Posterior roots and Ramp lesions

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Ramp lesions

Ramp lesions

Definition - High Incidence in ACL-deficient knees

- Ramp lesions: **meniscosynovial or meniscocapsular of posterior medial meniscus** (Strobel 1988)
- Commonly associated with the ACL- deficient knee, both in the acute and chronic setting, with their incidence increasing in time from injury, particularly if > 3 months after the injury
- Incidence in ACL-deficient knees: **9 to 24%**, even more until 40%

Seil R, Mouton C, Coquay J, et al. Ramp lesions associated with ACL injuries are more likely to be present in contact injuries and complete ACL tears. Knee Surg Sports Traumatol Arthrosc 2018;26(4):1080–5.

Ramp lesions

- Posterior horn of medial meniscus is a secondary restraint to anterior tibial translation
- Lesions in this area:
  - Increase of anterior tibial translation
  - Can contribute to ACL graft failure if not treated

Ramp lesions

Risk factors

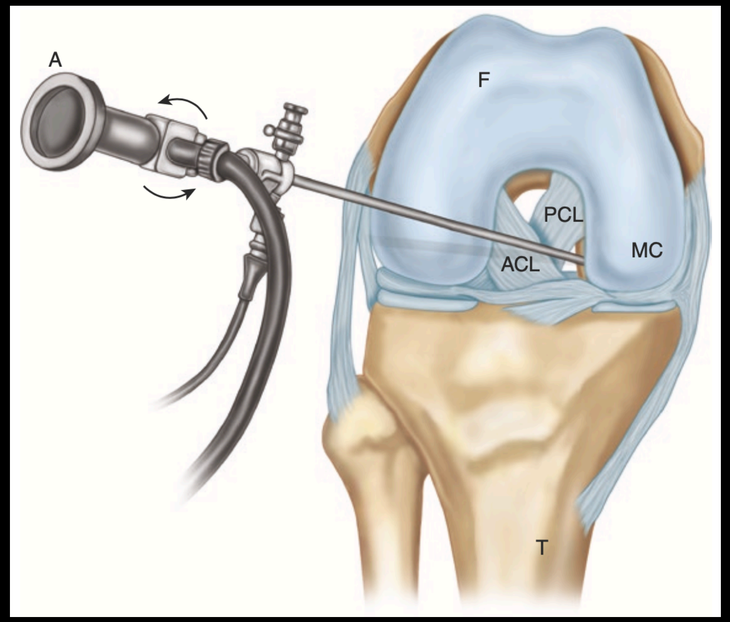
- patients younger than 30 years,
- revision ACL reconstruction,
- chronic injuries,
- preoperative side-to-side anteroposterior laxity difference of 6 mm or more,
- and the presence of concomitant lateral meniscal tears

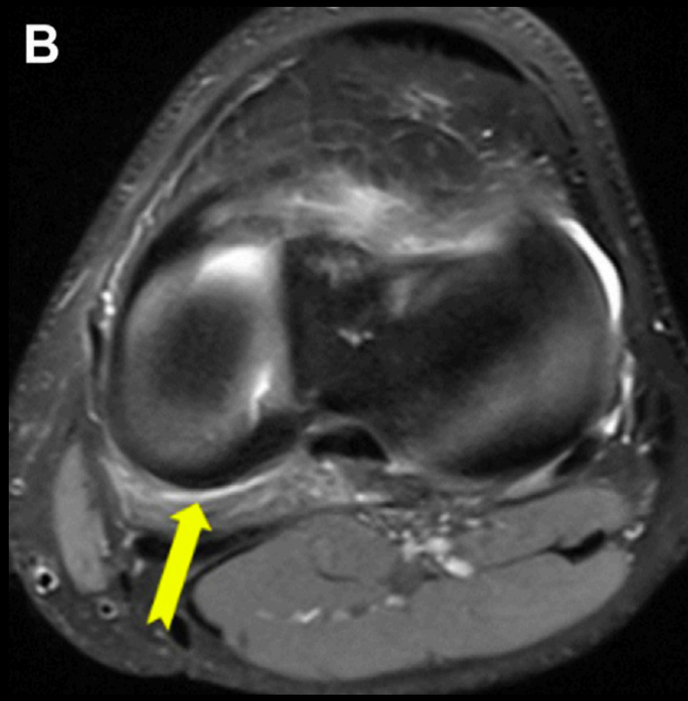
Sonnery-Cottet B, Serra Cruz R, Vieira TD, Goes RA, Saithna A. Ramp Lesions: An Unrecognized Posteromedial Instability?. Clin Sports Med. 2020;39(1):69-81.

Ramp lesions

Clinical and MRI diagnosis can fail

- High index of suspicion
- Arthroscopy is the gold standard but with some pitfalls

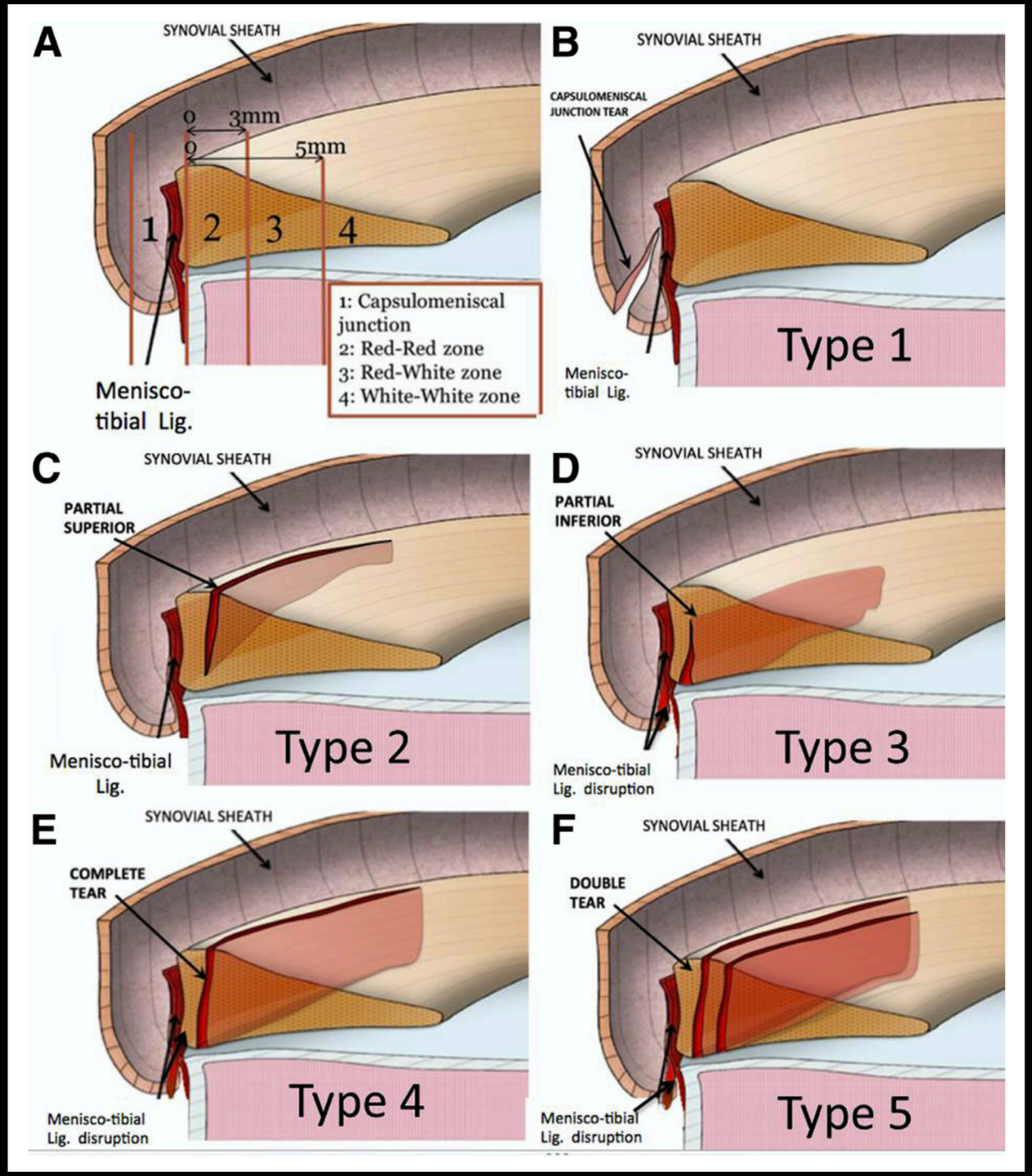




Sonnery-Cottet B, Serra Cruz R, Vieira TD, Goes RA, Saithna A. Ramp Lesions: An Unrecognized Posteromedial Instability?. Clin Sports Med. 2020;39(1):69-81.

