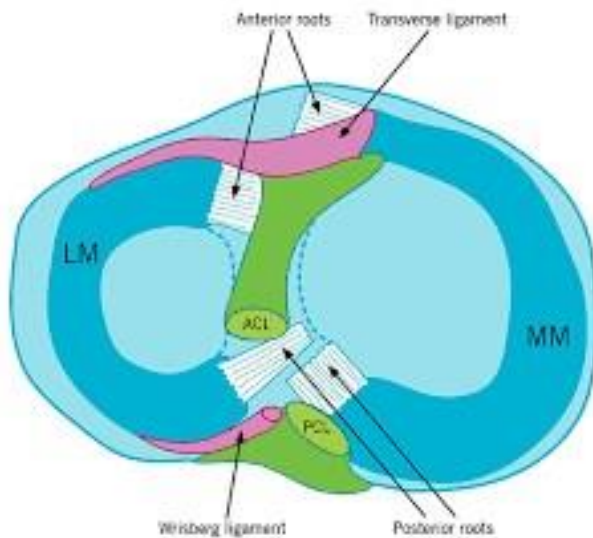


# Meniscal Root Tears

## By William Renner, M.D.

Meniscal root tears were not reported in the literature 10 years ago but recently have become increasingly important in both radiology and orthopedics. The meniscal roots are the primary structural anchors of both the medial and the lateral meniscus to the tibial plateau. As you can see in diagram below, the posterior roots of both the lateral and medial meniscal roots are anterior to the posterior cruciate ligament (PCL). It is always the posterior roots that tear.



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Most people learn best by recall. Read the material, and then look away from it. Jot down the main ideas on a piece of paper. If you cannot recall the important points, re-read the article and try it again.

Diagram 1. Axial diagram of meniscus, meniscal roots, ACL and PCL. Meniscal roots are the main anchors holding both menisci to the tibial plateau.

It is always the posterior meniscal root that tears.



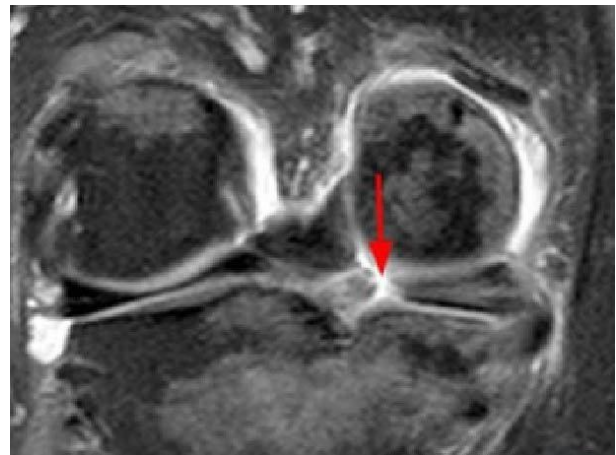
*Normal Medial Meniscus Posterior Root*

*PD Fat Sat coronal image obtained at the level of the PCL insertion. Note the posterior root of the medial meniscus extends horizontally to attach adjacent to the PCL insertion (white arrow). The lateral meniscal root has a slight inverted “V” appearance before its insertion (red arrow).*

Sagittal images are the most important in diagnosing routine meniscal tears, however for evaluation of the meniscal roots, the coronal T2 images are the most important. It is always the posterior meniscal roots that tear. Both the lateral and medial posterior horn roots should be visible on coronal T2 images.

*Medial Meniscus Posterior Root Tear*

*PD Fat Sat coronal image reveals fluid signal extending through the posterior meniscal root medially (arrow). Extensive degenerative signal is present within the posterior horn of the meniscus.*



Medial meniscal root tears occur most commonly in middle-aged individuals with minimal trauma. Articular cartilage wear is frequently present with grade 2-4 chondromalacia.

Medial meniscal root tears can occur with other injuries but this is much less common. The most frequent combined injuries are with PCL tears or multiple ligament injuries of the knee.



*(Above) Coronal PD Fat Sat in patient with medial root avulsion. Peripheral displacement of medial meniscus, with bowing of tibial collateral ligament, edema of adjacent medial tibia plateau.*

*(Right) Coronal PD Fat Sat with a meniscal root tear (not shown) reveals crescentic low signal in the subchondral regions of both the medial femoral condyle and the medial tibial plateau (arrows) with extensive associated marrow edema comparable with subchondral insufficiency fractures. Note the medial meniscus is extruded (arrowheads).*

Signs of complete avulsion of the posterior medial root ligament include:

1. Peripheral displacement of the medial meniscus with fluid seen within the meniscus (cleft sign). A fluid-filled gap is seen between the PCL insertion and the posterior horn of the medial meniscus
2. Extrusion of the medial meniscus laterally with bowing of the tibial collateral ligament
3. Edema of the tissues superficial to the tibial collateral ligament
4. Edema within the bone, usually the medial tibial plateau
5. Frequently accompanied by Cartilage loss



Tears of the meniscal roots have been associated with subchondral insufficiency fracture (SONK) since there is loss of the normal cushion of the meniscus and meniscal ossicles which may be secondary to an avulsion of bone.

Tears of the posterior lateral meniscal root are almost always associated with ACL tears. About 15% of ACL tears have a lateral meniscal root tear. About half of these tears are avulsed from the bone while the other half of tears are within 1 cm of the bony insertion. They are frequently associated with radial split tears in the midportion of the lateral meniscus.

Tears of the posterior horn of the lateral meniscus are relatively easy to repair by the surgeons when

they are off the bone. Tears of the body of the meniscus are more difficult to repair. Medial meniscal root tears are repaired if there is intact articular cartilage with only grade 1–2 chondromalacia and minimal joint space narrowing.