Knee Joint PART II

Presented by

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Magnetic resonance imaging of the knee

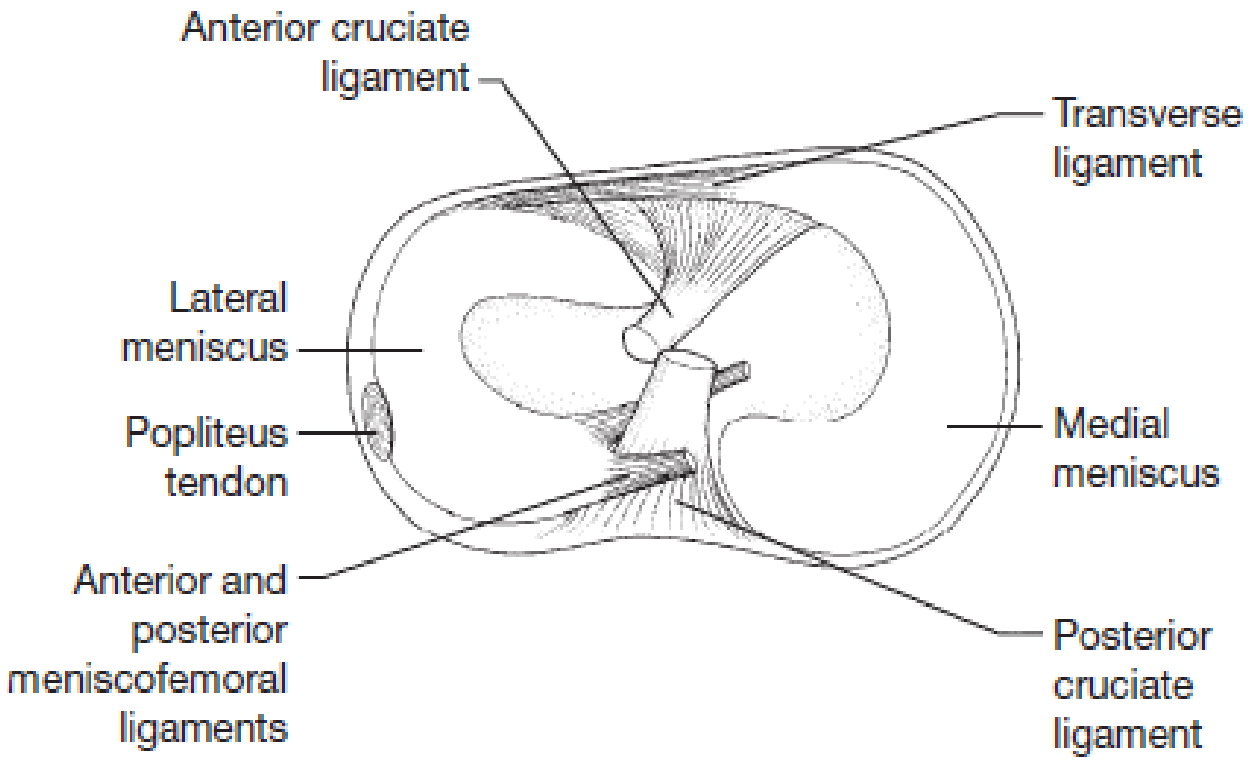
- MRI is used in the evaluation of internal derangements of the knee.
- Using a dedicated quadrature surface coil images are acquired in the **coronal plane** to evaluate the collateral and cruciate ligaments, in the **sagittal oblique plane** to evaluate the cruciates and menisci, and in the **axial plane** to evaluate patellofemoral cartilage.

