

Case report: Bilateral Popliteal Artery Thrombosis from Traumatic Knee Dislocation

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Abstract:

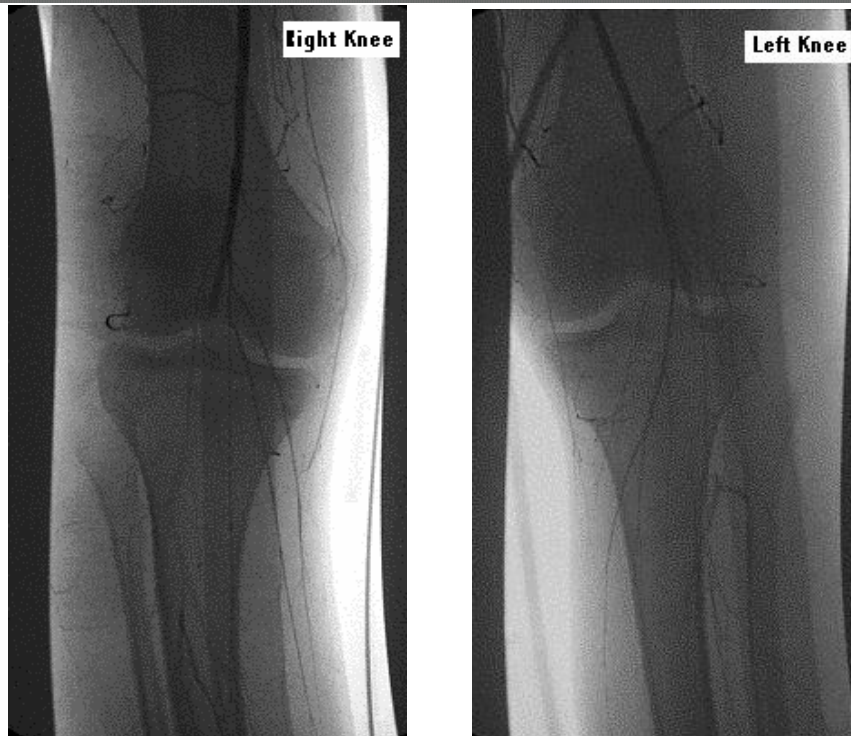
Knee dislocations are a relatively uncommon occurrence in the trauma patient. However, sequelae may be disastrous if this condition and its complications are not recognized early. Perhaps the most significant complication is popliteal artery injury, occurring in 10-32% of knee dislocations (1). This frequent complication can result in amputation (3,6,16). Popliteal artery injury from knee dislocations has been well described in the literature, however, there are very few reports of bilateral popliteal artery injury. We report a case of this injury from blunt trauma as a consequence of a motor vehicle accident.

MeSH Words: Trauma, Popliteal Artery, Knee Dislocation

Case Report:

An 18 year old male was brought by EMS to the trauma room after a motor vehicle accident. The patient was a belted driver in an automobile rollover on an interstate highway. On examination the patient had an intact airway, equal breath sounds, and strong carotid and femoral pulses bilaterally. It was immediately evident that he sustained a right knee injury as there was gross deformity present. His dorsalis pedis and posterior tibial pulses were absent to palpation and his bilateral lower extremities were cold to the touch with decreased sensation and motor movement below both knees.

His secondary survey revealed tenderness over the right clavicle in addition to the lower extremity findings, but was otherwise unremarkable. Initial chest and pelvis x-ray were normal except for a right clavicle fracture. The right knee exhibited a posterior dislocation with a tibial plateau fracture. The left knee xray showed a joint effusion and a proximal fibular fracture but no dislocation. The right knee was reduced by the orthopedic surgery service after rapid sequence intubation was performed.



Due to the patient's relatively unremarkable secondary survey, including a negative FAST exam and stable vital signs, it was decided to proceed directly to angiography. Angiogram showed occlusions of bilateral popliteal arteries with selected low flow tibial vessel run off. While the OR and vascular surgery team was en route to the hospital, CT scans of head, neck, chest, abdomen, and pelvis were performed which revealed a left frontal contusion of the brain, right clavicular fracture, left small apical pneumothorax, and bilateral lung contusions.