Ramp lesions
Classification

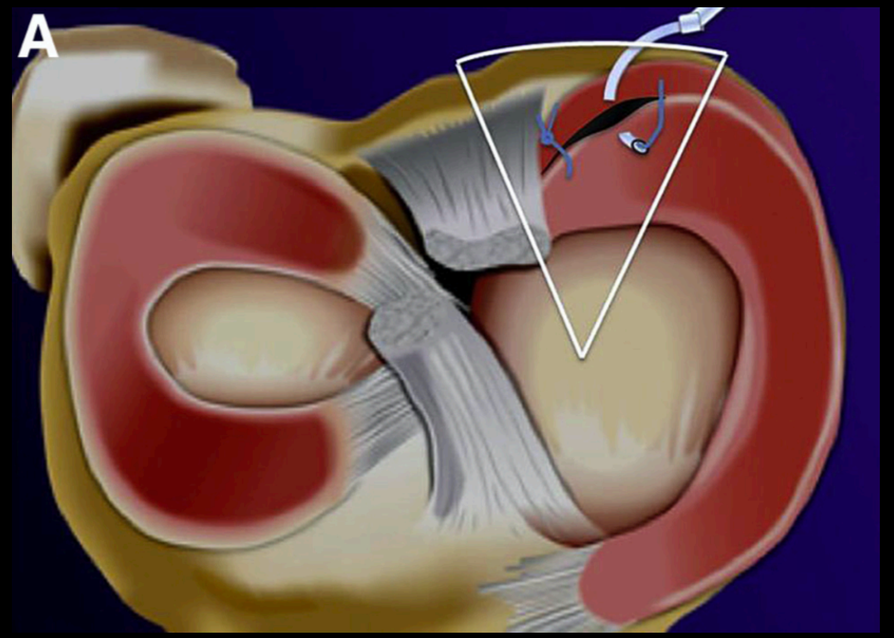
- Type 1: Meniscocapsular lesion, located in the synovial sheath
- Type 2: Upper partial lesion
- Type 3: Lower lesion (“hidden lesion”)
- Type 4: Complete injury in the red-red area
- Type 5: Double tear

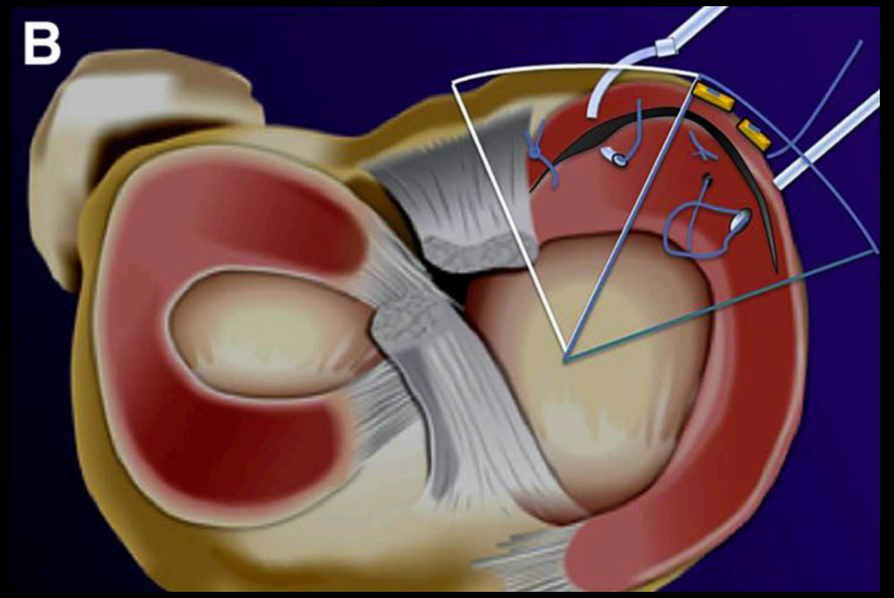


Thaunat M, Fayard JM, Guimaraes TM, et al. Classification and surgical repair of ramp lesions of the medial meniscus. Arthrosc Tech 2016;5(4):e871–5.

Ramp lesions
Treatment options

- Conservative is limited and stable
- Repair:
  - Arthroscope in the notch
  - Posteromedial portal
  - Probe
  - Repair

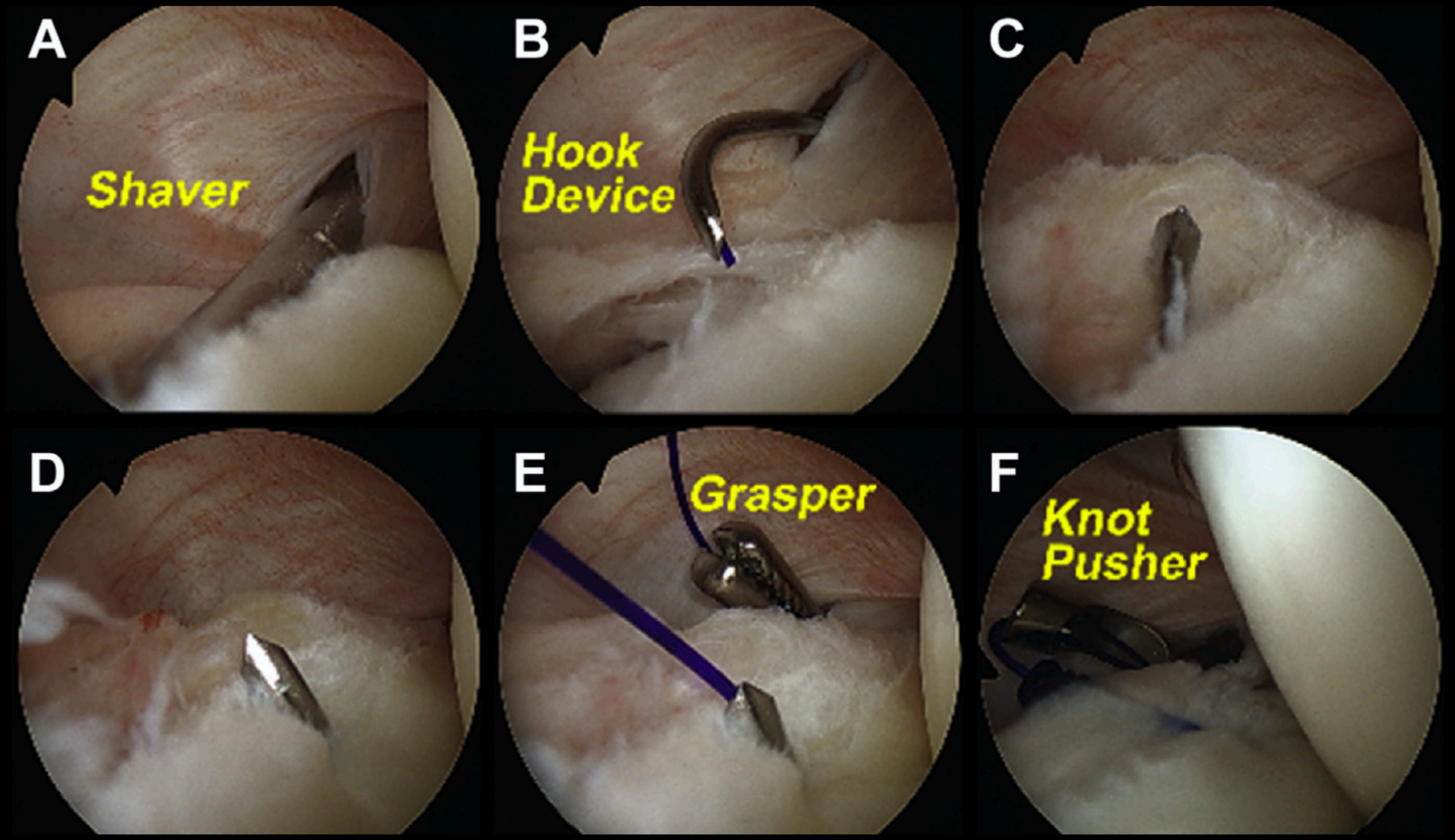




Thaunat M, Fayard JM, Guimaraes TM, Jan N, Murphy CG, Sonnery-Cottet B. Classification and Surgical Repair of Ramp Lesions of the Medial Meniscus. Arthrosc Tech.