The menisci

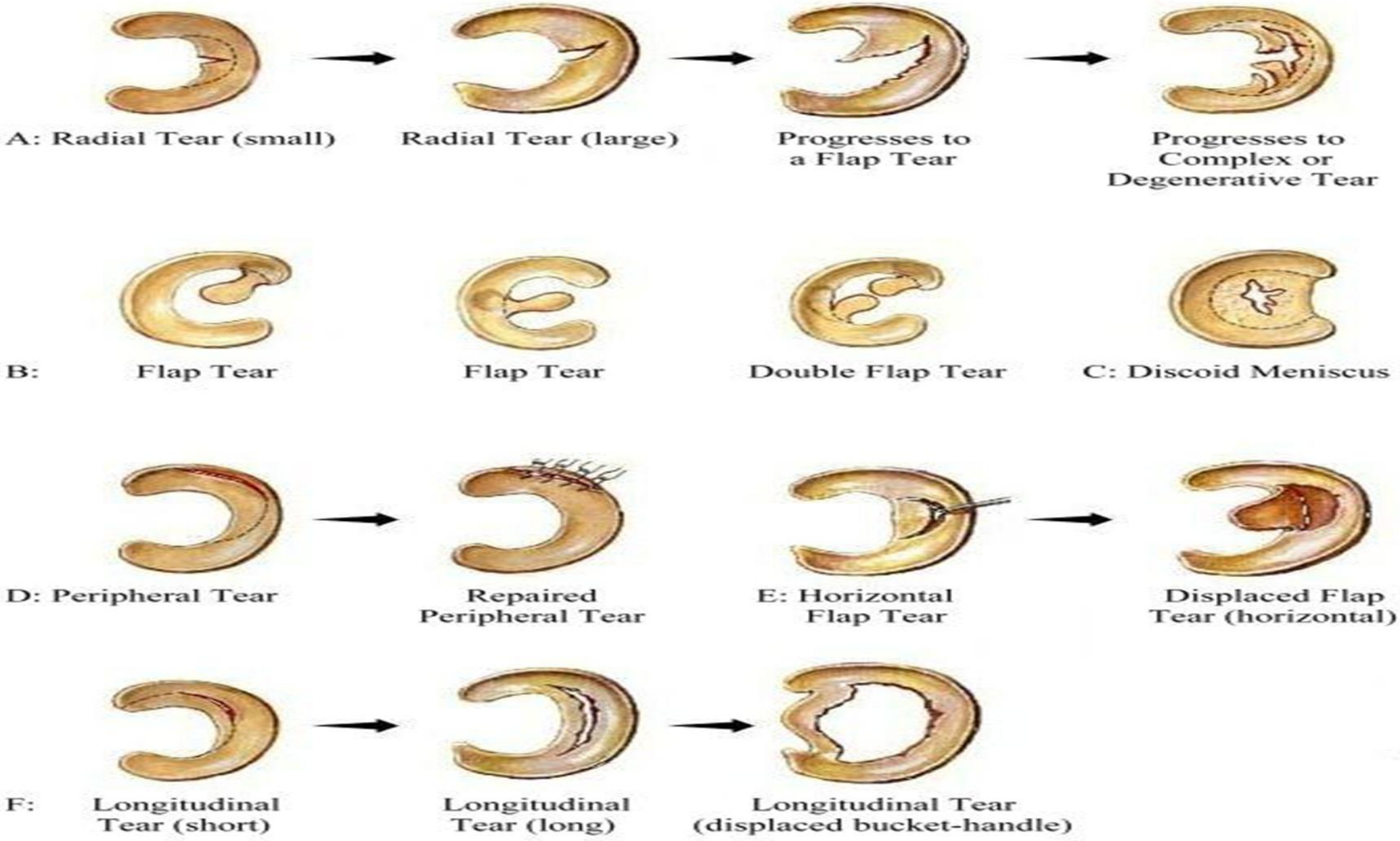
- **The menisci** are C-shaped semilunar rings inter- posed between the articular surfaces of the femoral condyles and the tibial plateau
- Menisci are poorly vascularized, only the outer third being vascularized in adulthood via a perimeniscal plexus
- **therefore following injury meniscal healing is poor**
- **Function**:

1. They act as a buffer between the two surfaces.
2. protecting articular cartilage
3. distributing the strain of weightbearing (they support 50% of load sharing)
4. improving stability
5. providing lubrication to facilitate joint flexion and extension

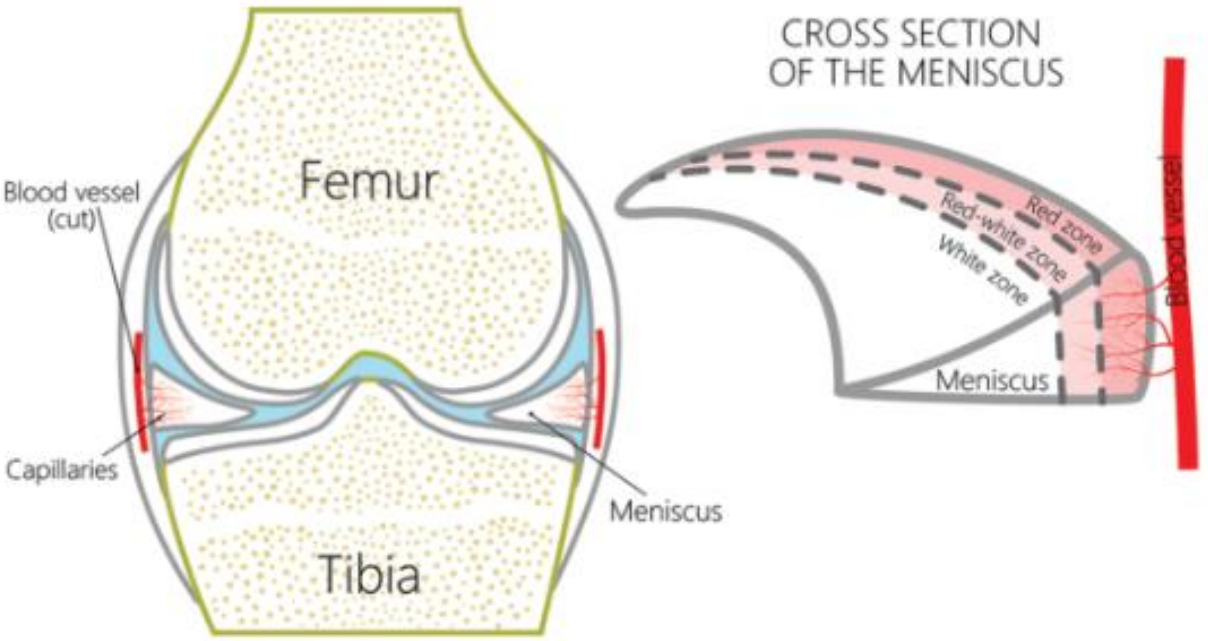
- **The medial meniscus** has an open C shape and is attached to the intercondylar notch of the tibia both anteriorly and posteriorly to the anterior horn of the lateral meniscus through the transverse meniscal ligament in 40%, to the posterior capsule and to the medial collateral ligament.
- **The lateral meniscus** is more circular in shape, has anterior and posterior intercondylar notch attachments, transverse meniscal attachment to the anterior horn of the medial meniscus, menisco femoral ligament attachments to the inner aspect of the medial femoral condyle, and is loosely attached to the capsule but not the lateral collateral ligament.
- It is separated from the posterior capsule by the popliteus tendon



