



# A multidisciplinary approach to a complex case of lower limb trauma



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## A multidisciplinary approach to a complex case of lower limb trauma

**INTRODUCTION:** *Blunt trauma of the popliteal fossa is an uncommon cause of lower limb ischemia and it is associated with a high risk for limb loss.*

**REPORT:** *The case of a young man with anterior dislocation of the right knee joint causing post-traumatic popliteal artery occlusion and severe lower limb ischemia is reported.*

**DISCUSSION:** *To our knowledge we first report a multidisciplinary approach involving the vascular and plastic surgical teams to treat a wide soft tissue damage after a blunt injury to the popliteal artery.*

**KEY WORDS:** Platelet Concentrate Gel, Popliteal artery blunt trauma, VAC therapy

## Introduction

Blunt injury to the popliteal artery may be the result of a direct force to the popliteal fossa, but is commonly seen as a result of an indirect force following knee dislocation or tibial plateau fracture.

The majority of these injuries are due to motor vehicle collisions or falls from a height and accounts for less than 3% of all peripheral arterial trauma<sup>1</sup>. Soft tissues damage or major tissue loss are common complications associated with this type of trauma.

The case of a young man with a post-traumatic occlusion of the popliteal artery with wide soft tissue damage is presented.

## Case report

A 27 year-old white man was referred to our Institution on March 2007, three days after a motorcycle accident, for critical limb ischemia following an anterior dislocation of the right knee joint and fracture of the right surgical neck of the humerus. At presentation, the skin was pale, capillary refill was slow, a partial sensory loss was present, peripheral pulses were absent, and a compartment syndrome of the lower leg with a large hematoma involving the antero-medial portion of the thigh was noted. EchocolorDoppler showed a complete occlusion of the popliteal artery at the level of the knee joint and the popliteal vein was patent. A digital subtraction arteriography confirmed the occlusion of the popliteal artery with late revascularization of the posterior tibial artery and the proximal tract of the anterior tibial and

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peroneal arteries (Fig. 1 A, B). Arterial thrombolysis with 200,000 V.I. of urokinase followed by 50,000 V.I./hour for the next 24 hours was started and an extended fasciotomy of the tibial and peroneal compartments was performed. The following day a control angiography showed no direct revascularization of the popliteal artery with poor distal revascularization. Stent positioning was felt at high risk for distal arterial dissection. A proximal popliteal artery tibioperoneal trunk bypass graft using a reversed autologous saphenous vein was constructed for limb salvage. A thrombectomy with Fogarty catheter of the three vessels of the leg was also associated. The postoperative course was complicated by wound dehiscence of the mid-distal portion of the surgical incision, necrosis and infection of the muscles of the right anterior leg compartment (Fig. 2 A, B). A large debridement was performed and the Vacuum-Assisted Closure (VAC) therapy was applied for four weeks to protect the closure of the surgical sites and the underlying bypass. To also achieve a cosmetic result, implanted islands of autologous skin on a pabulum of Platelet Concentrate Gel (PCG) were applied. After 8 weeks of treatment, we observed the complete closure of the surgical sites (Fig. 2 A, B). At 82 months follow-up, the bypass graft is patent and the cosmetic result is good.

## Discussion

Popliteal artery lesions following knee dislocation are due to a distraction type of injury to the neurovascular bundle

traversing the popliteal fossa, and may range from an intimal tear to a complete rupture. The amputation rate following vascular injuries secondary to knee dislocation is higher than penetrating trauma and ranges from 30% to 54%<sup>2,3</sup>.

At present two therapeutic options are available to treat popliteal artery injuries: 1-open repair and 2-endovascular treatment.

Open repair has a greater risk for sepsis, bypass infection and injuries of the nervous structures during the surgical approach. The presence of major tissue loss or severe soft tissue ischemia may contraindicate open repair. Therefore, non-invasive approaches have been proposed to minimize the complication rate but data and definitive indication are scattered. These approaches are reasonable in ischemic extremities with blunt artery injuries without active external bleeding<sup>4</sup> suspicion of complete vessel transection, head or intraabdominal solid organ trauma or as a back up or bail-out technique in patients with very high anesthetic risk, to shorten operative time<sup>5</sup>.

