



Meniscus radial tears: which technique?



Disclosure

1. Royalties from Move Up and SBM
2. Consulting income from Arthrex, Move-Up and SBM



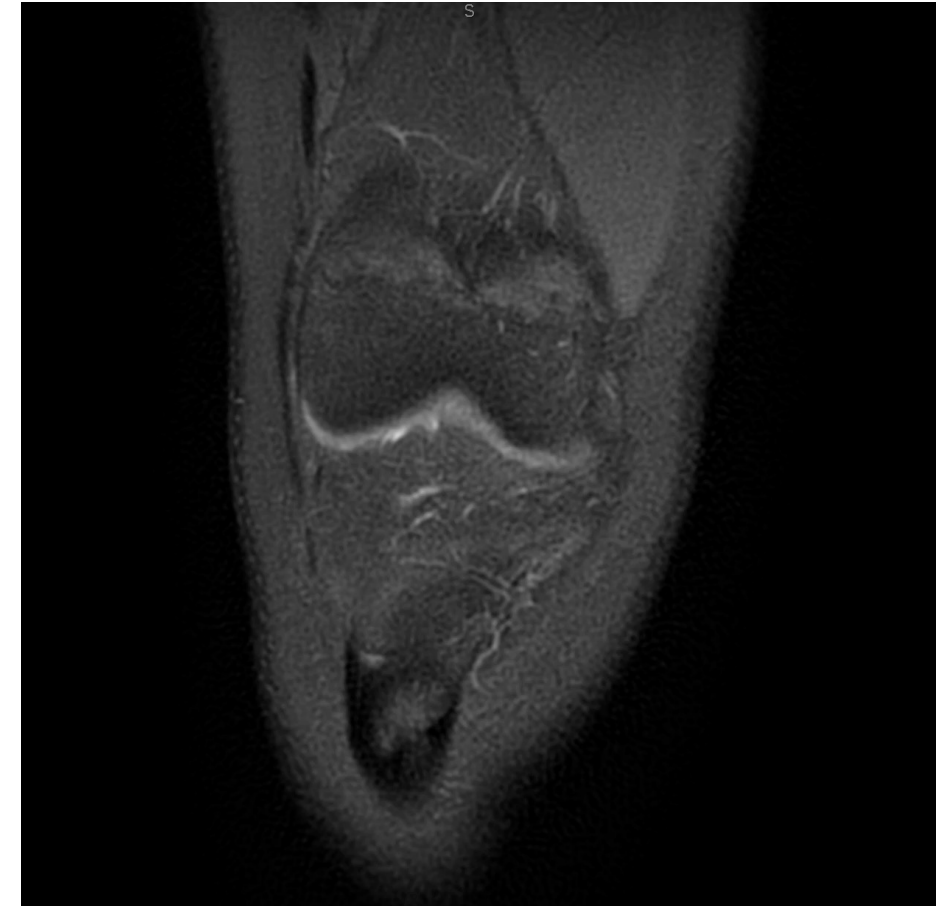
10th

**Advanced Course
on Knee Surgery**

Clinical Case



- Female Judoka 15 y.o. (competition)
- Right knee pain + clicking and locking (“snapping knee sd”) since 3 mo.
- limping
- Clinical exam: H+ , lateral joint pain+++,

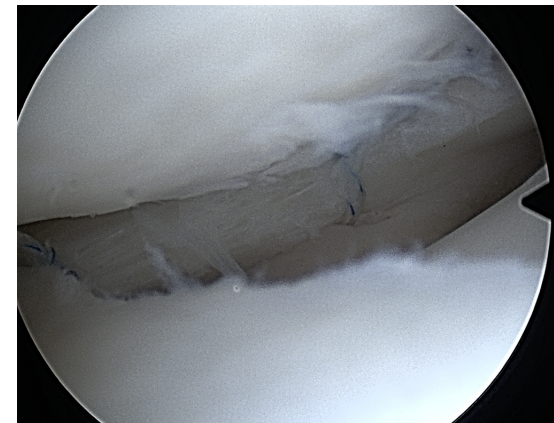
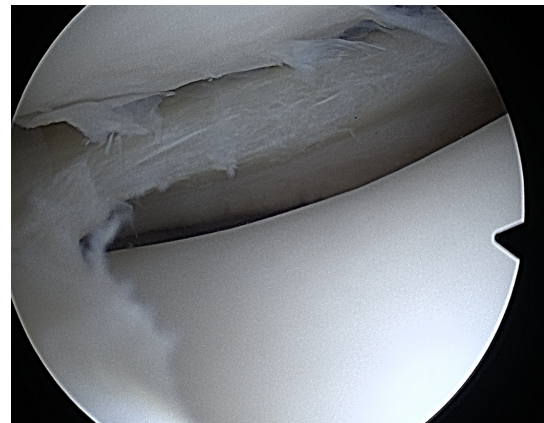
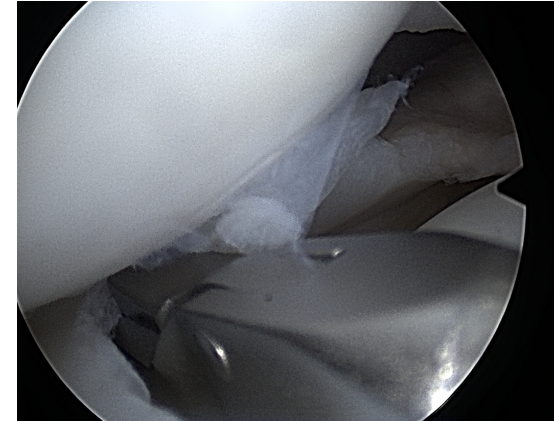
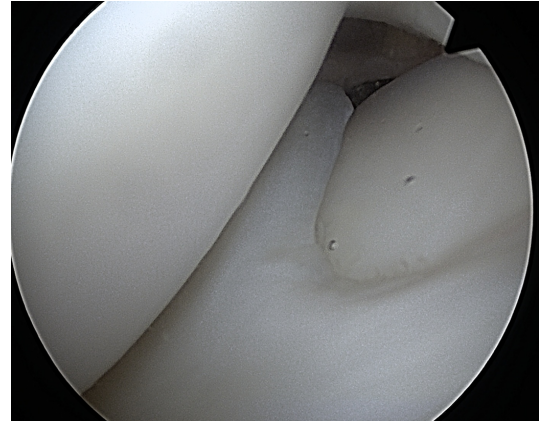


Discoid Lateral Meniscus (DLM)