- On MR imaging
- the compact menisci are hypointense on all sequences
- sagittal images are used to evaluate their integrity In the sagittal plane.
- the posterior horn of the **medial meniscus** is typically twice the size of the anterior horn
- the anterior and posterior horns of the **lateral meniscus** are equal in dimensions Typically, the bodies of the menisci are seen on only the outer two slices
- Lateral meniscal injury is **less common** than medial, as the meniscus is more mobile and has fewer osseous or capsular attachments.

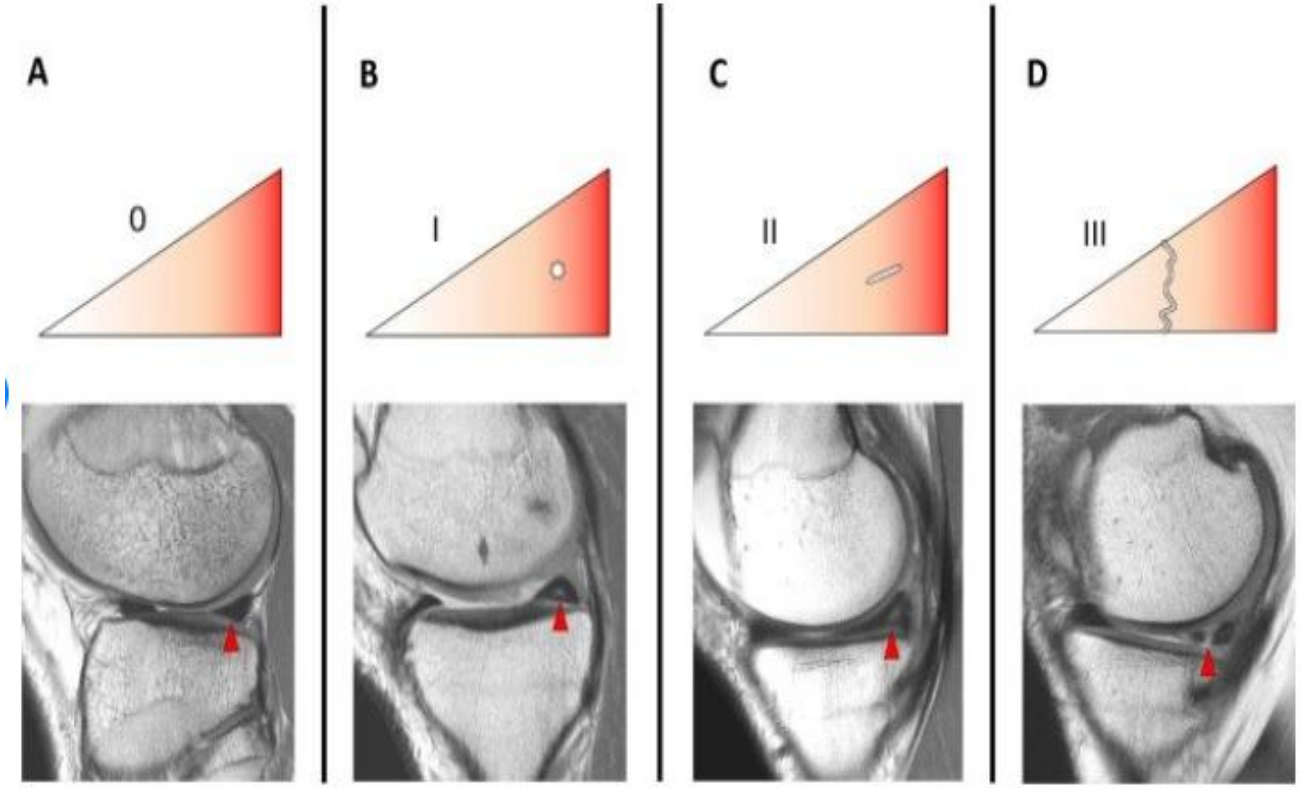

A: Radial Tear (small)
Radial Tear (large)
Progresses to a Flap Tear
Progresses to Complex or Degenerative Tear
B:
Flap Tear
Flap Tear
Double Flap Tear
C: Discoid Meniscus
D: Peripheral Tear
Repaired Peripheral Tear
E: Horizontal Flap Tear
Displaced Flap Tear (horizontal)
F:
Longitudinal Tear (short)
Longitudinal Tear (long)
Longitudinal Tear (displaced bucket-handle)