Ramp lesions

Treatment options



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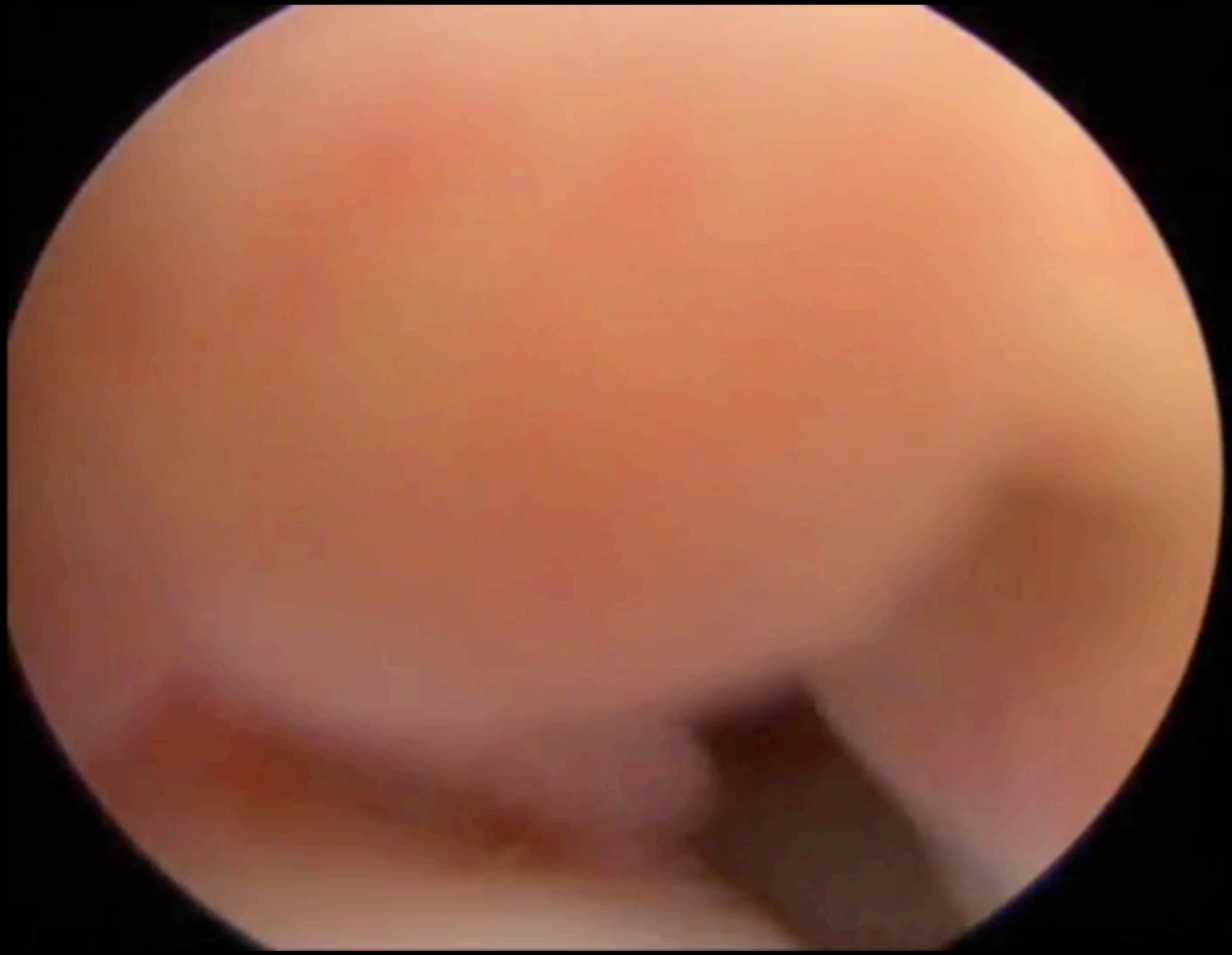
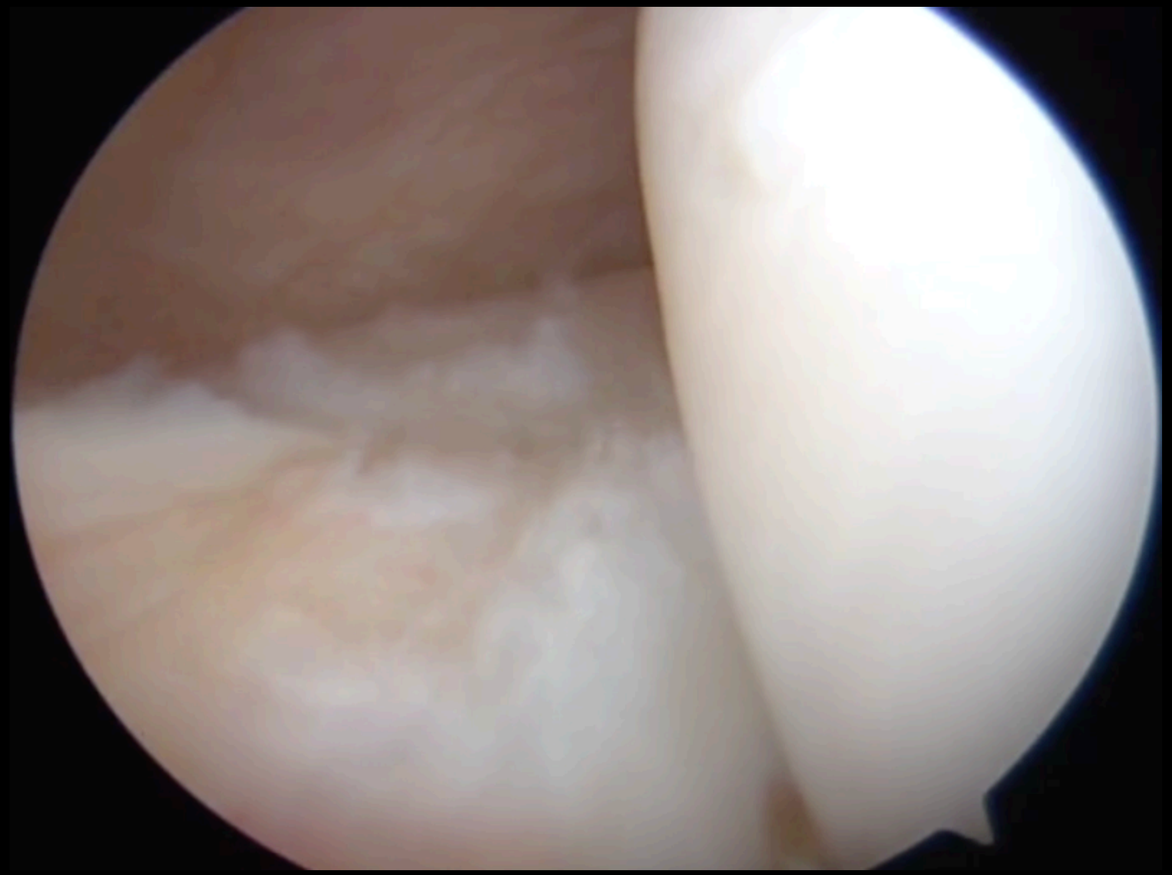




Ramp lesions

Post-operative management

- Controversial
- Brace?
- Weight-bearing or not weight-bearing?
- Flexion more than 90°?
- Time?

Posterior root lesions

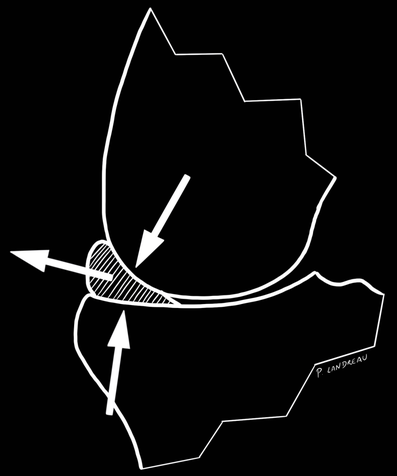
The roots

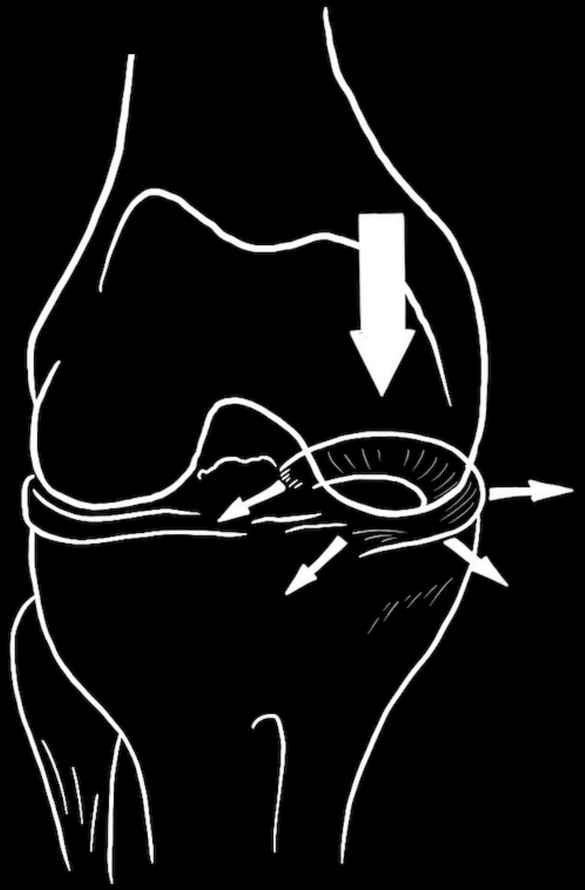
Anatomy

Anchorage

The roots
Biomechanics

- Meniscal roots convert and disperse **axial tibiofemoral loads as hoop stresses**. 50% to 70% of medial and lateral compartment loads absorbed by the meniscus.



