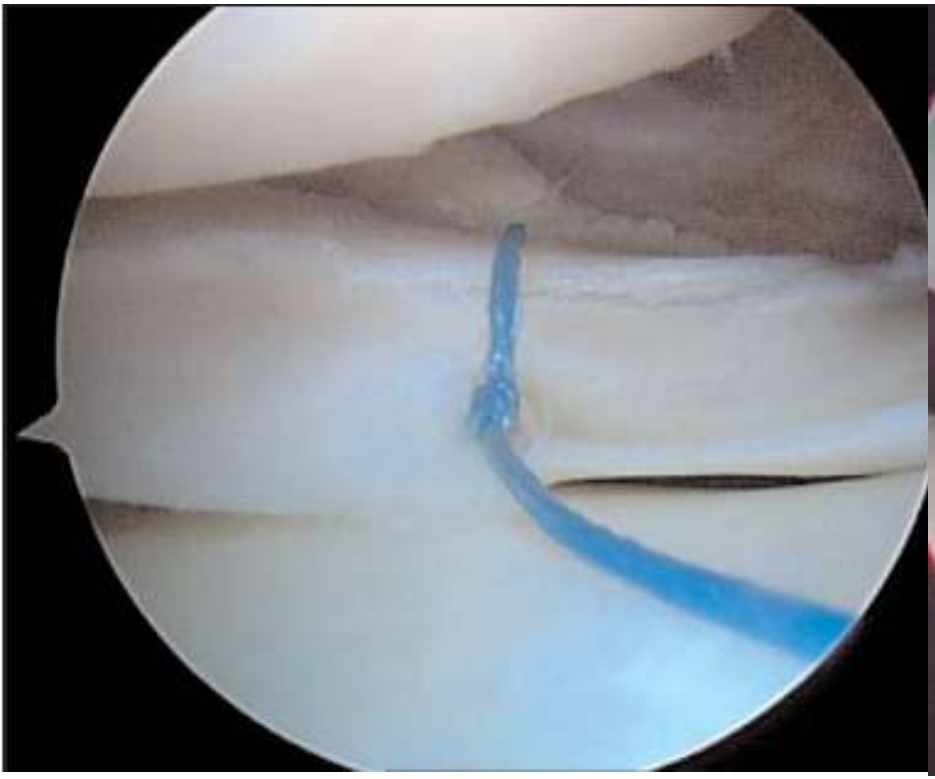
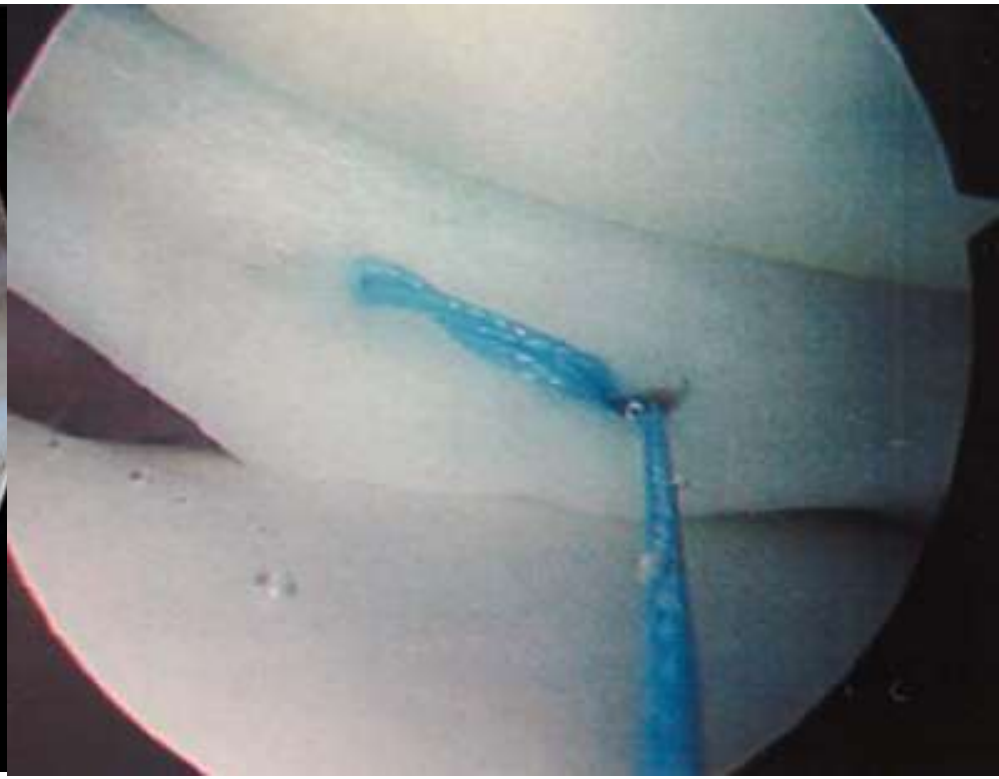
Meniscal Repair Workshop





