

# Delayed Diagnosis of a Popliteal Artery Rupture after a Posteromedial Tibia Plateau Fracture-Dislocation

## Case Report

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### INTRODUCTION

Vascular injury in closed tibial plateau fractures is sometimes difficult to diagnose because radiological examination might reveal only minor disengagement of the tibial plateaus and a coexistent compartment syndrome may overlap the clinical signs.<sup>1,2,8,9</sup> This article presents a case of a medial split fracture-dislocation with an associated rupture of the popliteal artery that went undiagnosed, leading to a below-knee amputation.

### CASE REPORT

A 20-year-old motorcyclist was transferred to the regional hospital of an island after a traffic accident. He was conscious and reported severe left knee pain. There was marked tenderness over the medial side of the joint, mild effusion, bruising, and crepitus. The neurovascular status of the lower extremity was recorded as normal. Plain radiographs revealed a posteromedial tibial plateau fracture with slight displacement and posterior angulation (Figure 1). A long leg cast was applied and a transfer was arranged to our Level I trauma center for final orthopedic management. Transportation via ship was impossible due to bad weather, and since the case was not evaluated as urgent an immediate air-transfer was not considered necessary.

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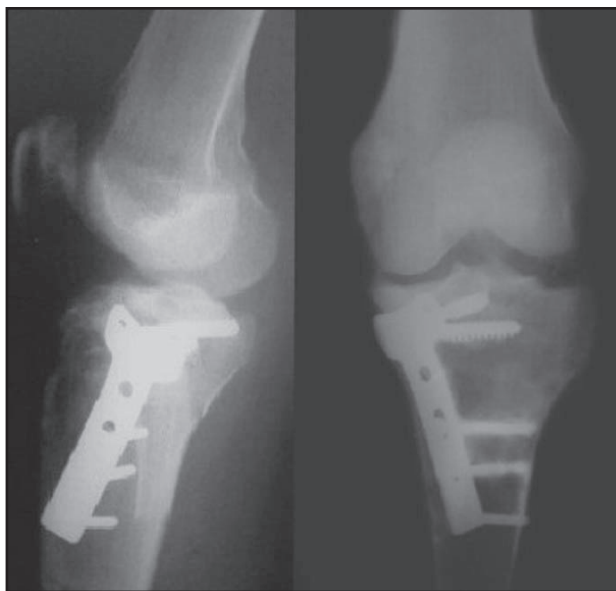


**Figure 1.** A posteromedial split type fracture-dislocation of the left medial plateau (the enclosed icon shows the arterial stop).

Low molecular-weight heparin and intramuscular analgesics were administered for thromboembolic prophylaxis and pain relief, respectively.

The patient arrived at our hospital 36 hours after the injury. He reported severe pain and loss of sensitivity in his left foot, and was not able to move his ankle and toes. Physical examination demonstrated the classic signs of lower limb ischemia. Popliteal, posterior tibial, and dorsalis pedis arteries were not palpable and no pulses were detected even with Doppler control.

Urgent angiography of the left popliteal artery showed complete obstruction of blood flow at the fracture level. There was a minor collateral circulation without significant contribution to the peripheral blood supply.



**Figure 2.** Face and profile view 16 months postoperatively.

At subsequent surgical exploration via a posteromedial approach, a tear of the popliteal artery was found along with complete loss of muscle turgor at the posterior compartment. A saphenous vein graft was used to restore circulation. The fracture was fixed with a medial buttress plate and all tibial compartments were released at the same time. A below-knee amputation was performed two days later due to inadequate blood perfusion. Hospital stay was uncomplicated without signs of infection or wound disruption. At 16-month follow-up, the patient had a healthy stump (Figure 2) and was able to walk with a well-fitted prosthesis.

## DISCUSSION

Our case is an example of type I fracture-dislocation according to Hohl and Moore<sup>4</sup> classification (Figure 3), with posterior displacement beneath the intercondylar eminence. Coronal split fractures account for 37% of tibial plateau fracture-dislocations and have a neurovascular incidence of about 2%. The fracture usually involves the medial side, is apparent on the lateral view, and has a fracture line running at 45° to the medial plateau in an oblique coronal-transverse plane. The fracture may extend to the lateral side, as in our patient, and avulsion fractures of the fibular styloid, insertion of the cruciates, and the Gerdy's tubercle are common. Half of these fracture-dislocations are stable on stress views, and although they could be managed using closed reduction and percutaneous screw fixation, open reduction and plate osteosynthesis may be necessary. Associated ligament injuries can be repaired or reconstructed along with the invariable capsular disruption.

The mechanism of popliteal artery trauma is similar to that of knee dislocation.<sup>5-7,11,12</sup> The femoral condyle usually follows the posterior split of the medial tibial plateau producing a posterior subluxation of the knee joint in flexion. As this subtle dislocation can be reduced in extension and the displacement of the fracture usually is minimal, the vascular compromise can be misdiagnosed, especially when inexperienced doctors perform the initial consultation. Collateral circulation through the superior knee arteries (from profundus femoral) and articular branches (from popliteal) can preserve the vascular supply to the



**Figure 3.** Hohl and Moore classification of proximal tibial fracture-dislocations.

lower extremity in the initial stage of the injury and distal pulses may still be palpable. Later on, the knee effusion and the subsequent compartment syndrome may make palpation of the popliteal artery extremely difficult even with the use of Doppler.

Open reduction and plate osteosynthesis is the preferred method of fracture management allowing for direct repair of any associated ligamentous injuries.<sup>10</sup> The posteromedial approach involving detachment of the semi-membranous and popliteal muscles as well as a partial dissection of the medial gastrocnemius muscle usually is recommended. Some authors<sup>3</sup> suggest a direct posterior approach with the patient in the prone position and posterior placement of the buttress plate in order to prevent caudal dislocation of the fragment during knee flexion. If the popliteal artery occlusion is diagnosed early, a direct repair using a reverse saphenous vein graft must be performed prior to fracture fixation.

Fracture-dislocation tibial plateau fractures, even those with minimal displacement, must always arouse suspicion of a vascular injury. Therefore, they should be treated like knee dislocations in which arterial evaluation of the popliteal artery either by serial physical exam, arteriography, or ultrasonography is mandatory.

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