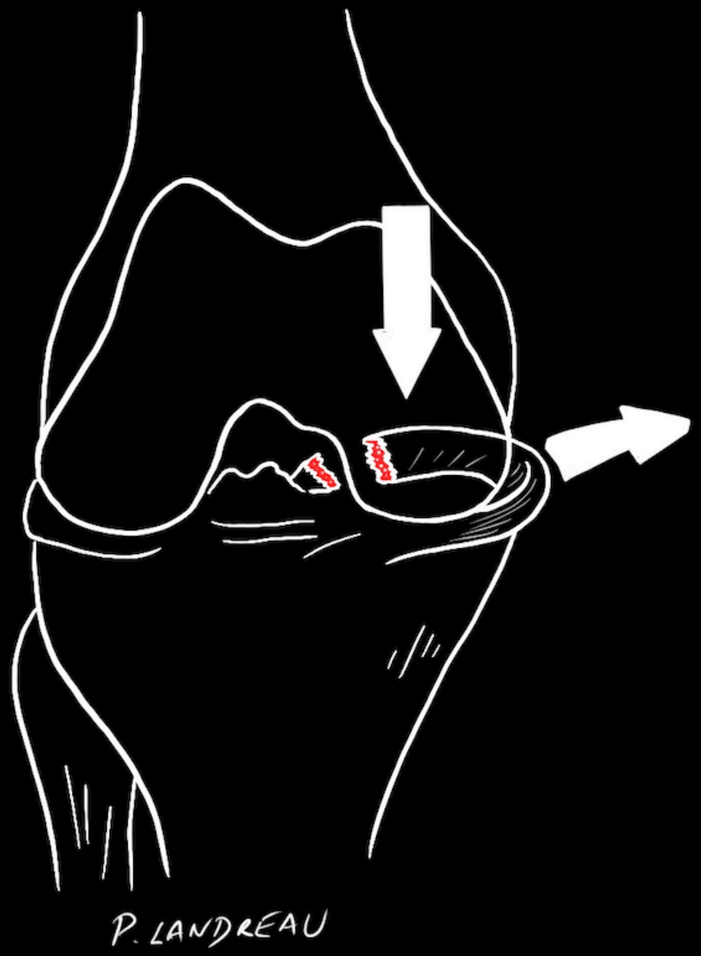


Root tears

Biomechanical effect

- Failure of the meniscus to convert axial loads into hoop stresses.

- “Peak contact pressures after a medial meniscus root tear were similar to that after total medial meniscectomy” (Allaire et al.)



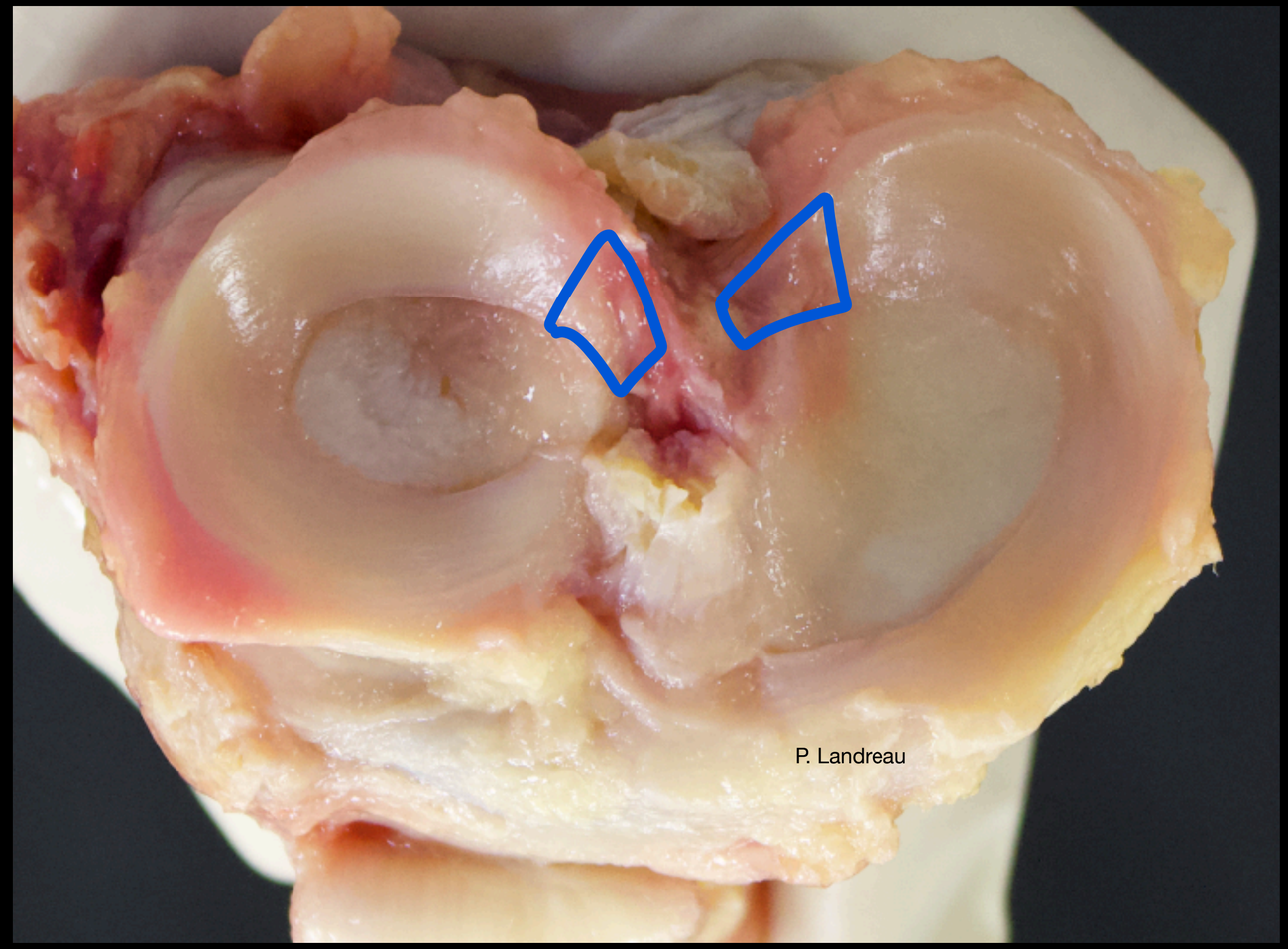
Root tears

Definition

- Radial tears within 1 cm of the meniscal root insertion, or an avulsion of the insertion of the meniscus.

Prevalence
7% to 9%

First description in 1991: Pagnani et al.

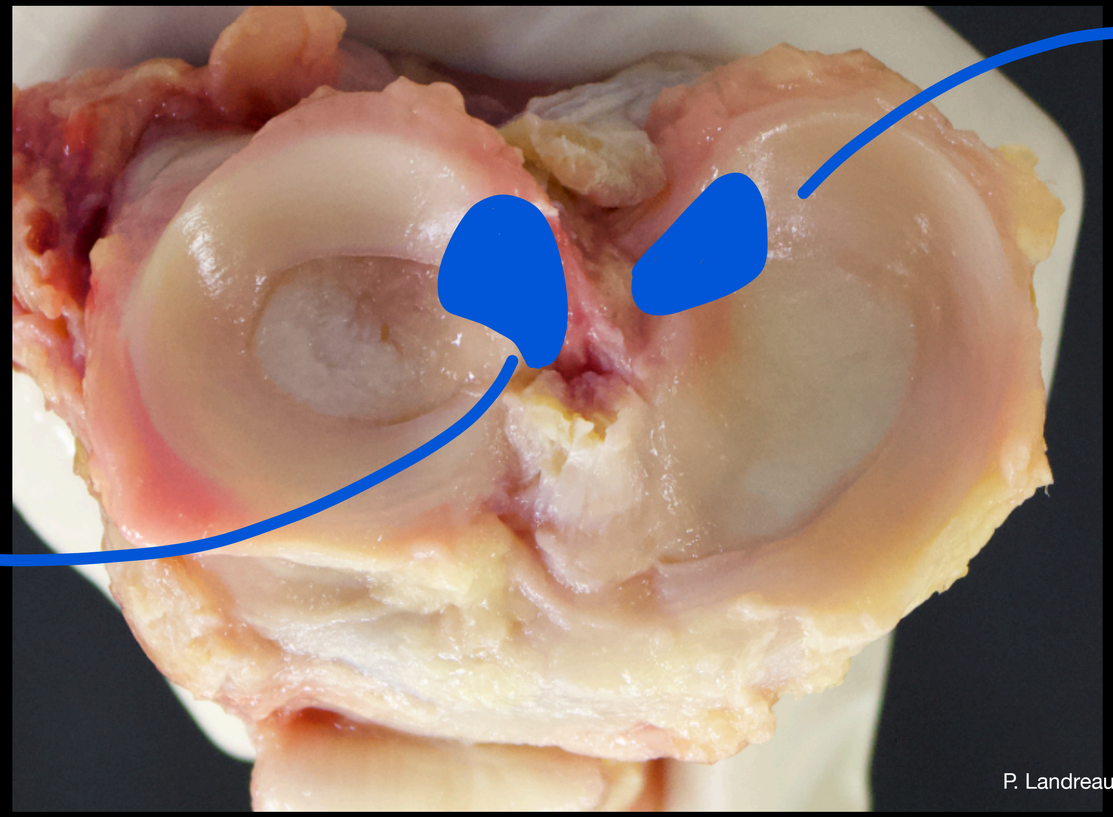


Root tears
Epidemiology

Shen et al. De Smet et al. Hwang et al.

Posterior root tears prevalence (identified during knee arthroscopy):
7% to 9% overall, 2/3 located medially and 1/3 located laterally.

