Lateral Meniscus Posterior Root Tear (LMPRT): A Case Report

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Abstract

There is a high rate of missed lateral meniscus posterior root tear from pre operative magnetics resonance image (MRI) as reported in the study of Krych AJ.[1] It was found that there was a high frequency (67%) of tears that were missed on preoperative MRI in this consecutive series. In our case report we present the case that missed lateral posterior meniscus root tear from pre operative MRI in the setting concomittant with anterior cruciate ligament (ACL) injury.

Keywords: lateral meniscus posterior root tear

The meniscus of the knee has several important biomechanical functions, the most important of which is load transmission and shock absorption.[2] By converting the axial load to a radially directed force or hoop stress, the meniscus reduces wear on the hyaline articular cartilage.[3] The meniscus roots describe the insertions of the anterior and posterior meniscal horns on the tibial plateau.[4,5] These structures are critical for meniscal function since they prevent meniscus extrusion under axial load, thereby converting axial load to a radially directed force (so-called hoop stress).[6,7]

Meniscus insufficiency, resulting from a posterior root tear, increases joint contact pressures,[8] especially with concomitant meniscofemoral ligament (MFL) disruption,[9,10] leading to articular cartilage degeneration over time.

According to the study by Krych AJ et al.,[1] there was a high rate of missed posterior lateral meniscus root tears (LMPRT) on preoperative MRI reported. This retrospective cohort study reported 45 consecutive patients with arthroscopically confirmed LMPRTs between 2010 and 2017. Of these, only 15 of 45 LMPRTs (33%) were initially diagnosed on preoperative MRI.

LaPrade et al.,[11] reported a sensitivity of 0.600 (95% CI, 0.281-0.860) and a positive predictive value of 0.181 (95% CI, 0.085-0.261) for the diagnosis of LMPRTs on 3-T MRI by a blinded fellowship-trained musculoskeletal radiologist. They conclude sensitivity was higher for medial root tears, indicating a higher risk of missing lateral root tears on MRI. Imaging has an important role in identifying meniscus posterior horn root tears, however, some root tears may not be identified until arthroscopy.

Case Report

A 37-year old Italian man suffered from a twisiting accident at the right knee 2 days before admission. He presented with right knee pain with swelling, and he was unable to walk and extend his right knee .

Physical examination shown as below

Right Knee: Range of motion : 15-140 (extension Lag 15 degree). Lachmann test was positive. Anterior drawer test was positive 3+ with no end point. Pivot shift test unable to evaluate due to pain.

MRI of the right knee was requested after fully completed history record was obtained and physical examination. The result of the MRI from the Radiologist reveals complete tear of ACL at mid to femoral insertion and normal morphology and signal intensity of the menisci and bone bruise at the posterior lateral tibial plateau.

Arthroscopy findings revealed complete ruptured ACL (Figure 1), femoral insertion and medial meiscus was normal, at the latereal meniscus a posterior root tear from the tibial insertion was found (Figure 2). An arthroscopic ACL reconstruction (Figure 3) was performed to repair the lateral meniscus posterior root tear by pullout sutured technique (Figure 4).

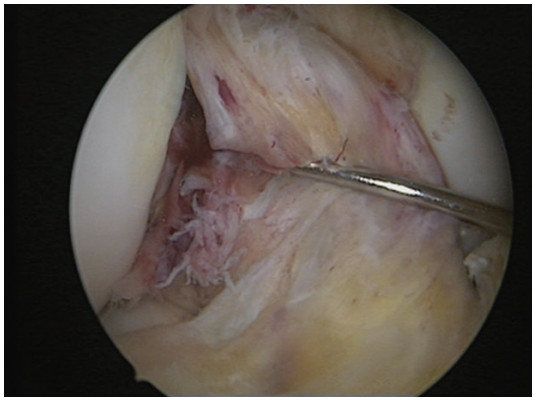


Figure 1: Complete tear of anterior cruciate ligament (ACL).

