of the posterior malleolus. Anteroposterior screws can then be placed to secure the fixation of the posterior malleolus. This is possible because the posterior malleolar fragment is attached to the fibula by the posterior inferior tibiofibular ligament. Huber et al (12) have reported lower success rates in achieving anatomic joint congruity with this indirect strategy compared with direct reduction of the posterior malleolus. Although less invasive, indirect reduction does not allow adequate visualization of the posterior malleolar fragment. Moreover, anatomic reduction might not be possible owing to the interposition of incarcerated periosteum or hematoma. These problems have led to newer surgical strategies that attempt to directly reduce the posterior malleolus.

Incisions and surgical approaches around the ankle that provide safe and adequate access to the posterior malleolus and also facilitate access to other malleolar bony injuries have challenged the surgeon. In this context, several surgical approaches have been described in published studies (5–8). A single incision posteromedial approach to the ankle, which allows fixation of the medial malleolus and limited access to the posterior malleolus, has been reported (5). Kao et al (6) have described a more extensive J-shaped incision across the posteromedial aspect of the joint for fixation of pilon fractures. Additionally, the use of dual incisions (7) and arthroscopic evaluation of the posterior malleolus have been described (8).

Recently, the use of a vertically oriented incision for the posterolateral approach has become popular (9,13,14). This approach uses the inter-nervous interval between the flexor hallucis longus (innervated by the tibial nerve) and the peroneal musculature (supplied by the superficial branch of the peroneal nerve). The patient is typically prone on the operating table, although some investigators have switched to using a lateral decubitus position (12). Although allowing good access to the posterior malleolus, problems have been reported with this approach, including a large incision and the risk to the sural nerve (11). Additionally, we believe that given the more posterior orientation of the wound in the posterolateral approach, access to the lateral malleolus requires a more extensive exposure with greater tension placed on the tissues. In a series of 112 patients who underwent a posterolateral approach, Little et al (15) found that 9.8% of patients developed skin edge necrosis.

Choi et al (11) have recently reported a modification of the posterolateral approach using a single oblique incision. In their study, 50 consecutive patients underwent fixation of the posterior malleolus through an oblique incision that coursed posteriorly at the level of the fracture site toward the Achilles tendon. The patients were positioned prone for the approach. However, 2 patients (4%) required repositioning to a lateral position intraoperatively, and 4 (8%) were deemed unsuitable for the prone position preoperatively owing to concomitant injury.

We describe a different technique, which we believe overcomes some of the reported problems associated with the posterolateral