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Blunt Traumatic Popliteal Artery Injury– A Case Series

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Abstract | **Case Report**

Introduction: Popliteal artery injury is associated with higher amputation rates than any other extremity vascular injury. We describe 3 cases of traumatic popliteal artery injuries in our unit over the past month. ***Results:*** Two of these patients were managed with an interposition graft and one patient was treated conservatively. All patients regained distal pulses successfully. One patient developed reperfusion injury. ***Discussion:*** The popliteal artery, by virtue of its ligamentous fixation and anatomic relationships to the femur, tibial plateau, and knee joint apparatus, is uniquely susceptible to injury with blunt extremity trauma.[1] Physical examination is imperative in recognising vascular injury. The Rutherford classification for acute limb ischaemia serves as a crucial guide for deciding between conservative, revascularisation and amputation. Amputation rates for popliteal artery injuries vary from 19.6% reported by Keeley et al., 14.5% by Mullenix et al and 16.2% by Hafez et al.[3] Compartment syndrome after vascular repair is associated with higher rates of amputation. Though prophylactic fasciotomy is still controversial. Lim et al and Frykberg et al both advocate early fasciotomy and not waiting until signs of compartment syndrome arise.[2] We performed fasciotomy for the first and second patients in view of the delay to surgery (>6 hours) which was mainly due to transferring logistics.

Conclusion: Popliteal artery injuries are rare, with an incidence of <0.2%. Nearly 60% of these injuries are caused by blunt trauma[2]. These injuries are associated with the highest risk of extremity amputation, as the popliteal artery is an end artery with poor collateral supply. Thus, prompt recognition, early suspicion and investigation is imperative to limb salvage and reduced morbidity.

Keywords: Popliteal artery, Trauma, Blunt injury.

INTRODUCTION

Popliteal artery injury is associated with higher amputation rates than any other extremity vascular injury. We describe 3 cases of traumatic popliteal artery injuries in our unit over the past month. Two of these patients were managed with an interposition graft and one patient was treated conservatively. All patients regainded distal pulses successfully. Prompt diagnosis and a high index of suspicion is paramount for limb salvage.

CASE REPORT

Case One

Mr MA, a 13 year old adolescent was a pillion rider on a motorcycle that skidded. He suffered a closed supracondylar fracture of the right femur. Distal pulses were initially palpable on arrival to the emergency department at a nearby hospital 1 hour after trauma. However, 2 hours after arrival pulses diminished, hand-held doppler signals were monophasic. There was reduced sensation with no motor compromise (Rutherford Iib). Closed manual reduction was attempted, however, the leg remained pulseless. Urgent CT Angiography revealed a thrombosed right popliteal artery with minimal reconstituition. He was transferred to our unit where he underwent immediate operative exploration 12 hours after injury. Intraoperative findings confirmed a contused popliteal artery, we proceeded with above knee to below knee popliteal artery bypass with a reversed saphenous vein graft from the contralateral leg with end to side anastomosis and fasciotomy. External fixation was applied after revascularization by the orthopaedic team. Immediate post operative signals were biphasic though still not palpable. On postoperative day 4, pulses were palpable as the oedema had subsided. He had an uneventful recovery.

Fig-1: Plain radiograph of right supracondylar fracture

Fig-2: CTA image showing the non opacification of the popliteal artery

Case Two

Mr SS, a 51 year old gentleman with no co-morbids, was a motorcyclist who drove into a culvet. He sustained an anterior dislocation of the left knee. Distal pulses were palpable on arrival to a district hospital. However, after closed manual reduction, pulses diminished and signals were monophasic. He was transferred to our unit, upon arrival, clincially his leg was pulseless, with absent signals, minor loss of sensation and partial paralysis (Rutherford IIa). He had an immediate CT Angiography which revealed non opacification of the left popliteal artery. He underwent emergency operative exploration 10 hours after injury. Intraoperative findings confirmed the CT findings. We proceeded with above knee to below knee popliteal artery bypass with a reversed saphenous vein graft from

the contralateral leg with end to side anastomosis and fasciotomy. External fixation was applied after revascularization by the orthopaedic team. Pulses were palpable immediately. He developed reperfusion injury where his creatinine kinase went upto 32,000IU/L. However, his kidney functions remained normal without needing dialysis and he regained sensation and motor power.