- **Lateral posterior**
- Concomitant to **ACL** tear
- Acute
- Young population



- **Medial posterior**
- Context of **degenerative**
- Chronic
- Senior

Root tears

Clinical Assessment

Traumatic

Context of ACL or multiligament injuries

Non traumatic

Context of degenerative knee

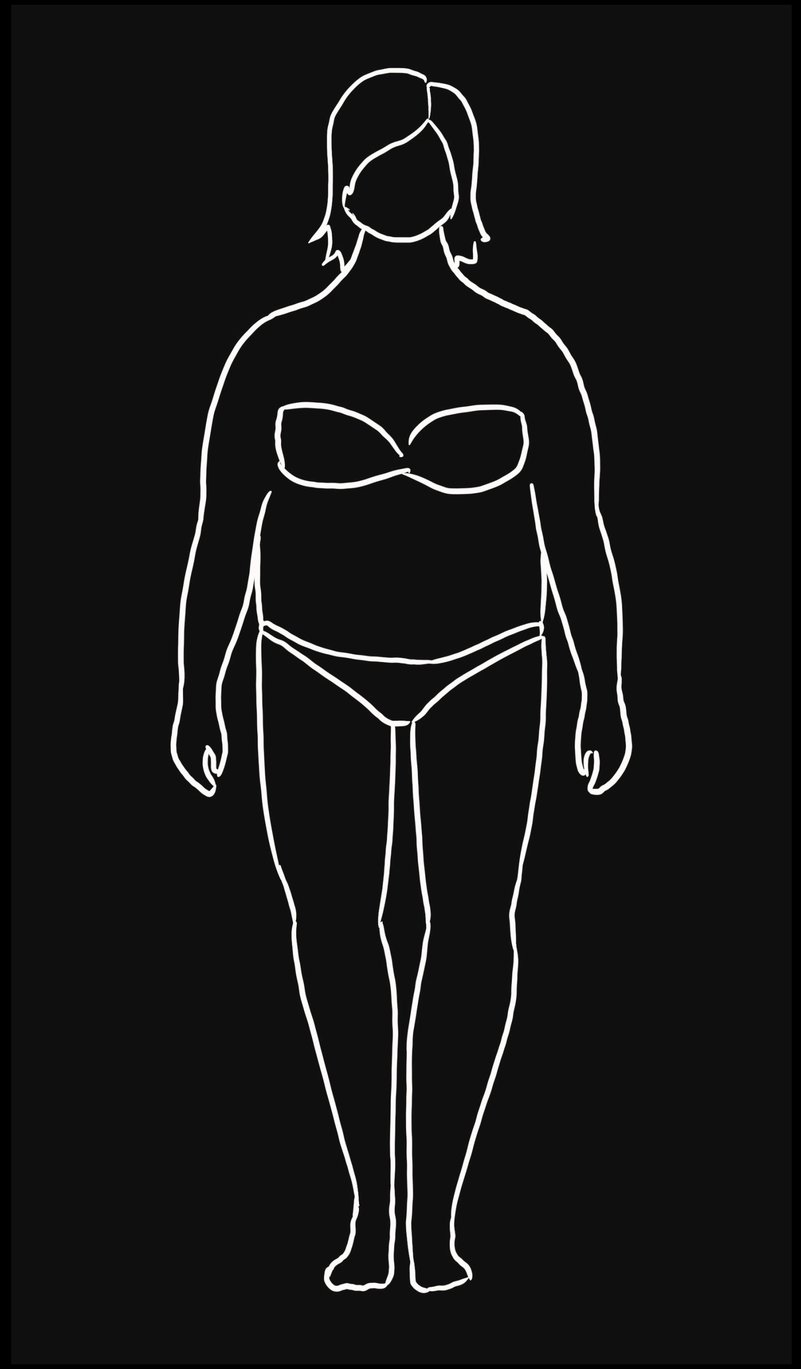
Posterior knee pain, pain in full knee flexion

Popping sound

Degenerative Root tears

Clinical Assessment

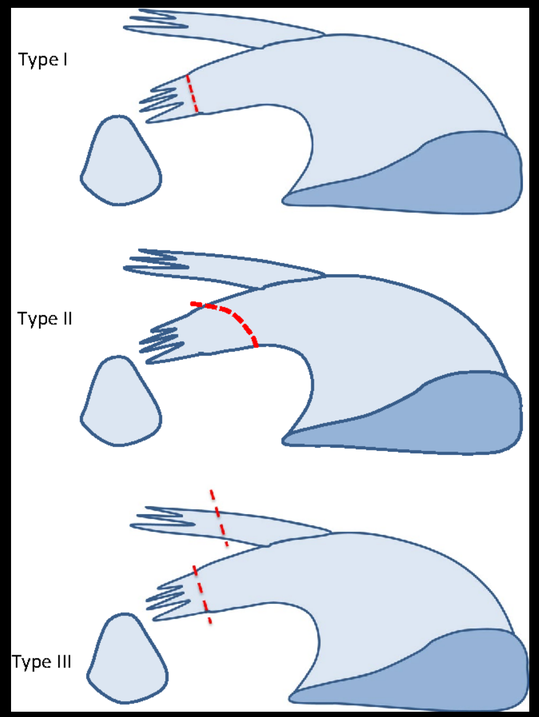
- High degree of clinical suspicion
- Risk factors:
  - older age
  - female sex,
  - increased body mass index (BMI),
  - varus malalignment
  - and increased Kellgren-Lawrence grade



Root tears
Clinical Assessment

- Symptoms are not really specific
  - Posterior knee pain, pain in full knee flexion
  - McMurray positive
  - Popping sound
  - Classical catching, locking and giving way seem to be less commun for root tears.

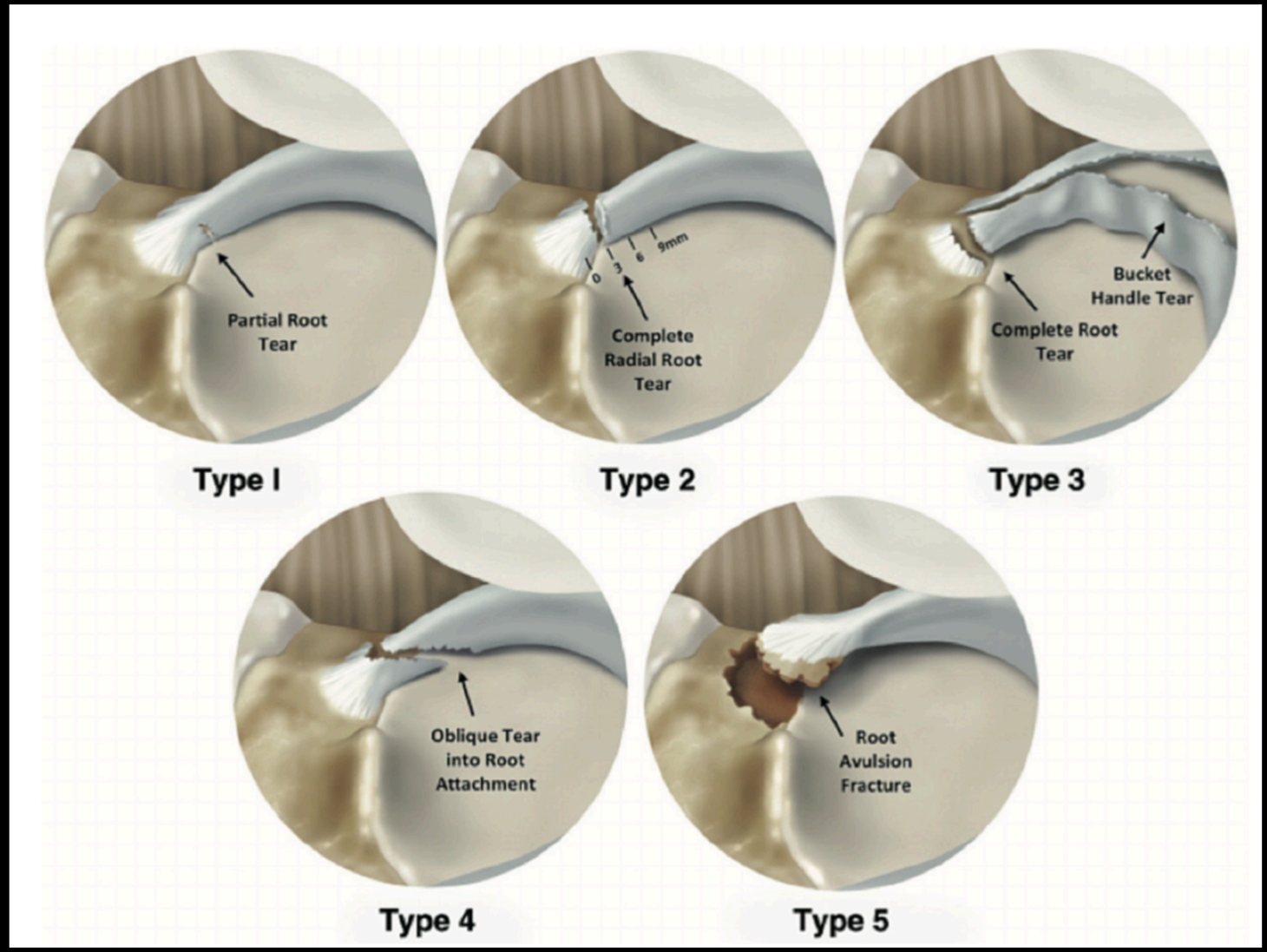
Root tears
Classification



Lateral meniscus

Forkel and Petersen

Laprade et al.