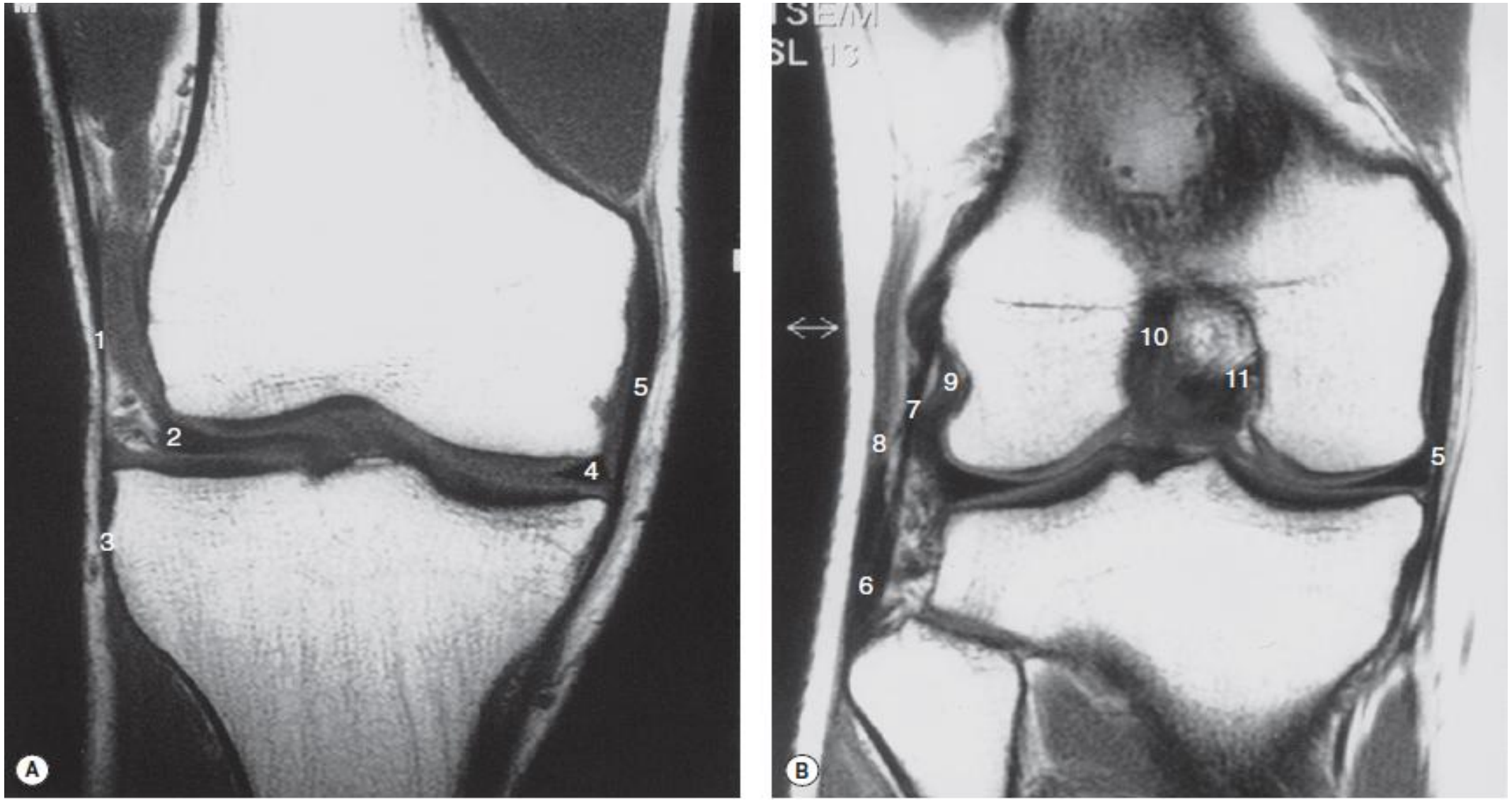
- Menisci may tear both in the setting of **acute trauma** or in the setting of **minor trauma** superimposed on meniscal degeneration.
- Following repetitive trauma, as part of the ageing process the central portion of the meniscus undergoes **first globular and then progressive linear mucoid degeneration**



Grading system Classification of MT

- **Grade 1** intrasubstance focal signal change (slight T 1 and T 2 hyperintensity) .
- **Grade 2** linear or diffuse globular signal abnormality not extending to a surface is.
- **Grade 3** signal abnormality, either linear or globular with definite extension to a surface.
- **Grade 4** Recognizing that extension of signal to multiple surfaces or in multiple planes reflects a more serious tear with surgical implications.