Clinical Case

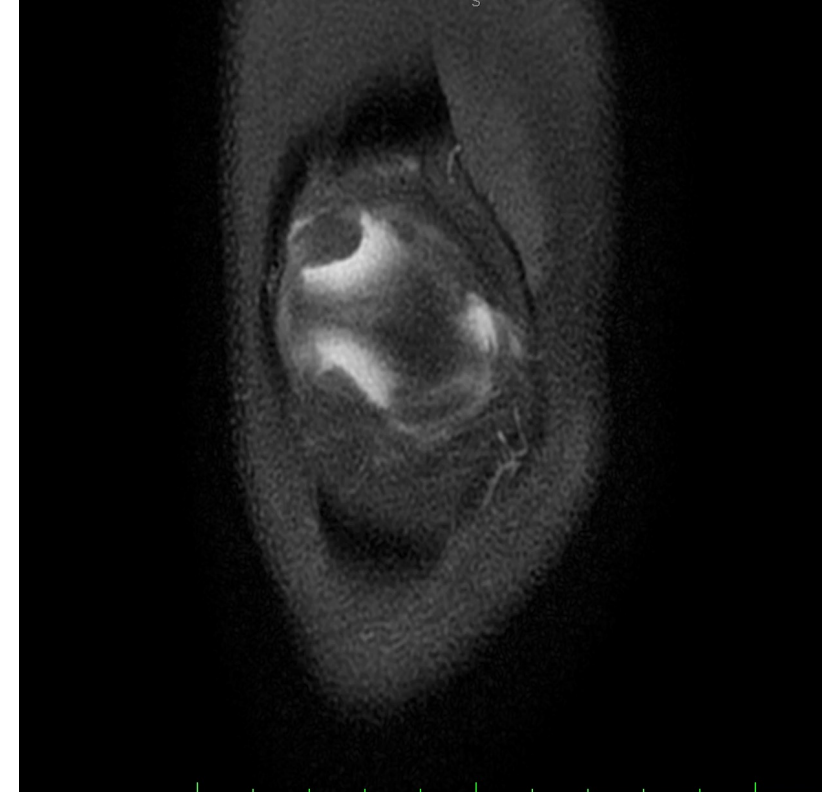
Arthroscopy

- Saucerization
- Repair (2 vertical sutures / fast fix including 1 in the popliteus)



Clinical Case

- Initially OK but pain > 1 month
- No improvement despite the injection
- Lateral joint pain +++



MRI at 5 months postop

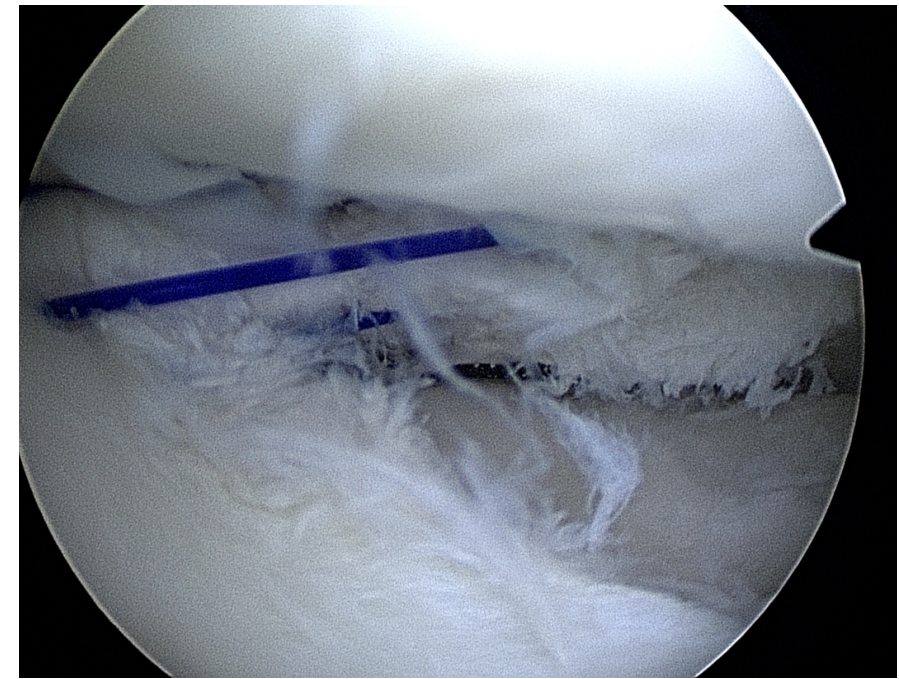
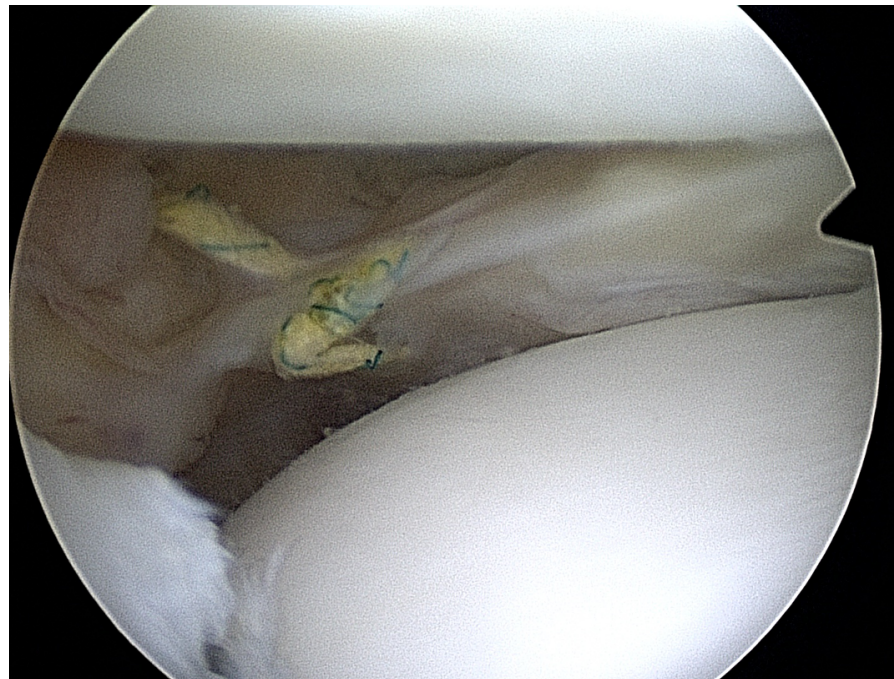
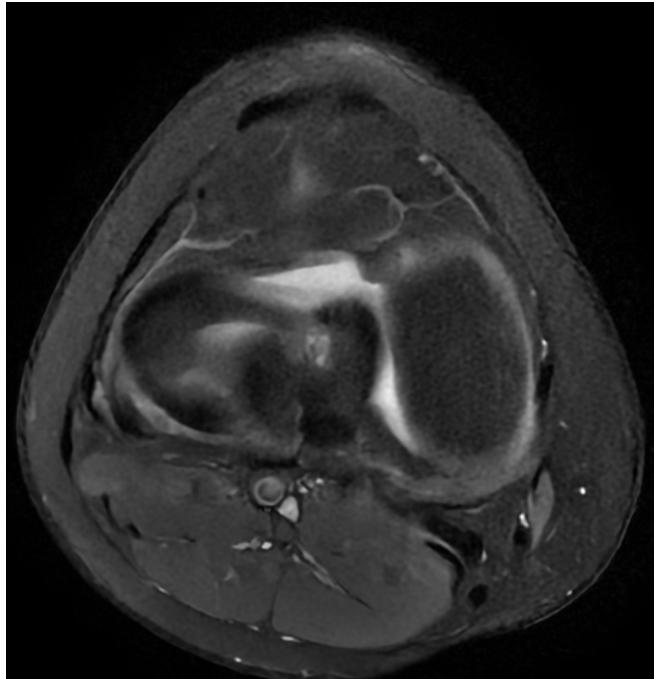
Clinical Case