Upon re-examination in the operating room, the patient was found to have no capillary refill on the right, and minimal capillary refill on the left. Therefore, the right popliteal artery was explored first. A medial surgical approach revealed a completely thrombosed and pulseless popliteal artery with an intact popliteal nerve and vein. Healthy popliteal artery was discovered above and below the thrombosis. Therefore, a reverse saphenous intra position vein graft procedure was performed. This resulted in strong doppler signals in the vein graft and in palpable distal pulses. A fasciotomy was performed to allow for swelling of potential ischemic tissue. Attention was then paid to the left side which revealed an almost identical injury with intact nerve and vein. A similar vein graft procedure

was performed on the left side which achieved similar results. It was noted, however, that there was more swelling and ischemic damage in the muscle on the left compared to the right. A fasciotomy was subsequently performed.

After an external fixator was placed on right knee, the patient was admitted to ICU and had a relatively unremarkable post operative course. His fasciotomies were closed 2 weeks later via both primary closure and split thickness skin grafting. Over the next two months, the patient had ACL/PCL reconstruction of both knees and was discharged to a rehab facility.

Discussion

The presentation of knee dislocations with bilateral popliteal artery thrombosis offers a unique challenge in management. It involves collaboration among several specialties including vascular surgery, orthopedics, trauma, and emergency medicine. It is important to note that although only the right knee was dislocated at the time of presentation, it was necessary to treat the contralateral knee in a similar fashion due to laxity of the knee joint suggestive of cruciate ligament injuries. In fact, it has been shown that bicruciate ligament injuries are equivalent to

knee dislocations with regard to mechanism of injury, severity of ligamentous injury, and frequency of major arterial injuries (15).

Much debate has occurred over the selective yet expeditious use of angiography. The reliability of physical exam in identification of popliteal artery injury has been questioned in the literature. In a recent meta-analysis 7 out of 52 arterial lesions requiring surgery after knee dislocation had normal pedal pulses (1). However, a small recent prospective study of 35 knee dislocations, all 8 patients with arterial injury requiring surgical intervention were identified with immediate angiography at presentation or during hospitalization when pulses were deemed abnormal (8). Therefore, a spectrum of standard of care exists regarding immediate angiography with knee dislocations versus selective angiography if physical signs are present.

Once injury is identified, several approaches to the management of popliteal artery injury have been described. Reversal of ischemia, if present, is of the utmost importance. Severe ischemia has been shown to be a strong predictor of poor outcomes with regard to limb amputation and sensory deficits (10).

One definitive option is end to end anastomosis. In this approach, it is important to achieve adequate debridement of the injured artery. Jones (4) and Moore (9) report that approximately 1 cm of healthy popliteal artery must be removed to avoid induction of thrombosis by minute injuries to the vessel wall. Another well described approach includes vein graft procedure, which was used in our case. In order to optimize flow to the distal extremities, other therapies have been employed. Early use of systemic anticoagulants has been shown to reduce the rate of amputation without inducing undue hemorrhagic complications (14,12). In addition, fasciotomies have been performed in suspected cases of elevated compartment pressures and in prolonged ischemia. Early fasciotomy allows reopening of collateral vessels, and has been shown to improve distal perfusion and reducing stasis in the microcirculation (12,7).

A limited number of other published cases describe management of bilateral popliteal artery injury (13). One surgical option involves

the insertion of temporary arterial shunts into the injured artery and/or vein so as not to prolong ischemia time (2,5). In another case report, a posterior approach was used as two vascular teams worked simultaneously on the prone patient to achieve bilateral popliteal flow via vein graft. In our case, a sequential popliteal artery repair was performed and completed within nine hours with resolution of flow and return of function. Therefore, we postulate that such an approach is reasonable if performed within this time frame.

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