

Case Report

Transection of the anterior tibial artery during minimally invasive plate osteosynthesis of the proximal tibia

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ABSTRACT

Minimally invasive plate osteosynthesis (MIPO) techniques have been developed to protect the blood flow to tissues surrounding fractures and reduce the risk of non-union. Typically, MIPO involves the insertion of a plate through a small incision and fixation with percutaneously applied screws targeted fluoroscopically. Here we present a case of a transected anterior tibial artery during routine minimally invasive plate osteosynthesis of a tibial plateau fracture to highlight a rare complication of this type of surgery and discuss relevant anatomical considerations.

Level of evidence: According to the OCEBM Levels of Evidence Working Group, this study is graded as a Level of Evidence IV.

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Introduction

Relative to other long-bone fractures, the tibia is distinctive for non-unions secondary to its limited soft tissue envelope [1]. Consequently, minimally invasive plate osteosynthesis (MIPO) techniques have been developed to safeguard extraosseous blood flow and improve union rates [2]. Despite preservation of microvascular blood supply, injury to larger neurovascular bundles is a known risk of less-invasive exposures, as they do not afford direct visualization of these critical structures. Nonetheless, injury to the anterior tibial artery in the proximal tibia is exceedingly rare, with only one other example reported in the literature [3]. Here we describe a case of injury to the proximal anterior tibial artery during routine percutaneous plating of the proximal tibia.

Case report

A 55-year-old pedestrian was transferred to our institution after being struck by a motor vehicle, having sustained a Schatzker VI tibial plateau fracture (AO/OTA 41.C1, Fig. 1A/B). On examination she was neurovascularly intact with palpable dorsalis pedis and posterior tibial pulses. While there were no signs of compartment syndrome, she had sufficient swelling to preclude immediate definitive osteosynthesis.

Accordingly, initial management consisted of closed reduction and placement of a length-stable spanning knee external fixator. She remained neurovascularly intact with intact pedal pulses and returned to the floor for ice and traction elevation.

Once the soft-tissue swelling had adequately resolved (hospital day #5), the patient was returned to the operating room for osteosynthesis. A sterile tourniquet was available but not used. The authors performed an anterolateral approach to the tibial plateau through a 10 cm curvilinear incision centered over Gerdy's tubercle. The proximal anterior compartment was laterally

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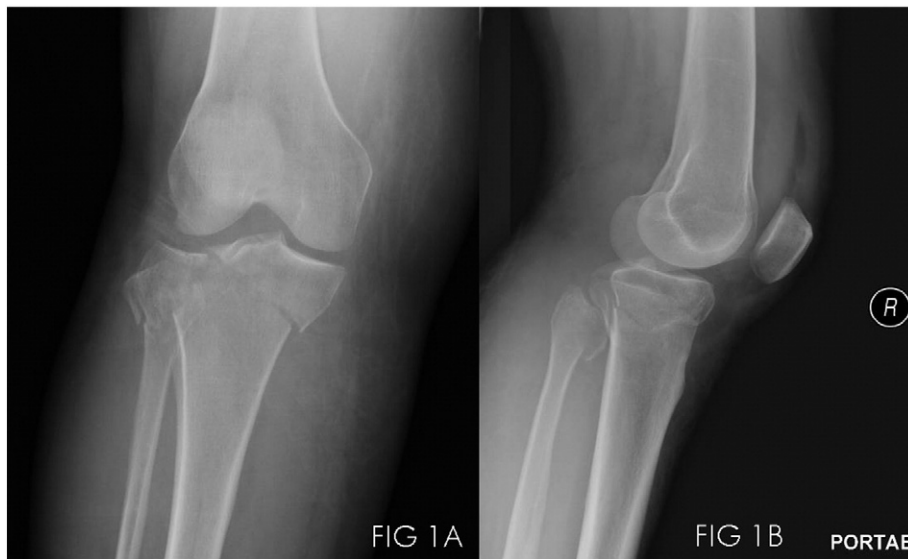


Fig. 1. AP injury film showing AO/OTA41.C1 proximal tibia fracture (1A). Lateral (1B).

elevated to expose the fracture. A minimal submeniscal arthrotomy was then performed to expose the joint surface. After the medial and lateral articular surfaces had been reduced and fixed with lag screws, the authors elected to plate the lateral tibia using a 4.5 mm large-fragment lateral tibial plateau locking plate (Synthes, West Chester, PA) measuring 154 mm in length (Fig. 2A/B). The plate was applied through the surgical incision in submuscular, extraperiosteal fashion to the anterolateral face of the tibia. The plate was secured in a distal to proximal fashion using percutaneous 4.5 mm cortical screws, by first making a small 1 cm stab incision, dilating the incision with a hemostat, then drilling under fluoroscopic guidance through a soft-tissue protector.

During insertion of the solid soft-tissue protection sleeve and drill-bit 73 mm from the proximal aspect of the plate and 80 mm from the tibial plateau, brisk bleeding was encountered. Pressure was held over the incision, but bleeding continued despite this. At this point the authors expanded the distal incision another 5 cm and explored the anterior compartment of the leg. Multiple arborizing vessels of the anterior tibial artery were discovered as well as a transection injury to the main vessel, which coursed through the muscular belly of the tibialis anterior muscle.

The artery was isolated proximal and distal to the transection point, but primary repair was not felt to be obtainable. Collateral flow through the posterior tibial artery was confirmed by palpation. Subsequently, the authors proceeded to ligate the anterior

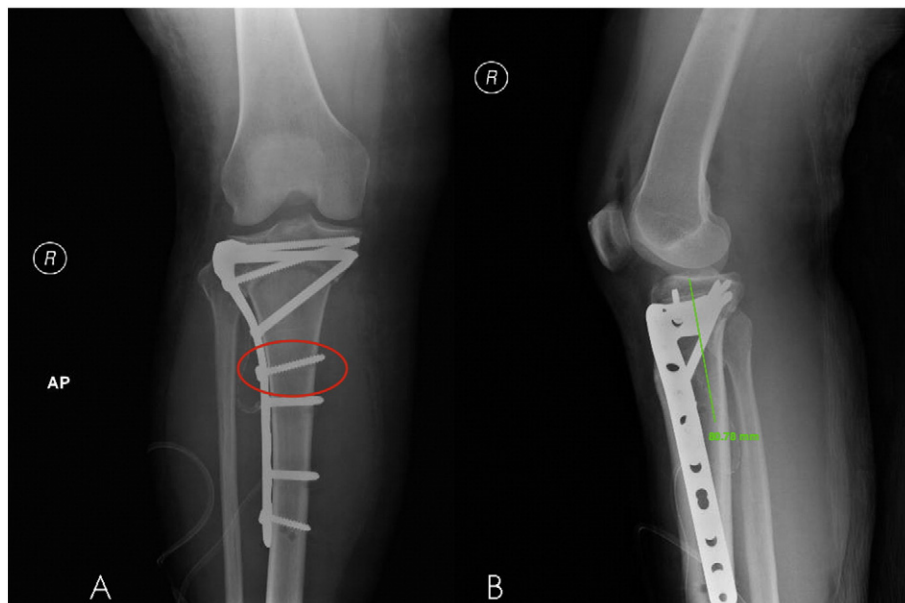


Fig. 2. AP (2A) and lateral (2B) postoperative films.

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