

Delayed presentation of popliteal artery transection following undisplaced lateral condyle fracture of tibia

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ABSTRACT

Literature suggests that vascular damage occurring with orthopedic injury of the lower extremity is rare and uncommon. We present a case of a young adult male who presented to the emergency room with a history of road traffic accident with complaints of pain in the right ankle diagnosed as medial malleolus fracture and pain in the left knee diagnosed as undisplaced lateral tibial condyle fracture. At the time of presentation, the left leg appeared normal and was stabilized with a knee brace, which on the next day developed severe swelling with absence of distal pulses. Doppler revealed no blood flow distal to popliteal artery with severe soft tissue edema. The patient was posted for emergency basis vascular exploration where popliteal artery was surprisingly found transected and was repaired followed by timely fasciotomy. This case report has also been prepared to stress the importance of secondary survey in patients after high energy trauma as it can prevent the important injuries from being missed.

Keywords: Compartment syndrome, delayed presentation, popliteal artery, proximal tibia fracture

Introduction

Popliteal artery injury around the knee joint has been reported more frequent and common than any other major vessel injuries. This injury is associated with high energy trauma which includes knee dislocations or complex fractures of the distal femur or proximal tibia.

Popliteal artery injury carries a high risk of limb amputation because initial clinical features present normal vascular circulation without the signs and symptoms of ischemia or obvious vascular injury.^[1,2]

In such a type of injury, the diagnosis could be delayed because the arterial deficit may progress slowly, being the main cause of limb amputation.

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Case Report

A young 18-year-old male presented to the emergency room with a history of road traffic accident and pain in the right ankle and left knee. The radiographs [Figure 1] revealed a right-sided medial malleolus fracture which was stabilized with a posterior splint and a left-sided undisplaced lateral tibial condyle fracture which was stabilized with a long knee brace. The distal pulses of the left lower limb were feeble on admission which were thought to be because of spasm following lateral condyle fracture which would resolve eventually, but on the following day of admission, the patient developed severe and painful swelling of the left lower limb below the knee which was sudden with the absence of distal pulses (dorsalis pedis and posterior tibial) distal to popliteal artery. Doppler revealed no blood flow distal to the popliteal artery in both anterior and posterior tibial arteries with severe soft tissue edema. The patient was posted on emergency basis for

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exploration which surprisingly revealed a complete transection of the popliteal artery [Figure 2] at the apex of adductor canal which was repaired with popliteal artery thrombolysis and reverse saphenous vein grafting from the opposite lower limb. An emergency fasciotomy also had to be done to relieve the tense compartment. The right-sided medial malleolus fracture was fixed with cannulated cancellous screws [Figure 3]. Postoperatively, the wound showed severe edema and eventually developed local infection over the site [Figure 4], following which the patient underwent a series of debridement for 2 months, wherein the medial head of gastrocnemius with part of soleus had to be removed [Figure 5], as the soft tissue edema would not reduce. Along with this, intensive antibiotic treatment was also given simultaneously and a series of vacuum-assisted

dressings [Figure 6] were done. Eventually, good granulation tissue [Figure 7] was seen following which the patient was posted for skin grafting. The patient had partial graft rejection due to wound infection [Figure 8], which was managed by twice daily sterile dressings. Wound improvement was seen over a period of 10 days following which the patient was re-posted for final skin grafting [Figure 9]. Later, after healing of the wound and fracture, a magnetic resonance imaging (MRI) was carried out to check and see if there was a knee dislocation which could have caused any associated ligamentous injuries, but it was found to be normal [Figure 10]. At follow-up, the patient is actively involved in all day-to-day routine works with no neurovascular deficit, and the graft is 100% accepted [Figure 11].

Discussion

Major trauma or high energy trauma such as complex fractures of the distal femur or proximal tibia, gunshot wounds, stab wounds, and knee dislocation are the major causes of amputation in popliteal artery injury.^[1,3] Popliteal artery injury around the knee joint has been reported more frequent and common than any other major vessel