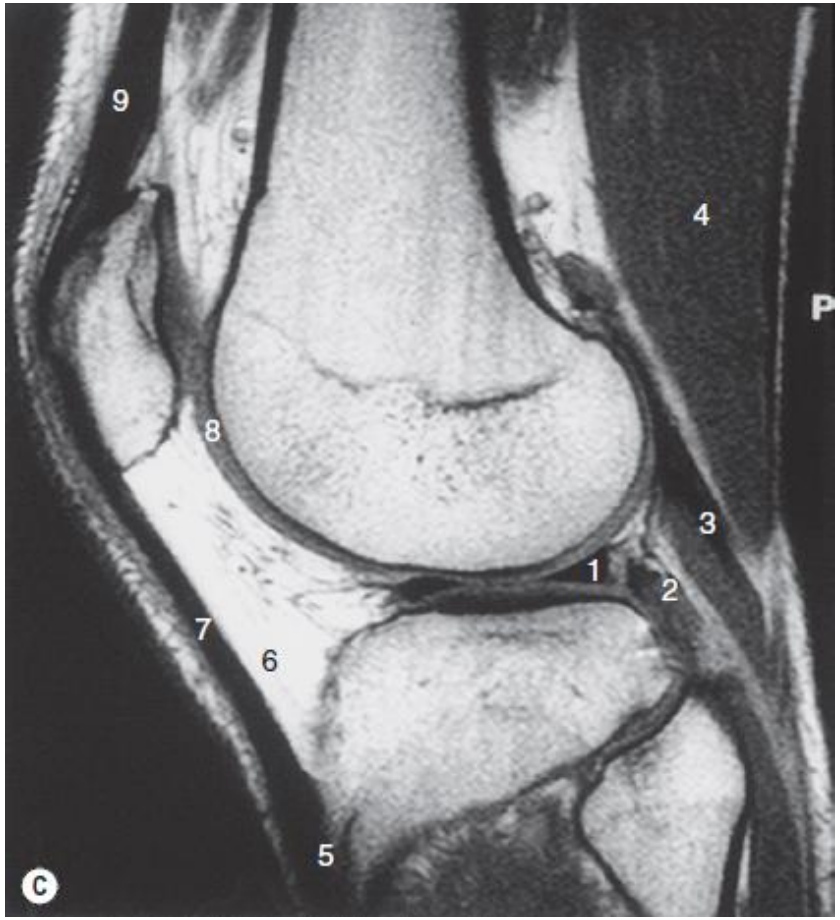
MRI scan of the knee Coronal T 1 -weighted images of the anterior knee (A) and of the posterior knee (B)

- 1. Iliotibial band 2. Lateral meniscus 3. Gerdy ’ s tubercle 4. Medial meniscus 5. Medial collateral ligament (superfi cial component)

- 5. Medial collateral ligament (superfi cial component) 6. Conjoined tendon 7. Fibular collateral ligament 8. Biceps femoris tendon 9. Popliteus insertion, notch 10. Anterior cruciate ligament 11. Posterior cruciate ligament

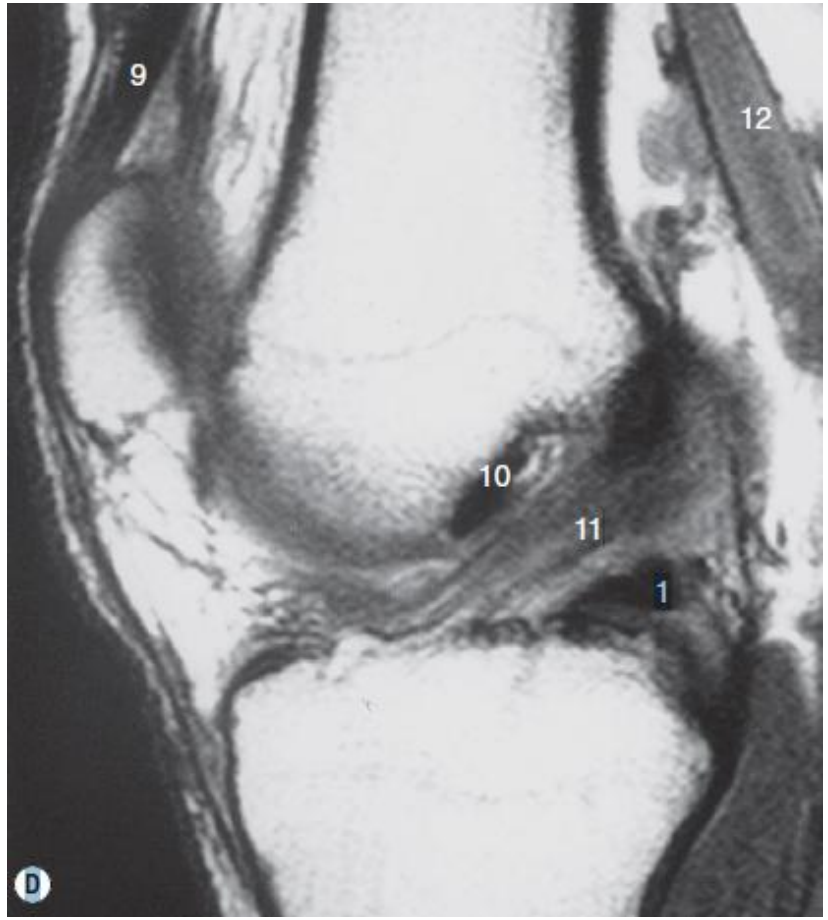
(C, D, E, F) Sequential sagittal scans from lateral to medial