Fig-3: Plain radiograph depicting the knee dislocation

Fig-4: CTA image of the popliteal injury

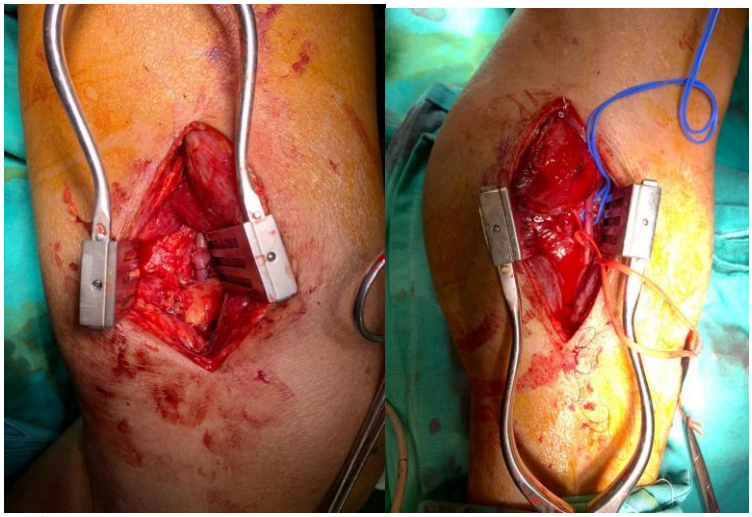

Fig-5: Intraoperative picture of the above knee (A) and below knee (B) popliteal artery anastomosis to the reversed saphenous vein graft

Case Three

Mr H, a 28 year old gentleman with no comorbids, skidded from his motorcycle. He sustained a left knee dislocation. Pulses were present on admission. He underwent closed manual reduction. However, after 2 days the pulses were noted to be diminished. There was no loss of sensation or motor involvement. Doppler signals were biphasic (Rutherford I). CT Angiography and Duplex sonography revealed reconstitution and collateral supply to the distal popliteal. Hence, no revascularization was carried out. External fixators were applied to fix the knee. Patient was started on anticoagulant and antiplatelet. He recovered well post-operatively.