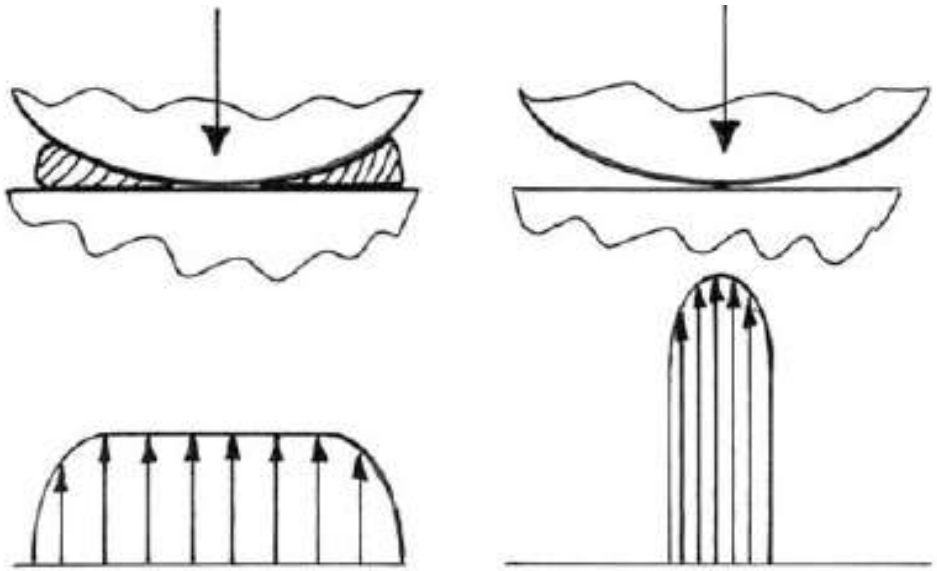
Sanjeev Anand
Leeds Teaching Hospitals NHS Trust
Executive member-at-large, BASK
Editor-in-chief, JAJS

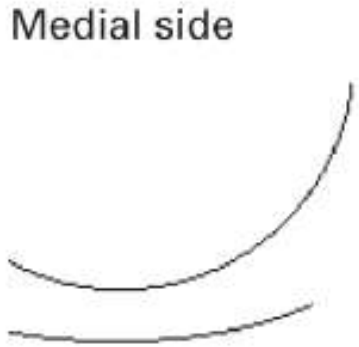
Meniscus Repair Workshop

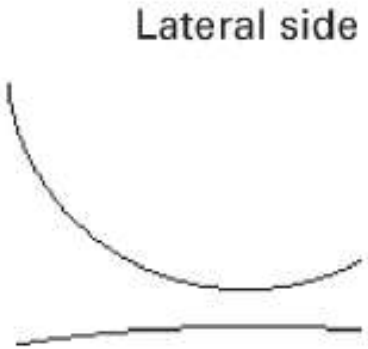
- Discuss reasons and indications for doing meniscal repair
- Demonstrate different techniques of meniscal repair
- Hands-on workshop on All-inside meniscus repair

Is meniscectomy the answer to meniscal tear?

