Pearls and pitfalls with proximal third tibial fractures

By Douglas W. Lundy, MD, FACS, and Robert P. Dunbar Jr., MD

Last month (AAOS Now; September 2007), we discussed pearls and pitfalls in the treatment of tibial plateau fractures. This month, the focus is on proximal third tibial fractures, such as the one depicted in Figure 1. This fracture of the proximal tibial metadiaphysis had been nailed 6 months previously. The patient had obvious angulation of the leg, a limb-length discrepancy, and significant pain with ambulation.

Unfortunately, complications after intramedullary fixation of proximal tibial fractures are all too common. Unless the orthopaedic surgeon consciously and actively addresses potentially deforming factors such as valgus, flexion, (apex anterior) angulation, shortening, and posterior translation of the distal fragment, this fracture may result in a reduction that is unacceptable and disconcerting to both the surgeon and the patient. With careful attention to detail, however, the orthopaedic surgeon may successfully treat these fractures with intramedullary nails. The following points may be helpful in avoiding potential complications.

**ORTHOPAEDIC RISK MANAGER**

**Recognize potential problems when nailing these fractures**

Most proximal third tibial shaft fractures nailed in valgus and flexion are not recognized as “proximal” tibial fractures with the potential for complications such as angulation and posterior translation.

Orthopaedic surgeons must recognize that tibial shaft fractures proximal to the isthmus of the tibia may angulate during intramedullary fixation due to the voluminous area of the proximal tibial metaphysis. Unless surgeons recognize the possibility of this deformity, they may be relatively unprepared to prevent it.

**Use an appropriate nail**

Different tibial intramedullary nails have the necessary bend (Herzog curve) at different points along their length. Maintaining this curve proximal to the fracture will minimize the deforming forces. If the bend of the nail progresses distal to the fracture as the nail is seated, a wedge effect may occur, contributing to posterior translation of the distal segment.

**Use an appropriate starting point**

Preventing the fracture from angulating into valgus is difficult if the surgeon uses a relatively medial starting point on the proximal tibia. In their letter to the editor of the *Journal of Orthopaedic Trauma*, Schmidt et al stated that the starting point should be “high on the tibia, at the edge of the articular surface of the knee, just medial to the lateral tibial spine.”

Using a relatively lateral starting point is important to successful intramedullary fixation of proximal tibial fractures. The proximal extent of the tibial diaphysis actually “lines up” under the anterolateral aspect of the tibial plateau. By understanding this spatial relationship, orthopaedic surgeons can better appreciate the ideal starting point for the nail. Surgeons may use a medial parapatellar incision, a tendon-splitting approach or a lateral parapatellar arthrotomy to reach the appropriate starting point.

In addition to being relatively lateral, the starting point should also be high on the tibia, essentially adjacent to the articular surface. Unless the surgeon is using the semi-extended technique of intramedullary fixation, the patient’s knee should be maintained in flexion. With the knee in flexion, the high starting point allows for a pathway more in line with the long axis of the tibia. A low starting point or an extended knee allows the patella to push the guidewire distally and anteriorly, directing the pathway more toward the posterior cortex of the tibia, where it may accentuate the flexion deformity, cause posterior translation of the distal segment, or penetrate the posterior cortex. Because hyperflexion may accentuate the flexion deformity, surgeons should position the knee in slightly less flexion after identifying the starting point to minimize the influence of the extensor mechanism.

**SEVEN SUGGESTIONS FOR AVOIDING POTENTIAL COMPLICATIONS**

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**Figure 1** Radiographs of a healed fracture of the proximal tibial metadiaphysis nailed 6 months earlier. The patient had obvious angulation of the leg, a limb-length discrepancy and significant pain with ambulation.

**Figure 2** Blocking screws are an elegant and minimally invasive adjunct to prevent valgus and flexion deformities from occurring when nailing proximal tibial fractures.