Since the absence of a large consensus to treat infrapopliteal vessels with stent and, in our case, the risk of arterial dissection we construct a vein bypass graft.

Either after an open or endovascular treatment, one third of the patients experience severe tissue loss and compartmental syndrome<sup>6</sup>. Their treatments may be improved with multidisciplinary approaches<sup>7</sup> such as VAC<sup>8,9</sup> and PCG<sup>10</sup>. The association of these techniques permitted to achieve coverage of the damaged soft tissue and good cosmetic result.

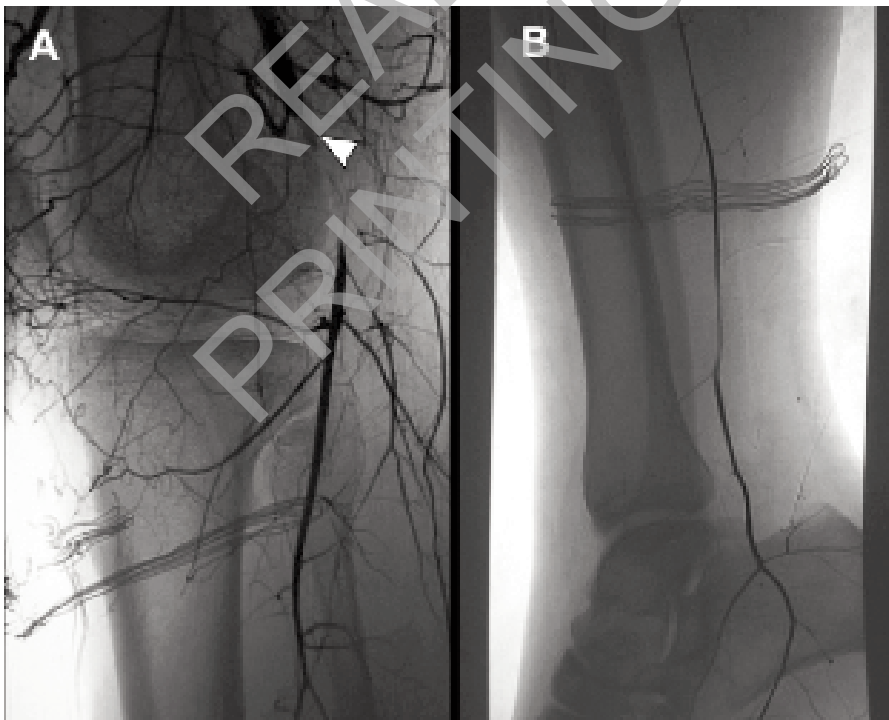


Fig. 1: A) Preoperative arteriography showing the occlusion of the popliteal artery (white arrow); B) and one vessel run-off (posterior tibial artery)



Fig. 2: A) Lower limb soft tissue status before VAC and platelet gel application (Panel A). After 8-week; B) VAC and platelet gel treatments.

## Conclusion

The exact timing and a multidisciplinary approach are mandatory to obtain a functional limb salvage and cosmetic result.

## Riassunto

**INTRODUZIONE:** I traumi chiusi della fossa poplitea sono una causa non comune di ischemia degli arti inferiori e si associano ad un elevato tasso di perdita d'arto.  
**CASO CLINICO:** Gli autori presentano il caso clinico di un paziente di 27 anni con dislocazione anteriore del ginocchio associato a occlusione post-traumatica dell'arteria poplitea e conseguente ischemia d'arto.

**DISCUSSIONE:** A nostra conoscenza si tratta del primo caso di trattamento multidisciplinare coinvolgente la chirurgia vascolare e la chirurgia plastica nel trattamento di un ampio danno dei tessuti molli successivo a trauma chiuso dell'arteria poplitea.

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