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Case Report

Complete rupture of the popliteal artery complicating high tibial osteotomy



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ABSTRACT

We present two cases of high tibial osteotomies performed at our institution. Both cases were complicated with the immediate postoperative occurrence of an ischaemic syndrome of the lower leg. Urgent diagnostics revealed a complete rupture of the popliteal artery that required re-operation and a vascular repair. Although neurovascular complications during high tibial osteotomies are rare the awareness of this potentially catastrophic complication should be present when performing this common procedure. All precautions to minimize the harm to the neurovascular bundle should be put into practice. A summary of the surgical precautions is presented and discussed in this paper.

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1. Introduction

High tibial osteotomy (HTO) is a common treatment option for symptomatic isolated osteoarthritis of the medial femorotibial compartment. Ideal candidates are young (40–60 years old) active non-smokers with isolated medial knee pain.¹ For a long time the classical lateral closing-wedge HTO technique has been the preferred method. Since the introduction of new implants such as locking plates that provide better fixation, the medial opening-wedge technique, described by Coventry 1965,² has become the most common technique. The main advantage of the medial open-wedge technique is an easier surgical technique without the need of lateral dissection (fibular osteotomy or tibiofibular joint release with potential

harm to the peroneal nerve), more precise angular correction and two-plane correction (coronal and sagittal). Furthermore, biplanar osteotomy below the tibial tubercle avoids the problem of a patella baja³ and preserves bone stock for future total knee replacement.⁴

The most relevant complications of the medial opening-wedge technique are infection, deep vein thrombosis, secondary loss of reduction, fracture of the lateral tibial plateau and delayed- or non-union of the tibial osteotomy.^{5,6} Rare but severe complications that have been reported only as case reports include the compartment syndrome,⁷ necrosis of the tibial head⁸ and injuries of the popliteal neurovascular bundle. Several reports of injuries of the popliteal and anterior tibial arteries exist following lateral closing-wedge HTO.^{9–14} In contrast, vascular injuries after medial opening-wedge

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osteotomy are extremely rare or maybe underreported. A case of a pseudoaneurysm of the popliteal artery after medial opening-wedge HTO was reported by Shenoy et al.¹⁵ and a case of a pseudoaneurysm after corrective HTO by Szyber et al.¹⁶

Vascular injuries after HTO for limb lengthening have been reported as a result of inappropriate pin application from the use of an external fixator. Another cause of vascular injury during limb lengthening was reported as a result of bone distraction more than two months after surgery.¹⁷ Limb lengthening either aggravated an unrecognized arterial injury during surgery or produced a de novo rupture of a scarred artery from previous trauma.

To our knowledge, a complete rupture, as a complication after a medial high tibial osteotomy, has never been reported so far. We present two cases of complete popliteal artery rupture complicating high tibial osteotomy, one after medial HTO and one after limb-lengthening anterolateral HTO. The purpose of this case report is to highlight the potentially catastrophic complication of these procedures, review the literature and present detailed surgical precautions to minimize the risk.

2. Case reports

2.1. Case 1

In a 42-year-old male patient with osteoarthritis in the medial femorotibial compartment, a corrective high tibial osteotomy was performed. The anteromedial proximal tibia was exposed and the laterally incomplete, biplanar, supratuberal medial opening-wedge osteotomy was carried out. The cut was initiated about 3.5 cm below the joint line, continued in an ascending direction towards the tip of the fibula without changing the slope. The osteotomy was completed by the use of chisels (osteotomes). The opening wedge was fixed with a locking plate (Tomofix®, Synthes™) (Fig. 1). The leg was held in slight flexion (about 30°) during the osteotomy. Tourniquet was active for the whole procedure (104 min, 350 mmHg). Before wound closure, the tourniquet was released and profuse bleeding of the osteotomy was observed intraoperatively. However, the source of the bleeding was allocated to the open cancellous bone. The foot pulses were significantly diminished immediately after surgery and the patient developed severe pain and swelling of the left lower leg within the next 12 h. Clinical assessment of the patient revealed decreased sensation of the plantar foot associated with impaired motor function of the foot. We performed an urgent CT angiogram. The diagnosis of a complete rupture of the popliteal artery at the level of the osteotomy (infragenicular part of the popliteal artery, pars III) was confirmed 24 h after surgery (Fig. 2). The vascular surgeons performed urgent revascularization with end-to-end anastomosis with a reversed ipsilateral saphenous vein interposition graft. The intraoperative findings confirmed a sharp dissection of the tibial artery caused by the osteotome. One year after surgery the interposition graft was successfully perfused. Motor function of the foot was normal. Nevertheless, the patient still suffered from sensibility disorders in the sole in combination with chronic pain.



Fig. 1 – Intraoperative anteroposterior radiograph of the knee that shows the medial opening high tibial wedge osteotomy and its fixation with a locking plate (Tomofix®, Synthes™).

2.2. Case 2

A 26-year-old female with a history of clubfoot presented with a leg length discrepancy of 4 cm. Initially, an external fixator (Monotube Triax®, Stryker™) was applied anteriorly. Through

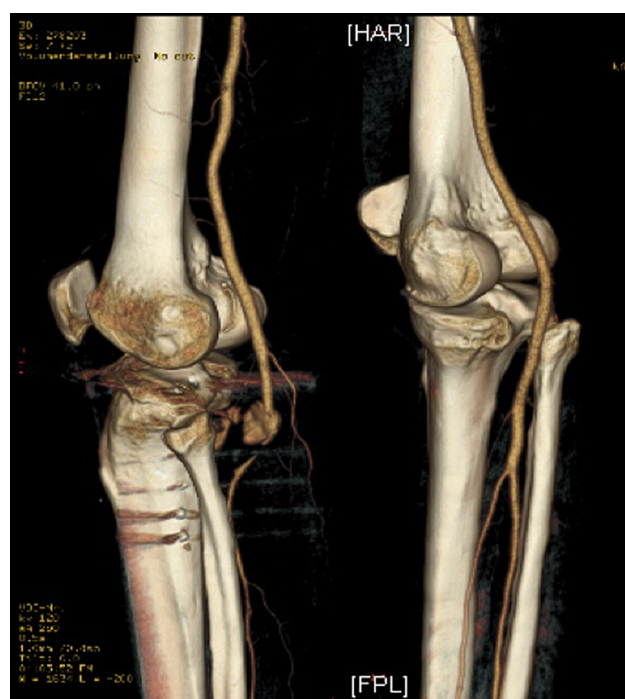


Fig. 2 – CT angiogram of both legs immediately after surgery that shows a complete rupture of the tibial artery at the level of the osteotomy.

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