

Special Article – Surgery Case Reports

Salvage of Lower Limb in Delay-Diagnosed Popliteal Artery Transection Caused by Blunt Trauma

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Corresponding author:** Chin-Choon Yeh, Division of Plastic Surgery, Department of Surgery, Chi-Mei Medical Center, No.901, Jhonghua Rd., Yongkang Distinct, Tainan County 71004, Taiwan**Received:** January 01, 2020; **Accepted:** January 22, 2020; **Published:** January 29, 2020**Abstract*Background:** Transection of popliteal artery could block majority of lower limb perfusion, results in gangrene and amputation finally.**Aim and Objectives:** This article presents a case of successful salvage of lower limb in delay-diagnosed popliteal artery transection and review of the literature. Total transection of popliteal artery could block nearly all perfusion to the lower limb and subsequently causes gangrene that need to be amputated.**Materials and Methods:** The patient was a 31-year-old male suffered from left lower limb blunt trauma in a traffic accident. The mechanism is falling down from riding motorcycle and hitting a telephone pole. Initially vessel injury was not identified and he was discharged from ER after 7-hour observation. However, he felt severe pain and swelling with large area ecchymosis of his left leg after working. So he came back to our ER on post-trauma day #3. Emergent fasciotomy was done but distal perfusion did not recover. Cardio-vascular surgeon was consulted for arterial bypass. However, distal limb did not become warm and pink immediately. We kept medication for vessel patency and anti-coagulation. Fortunately, distal perfusion recovered gradually after several days. But partial muscle and fascia necrosis resulted in bone exposure. Serial debridement and sequestrectomy were done. Finally, we applied Negative Pressure Wound Therapy (NPWT) then STSG eventually closed the wound.**Result:** We followed up his wound condition for one year, his wound healed well and there was no recurrence of infection or necrosis. Ambulation is regained without aid of prosthesis or crutches despite of mild foot-drop.**Conclusion:** Clinicians should be cautious to unusual manifestations of blunt trauma, which may signalize a concomitant vascular injury. Early detection and re-perfusion as soon as possible are very important and encouraged for successful limb salvage.**Keywords:** Limb salvage; Artery transection; Limb blunt trauma; Arterial bypass

Introduction

Popliteal artery injury is an uncommon situation encountered in lower limb trauma. Delay in diagnosis and treatment could increase morbidity and eventually result in a disaster. Popliteal artery was anatomically surrounded by the popliteal ligamentous, femur bone, tibial plateau, and knee joint capsule thus susceptible to high-energy blunt and penetrating trauma [1]. The association between popliteal artery injury and tibiofemoral dislocations as well as femur fractures has been widely discussed in literatures [2,3]. Initial physical exams characteristically show marked knee joint instability, and roentgenogram revealed fractures, subluxations and soft tissue swelling [4].

Reviewed literatures about popliteal artery injury caused by trauma have described intimal tears, dissection, ruptures, or even transection of the popliteal artery upon surgical exploration [5]. We present a unique case of a delay-diagnosed complete left popliteal artery transection following a motorcycle collision, without obvious associated fracture or evidence of a tibiofemoral dislocation.

Case Report

This patient was a 31-year-old male suffered from acute left lower limb blunt trauma in a traffic accident which mechanism was falling down from riding motorcycle and hitting a telephone pole. He was sent to our ER (emergency room) by EMT (Emergency Medical Technician). The Glasgow Coma Score was 15 at the scene, no requiring of intubation. The systolic blood pressure was 122mmHg while the diastolic blood pressure was 68 mmHg, and the heart rate was 120 beats per minute. CT (Computed Tomography) of brain and focused assessment with sonography for trauma yielded negative results.

On physical examination, the left lower extremity was swollen and tense, but distal pulses were auscultated by sonogram. Radiographs of the left femur and left knee demonstrated no evidence of fracture or dislocation. Due to left lower limb pain complained by the patient, he stayed in our ER for 7 hours observation then was discharged. Symptoms and signs of vessel injury were not detected at that moment.



Figure 1: The patient felt severe pain and swelling with large area ecchymosis of his left leg after working. So he came back to our ER on post-trauma day #3.



Figure 2: Emergent fasciotomy was done the compartment pressure was released, but distal perfusion didn't recover. Immediately, a vascular surgeon was consulted for arterial bypass. Popliteal artery transection was observed at that scene.