- Loss of the medial meniscus led to a decrease in contact areas of approximately 75% and an increase in the peak contact pressures of approximately 235%.
- Worse following lateral meniscectomy.



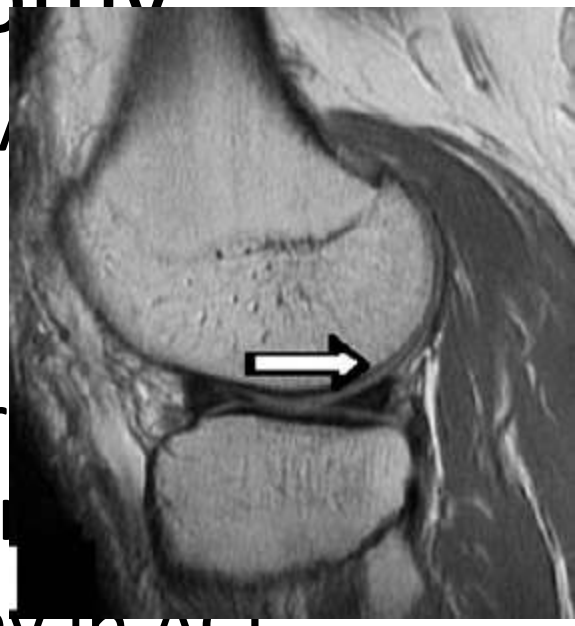




Baratz, Fu et al, AJSM, 1986

OA after meniscectomy

- Radiographic incidence of knee OA
  85% of patients, at 10 yrs after
  meniscectomy*
- Severity of late degeneration is pr
  to the amount of meniscal tissue r
- Worse OA following meniscectomy in ACL deficient d/t loss of stabiliser action of meniscus



*Tapper EM, Hoover NW: *J Bone Joint Surg* 51A:517, 1969. Sherman et al, AJSM, 1993 Gear MWL: *Brit J Surg* 54:270, 1967 Allen et al, Journal of Orth research 18 (1) 109-115Huckell JR: *Can J Surg* 8:254, 1965

Role of Meniscus

- Shock absorption,
- Force transmission
- Load distribution
- StabilityJoint congruence

Nutrition of the articular cartilage
Protection of the articular cartilage
Joint lubrication
Proprioception

Natural history of the meniscectomized knee = late degenerative osteoarthritis

Still, arthroscopic partial meniscectomy remains the most commonly performed orthopaedic procedure.

It seems more logical to repair or reconstruct injured menisci whenever possible rather than just resecting the damaged portion.

Evidence for meniscal repair

- Long-term outcome after meniscal repair versus partial meniscectomy for traumatic meniscal tears.
- Stein et al AJSM 2010 Aug;38(8):1542-8.

- 81 pts, 8.8 yr FU

- No osteoarthritic progress was detectable in 80.8% after repair compared with 40.0% after meniscectomy (P = .005) with significant benefit for the "young" subgroup (P= 0.01)

- The preinjury activity level was obtained in 96.2% after repair compared with 50% after meniscectomy (P = .001)

- The athletes showed a significantly reduced loss of sports activity after repair compared with the athletes after meniscectomy (P = .001)