Revision Arthroscopy

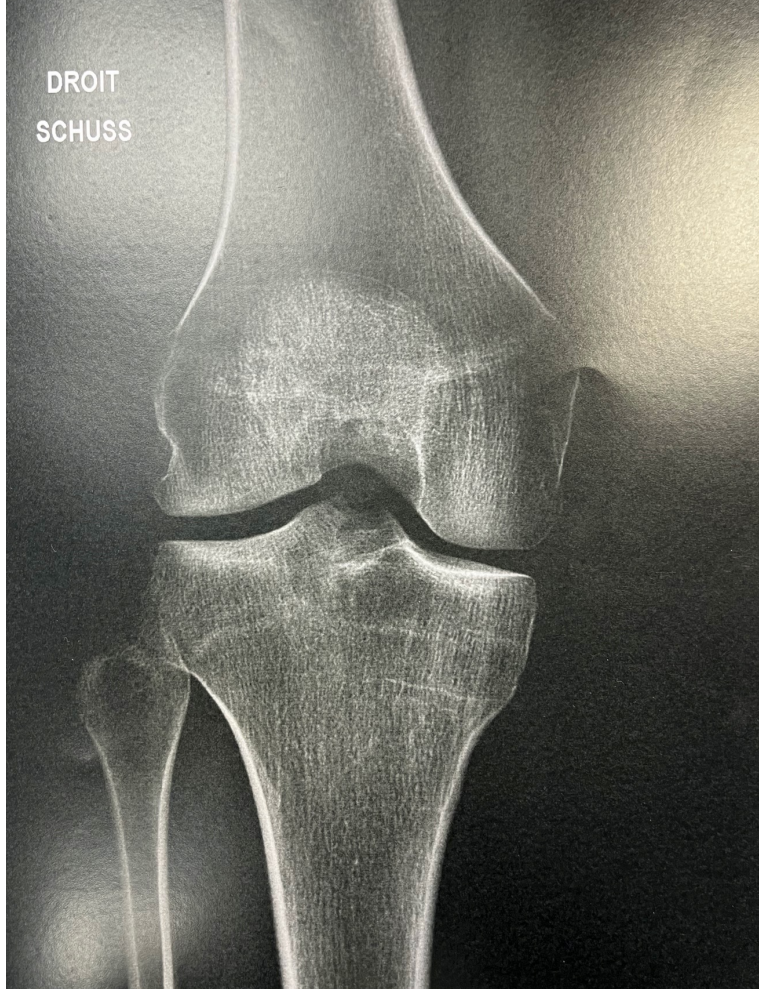
Medial compartment : no lesion

Lateral compartment :
Tibia: chondral lesion stage 2
Femur: chondral lesion stage 1
LM: iatrogenic radial lesion

→ Debridement and meniscal repair with 2 horizontal PDS0 stitches (Out-In)



Clinical Case

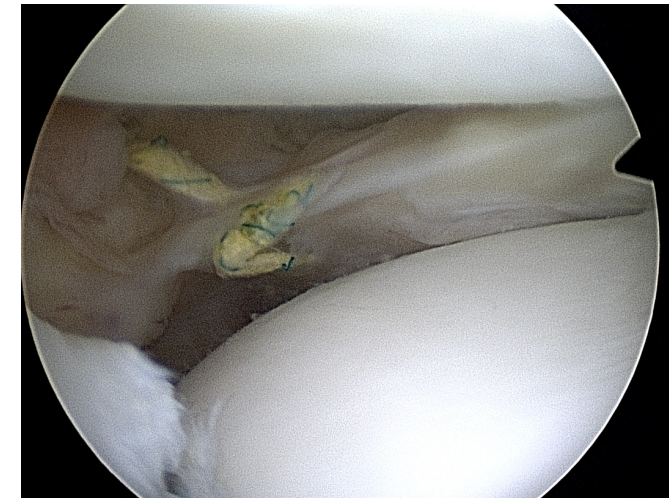
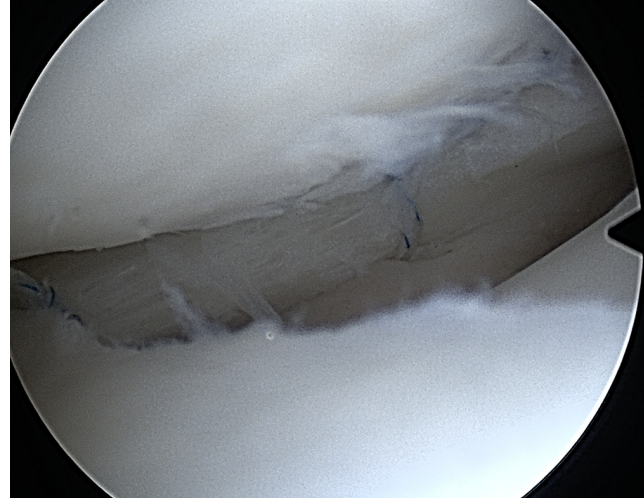


2y FU

	IKDC	ACI RSI	Lysholm	KOOS	F-AKPS
D0	16.1	17.5	14	23.2	22
M24	90.8	25.8	89	88.7	91

What happened ?

