

Non-Contact Femoral-Tibial Dislocation with Peroneal Nerve Palsy in a High School Football Linebacker

Mason W. Briles, MS, LAT, ATC; R. Amadeus Mason, MD, CAQSM, RMSK; John W. Xerogeanes, MD

Injury Uniqueness

- Femoral-Tibial (knee) dislocations are a rare injury that can have serious complications¹
 - Knee dislocations have an estimated prevalence of <0.02% of all knee injuries¹
- 14% to 40% of knee dislocations have an associated peroneal nerve palsy²
 - Palsy occurs due to shear forces and the nerve's anatomical location against fibular head²
 - Non-surgical interventions for peroneal nerve palsy associated with long-term disability³
 - Lifelong use of an ankle and foot orthosis and development of circumduction gait³
- Popliteal artery compromise can cause compartment syndrome leading to amputation⁴
 - Amputation risk of 86% if not treated within 8 hours⁴
 - Amputation risk of 11% when treated in less than 8 hours⁴

Patient Background

- Patient was a 17-year-old African American male attending high school
 - Patient was a junior at time of injury and graduated high school prior to injury resolution
- Patient primarily played linebacker on his high school's American football team
 - At the time of injury, patient was playing practice squad offensive guard

Acute Injury Management and Differential Diagnosis

- The injury was sustained when patient stepped in a hole on football practice field
 - Patient tripped and fell without external contact from another athlete
 - Simultaneous transverse and varus forces acted at the knee causing a dislocation
- Patient's knee was visibly dislocated and the school's athletic trainer provided initial on-site care
 - The school's emergency action plan was activated
 - Lower leg neurovascular assessment performed by athletic trainer
 - Bilateral comparison indicated compromise of dermatomes, myotomes, and circulation
- Straight-leg immobilizer applied by athletic trainer and knee self-reduced spontaneously
 - Neurovascular screen subsequently rechecked and with no improvement
- Emergency Medical Services transported patient to a level one children's trauma center
 - MRI and vascular evaluation conducted at ER; patient was not vascularly compromised

Surgical Intervention

- MRI of the injury revealed complete tears to ACL and LCL, partial tears to PCL and MCL
- Patient followed up with team's orthopedist early the following week for evaluation
 - Patient fitted for a locking, hinged-knee brace and an ankle-foot orthosis
 - Referred to physical therapy focused on regaining range of motion and strength
- At 3 months, patient still had unresolved foot-drop in right leg
 - Electromyography (EMG) study conducted to assess peroneal nerve function
 - EMG revealed right peroneal sensorimotor neuropathy with a severe axonal loss
 - Distal muscles showed signs of denervation and no voluntary activity
- At 4 months, patient had ACL, LCL, and posterolateral corner reconstructed
 - ACL was reconstructed using a quadriceps tendon autograph
 - LCL was reconstructed using a tibialis anterior allograft
 - Surgical timeline allowed MCL and PCL to heal and therefore did not require surgery
- Patient continued physical therapy consistent with ACL reconstruction
 - Therapy emphasized reestablishing range of motion and strength prior to next surgery
- 5 ½ months after injury, patient had a tibial tendon transfer to salvage foot-drop
 - Complete common peroneal nerve injury including ankle extensors and evertors
 - Right posterior tibial tendon transfer to dorsum of the foot; gastrocnemius recession
 - Occurred 1½ months after knee surgery, allowed strength and range of motion restoration



Patient supine – leg dislocated at femoral-tibial joint



Frontal and sagittal views of right leg in Emergency Room.
Femoral-tibial joint already reduced, patella dislocated

NATA Virtual 71st Clinical Symposia & AT Expo • July 13-16, 2020 • Atlanta, GA

EMORY
HEALTHCARE

Post-Surgical Progress

- 7 months post-injury: patient cleared to begin strength training by knee surgeon
 - Lifting supervised by physical therapist in clinic and athletic trainer at patient's high school
- 8 months post-injury: patient cleared to begin a walk-run program with regards to foot drop
 - Instructed to wear high-top shoe for physical activity and was discharged by foot surgeon
- 13 months post-injury: returned for 8-month knee surgery follow-up, not cleared for athletics
 - Patient still displayed mild foot-drop, though it had no impact on walking or running ability
 - Surgeon's estimate for full athletic clearance is December 2020 (19 months post-injury)



Sagittal-plane view of patient
back-squatting



Frontal-plane view of
patient back-squatting



Sagittal-plane view of patient
deadlifting

CLINICAL RELEVANCE

- Athletic trainers should be on-site for all athletic activities to manage catastrophic injuries
- Thorough examination is paramount for injury recognition and prevention of lifelong disability
 - Vascular compromise can lead to compartment syndrome and amputation
- Emergency Action Plans should be updated and practiced regularly by all staff and clinicians

DISCLOSURES AND CONTACT INFORMATION

- Authors have no conflicts of interest to disclose
- Primary author may be reached via email at: mason.briles@emoryhealthcare.org

REFERENCES

1. Bui KL, Ilaslan HD, Parker RD, Sundaram M. Knee dislocations: a magnetic resonance imaging study correlated with clinical and operative findings. *Skeletal Radiol.* 2008;37(7):653-661.
2. Ridley TJ, McCarthy MA, Bollier MJ, Wolf BR, Amendola A. The incidence and clinical outcomes of peroneal nerve injuries associated with posterolateral corner injuries of the knee. *Knee Surg Sport Tr A.* 2017;26(3):806-811.
3. Krych AJ, Giuseffi SA, Kuzma SA, Stuart MJ, Levy BA. Is Peroneal Nerve Injury Associated With Worse Function After Knee Dislocation? *Clin Orthop Relat R.* 2014;472(9):2630-2636.
4. Henrichs A. A Review of Knee Dislocations. *J Athl Training.* 2004;39(4):365-369.