Root tears

Imaging Assessment

- MRI
- Positive predictive value is depending on experience of radiologist and physician in general.

Mainly for medial meniscus

Meniscus extrusion on Coronal
High signal on Axial
Ghost sign in Sagittal

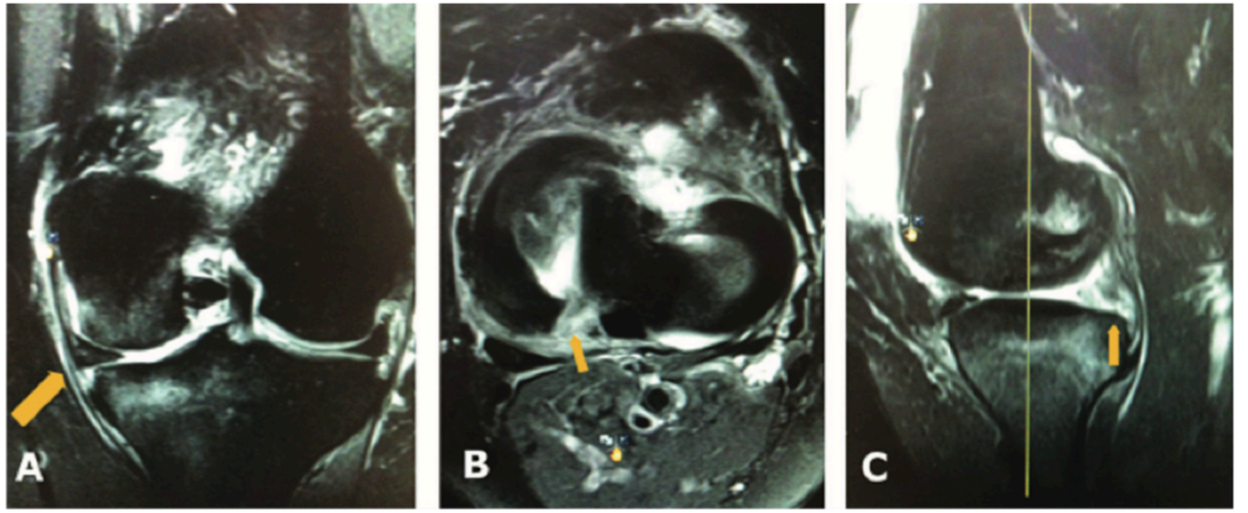
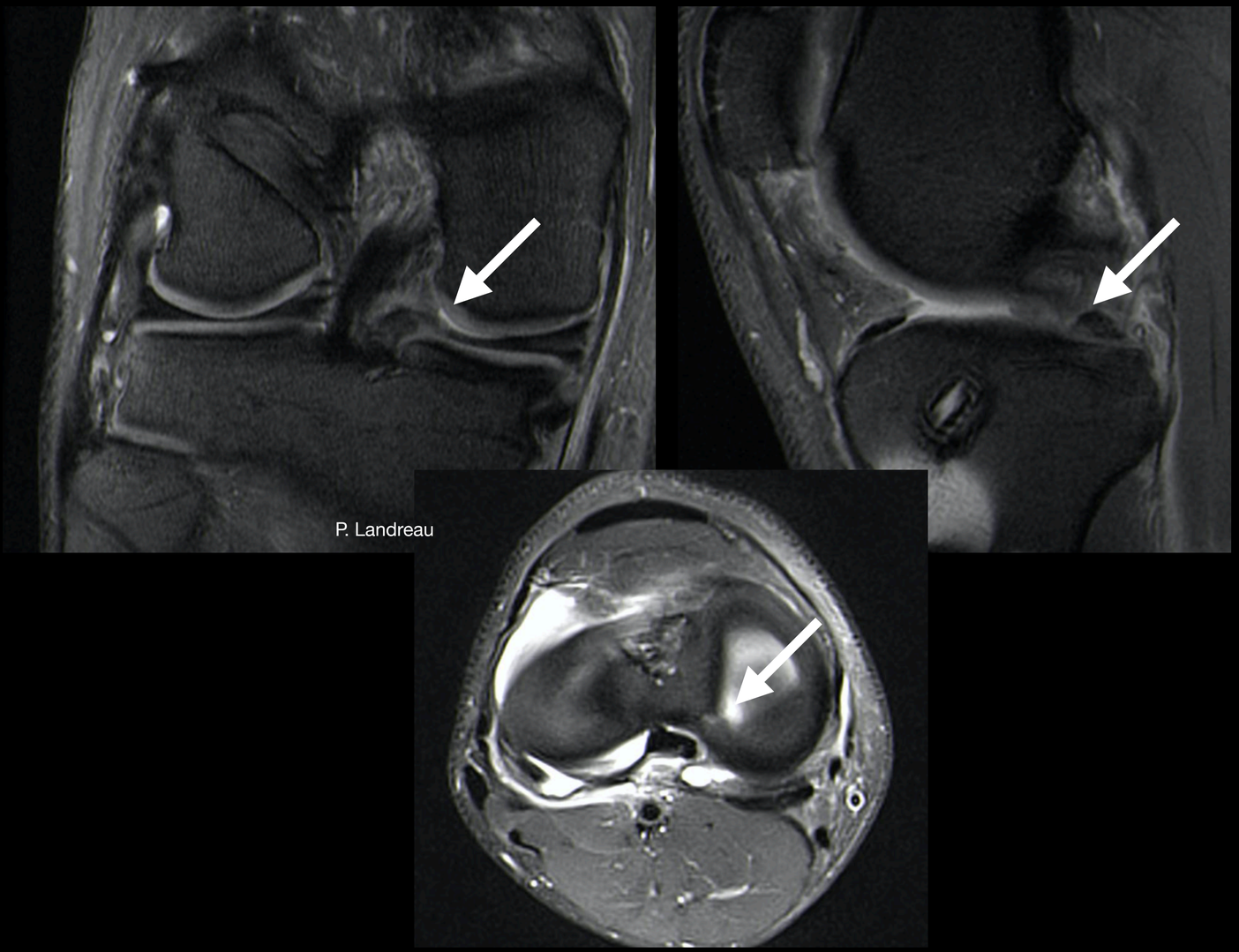


Figure 5. Visualization of meniscal root tears via magnetic resonance imaging. A. Coronal T2-weighted section demonstrating medial meniscal extrusion (arrow) (left knee). B. Axial image demonstrating high signal in region of meniscus root and posterior horn with a radial root tear (arrow) (right knee). C. Sagittal image demonstrating ghost sign (arrow) (right knee). Reprinted with permission from Bhatia et al. (2014).

Bhatia S, LaPrade C M, Ellman M B, LaPrade R F. Menis- cal root tears: significance, diagnosis, and treatment. Am J Sports Med 2014; 42 (12): 3016-30.

