

EM CASE OF THE WEEK

BROWARD HEALTH MEDICAL CENTER DEPARTMENT OF EMERGENCY MEDICINE



In warm weather states, orthopedic injuries secondary to “pick-up sports” are always in season. It is important to be able to know the risks these injuries entail that may need immediate assessment to avoid a simple injury becoming an emergency situation.

EM CASE OF THE WEEK



CT Angio showing dissected popliteal artery

Knee Dislocation- Parting of Ways

A 46 year old male brought to the ED with severe pain in right leg for 4 hours. He states he was playing football with son and got tackled around the knees and felt severe pain. States he could not stand on it and decided to come to ER but when he was getting into the car he felt a slight reduction in pain. His vital signs are T 98.8, HR 87, RR 20, BP 118/84, O2 sat 98%. He is triaged and evaluated by the physician assistant who feels pedal pulses bilaterally with some anterior laxity in right leg on Lachman test. Patient denies any loss in sensation in lower extremity, but the pain is still a 7/10. X-Rays were ordered and showed no acute osseous changes. Due to pain, ER physician ordered CT angio to rule out popliteal artery dissection, despite palpable pulses and limb being warm to touch. So I ask you, approximately what percentage of anterior/posterior knee dislocations result in vascular injury?

- A. 15%
- B. 25%
- C. 40%
- D. 65%
- E. 80%



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Knee Dislocation

The correct answer is C, approximately 40% of anterior/posterior knee dislocations result in vascular damage. Vascular injury to the popliteal artery within the popliteal fossa occurs due to tethering- proximally a fibrous tunnel at the adductor hiatus and distally the fibrous tunnel at soleus muscle. Posterior dislocations are the second most common dislocation but result in the highest rate of **complete popliteal artery tear**. On the other hand, anterior dislocations, which are the most common type of knee dislocation, mostly result in **intimal tear** of the popliteal artery secondary to traction.

Knee dislocations can be caused by high energy or low energy mechanism. High energy injuries are typically described as axial load to flexed knee- typically occurring from MVC in which leg is flexed against dashboard or fall from height. Low energy dislocations are more common in the obese population and are more common to occur in sports and with an added rotational force.

Discussion:

Knee dislocations are named based on the direction of displacement of the tibia on the femur. The most common type of dislocation is anterior, making up 30-50% of the knee dislocations. Hyperextension is generally the mechanism of injury, leading to a concurrent PCL tear. If there is vascular injury it is typically not a complete dissection but rather an intimal tear due to traction.

The next most common type of dislocation is posterior, responsible for about 25%. The mechanism of injury is typically axial load to flexed knee such as in an MVA or fall from height. This mechanism is the most likely to lead to complete tear of the popliteal artery.

Lateral knee dislocations are typically associated with a valgus or varus force and commonly involve ACL/ PCL tears. This mechanism most often results in peroneal nerve injury.

Medial dislocation is also due to valgus/varus force and is commonly associated with PCL disruption. Rotational dislocation is most typically posterolateral and is least likely to be reduced. (cont'd)

Take Home Points

- Approximately 50% of knee dislocations self-reduce prior to arrival to ED. Posterolateral rotational dislocations are usually irreducible.
- Peroneal nerve injuries occur in 25% of knee dislocations, most commonly in posterolateral dislocations. Affect common peroneal nerve more commonly than tibial nerve.
- 5-15% of all knee dislocations and 40-50% of anterior/posterior knee dislocations result in vascular injury. This is due to tethering within the popliteal fossa. Risk of amputation increases to 86% if not corrected within 8 hours of vascular injury.
- Due to collateral circulation, presence of pulses in LE does not rule out popliteal artery injury. ABI >0.9 has 100% negative predictive value.

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and click on the "Conference" link. All are welcome to attend!

Physical Exam- Patients often have signs of swelling. 50% of dislocations spontaneously reduce before reaching the ED, and in those that do not you will typically see gross deformity. In those with gross deformity, reduce immediately even before radiograph. Only exception is if “dimple sign”, which is a buttonholing of the medial condyle of the femur, is present. This signifies posterolateral dislocation which is irreducible and reduction carries increased risk of skin necrosis. Always check for dorsalis pedis and posterior tibial pulses.

Vascular Exam- This is the first step in assessment following a knee dislocation, no matter the mechanism. First step is to assess for pulse. While ischemic changes are only seen in 60% of limbs with vascular injury, pulselessness is seen in up to 84% of limbs. Despite being able to palpate pulses, this may be due collateral circulation and does not rule out vascular injury. Further testing is necessary. An ankle brachial index >0.9 is 100% negative predictor of popliteal tear. ABI <0.9 requires CT angio or Doppler ultra sound. Arterial injury requires vascular consult. Vascular injury must be surgically explored within 8 hours to decrease risk of ischemia. Amputation is seen in 86% of cases in which vascular injury occurs >8 hours post dislocation. If tests are normal, publications suggest observation for 48-72 hours.

Radiological Exam- Radiological studies should always be performed in cases involving knee dislocation. Initial X-Ray should be done even in situations of spontaneous reduction as avulsion fracture of lateral tibial condyle is common occurrence. Also necessary following closed reduction for confirmation. MRI required for soft tissue evaluation- 3 out of 4 knee stabilizing ligaments are generally involved in some degree.

Treatment- If patient presents to the ED with knee that is still dislocated, initial treatment is closed reduction, with the exception being if “dimple sign” is present signifying posterolateral dislocation. Once reduced, vascular evaluation and radiologic confirmation must be done. Reduced knee should be braced in 20-30 degrees of flexion. With vascular injury, immediate surgery is indicated and takes precedence over all other surgical management. Typically involves external fixation with excision of damaged segment and repair with reverse saphenous vein graft. Other indications for emergent surgery include irreducible dislocation, open fx, open dislocation, or compartment syndrome. Delayed reconstruction or repair is indicated in cases of knee instability without vascular injury.

► **Schenk Classification system**

KD1	Multiligament injury with ACL or PCL involvement
KDII	Injury to ACL and PCL only
KDIII	Injury to ACL, PCL, and PMC/PLC
KDIV	Injury to ACL, PCL, PMC and PLC
KD V	Multiligament injury with periarticular fracture

► **Complications** include arthrofibrosis (38%) especially with delayed mobilization, laxity/instability (37%), peroneal nerve injury (25%; most commonly posterolateral dislocation), and Vascular compromise resulting in claudication, skin changes and/or muscle atrophy.

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ABOUT THE AUTHOR:

This month’s case was written by Tamer Shtayeh. Tamer is a 4th year medical student from NSU-COM. He did his emergency medicine rotation at North Broward Medical Center in April 2015.