- Overestimation of DLM tissue quality¹
- Excessive meniscectomy²
- Too rigid fixation method³
- Failure due to fixation on the popliteus⁴

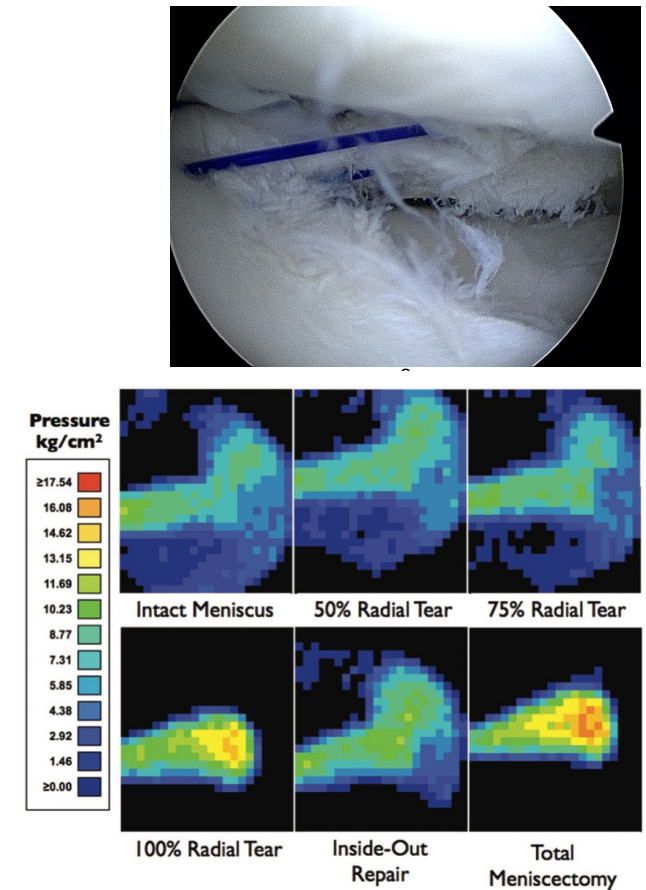


1. Diagnosis and Treatment of Discoid Meniscus [J-G Kim *et al.* Knee Surg Relat Res 2016](#)
2. Long-Term Results of Arthroscopic Reshaping for Symptomatic Discoid Lateral Meniscus in Children [J.H. Ahn *et al.* Arthroscopy 2015](#)
3. Increased Construct Stiffness With Meniscal Repair Sutures and Devices Increases the Risk of Cheese-Wiring During Biomechanical Load-to-Failure Testing [S. Müller *et al.* OJSM 2021](#)
4. Le tendon du poplité constitue-t-il un point d'ancrage suffisant pour les sutures du ménisque lateral? [A. Séguineau *et al.* SFA 2021](#)



Can we restore the contact pressure & area¹?

- A complete radial meniscal tear of the lateral meniscus has a detrimental effect on load transmission
- Repair of a complete radial tear using an all-inside or inside-out construct did improve the time zero biomechanical contact pressure profile but did not return the contact area to the intact state

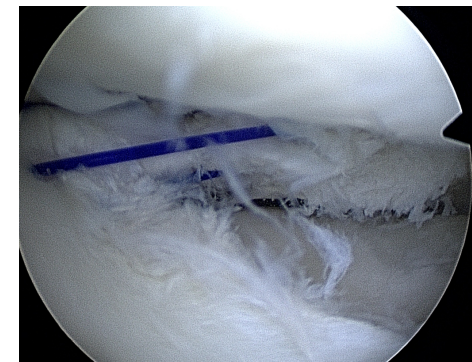


1. Effects of Serial Sectioning and Repair of Radial Tears in the Lateral Meniscus [G. E. Ode et al. AJSM 2012](#)



Does it heal ?

Factor	Complete Healing Rate		Partial Healing Rate		Failure Rate	
	Pooled Rate (95% CI)	I^2 , %	Pooled Rate (95% CI)	I^2 , %	Pooled Rate (95% CI)	I^2 , %
Type of tear						
Bucket-handle	76 (68-83)	23	7 (3-16)	29	16 (11-21)	0
Vertical	78 (67-86)	84	10 (5-19)	83	10 (6-16)	74
Radial	64 (35-86)	75	28 (19-39)	0	13 (4-32)	50
Horizontal ^d	73 (39-94)	NA	18 (2-52)	NA	9 (0-41)	NA
Complex ^e	70 (55-83)	NA	21 (11-36)	NA	9 (2-20)	NA



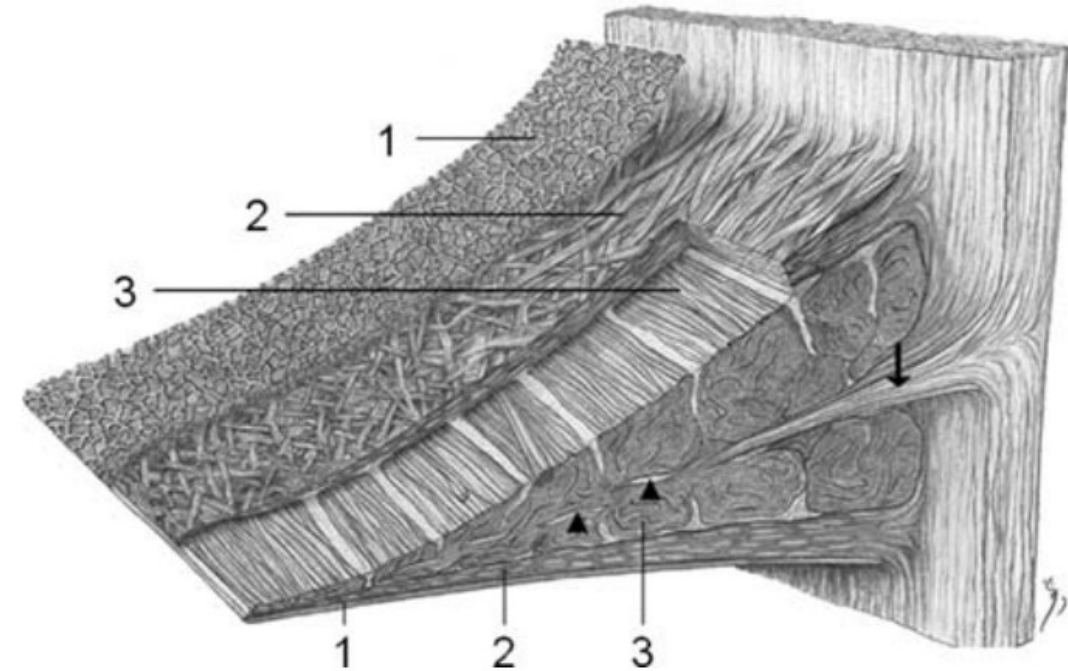
1. Second-Look Arthroscopic Evaluation of Healing Rates After Arthroscopic Repair of Meniscal Tears. A Systematic Review and Meta-analysis
[W. Dai et al. OJSM 2021](#)