Root tears

Imaging Assessment



Sensitivity of only 82% and 60%
Laprade et al. 2015

Root tears

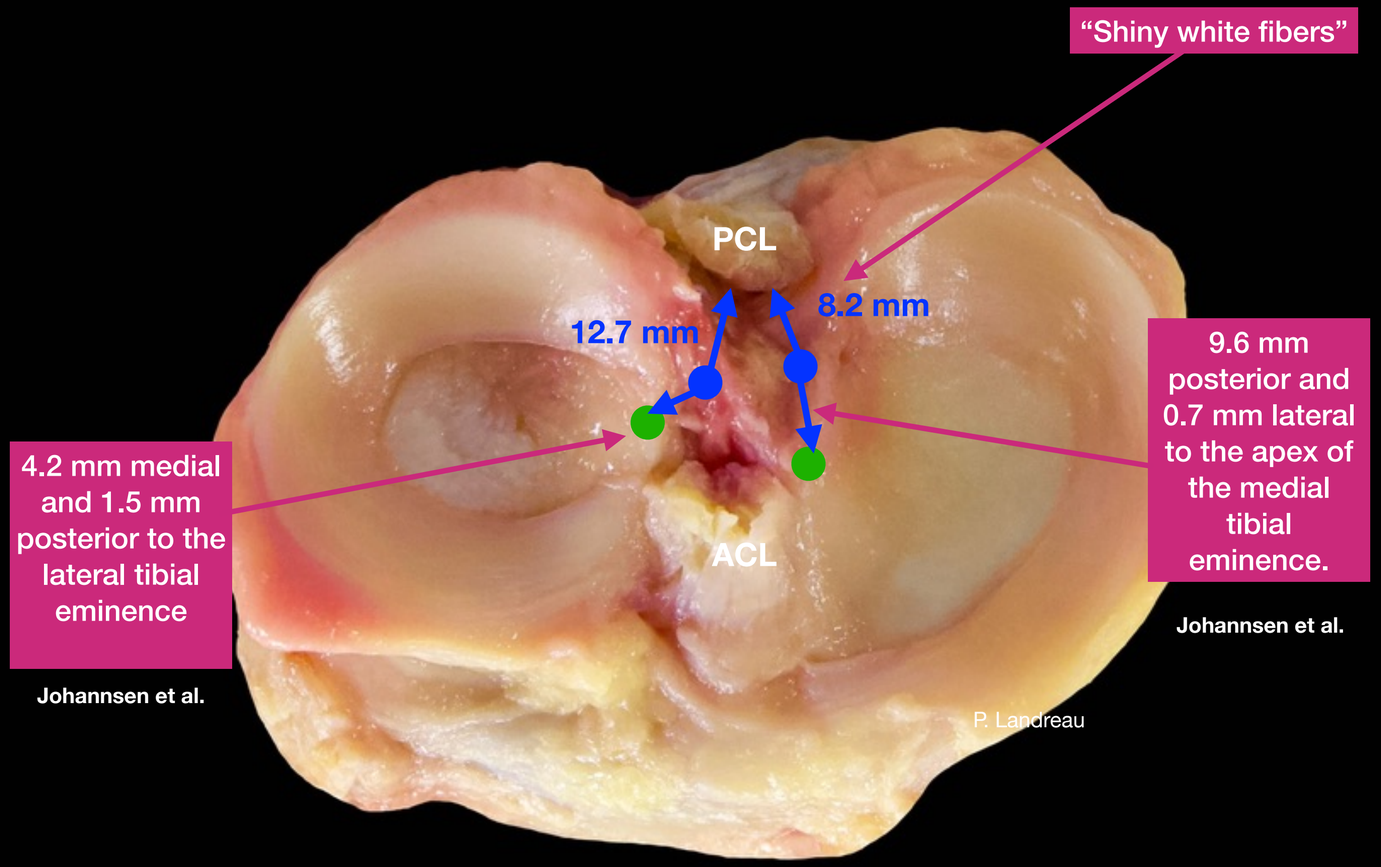
Treatment

- Non-operative treatment: elderly, context of advanced osteoarthritis
- Meniscectomy: partial tear, osteoarthritis with looking episodes
- Repair for young patients with “healthy knee”