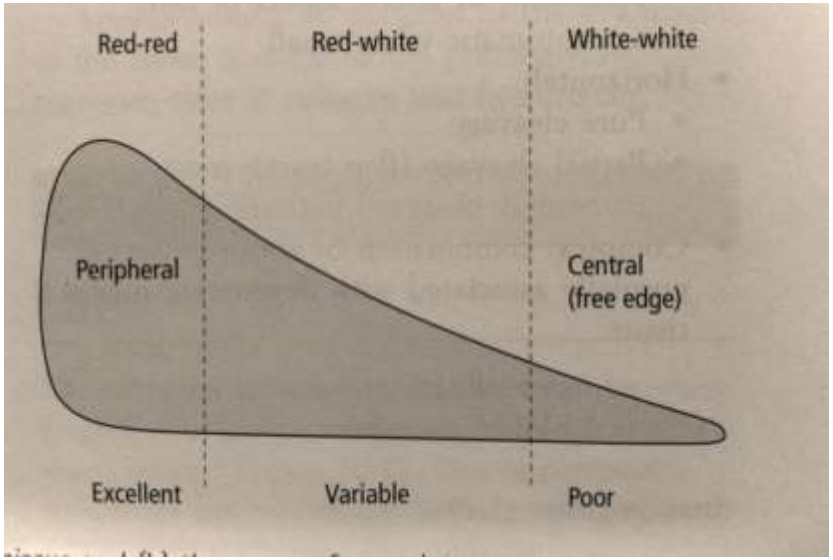
Evidence

- **Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes.** Paxton et al, Arthroscopy. 2011 Sep;27(9):1275-88.

- While meniscal repairs have a higher reoperation rate than partial meniscectomies, but they are associated with better long-term outcomes (Lysholm scores and radiological degeneration).