10th

**Advanced Course
on Knee Surgery**

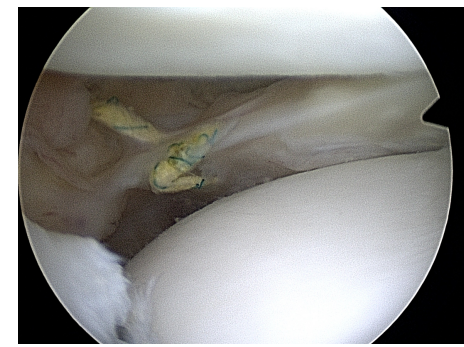
- Normal: dense framework of predominantly circumferentially orientated collagen fibres with fewer radially aligned fibres, which are believed to mainly function by 'tying' the circumferential fibres together¹
- Discoid: significant disorganization of the circular collagen network and a heterogeneous course of the circumferentially arranged collagen fibers²



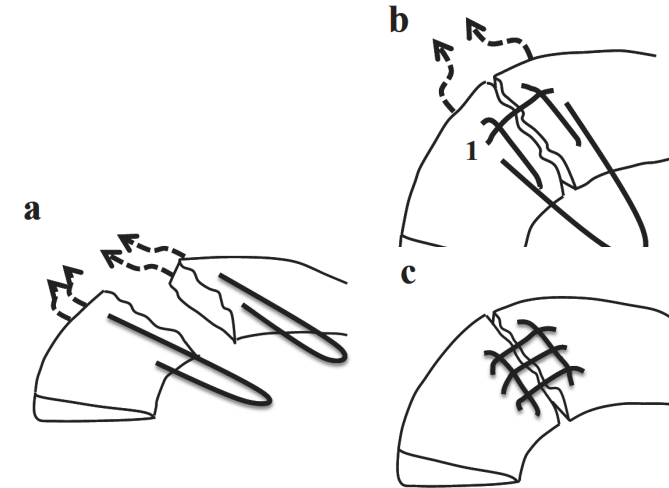
1. Biomechanics of the meniscus-meniscal ligament construct of the knee [D. Masouros et al. KSSTA 2088](#)
2. Diagnosis and Treatment of Discoid Meniscus [J-G Kim et al. Knee Surg Relat Res 2016](#)



How to avoid this problem?



- Respect at least 6-8 mm of LM¹
- Avoid suturing « the entire LM »²
- Laterally : PDS (Out-in) less rigid is optimal³
- In case of radial tears: « Tie Grip »⁴

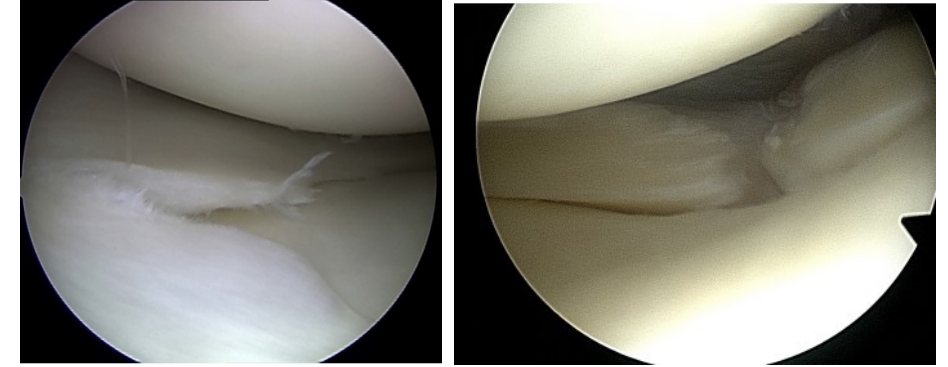


1. Diagnosis and Treatment of Discoid Meniscus [J-G Kim et al. Knee Surg Relat Res 2016](#)
2. Meniscal repair: Technique [Beaufils P et Pujol N. OTSR 202017](#)
3. Increased Construct Stiffness With Meniscal Repair Sutures and Devices Increases the Risk of Cheese-Wiring During Biomechanical Load-to-Failure Testing [S. Müller et al. OJSM 2021](#)
4. Second Look Arthroscopic Evaluation of Repaired Radial/Oblique Tears of the Midbody of the Lateral Meniscus in Stable Knees [Akira T et al. Journal of Orthopaedic Science 2018](#)



Radial tears¹

- Numerous types
- Poor prognosis → early accelerated knee OA
- Perpendicular to the meniscal axis → significant loss of function → increased contact pressure → greater degree of cartilage damage + meniscal extrusion
- Cleavage tears arising from the central region (white-white) to the periphery (red-red)
- Partial-thickness or full-thickness tears



1. Meniscus Radial Tears: Current Concepts on Management and Repair Techniques [E. S. Mameriet al.](#) **Current Reviews in Musculoskeletal Medicine 2023**



10th

**Advanced Course
on Knee Surgery**

Surgical indications¹

Indications

- No clearly defined
- The feasibility of meniscus repair depends on
 - specific combination of tear patterns
 - location and healing potential

Contraindications

- Grade III and IV OA
- BMI >35 kg/m²
- Untreated ligamentous knee instability
- Tibiofemoral malalignment

1. Meniscus Radial Tears: Current Concepts on Management and Repair Techniques [E. S. Mameriet al.](#) **Current Reviews in Musculoskeletal Medicine 2023**

