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Clinical Communications: Adults

VASCULAR INJURY AFTER OCCULT KNEE DISLOCATION PRESENTING AS COMPARTMENT SYNDROME

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□ **Abstract—Background: Popliteal artery injury can occur in up to one-third of patients with knee dislocation. Delay in the diagnosis of popliteal artery injury is the leading cause of amputation in this limb-threatening injury. Objectives: To remind emergency physicians to consider popliteal artery injury in any pulseless lower extremity, even in cases of spontaneous reduction of the knee dislocation before evaluation by medical personnel. Case Report: We present a case of popliteal artery injury and occult knee dislocation in which the diagnoses were delayed for hours by incorrectly attributing the absence of posterior tibial and dorsalis pedis pulses to compartment syndrome. The correct diagnosis was made after operative release of lower extremity compartment pressures, when it was noted that distal vascular flow remained absent. A computed tomography angiogram demonstrated complete rupture of the popliteal artery and magnetic resonance imaging performed later revealed total disruption of both cruciate ligaments, as well as posterolateral ligaments. Conclusion: As absence of distal pulses is a very late finding in compartment syndrome, it should be considered a result of arterial injury in patients with lower extremity trauma until proven otherwise. Published by Elsevier Inc.**

□ **Keywords—compartment syndrome; knee dislocation; popliteal artery injury; pulseless extremity**

INTRODUCTION

Patients who experience a knee dislocation must be assessed for neurovascular injury. Vascular injury to the popliteal artery is seen in one-third of such patients (1–5). Absent pedal pulses or signs of distal ischemia mandate immediate angiography with vascular surgery consultation. Failure to revascularize within 6–8 h results in an unacceptably high amputation rate (1–10). Peroneal nerve injuries are less common than popliteal artery injuries because the nerves are not as tightly anchored; however, when nerve injury is present, a concomitant vascular injury must be suspected as it is more likely to be present.

Although knee dislocations are commonly associated with high-energy mechanisms such as motor vehicle accidents or significant falls, they also can be caused by low-energy mechanisms such as direct blows and sports injuries (1,3,4). Remarkably, these dislocations frequently spontaneously reduce before Emergency Department (ED) presentation, but still carry the same associated risk of arterial injury (1,4,5). Physicians must aggressively search for occult knee dislocation with concomitant vascular injury in the case of a pulseless lower extremity immediately after minor or major lower extremity trauma. We present a case of popliteal artery injury and occult knee dislocation in which the diagnoses were delayed for hours by incorrectly attributing the absence of posterior tibial and dorsalis pedis pulses to compartment syndrome.

CASE REPORT

Paramedics brought in a 37-year-old woman with recent alcohol and cocaine use to our ED with a chief complaint

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Figure 1. Visible swelling of the right lower extremity and knee joint.

Figure 2. Post-operative examination demonstrates hyperextension of the knee, and relative "sag" of the calf relative to the thigh, which is indicative of bicruciate ligamentous disruption.

of severe right lower extremity pain. She had been found rolling on a sidewalk, and reportedly had been assaulted. In triage she repeatedly screamed "I'm hot!" and attempted to remove all her clothes. On further questioning she would only say "He stomped me."

On physical examination, she appeared to be in severe pain and was writhing on the hospital gurney. Vital signs included oral temperature 37.1C (98.8°F), blood pressure 110/70 mm Hg, heart rate 152 beats/min, respiratory rate 28 breaths/min, and oxygen saturation was 100% on room air. Fingerstick glucose was 212 mg/dL. Her pain was immediately treated with 2 mg of intravenous hydromorphone before any attempt at history and physical examination.

Despite agitation, the physical examination was essentially normal with the exception of the heart rate, initial respiratory rate and the right lower extremity (Figure 1). An area of ecchymosis that was tense and indurated on palpation was noted in the distal posterior thigh extending into the popliteal fossa. The knee joint was swollen; however, exquisite pain limited any examination of this joint. She was noted to have significant circumferential swelling of the entire lower right leg. Upon palpation, this area felt solid and was significantly tender. The patient was able to slightly dorsiflex and plantarflex the foot, but further range-of-motion and ligamentous examinations were precluded by severe pain. Vascular assessment of the lower extremity revealed non-palpable dorsalis pedis and posterior tibial pulses.

Based on the physical examination findings, compartment pressures were measured and found to range from 60–70 mm Hg in the lateral, medial, and posterior right lower extremity compartments. Radiographs were quickly obtained and revealed no associated fracture. Laboratory results were remarkable for a white blood cell count of 21,000/μL, hemoglobin of 8.8 g/dL, creatinine of 1.4 mg/dL, creatine kinase of 528 U/L, and an anion gap acidosis of 25 mEq/L. A urine toxicology screen was positive for opiates and cocaine.

An orthopedics consult was obtained, and the patient was taken to the operating room for emergent fasciotomy. A four-compartment fasciotomy was performed on the right lower extremity and on the distal lateral right thigh (Figure 2). Post-operative physical examination revealed persistent absence of dorsalis pedis and posterior tibial pulses on Doppler examination.

A vascular surgery consult was obtained, and a computed tomography angiogram of the lower extremity was recommended, which revealed obliteration of the right popliteal artery (Figure 3). The patient received a saphenous vein graft with restoration of distal pulses within 10 h of the injury. After restoration of pulses, gentle examination of the knee revealed obvious ligamentous laxity in the anterior, posterior, and lateral directions, and the diagnosis of spontaneously reduced knee dislocation was strongly suspected at that time. Of note, before that examination, the working diagnosis of the vascular surgeons had been iatrogenic laceration of the popliteal artery during fasciotomy, despite the lack of pulses prior to that surgery. Magnetic resonance imaging confirmed the complete rupture of the anterior and posterior cruciate ligaments and the lateral collateral ligament.

Over the next 10 days, the patient was treated for rhabdomyolysis, taken back to the operating room for debridement, and subsequently underwent closure of the medial fasciotomy incision. One month after being admitted to the hospital, the patient was discharged to an acute rehabilitation facility with persistent right foot drop and lower extremity paresthesias (secondary to peroneal