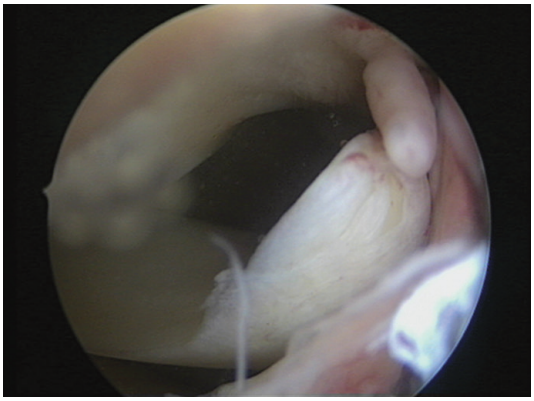
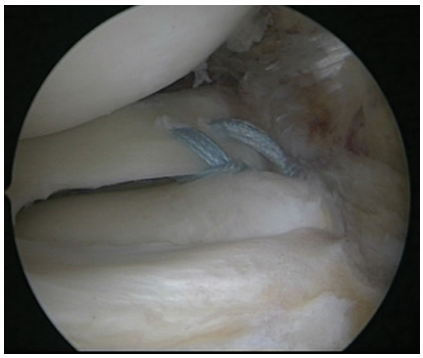


Figure 2: Arthroscopy findings reveal lateral meniscus posterior root torn from the tibial insertion.



Figure 3: After anterior cruciate ligament (ACL) reconstruction.



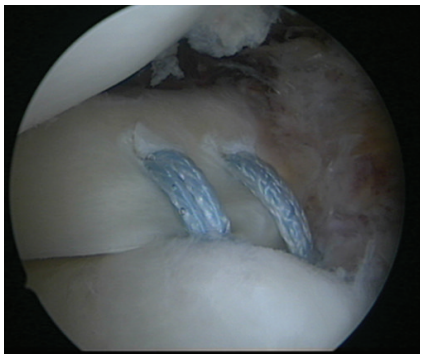


Figure 4: After transtibial pullout suture repair of lateral meniscus root with FiberTape.

Surgical Technique

An anatomic transtibial single-tunnel pull-out meniscal root repair was performed using LaPrade et al. [12] technique. The patient was positioned supine with the surgical leg in 70° of knee flexion, the thigh secured in a leg holder. Standard medial and lateral parapatellar arthroscopic portals were created. The posterior medial and lateral meniscus root attachments were identified, and a calibrated arthroscopic probe was used to assess root stability and, in the event that a tear was identified, to characterize the root tear type. With a curved curette, the tibial attachment site of the torn meniscus root was debrided of soft tissues down to a bleeding bone bed to improve healing of the repair. A 3-cm incision was created adjacent to the tibial tubercle on the ipsilateral side of the root tear. One transtibial tunnel was drilled 5 mm apart, exiting intra-articularly at the posterior root attachment site. An aiming device with a cannulated sleeve was used to position a drill pin. The tunnels were visualized arthroscopically to verify appropriate tunnel positioning and the drill pins were removed. The knee scorpion suture passer was used to pass the 2-0 Fiberwire suture at the posterior root of the lateral meniscus. The 2-mm FiberTape suture was changed to 2-0 FiberWire by reroute technique, which was then shuttled down the posterior transtibial tunnel (Figure 4). The steps were repeated with a second suture passed through the midportion of the torn meniscus root and shuttled down the same transtibial tunnel. The sutures were tensioned to reduce the meniscus root to its native anatomic attachment site. An anatomic repair was performed because nonanatomic root repair fails to restore the contact area and mean contact pressures to those of the intact knee or those achieved with anatomic repair. Once the reduction of the root repair was verified under direct arthroscopic visualization, the sutures were tied over a surgical cortical fixation device on the anterior tibia.

Rehabilitation

Patient remained non-weightbearing in a straight leg brace for the first 6 weeks after surgery to prevent isolated hamstring activation, which could impart stress on the meniscal root repair. Partial weightbearing began at week 7 and gradually increased to full weightbearing as tolerated without pain or swelling. Patient focused on endurance and strength exercises starting at 2 months postoperatively and gradually progressed to normal activities with an average return to full activities at 5 to 7 months postoperatively.[12]

Conclusion

Despite improving the identification of other meniscus tear patterns on MRI, a high percentage of LMPRT is still missed. From our case the MRI showed normal morphology and signal intensity of both menisci but after arthroscopic probe, we identified a completely torn lateral meniscus root from tibia insertion.

Posterior lateral meniscus root tears (PLMRTs) are usually traumatic in nature and have been reported in 7-12% of patients with a tear of ACL.[13]

The surgeon should maintain a high level of suspicion and prepare the patient and operation for posterior lateral meniscus root repair especially in cases of anterior cruciate ligament reconstruction surgery due to the probability of high concomitant injury. Finally, the posterior root of the lateral meniscus should be carefully probed at the time of arthroscopy, especially in cases of ACL injury.

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