Figure 1: Preoperative X-rays

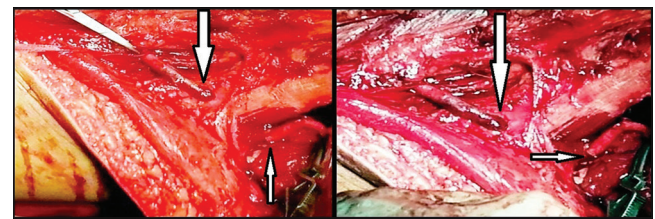


Figure 2: Intraoperative transected popliteal artery



Figure 3: Postoperative X-rays



Figure 4: Soft tissue edema

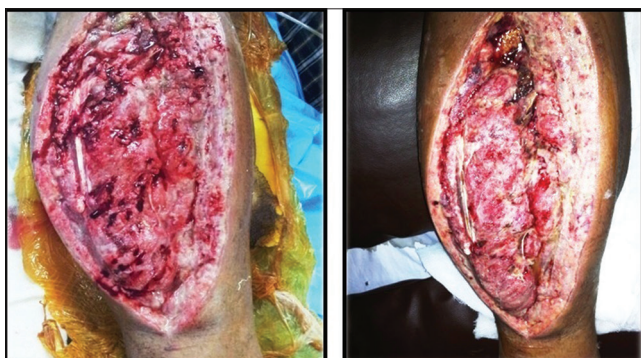


Figure 5: Medial gastrocnemius with part of soleus removed

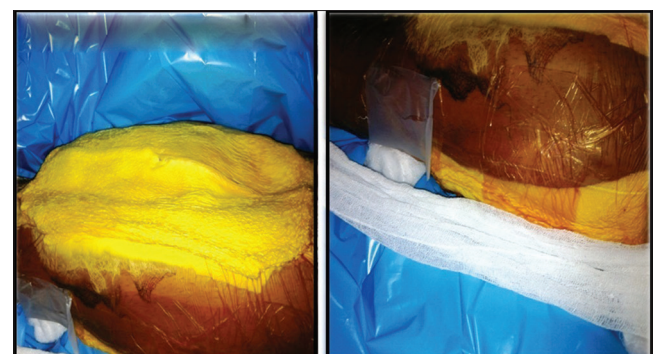


Figure 6: Vacuum-assisted dressings



Figure 7: Granulation tissues



Figure 8: Skin grafting with partial rejection



Figure 9: Regrafting

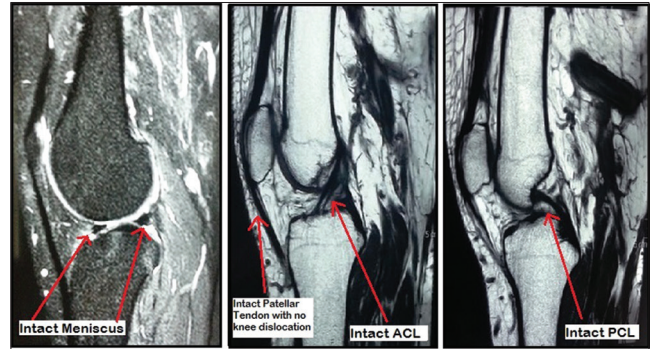


Figure 10: Magnetic resonance imaging



Figure 11: Follow-up

injuries. Another problem in blunt trauma with popliteal artery injury is that the arterial deficit may progress slowly and it carries a high risk of limb amputation because initial clinical features present normal vascular circulation without the signs and symptoms of ischemia or obvious vascular injury.^[1,2] Improper initial examination and delayed vascular repair may lead to 60–80% amputation rate.^[4]

However, our present case clearly shows a successful treatment of delayed presentation of popliteal artery transection without limb amputation.

The failure in initial diagnosis is believed to be because of delayed appearance of clinical features due to the collateral circulation around the knee joint. Many authors have focused attention on the distal pulses of foot that they may be initially present in patients with popliteal artery injury.^[5,6]

If doubtful, the vessels must be assessed immediately with no delay, using techniques such as color Doppler, MRI scan, plain angiography, or computed tomography angiography.^[3,7]

In this case, the patient developed severe swelling which was thought as a tight compartment causing absence of distal pulsations. However, intraoperatively, on exploration, it was surprising that popliteal artery transection causing hematoma collection in the popliteal fossa caused a tamponade effect and thrombus at the end of the transected portion of artery.

Compartment syndrome is a condition showing elevated pressure and impairment of microcirculation resulting from poor oxygenation and nutrition supply to muscles and nerves in a tightly confined compartment.^[8,9] The pathophysiology of compartment syndrome is characterized by ischemia that affects a group of muscles enclosed in relatively nonexpandable fascial sheath and bony structures. Normally, the clinical diagnosis is based on the golden rule of 6P's which are pain, paresthesia, pressure, paralysis, pulselessness, and pallor.^[9]

Schwartz *et al.*^[10] also focused that infections are a major problem in the postoperative phase in patients with compartment syndrome due to compromised microvascular system and they mentioned a local infection rate of 66%.

Failure of early diagnosis and late decompression is associated with remarkable morbidities due to irreversible ischemic necrosis within the compartment.^[11]

Conclusion

Timely intervention in the form of fasciotomy and vascular repair helped to prevent the development of any sequel of compartment syndrome and even amputation. High clinical suspicion obtained from detailed history regarding the mechanism of injury should be a tool in diagnostic decision-making process, while high energy trauma with associated fractures may offer conditions to rule out vascular involvement. All patients in the emergency room should be assessed for distal pulsations of all the upper and lower limbs as a protocol. A high index of suspicion should be kept for vascular involvement of the limb with feeble or absent pulsations.

This case report has also been prepared to stress the importance of a thorough secondary survey in patients after high impact motor vehicle accidents, as a proper secondary survey can prevent the important injuries from being missed.

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Conflicts of interest

There are no conflicts of interest.

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