

Acute Knee Dislocation with Neurovascular Injury- Salvage or Amputation? A Case Report

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Abstract

Introduction: Traumatic knee dislocation is considered an orthopaedic emergency. Knee dislocations are relatively infrequent injuries. This injury frequently occurs from high energy impact trauma. Neurovascular injuries can result in debilitating consequences if the diagnosis and treatment is delayed. Associated complications include degenerative arthritis, permanent neurovascular injury and amputation. Poorest prognosis is seen in patients with knee dislocation longer than 6-8 hours before reduction.

Case Report: History: The 25-year-old male patient presented with history of road traffic accident to the emergency department. Patient presented with swelling, pain and deformity of left knee and leg.

Examination: On examination, patient had tense swelling and tenderness of left knee joint and leg. Visible deformity of left knee joint is seen. Posterior tibial artery and dorsalis pedis artery were not palpable. Active ankle and toe movements were absent.

Investigations: Plain radiograph was taken at the emergency department of the left knee and leg. X-rays showed anterior dislocation of knee joint.

Treatment: After valid written informed consent, the dislocated left knee joint was reduced under sedation in operation theatre and immobilized in above knee plaster slab. Reduction of the knee joint was done within 4 hours of injury. Then the distal pulses were re-assessed. The posterior tibial and dorsalis pedis artery were absent. Hence, MR Angiography of left lower limb was done. It showed popliteal artery transection. So, the artery was explored and end to end vascular anastomosis was done. Knee spanning external fixator was applied for left lower limb. Fasciotomy was done for the tense leg compartments. After a week, the fasciotomy wounds were infected for which extensive debridement of the wounds was done and antibiotic beads were placed. Knee was mobilized with gradual range of motion exercises and non-weight bearing mobilization with foot drop splint. Gradually full weight bearing ambulation was allowed.

Conclusion: Knee dislocation is rare, albeit a serious and potentially limb threatening condition. The prognosis of knee dislocations is variable and is heavily dependent on the time interval between trauma and initiation of management. Immediate, timely and proper management can salvage the limb and amputation is not the only solution.

Keywords: Dislocation, Posterior tibial artery, Fasciotomy.

Introduction

Traumatic knee dislocation is considered an orthopedic emergency. Knee dislocations are relatively infrequent injuries. This injury frequently occurs from high energy impact trauma [1]. Neurovascular injuries can result in debilitating consequences if the diagnosis and treatment is delayed [2]. Associated complications include degenerative arthritis, permanent neurovascular injury and amputation. Poorest prognosis is seen in patients with knee dislocation longer than 6-8 hours before reduction [3].

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Case Report

History: The 25-year-old male patient presented with history of RTA to the emergency department. Patient presented with swelling, pain and deformity of left knee and leg.

Examination: On examination, patient had tense swelling and tenderness of left knee joint and leg. Visible deformity of left knee joint is seen. Posterior tibial artery and dorsalis pedis artery were not palpable. Active ankle and toe movements were absent.

Investigations: Plain radiograph was taken at the emergency department of the left knee and leg. X-rays showed anterior dislocation of knee joint (Figure 1).

Treatment: After valid written informed consent, the dislocated left knee joint was reduced under sedation in operation theatre and immobilized in above knee plaster slab (Figure 2).

Reduction of the knee joint was done within 4 hours of injury.

Then the distal pulses were re-assessed. The posterior tibial and dorsalis pedis artery were absent. Hence, MR Angiography of left lower limb was done. It showed popliteal artery transection (Figure 3).

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Figure 1: Pre Reduction Radiograph Of Patient



Figure 2: Post Reduction Radiograph of Patient



Figure 6 and 7: Extensive Debridement and Antibiotics Bead Application for Infected Fasciotomy Wounds.

So, the artery was explored and end to end vascular anastomosis was done. Knee spanning external fixator was applied for left lower limb. Fasciotomy was done for the tense leg compartments (Figure 4, 5). After a week, the fasciotomy wounds were infected and muscles were necrosed. Following which extensive debridement of the wounds were done (Figure 6, 7) and anterior compartment muscles were non-viable and excised and antibiotic beads were placed (Figure 8, 9). Regular dressings were done and wounds healed after two weeks. After the month, external fixator was removed and knee was

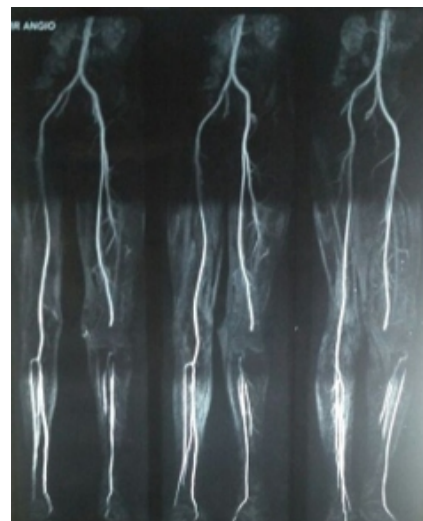


Figure 3: Mr Angiofram Study Showing Popliteal Artery Transection Following Knee Dislocation

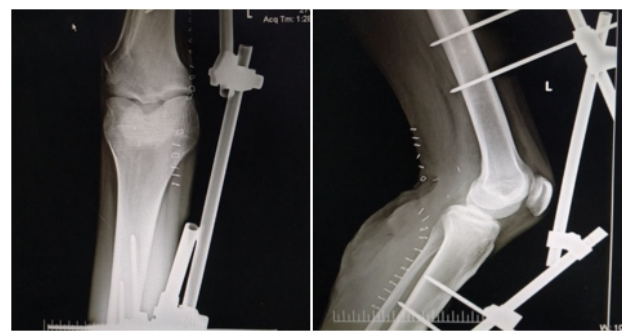


Figure 4 and 5: Post Operative Xray After Knee Reduction, Fasciotomy for Tense Leg Compartments, Vascular Repair, External Fixator Application.