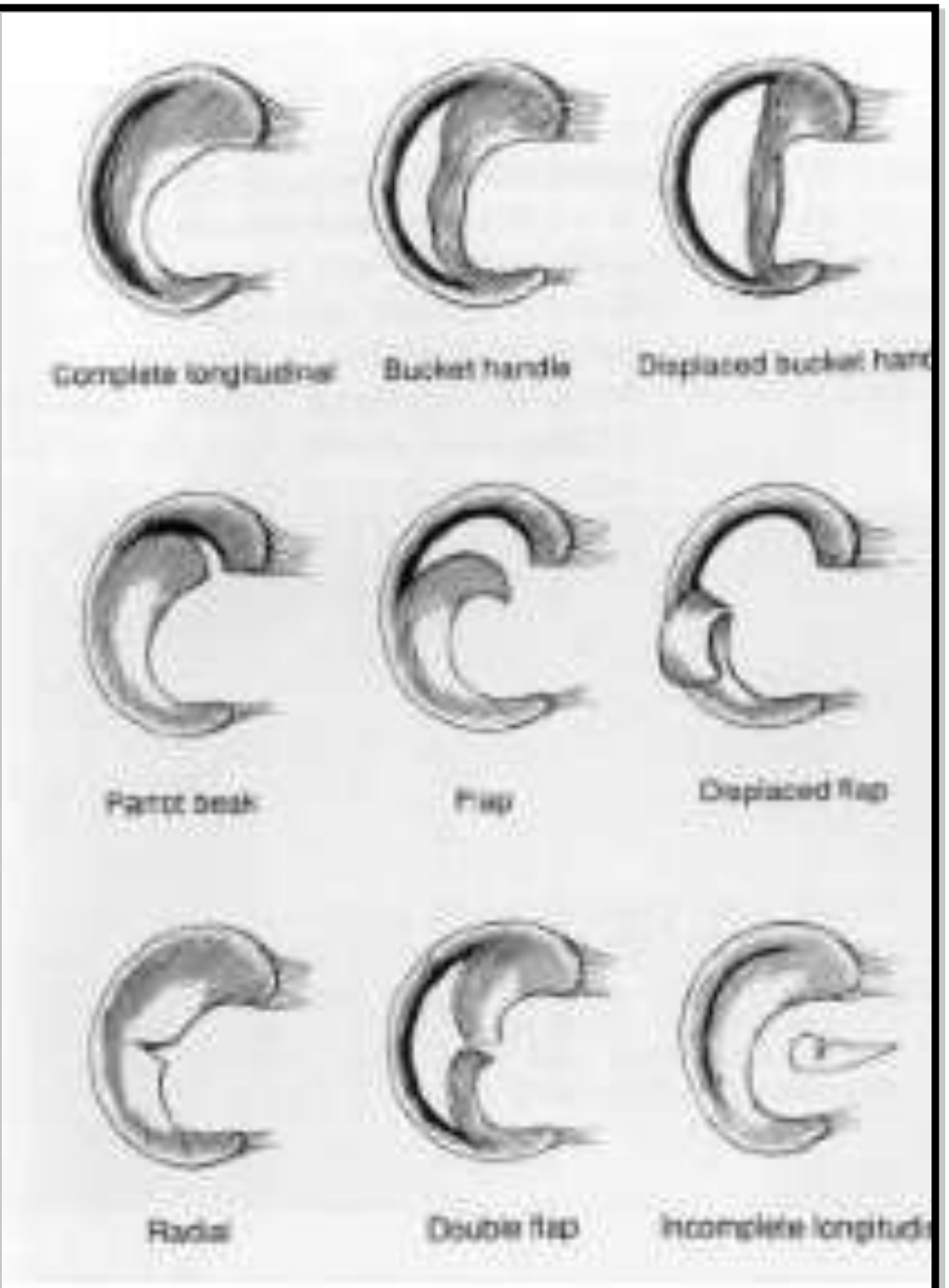
Classical indications for Repair

- Longitudinal traumatic tear within the peripheral 10-30% of a healthy meniscus



Classical indications for Repair

- Longitudinal traumatic tear within the peripheral 10-30% of a healthy meniscus
- The tear should be >1cm
- Knee should be stable or a concomitant ligament reconstruction should be performed.



Meniscal Tears

- **Vertical Plane**
  - Longitudinal
    - Bucket handle
    - Commonly peripheral
  - Radial
    - lateral aspect of LM
- **Horizontal Plane**
  - Pure Cleavage
  - Partial Cleaveage (Flap tears)
    - Most common
- **Complex**
  - Combination of above
  - Assoc with degenerate meniscal tissue

When to extend the indications?

- Young patients
- Acute longitudinal tear in the white-white area but still in the peripheral third that would otherwise result in resection of a large volume of meniscus
- Chronic tear in the periphery (combine with augmentation techniques)
- Large radial tear extending to peripheral rim

Augmentation techniques to aid meniscal healing

- Meniscal rasping
- Synovial abrasion

- Meniscal trephining
- Microfracture

- Fibrin clot

- Hyaluran
- Synovial graft
- Radiofrequency stimulation

Concomitant ACL reconstruction

Does age of tear affect healing?

- Better healing rates in tears < 2mo duratrion from the injury

- Newer studies with newer devices suggest that chronicity of injury does not affect outcome