- 1. Lateral meniscus (posterior



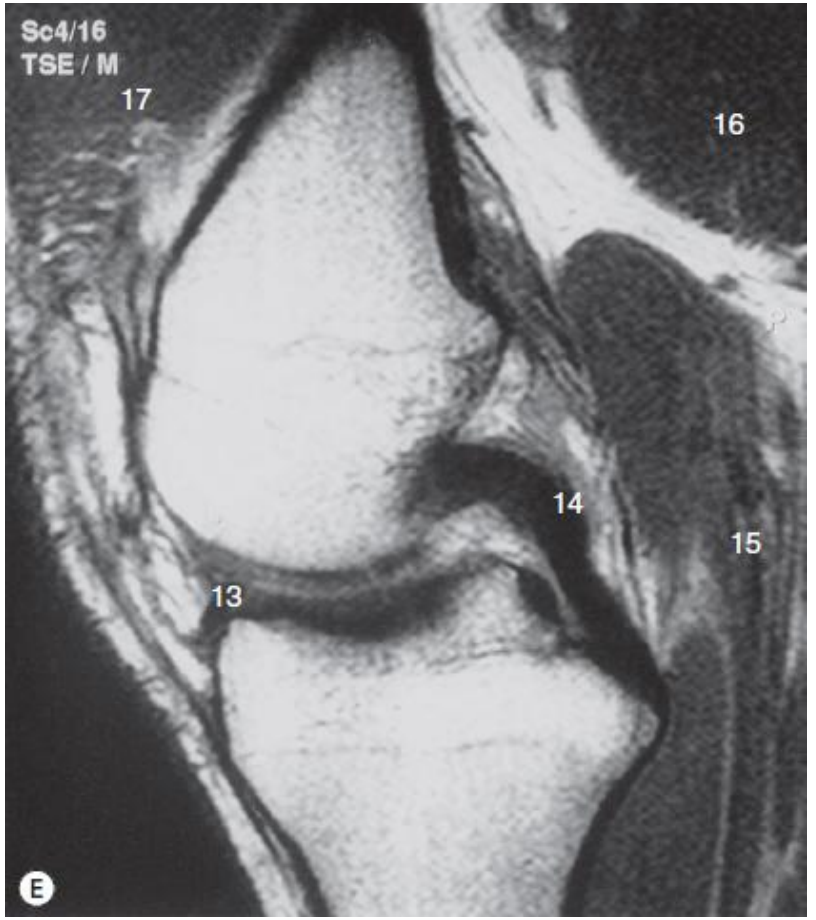
(C, D, E, F) Sequential sagittal scans from lateral to medial

- 9.



(C, D, E, F) Sequential sagittal scans from lateral to medial

- 13. Medial meniscus (anterior horn) 14. Posterior cruciate ligament 15. Medial head of gastrocnemius 16. Semimembranosus muscle belly 17. Vastus medialis muscle belly 18. Medial meniscus posterior horn



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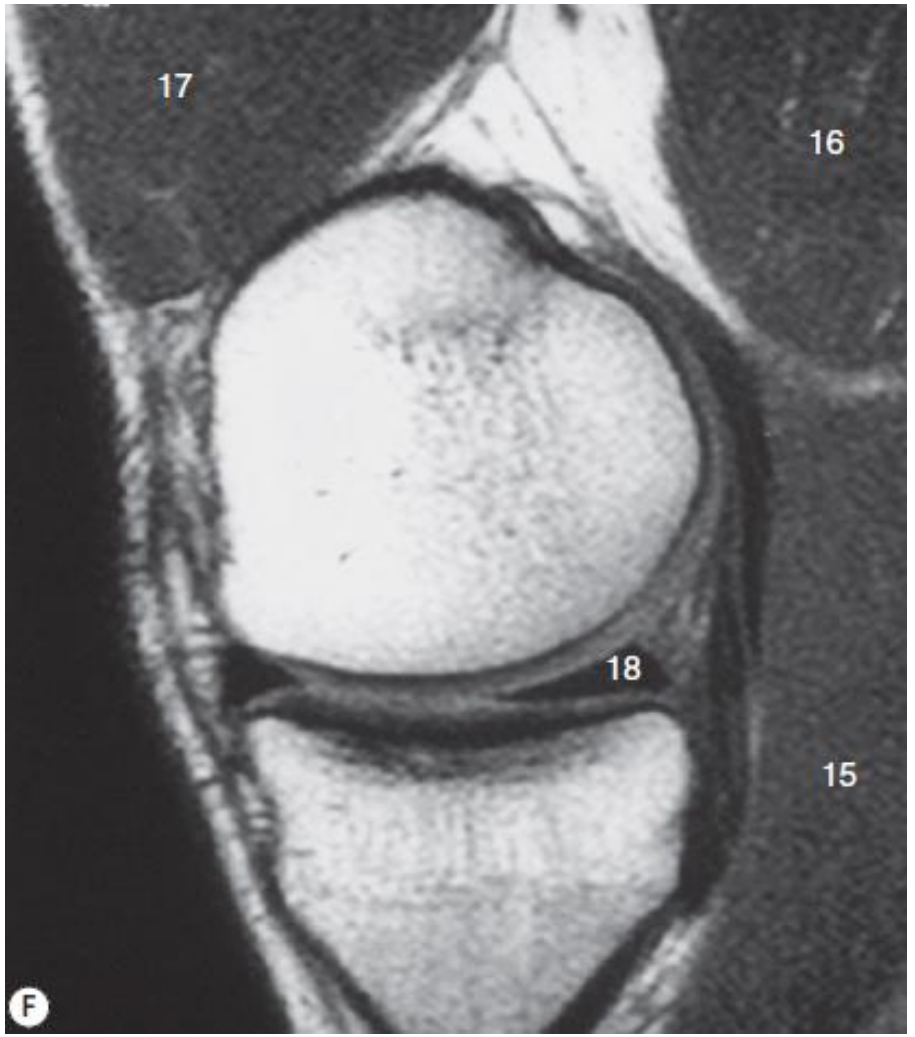