Figure 8 and 9: Post Op Radiograph Showing Antibiotic Beads After Extensive Debridement.

mobilized with gradual range of motion exercises and non weight bearing mobilization with foot drop splint.

Follow Up: Patient was followed up for every fifteen days for two months. Antibiotic beads were removed. Following which the wounds healed after fifteen days. Then the patient was allowed partial weight bearing ambulation with walker as he can tolerate the pain following which full weight bearing ambulation was allowed gradually. Then the patient was followed up for every one month for two months.

Discussion

Traumatic knee dislocation is one of the serious limb threatening injuries, and also a infrequent condition with incidence of approximately 0.02-0.2% of all orthopaedic injuries [4]. Common peroneal nerve and popliteal artery are at high risk of damage, where they are tethered by fibular head and popliteal fossa boundaries respectively, reported to be 20-40% and upto 64% for popliteal artery injury in few studies [5]. Dislocations of knee often reduce spontaneously, potentially resulting in high rate of delayed presentation or missed diagnosis. With regard to latter, spontaneously reduced dislocations frequently have normal radiographs and minimal clinical findings. Physician should be vigilant and must have high index of suspicion in avoiding missing of diagnosis and its potentially devastating complications. Missed knee dislocations result in complications like permanent nerve damage, vascular compromise, popliteal vessel thrombosis, ischemic limb, acute compartment syndrome which need fasciotomies and even amputation [6]. Exact rate of knee dislocations is not known due to number of spontaneously reduced dislocations [6]. They are divided epidemiologically into those caused by high energy trauma such as a road traffic accident and low energy injuries like in sporting injuries. They are more commonly seen in younger patients and occur in female to male ratio of 1:46. Anterior dislocations are most frequent, commonly occur by forced hyperextension. They occur in approximately 40% of knee dis-locations [4]. Studies show that 30 degrees of forced hyperextension was necessary for an anterior dislocation to occur with mechanism being rupture of the capsule followed by rupture of anterior cruciate ligament. Such dislocations are frequently associated with intimal tear to popliteal artery and hence by causing arterial thrombus. After the initial trauma management along with resuscitation and Advanced Trauma Life Support (ATLS) management of life threatening injuries, attention should be given to affected limb. Assessment of affected limb should include both obvious and subtle clues of neurovascular threat to limb. once it is observed that knee joint is still sublux-ated or dislocated, reduction without delay is imperative. Immediate vascular assessment of limb should be performed and documented. As with an intimal tear of the popliteal artery, pulses may still be present, palpation for distal pulses may not be a reliable examination. Ankle brachial pres-sure index (ABPI) should always be examined for in such patients. It has been well established that if ankle brachial pressure index is 0.9 or more, likelihood of a serious arterial injury approaches 0% [7]. If it is less than 0.9, there is more chance of loss of vascular integrity and further management of such patients must include MRA imaging or duplex ultrasound [7]. Patients must be undergoing immediate vascular surgical intervention if there is clinical evidence of de-vascularised limb. It has been reported that common peroneal nerve is most commonly involved nerve in neurological compromise patients associated with knee dislocation with an incidence of 10-40% [8]. Neurological injury doesn't pose immediate threat to limb unlike vascular compromise. But, neurological injury should form part of surgeon's decision making protocol. The vascular integrity of the limb should be in the primary assessment. Popliteal artery is tethered superiorly at adductor hiatus and inferiorly at soleal muscle arcade.

This relative tethering confers high risk of injury. The risk incidence of popliteal artery injury is documented to be 4.8-14% and also as high as 64% in some knee dislocation [9]. Frank vascular compromise mandates emergency vascular surgical intervention. As popliteal collateral circulation is inadequate to perfuse the limb, restoration of arterial patency and blood supply to limb is imperative. It is evident that delay in reperfusion of over 8 hours can increase risk of amputation to 86%, compared with 11% if the limb is reperfused within 8 hours [4]. Subsequent surgical priority must be given to stabilise the knee to protect vascular repair, if it is required. Limb can be immobilised with a standard above knee plaster cast or external fixator while waiting for definitive surgery. In respect to neurological function, common peroneal nerve injury can be source of significant dysfunction and decreased quality of life. Nerve injuries are documented to resolve spontaneously in up to 50% of cases in few studies and resolution has been documented in as high as 75% in some studies [8,9].

Conclusion

Knee dislocation is rare, albeit a serious and potentially limb threatening condition. Expediency to reduce acutely dislocated knee is vital to prevent neurovascular damage, compartment syndrome and limb amputation. Missed diagnosis may lead to disastrous complications. Available evidence supports an operative management strategy, normally performed in first few weeks of injury. Surgical management depends on both pattern and severity of injury. Prognosis of knee dislocation is variable and is predominantly dependent on mechanism, pattern of injury and time interval between trauma and initiation of treatment. Immediate, timely and appropriate management can salvage the limb and amputation is not the only solution.

Clinical message

Knee dislocation is a rare limb threatening clinical condition which needs to be assessed and managed as a surgical emergency and the management is challenging. If timely managed with proper expediency, most of the limbs can be salvaged without doubt.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed

Conflict of interest: Nil **Source of support:** None

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