Henning CE,. Arthroscopy 3:13-18, 1987
Kotsovolos. Arthroscopy 2006

Repair tissue

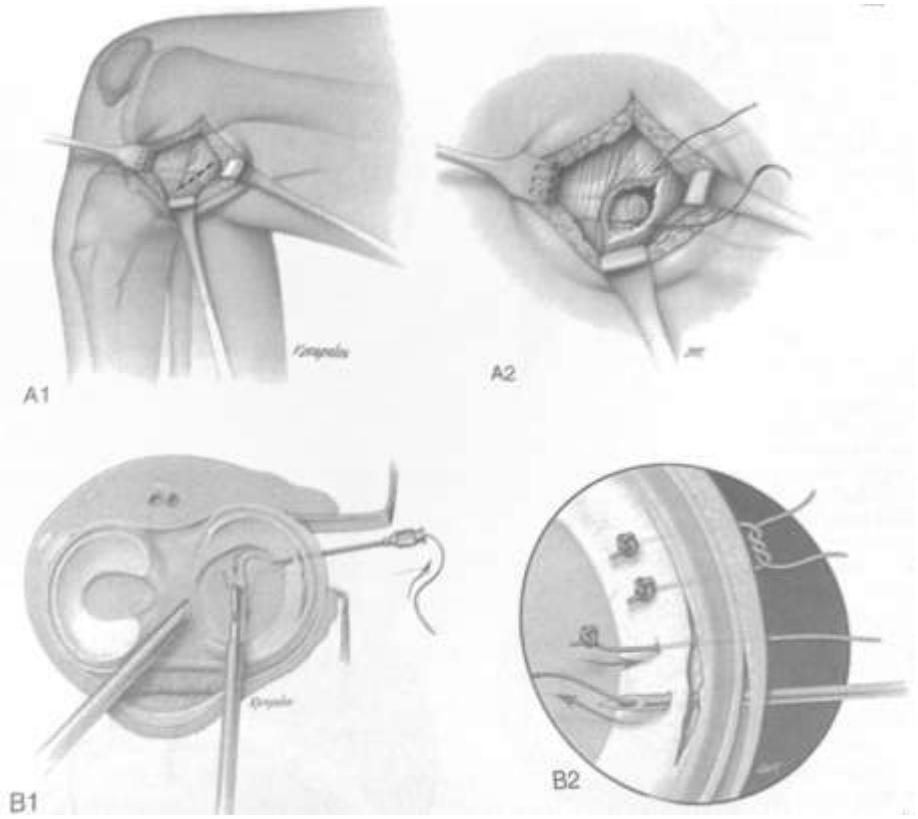
- Fibrovascular scar tissue made of fibroblasts, blood vessels and collagen.
- Scar line persistently visible in postoperative MRI scans.
- MR arthrogram or arthroscopy, best modalities to assess healing

Techniques

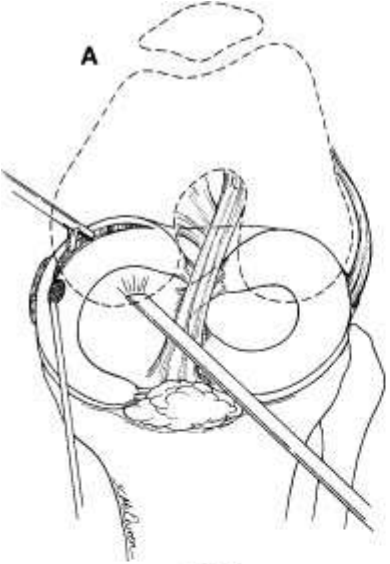
- **Open Repair**

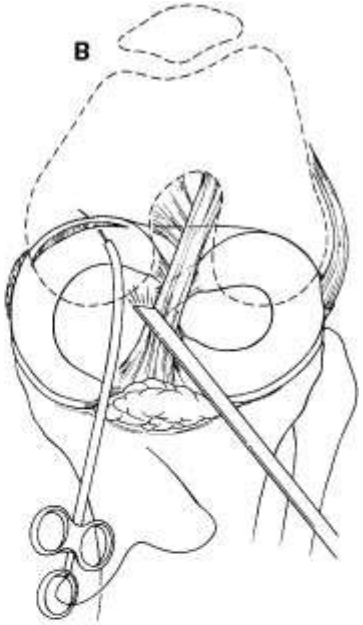
- **Closed repair**
  - **Inside out**
  - **Outside in**
  - **All inside**