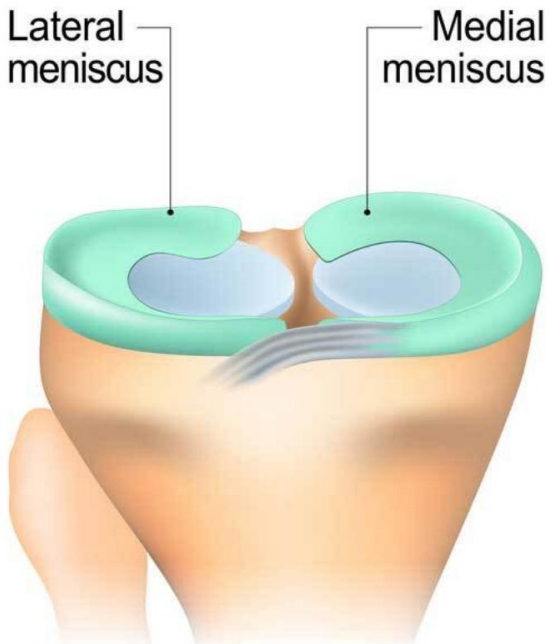
Discoid meniscus

- **A discoid meniscus** is an anatomical variant in which the normal open configuration of the meniscus is absent and the meniscus acquires a solid appearance.
- The configuration lacks normal biomechanical integrity and is predisposed to tears and occasionally a painful ‘ snapping knee syndrome ’

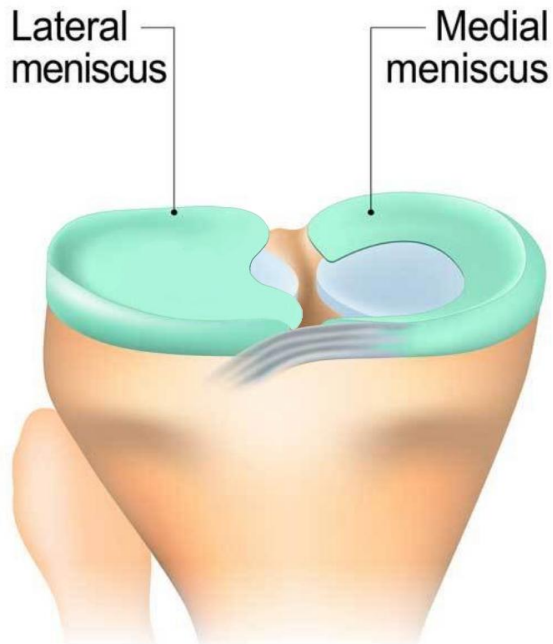
A) Coronal fat suppressed MRI and (B) sagittal T_1-weighted image of the knee showing a discoid lateral meniscus

- ypes of Discoid Meniscus
- There are three types of discoid menisci:

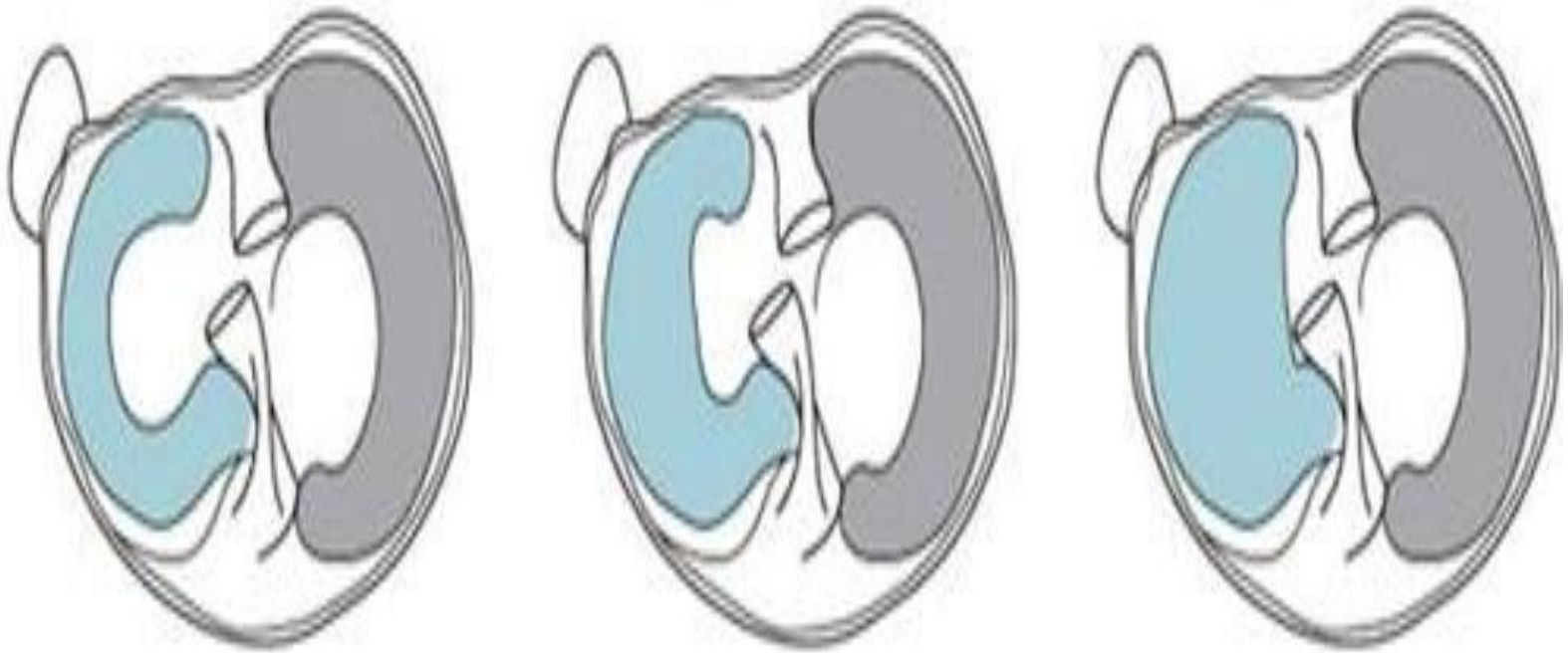
- Incomplete. The meniscus is slightly thicker and wider than normal.
- Complete. The meniscus completely covers the tibia.
- Hypermobile Wrisberg. This occurs when the ligaments that attach the meniscus to the femur and tibia are not there. Without these ligaments, even a fairly normally shaped meniscus can sometimes move around in the joint and cause pain, as well as locking and popping of the knee.



Normal meniscus



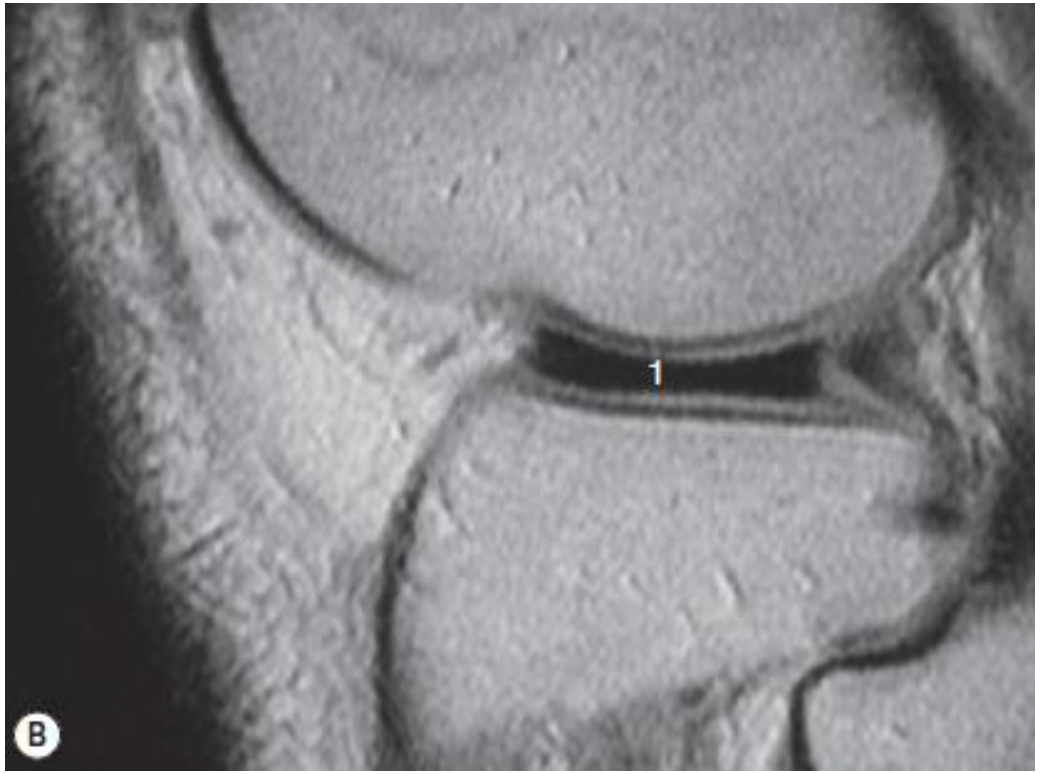
Discoid meniscus



Normal Incomplete Complete

Discoid meniscus

- Criteria for diagnosis on MR images include
- identification of the body of the meniscus on more than three contiguous sagittal 4 mm slices.
- lack of rapid tapering from the periphery to the free edge of the meniscus, and an abnormally wide meniscal body on coronal images, encroaching further into the femorotibial compartment without the normal triangular configuration



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