Consider BMI and malalignment

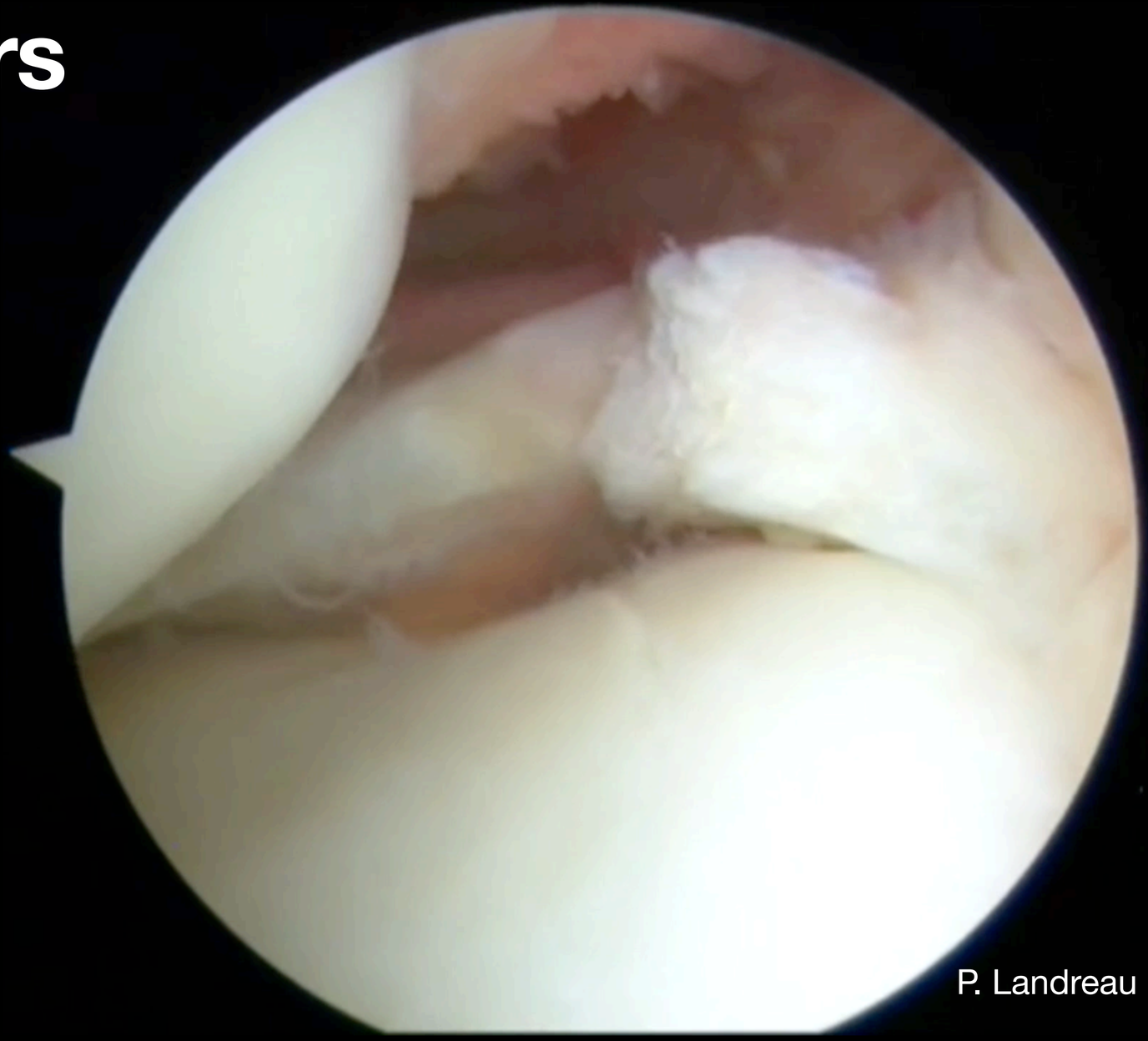
Root tears

Treatment



Root tears

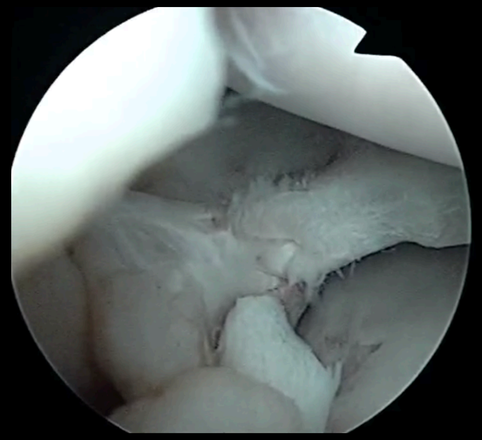
Direct repair

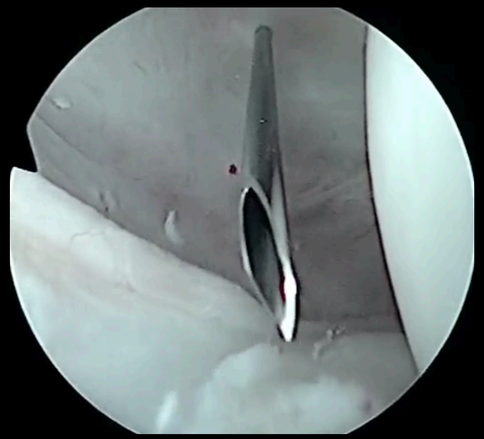


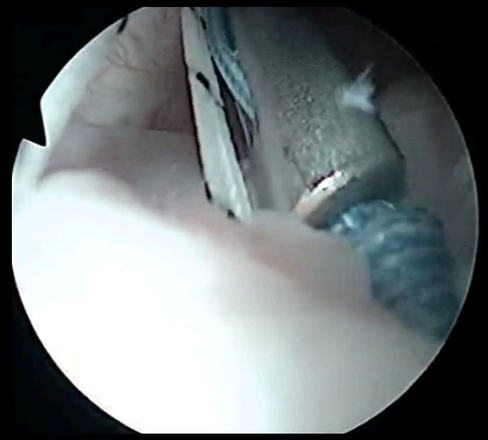
P. Landreau

Root tears

Anchor







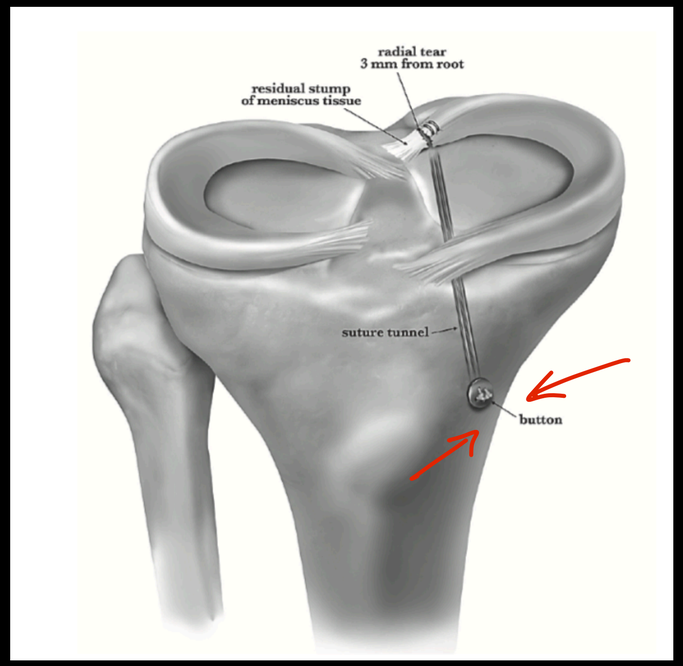
Posteromedial portal

Curved instruments are helpful

For medial meniscus

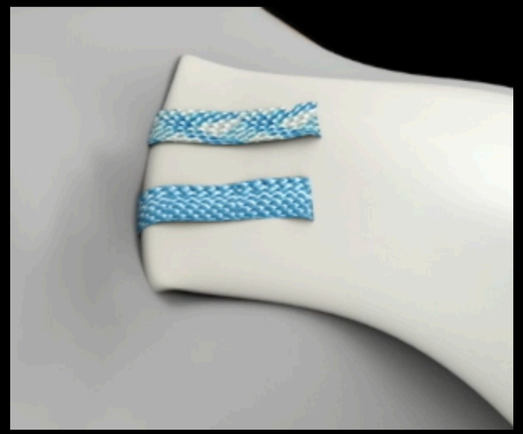
B. Poberaj. Vumedi

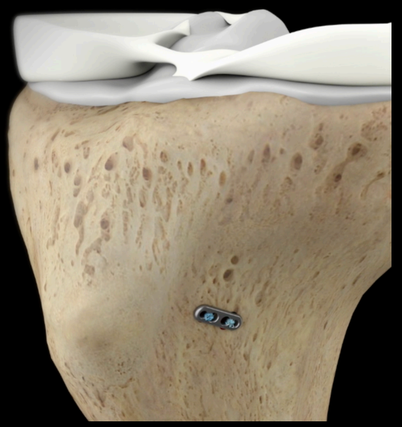
Root tears
Tibial Tunnel



Padalecki et al

Single or double tunnel

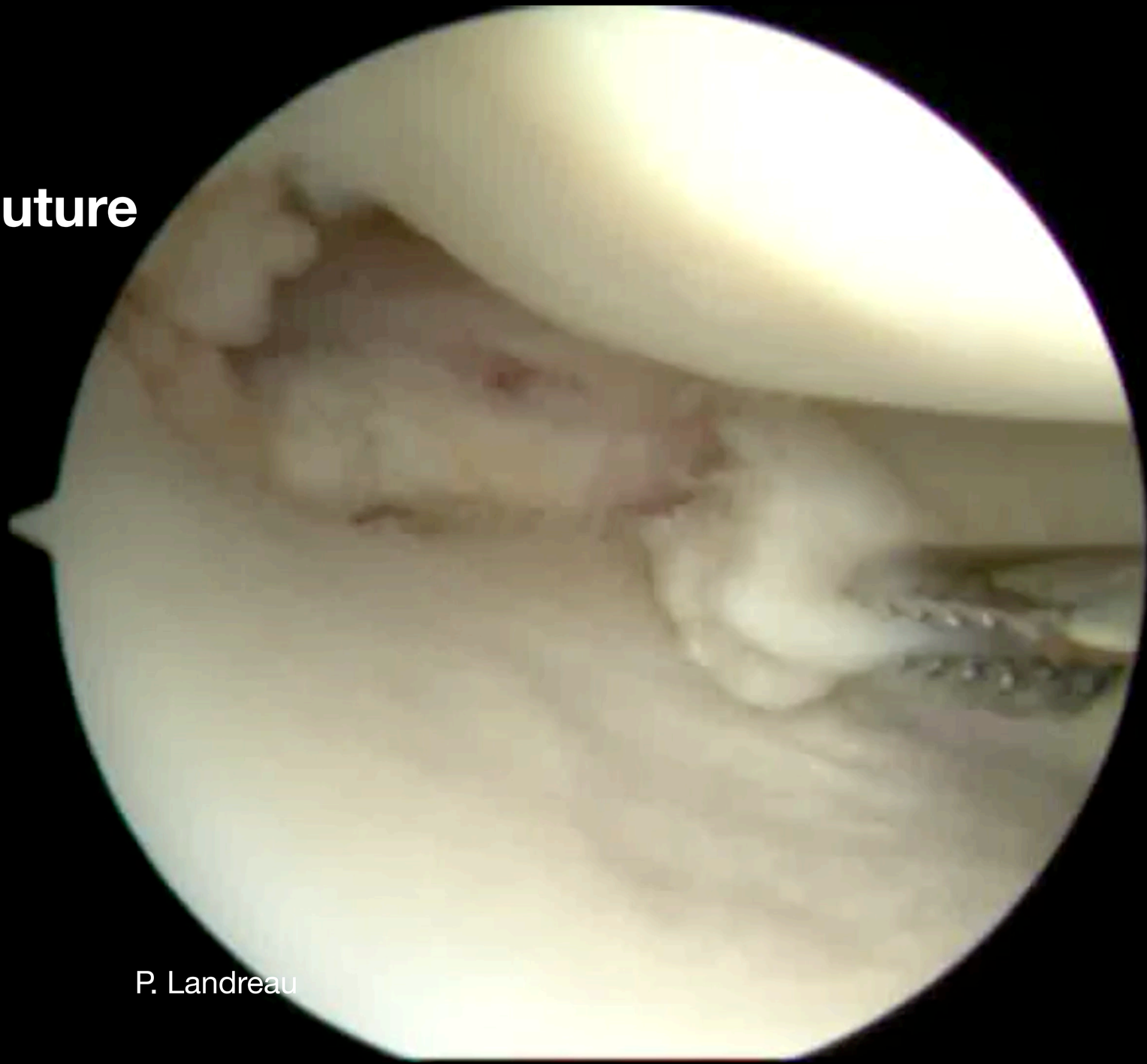




Low profile instruments
Pie-crusting can be helpful on medial

Root tears

One tunnel + all-inside suture

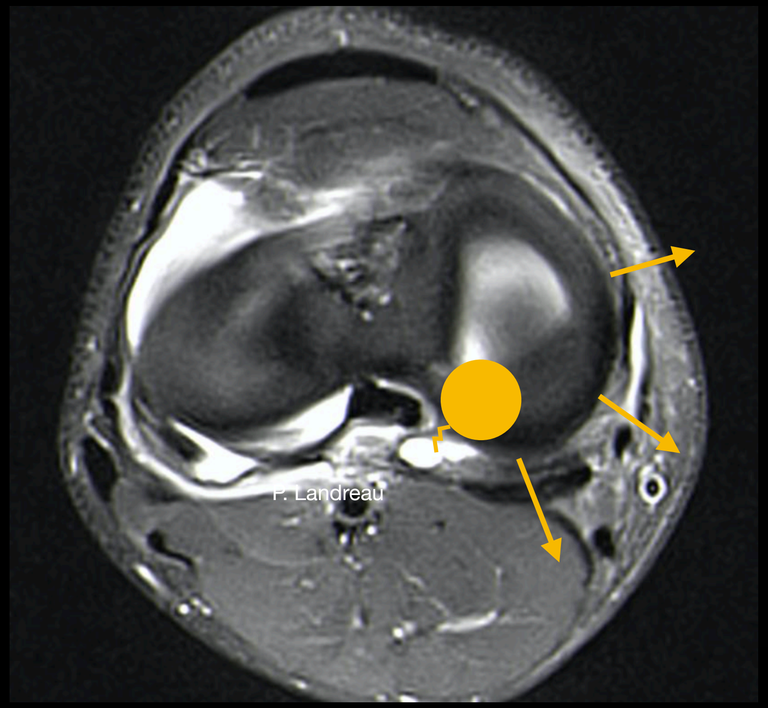


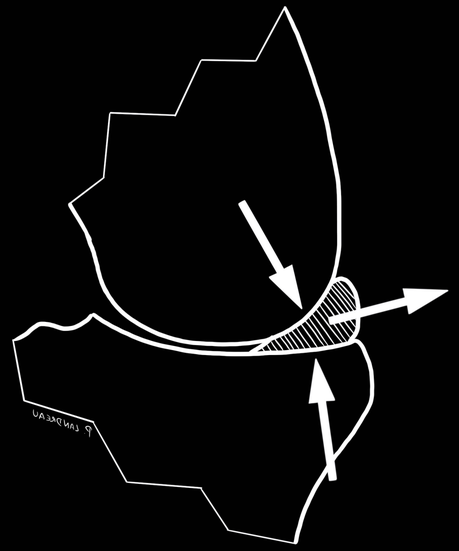
P. Landreau

Root tears

Post-operative Management

- Controversial





Non weight bearing: 4 to 6 weeks
Flexion limited to 90°: 2 to 6 weeks
Legs press and squats limited initially
Return to sport usually after 6 months

Root tears

Evidence

Allaire R, Muriuki M, Gilbertson L, Harner C D. Biomechanical consequences of a tear of the posterior root of the medial meniscus. Similar to total meniscectomy. J Bone Joint Surg Am 2008; 90 (9): 1922-31

- **The natural history of meniscal root tears is particularly poor**: Up to 28% of patients undergoing total knee arthroplasty (TKA) at a mean of 3.2 years after initial diagnosis
- **Repair of medial meniscus root tears**, as compared with total meniscectomy and nonsurgical treatment, leads to **less osteoarthritis**
- **Good clinical results** in 96% of patients
- **But high BMI** is pejorative

Thank you