TIPS & TECHNIQUES

Single-Incision Technique for Internal Fixation of Distal Tibia and Fibula Fractures

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ABSTRACT

Open reduction and internal fixation of distal tibia and fibula fractures generally involves two separate incisions: an anteromedial incision to approach the tibia and a lateral incision to approach the fibula. Exposing the distal tibia from the medial side is associated with the risk of wound dehiscence, infection, and discomfort to the patient since the hardware is directly beneath the skin. By using a single incision from the anterolateral side, the fibular fracture can be fixed and the lateral aspect of the distal tibia can be safely approached for internal fixation, thus eliminating the need for two separate incisions.

Fractures of the distal tibia and fibula are relatively frequent and are caused by a fall, motor vehicle trauma, or sports-related injury as a result of axial compression or rotational forces. A number of methods such as closed reduction and cast application, external fixation, a combination of limited internal fixation with application of an external fixator, and open reduction and internal fixation (ORIF) with plates and screws can be used to treat distal tibia and fibula fractures. However, certain distal tibia and fibula fracture configurations are best treated with ORIF. In these situations, the distal tibia generally is approached via a medial incision and the distal fibula is approached via a lateral incision.

Internal fixation of the distal tibia with plates and screws approached from a medial incision is associated with some risks. Because the distal tibia is located subcutaneously, the hardware is situated directly beneath the skin, causing some discomfort to the patient, especially the asthenic patient who lacks adequate soft-tissue coverage.

In the event of infection or wound dehiscence, the plate may become exposed, making it necessary for additional soft-tissue coverage procedures such as a skin graft or flap. When internal fixation of both fractures requires two separate incisions, there is an added risk of skin slough, particularly if the injury involves more extensive soft-tissue damage or if the two incisions are not separated by ≥7 cm.

However, by using a single anterolateral incision to approach both the distal tibia and the distal fibula fractures, these complications may be avoided due to more adequate soft-tissue coverage and less invasiveness, resulting in a better and more aesthetically acceptable outcome for the patient. This single-incision technique is applicable to fractures of the distal third of the tibia and fibula best treated with open reduction and internal fixation of both fractures, e.g., type A1, A2, B1, or C1 distal tibia fracture and a type C1 fibula fracture, according to the AO classification system.

MATERIALS AND METHODS

Eight patients (five men and three women) with distal tibia and fibula fractures requiring open reduction and internal fixation of both fractures were treated using a single-incision technique. Patients ranged in age from 35-60 years. In all patients, injury resulted from low-velocity trauma.

Six patients had type A1, one patient had type B1, and one patient had type B1 tibia fractures; all patients had type C1 fibula fractures (Figure 1). Following surgery, two patients were treated with a brace for 4 weeks. Casts were used as a prophylactic measure against a high rate of noncompliance among our itinerant patients in our county facility.

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“By using a single anterolateral incision to approach both the distal tibia and distal fibia fractures, adequate soft-tissue coverage over the hardware is achieved and common postoperative complications are avoided.”

Gradual weight bearing and range of motion exercises were initiated following cast or brace removal. All fractures healed between 6 and 12 months postoperatively.

**Operative Technique**

An incision is made 1 cm proximal to the ankle joint and in the anterolateral aspect of the distal tibia, extending superiorly for approximately 10-15 cm (Figure 2). Dissection is carried through the soft tissues in the plane between the peroneal muscles (supplied by the superficial peroneal nerve) and the extensor muscles (supplied by the deep peroneal nerve). The dorsal cutaneous branches of the superficial peroneal nerve are retracted and preserved. The extensor musculature is retracted medially and the peroneal muscles are retracted laterally to expose the distal third of the fibula and the lateral surface of the distal tibia.

Periosteum on the bones is elevated about the fracture site using minimal trauma dissection in accordance with AO technique so that adequate atomic reduction is achieved. Plates are then applied on the fibula anterolaterally (Figure 3) and on the distal tibia over its lateral surface (Figure 4). In this series, all plates used were stainless steel from an AO fracture instrument set. However, titanium plates may be used in place of stainless steel plates.

**RESULTS**

Follow-up for all patients was >2 years. In all patients, the fractures, skin, and soft tissues healed well without any complications (Figure 5). All patients are satisfied with the outcome and have resumed normal activity.

**DISCUSSION**

Several surgical approaches have been discussed in standard orthopedic texts for the fixation of distal tibia and fibula fractures. These include a lateral approach to the distal fibula and a medial approach to the distal tibia; an anterolateral and posterolateral approach to the middle third of the distal tibia; and an anterolateral approach to the ankle joint. However, an anterolateral approach to the distal tibia has not been discussed.

Due to the nature of the forces contributing to distal tibia and fibula fractures and the lack of an adequate soft-
tissue envelope about the anteromedial aspect of the distal tibia, complications from the standard two-incision approach are common. Infection, skin slough, and wound dehiscence potentially exposing the hardware are possible complications requiring additional operative procedures. However, in fractures in which both distal tibia and fibula fixation is indicated, both fractures can be approached safely via an anterolateral incision, thus avoiding these undesirable outcomes associated with a two-incision technique.

CONCLUSION

Distal tibia and fibula fractures are common, but their treatment can be a challenge to the orthopedic surgeon. Because of the anatomy of the lower extremity and the nature of the forces causing these fractures, the standard two-incision approach to open reduction and internal fixation of both fractures usually involves some degree of complication. However, by using a single anterolateral incision to approach both the distal tibia and distal fibula fractures, adequate soft-tissue coverage over the hardware is achieved and common postoperative complications are avoided.

Although the present series is small, no complications have been encountered with this technique. While, no definite conclusions can be reached, initial results are promising. Further evaluation is ongoing.

REFERENCES