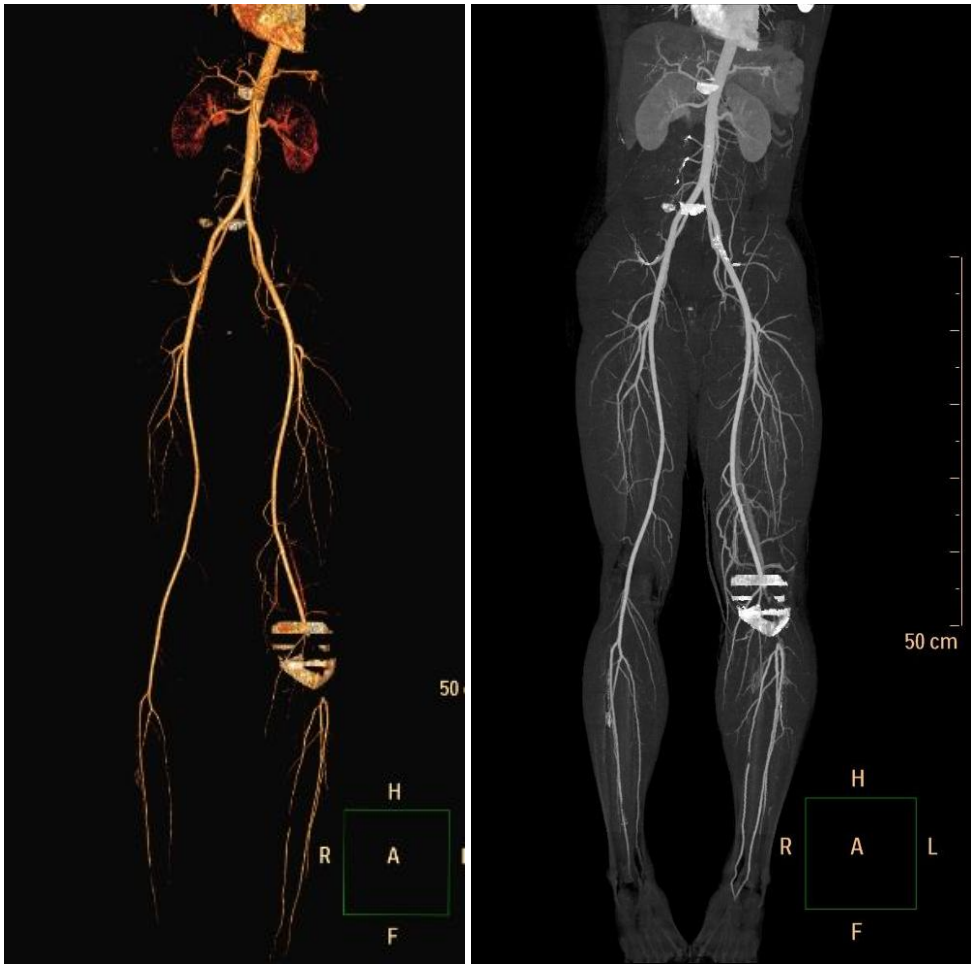

Fig-6: CTA Image of reconstituition of contrast after popliteal injury

DISCUSSION

A popliteal artery injury, in the form or transection, occlusion, or intimal injury, is devastating and limb threatening. The popliteal artery, by virtue of its ligamentous fixation and anatomic relationships to the femur, tibial plateau, and knee joint apparatus, is uniquely susceptible to injury with blunt extremity trauma [1]. Physical examination is imperative in recognizing vascular injury. The Rutherford classification for acute limb ischaemia serves as a crucial guide for deciding between conservative, revascularisation and amputation. CT Angiography is the gold standard for determining vascular injury and also aides in surgical planning. Duplex sonography may also provide useful information, however is less specific than CT Angiography.

Amputation rates for politeal artery injuries vary from 19.6% reported by Keeley *et al*., 14.5% by Mullenix *et al*., and 16.2% by Hafez *et al*., [3] Multiple studies have been conducted to predict factors that influece amputation rates, this includes concomitant orthopaedic and nerve injuries, higher amount of blood transfusion which maybe a result of the level of severity of injuries [3]. Keeley *et al*., and MJ Ramdass *et al*., [4] demonstrated that orthopaedic repair prior to revascularisation did not affect amputation rates. Compartment syndrome after vascular repair is associated with higher rates of amputation. Though prophylactic fasciotomy is still controversial. Lim *et al*., and Frykberg *et al*., both advocate early fasciotomy and not waiting until signs of comprtment syndrome arise [2]. We performed fasciotomy for the first and second patients in view of the delay to surgery (>6 hours) which was mainly due to transfering logistics. Despite, the delay in transfer and operative intervention, only one patient developed reperfusion injury.

Delay in recognition usually leads to inability of limb salvage. Though, there have been cases reported with vascular injuries and presense of distal pulses. Kim JW *et al*., [5] reported such a case where 1 week after the trauma, distal pulses were avilable because of colaterals. Reevaluation is key to ensuring a vascular injury is not missed. Like the 3rd case, there was already presence of colaterals, which negated the need for surgical exploration.

CONCLUSION

Popliteal artery injuries are rare, with an incidence of <0.2%. Nearly 60% of these injuries are caused by blunt trauma [2]. These injuries are associated with the highest risk of extremity ampulation, likely beacause the popliteal artery is an end artery with poor colateral supply. Thus, prompt recognition, early suspicion and investigation is imperative to limb salvage and reduced morbidity.

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