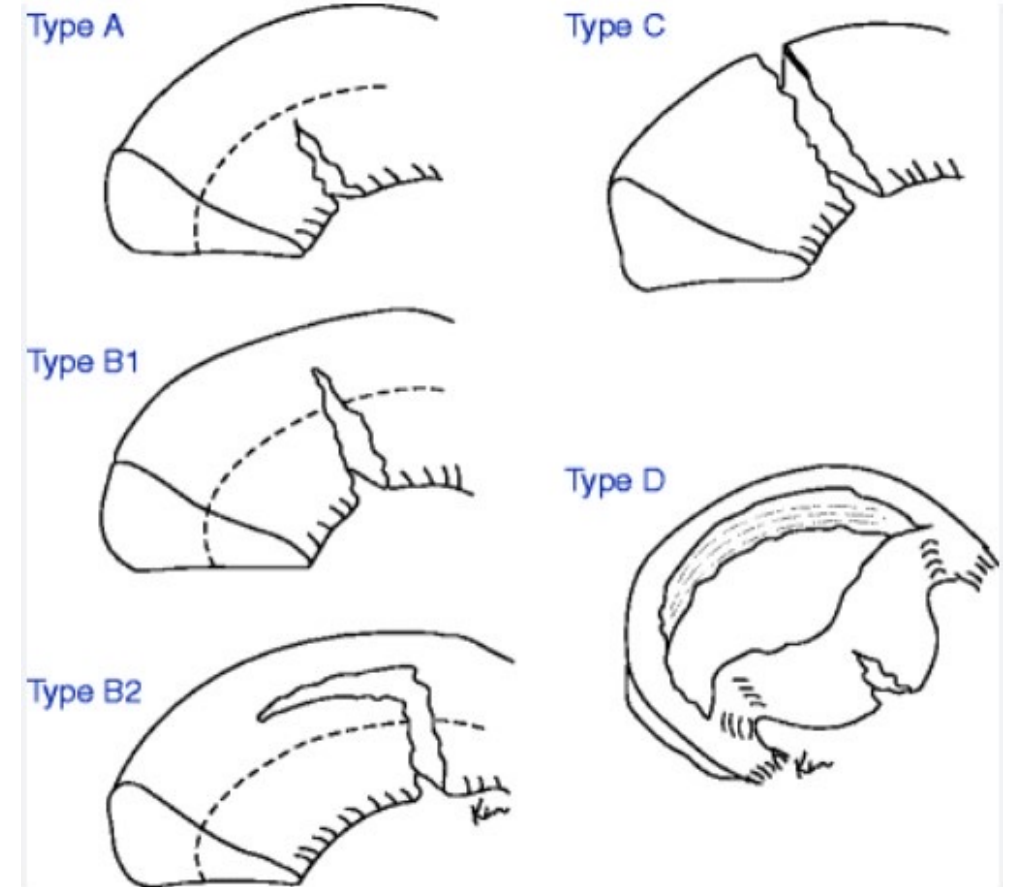


10th

**Advanced Course
on Knee Surgery**

classification¹

- Type A: Radial split less than 50% of the width of the peripheral rim
- Type B: Tears extended to more than 50%
- type B1: a simple radial split tear
- type B2: a fap tear including a radial tear.
- Type C: Complete radial split tear, which extended to the peripheral rim.
- Type D: Bucket-handle tears including a radial tear component

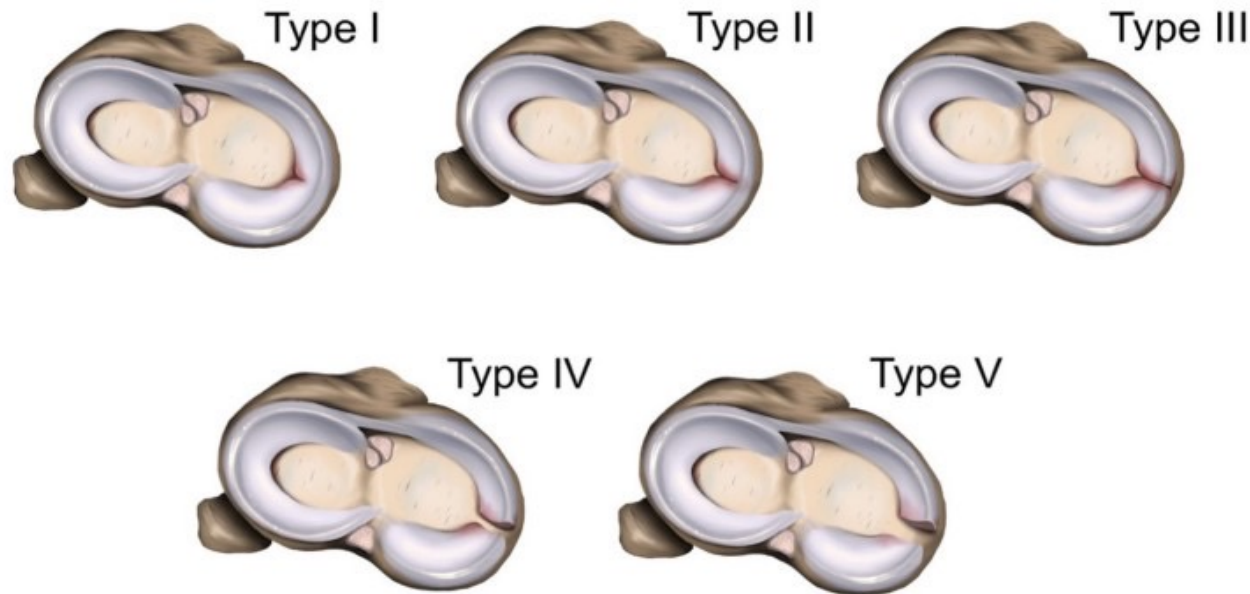


1. New Technique of Arthroscopic Meniscus Repair in Radial Tears [K. Nakata. et al. Sports Injuries 2012](#)



Classification based on tear morphology¹

I	Partial radial tear extending to the white-white zone
II	Partial radial tear extending to the red-white zone
III	Complete radial tear with no gapping
IV	Complete radial tear with ≤ 3 mm of gapping
V	Complete radial tear with >3 mm of gapping

