



Magnetic Resonance Imaging of Posterior Cruciate and Posterolateral Corner Injuries of the Knee

William James Malone, DO,^{*,†} Aditi Shruti, MD, MBBS,[†] Jounghyun Ko, MD,[†] and Joel Salesky, MD[‡]

Posterior cruciate ligament (PCL) and posterolateral corner injuries are less common than anterior cruciate ligament injuries. Over the last decade or so, there has become increased awareness of these injuries and also the realization of potential poor clinical outcomes if not repaired, to include chronic instability, osteoarthritis, and both anterior cruciate ligament and PCL graft failures. This, in turn, has led to improvements in imaging technique and understanding of biomechanical anatomy. The objective of this article is to review the normal anatomy and normal appearance of PCL and posterolateral corner structures on magnetic resonance imaging. We would then discuss the imaging findings of injuries of PCL and posterolateral corner and common imaging pitfalls that can mimic an injury. *Oper Tech Sports Med* 23:278-288 © 2015 Elsevier Inc. All rights reserved.

KEYWORDS PCL, posterior cruciate ligament, posterolateral corner, ligament, injury, MRI, radiology

Introduction

The strengths and weaknesses of magnetic resonance imaging (MRI) must be considered before ordering an MRI examination. First, high-quality MRI utilizes protocols with sequences that are tailored to specifically evaluate the ligaments, menisci, and cartilage. Separate and distinct protocols are employed to evaluate for suspected infection and mass lesion. Second, low-field (open) MRI should be reserved only for those patients requiring an open system owing to body habitus or claustrophobia. This is so because low-field units typically produce images of inferior quality compared to high-field MRI secondary to poor fat suppression and low signal to noise. Low-field systems also take considerably longer to image, often resulting in motion artifact, which further degrades the images.¹ Finally, MRI is accurate in diagnosing

acute ligamentous injuries but should be used with caution when evaluating chronic injuries. As ligaments heal, granulation tissue bridges the tendon gap to the point where the ligament appears intact but is insufficient (Fig. 1A and B). In such instances, MRI must be interpreted with caution and correlated with a good physical examination or stress imaging (Fig. 1C). For these reasons, care should be taken to direct patients to imaging centers with high-field MRI and excellent quality imaging protocols. Even when these criteria are met, one must be cognizant of the limitation of MRI for chronic ligament injuries.

Representative Cases

There are characteristic radiologic findings that should raise suspicion for posterior cruciate ligament (PCL) and posterolateral corner (PLC) injury, even before directly examining these structures on MRI. “Kissing” bone contusions in the anterior aspect of both the medial femoral condyle and medial tibial plateau suggest hyperextension varus injury (Fig. 2). When this contusion pattern is noted, it suggests opening of the posterior and lateral joint, often indicating injury to the PCL and concurrent PLC injury.^{2,3} The “arcuate sign” (Fig. 3) is an osseous avulsion fracture of the fibular head, involving some combination of the arcuate complex (arcuate,

*Musculoskeletal Imaging, Department of Radiology, Geisinger Health System, Danville, PA.

†Department of Radiology, Geisinger Medical Center, Danville, PA.

‡Department of Radiology, Geisinger Wyoming Valley Medical Center, Wilkes Barre, PA.

Address reprint requests to W. James Malone, DO, Department of Radiology, MC 20-07, Geisinger Medical Center, 100 N Academy Ave, Danville, PA 17822. E-mail: wjmalone@geisinger.edu



Figure 1 (A) Complete disruption and therefore nonvisualization of PCL at time of injury. White arrow shows an intact menisiofemoral ligament. (B) A “healed” PCL on an MRI obtained 6 months later on the same patient. The PCL is not disrupted but is mildly thickened and demonstrates mild intrasubstance signal changes. (C) Stress imaging obtained at same time as (B) shows posterior drawer, consistent with lax PCL despite it being “intact” on MRI.

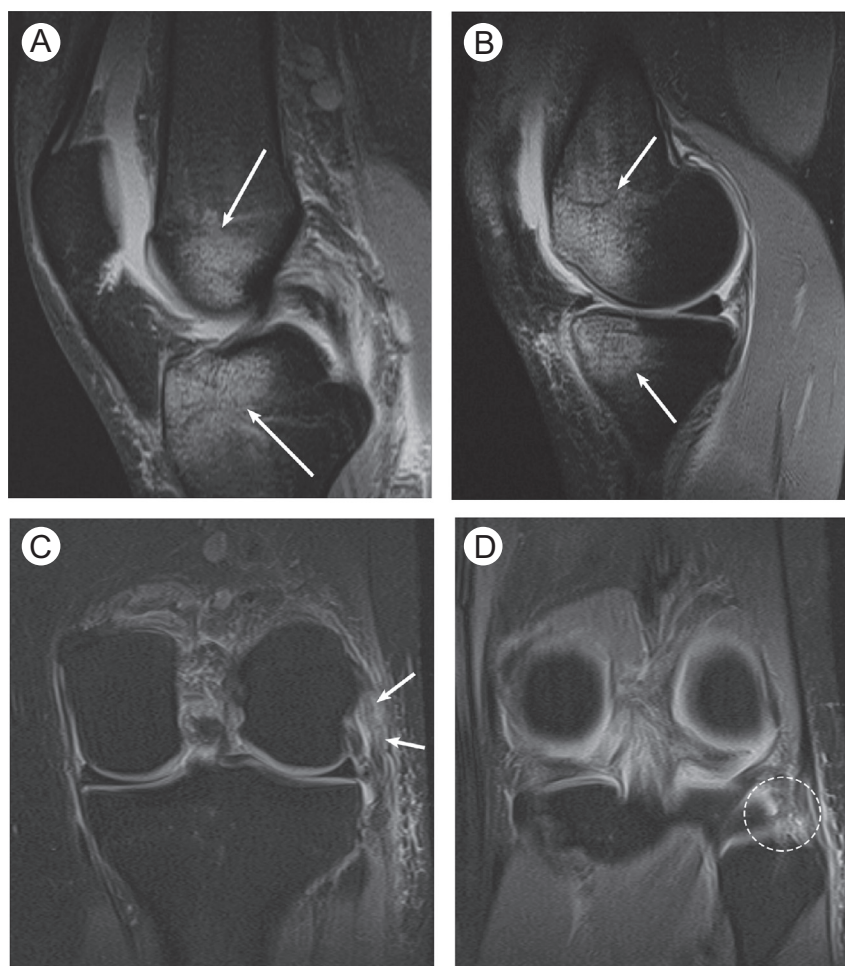


Figure 2 (A and B) Hyperextension bone contusions in the central and medial aspect of distal femur and proximal tibia. These “kissing” contusions (arrows) are consistent with hyperextension varus injury and often indicate PCL and posterolateral corner injuries. Note Grade 1-2 PCL sprain. (C and D) posterolateral corner injury in same patient. (C) A moderate to high-grade injury of FCL at femoral attachment (arrows). (D) The conjoint tendon insertion and popliteofibular ligament are torn from their fibular attachments (circle).

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