

Authors: M. Bradford Henley, MD MBA and Anna Miller, MD (JUNE 2012)

Title: Internally rotated oblique x-ray to assess healing of distal tibial shaft fractures

Tibial shaft fractures have a slightly lower rate of healing compared with other long bones, partly due to their limited vascularity and enveloping soft tissues. The tibia has two main sources of perfusion – the nutrient artery and the periosteal vessels.¹ The nutrient artery is a branch of the posterior tibial artery that enters the posterior cortex of the tibia, then branches into an ascending and descending branch. With fracture or intramedullary nailing (with or without reaming), the nutrient artery is usually damaged. The other main vascular supply is from external vessels through soft tissue attachments to the bone. These vessels provide nutrition for fracture callus and revascularization after fracture. Using vascular perfusion studies, Trueta showed “profuse penetration of periosteal vessels across the cortex at the place where the interosseous membrane is attached.” With this information, he hypothesized that this explained that most distal third tibia fractures have healing starting at this area.²

Our technical trick is imaging of the posterior-lateral cortex of the tibia specifically with an internal oblique radiograph to assess fracture healing in patients with tibial shaft fractures. Because of the destruction of the internal blood supply and the excellent blood supply near the interosseous membrane, the posterolateral tibia is often where healing is visualized first; this is best assessed on the internal rotation oblique view. In addition, this area can be a harbinger of poor healing if fracture callus is not seen on this view by 8-12 weeks post injury. Our recommended series of radiographs for post-operative evaluation of tibia fractures includes an anteroposterior, lateral and internal rotation oblique radiograph (FIGURE 3).

¹Rhineland FW. Tibial blood supply in relation to fracture healing. Clin Orthop Relat Res. 1974 Nov-Dec; 105: 34-81.

²Trueta J. Blood supply and the rate of healing of tibial fractures. Clin Orthop Relat Res. 1974 Nov-Dec; 105: 11-26.

FIGURE 1: Example of two views taken on the same date of service after nailing of a tibial fracture with segmental comminution.



Figure 1A is an AP view with little evident callus.

Figure 1a



Figure 1B is an internally rotated oblique that demonstrates the presence of abundant early callus, clearly seen on the smaller close-up image.

Figure 1b