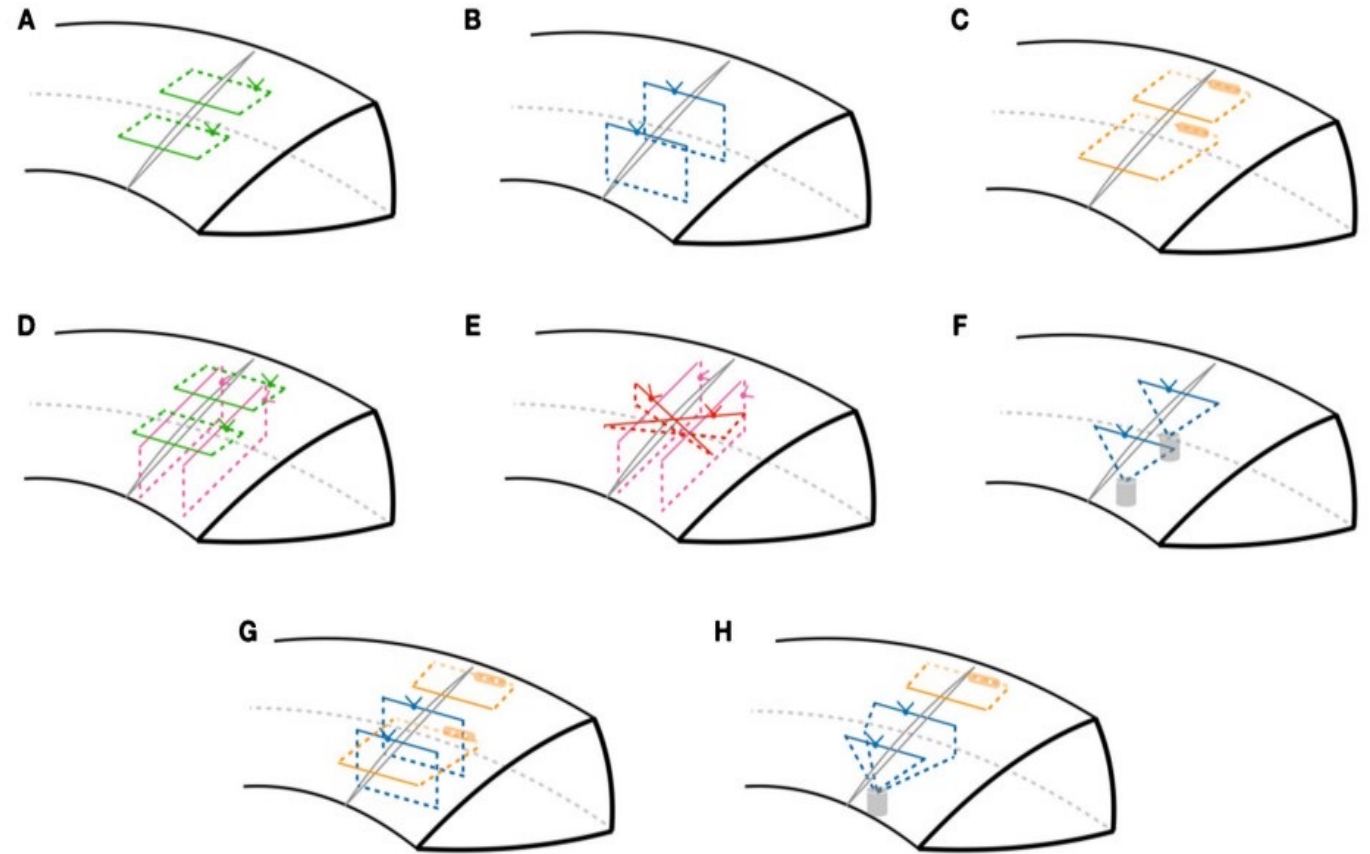


1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J Chahla](#) *et al.* **Arthroscopy Techniques** 2023



Techniques¹

- A: Horizontal inside-out
- B: suture-based all-inside double vertical repair
- C: anchor-based all-inside horizontal repair
- D: “hash-tag” inside-out horizontal + vertical “rip-stop”
- E: “cross-tag” or all-inside figure of eight “rip-stop”
- F: Two-tunnel transtibial pullout repair
- G: Hybrid double vertical + anchor-based
- H: hybrid double-vertical + transtibial



1. Meniscus Radial Tears: Current Concepts on Management and Repair Techniques [E. S. Mameriet al.](#) **Current Reviews in Musculoskeletal Medicine 2023**



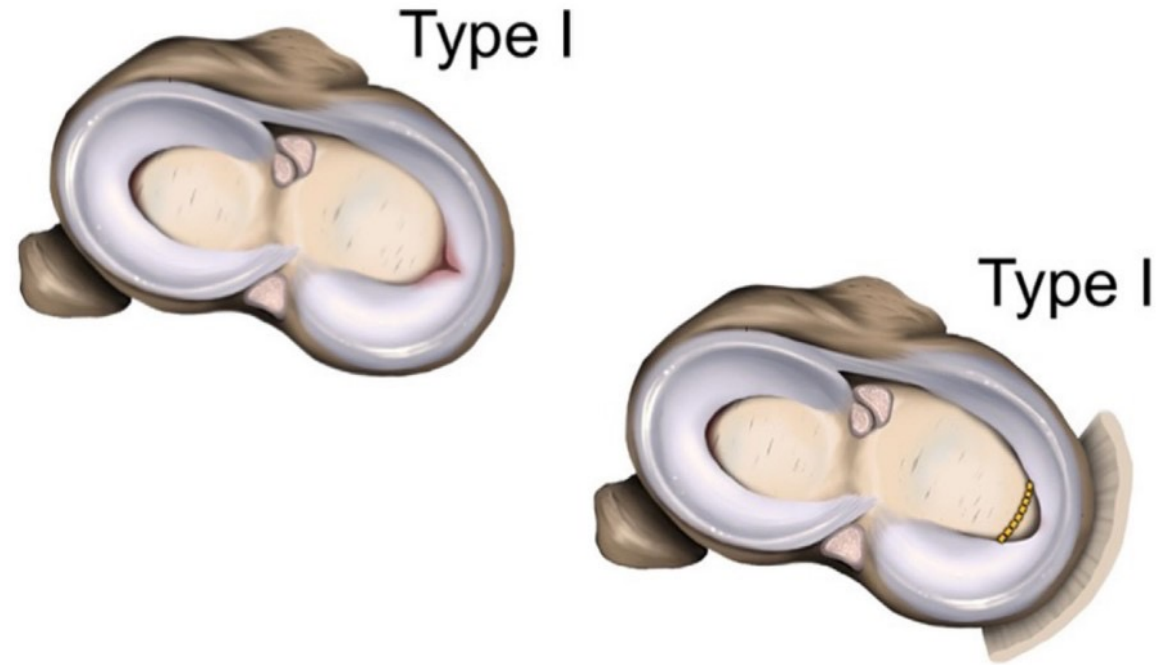
10th

**Advanced Course
on Knee Surgery**

Which techniques?¹

Type I: Partial Radial Tear in the White-White Zone

- Incomplete radial tears, stable, partial tears (inner border of the meniscus and extend peripherally to the white-white zone)
- Partial meniscectomy (low healing potential and avascular nature of the torn meniscus)

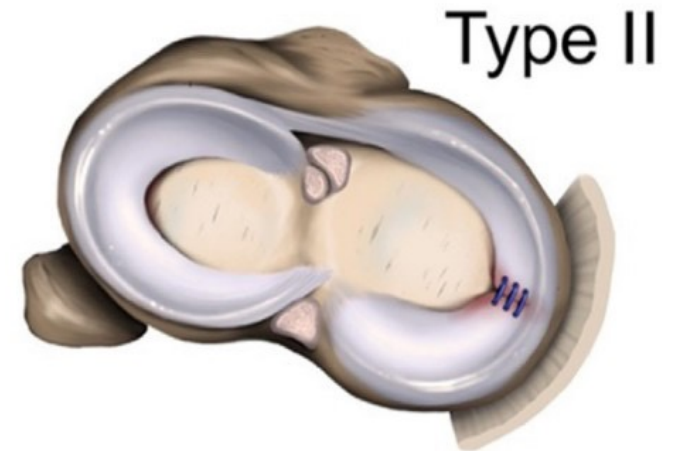
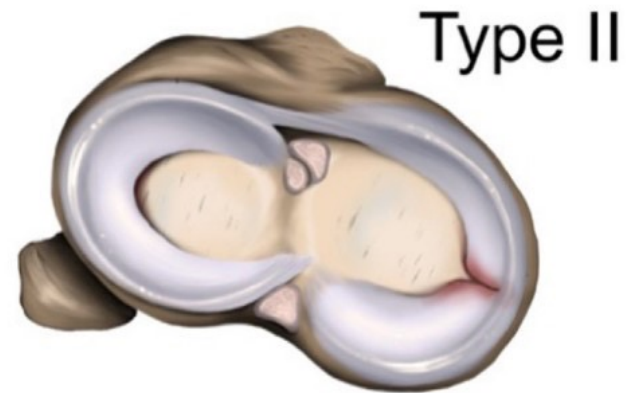