Figure 3: However, distal limb did not become warm and pink at that moment. We kept medication for vessel patency and anti-coagulation.

However, he came back to our ER 3 days later because of progressive swelling and pain of his left lower limb with large area of ecchymosis occurred after his working (Figure 1). At this moment, laboratory data showed Myoglobin was 5437 ng/mL whereas CK (creatinine kinase) -total was 31903 U/L. Distal perfusion of left lower leg and foot was absent. Due to clinical evidence of left lower extremity compartment syndrome with rhabdomyolysis, the patient was taken to the operating room immediately for emergent fasciotomy to release pressure. However, after we released all compartment of left lower leg, distal perfusion did not recover at this moment.

A cardio-vascular surgeon was consulted. Operation of arterial bypass (left supra-genicular popliteal artery bypass to infra-genicular



Figure 4: Partail muscle (mainly lateral compartment and anterior compartment) necrosis with small area of tibia and fibula bone exposure were noted.



Figure 5: We applied Negative Pressure Wound Therapy (NPWT) then STSG eventually closed the wound.

popliteal artery with reverse greater saphenous vein) was done after Angio-graphy examination (Figure 2). Unfortunately, distal limb did not become warm and pink immediately (Figure 3). We kept medication for vessel dilatation (Prostaglandin E1) and anti-coagulation (heparin) infusion for 7 days. Distal perfusion recovered and skin color became pink at post-bypass day 3. Partail muscle (mainly lateral compartment and anterior compartment) necrosis with small area of tibia and fibula bone exposure were noted (Figures 4-6).

Serial debridement and sequestrectomy with VAC (vacuum assisted closure) system apply then subsequent skin grafting were done from post-bypass day 12 to day 54. The wound closure was achieved eventually at post-bypass day 60 and the patient was discharged from our ward.

At OPD (outpatient department) examination and follow-up of a 3-month period, the skin graft condition is good without infection nor necrosis. Ambulation without crutch or wheelchair is achieved except mild frog footnoted.

Discussion

Although tibiofemoral knee dislocation is a rare and serious injury that occurs in ~0.02–0.1% of all musculoskeletal injuries [6], it could result in a disaster. These knee dislocations occur in both high- and low-energy contusional or penetrating traumas and often spontaneously reduce, thus severe injury could be ignored at first



Figure 6: We followed up his wound condition for one year, his wound healed well and there was no recurrence of infection or necrosis. Ambulation is regained despite of mild foot-drop.

aid. Physical examination of the knee for ligamentous instability can alert the physician to the possibility of an occult knee dislocation. It is imperative to recognize the clinical signs and symptoms of these dislocations, as they are associated with a significant incidence (25–40%) of concomitant popliteal vessel injury, with 1.6–13% of cases requiring acute popliteal vessel repair or re-perfusion [7]. Delayed diagnosis and treatment of a popliteal vessel injury significantly increases patient morbidity.

Popliteal artery injuries have been traditionally treated with open surgical repair or bypass and fasciotomy. Recent advances in facilities have allowed for endovascular repair in selected patients. Endovascular techniques are generally introduced in hemodynamically stable patients to treat vascular injuries such as thrombosis, pseudoaneurysm, dissection, hematoma and arteriovenous fistula, and have been demonstrated to be successful specifically in instances of popliteal artery trauma [8-10]. In severe lower extremity trauma, clinical or radiographic evidence of distal femoral fracture or tibiofemoral dislocation should prompt dedicated vascular evaluation, which will often reveal the concomitant popliteal vessels injury. In milder injuries, physical examination may demonstrate evidence of ligamentous instability, and radiographs may reveal only subtle findings such as nondisplaced fracture, subluxation, joint effusion/hematoma and soft tissue swelling. In these cases, a

high clinical suspicion for popliteal vessel injury must still be kept in mind. In fact, even in the absence of clinical or radiographic evidence of significant injury, careful evaluation for vascular injury is still needed, as tibiofemoral dislocation often spontaneously reduces by itself, leaving little or no detectable deformity at the time the patient is seen at first time. In addition, in cases where no trauma history information is available and the mechanism of injury is unknown, a severe vascular injury such as arterial transection or total thrombosis should be considered as a potential cause of refractory hypotension [11].

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