1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J. Chahla et al. Arthroscopy Techniques 2023](#)

Which techniques?¹

Type II: Partial Tear in the Red-White Zone

- Incomplete radial tears (inner border to the red-white zone)
- Meniscal repair if no degenerative tissue tearing or advanced chondral changes (modified Outerbridge 3)
- Based on the location of the meniscal tear (posterior horn, midbody, anterior horn), an outside-in, all-inside, or inside-out

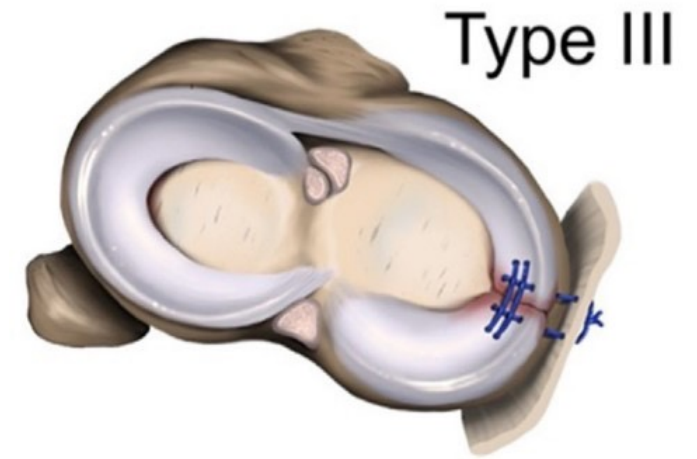
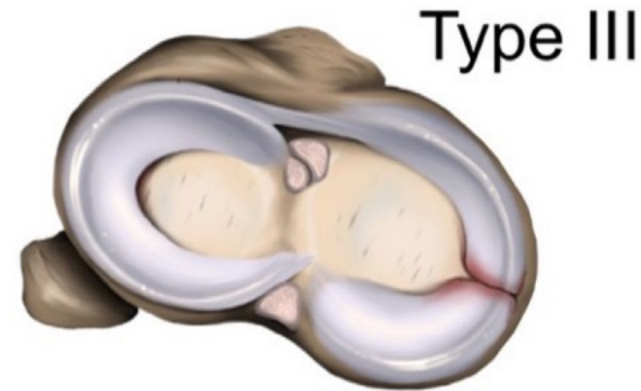


1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J. Chahla et al. Arthroscopy Techniques 2023](#)

Which techniques?¹

Type III: Complete Radial Tear With No Gapping

- Complete radial tears
- Meniscal repair If no degenerative meniscal edges or advanced chondral degeneration
- horizontal mattress configuration with 2 vertical rip-stop sutures (hashtag configuration). The vertical placed first

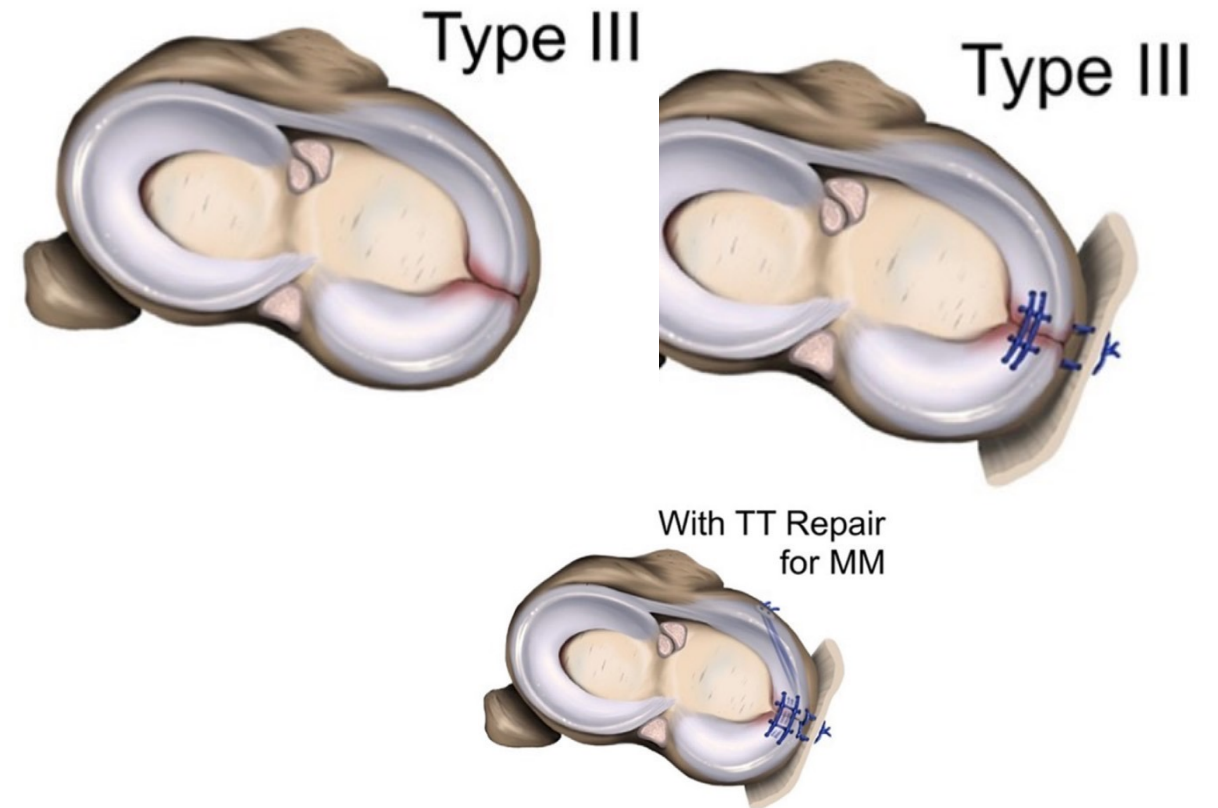


1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J. Chahla et al. Arthroscopy Techniques 2023](#)

Which techniques?¹

Type V: Complete Radial Tear With >3 mm Gapping

- Displacement, release of the anterior and posterior fragments
- A reduction stitch to approximate the edges + reinforced hashtag configuration
- Transtibial drill tunnels and suture fixation may be used to aid in reducing meniscal extrusion (types 3,4 and 5)



1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J. Chahla et al. Arthroscopy Techniques 2023](#)



In conclusion: radial tears

- Chahla classification with surgical implication
- Low healing rate (64%)
- Improve biomechanical constructs (hashtag configuration) in severe types
- Transtunnel fixation to reduce extrusion?
- Abstention in case of degenerative change & BMI > 35

1. Meniscal Radial Tears: A Classification System Based on Tear Morphology [J. Chahla et al. Arthroscopy Techniques 2023](#)



10th

**Advanced Course
on Knee Surgery**

Thank you!