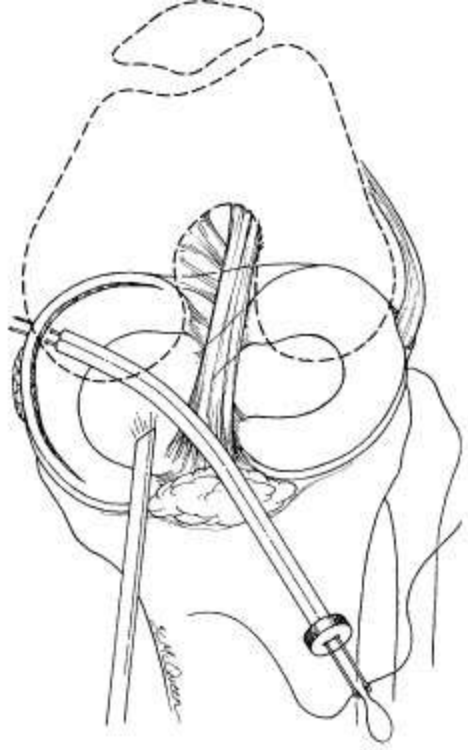
Open Technique

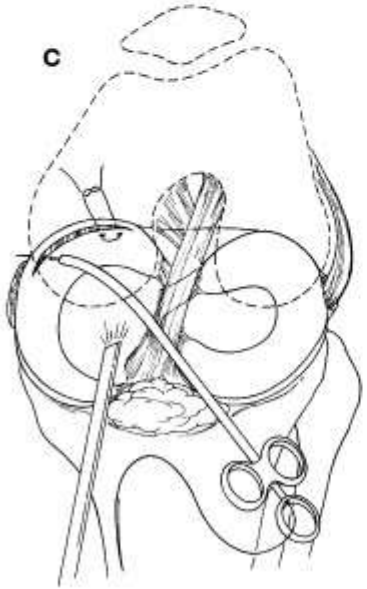


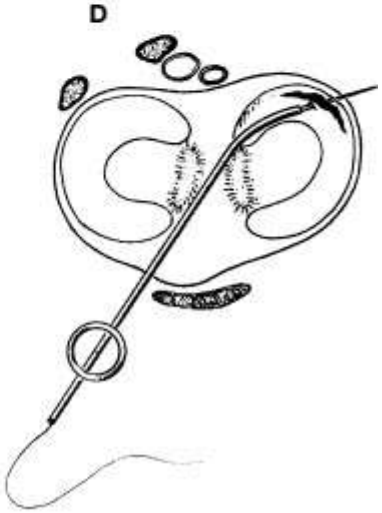
- Anterior capsular tear in association with Tibial Plateau Fractures
- Whilst doing an Acute Open Ligament repair

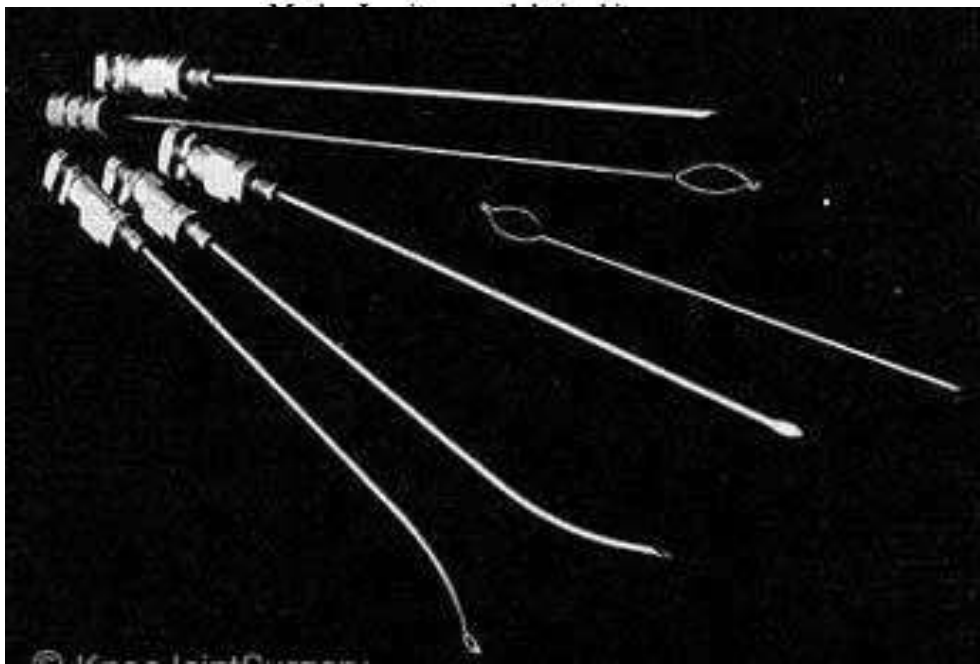






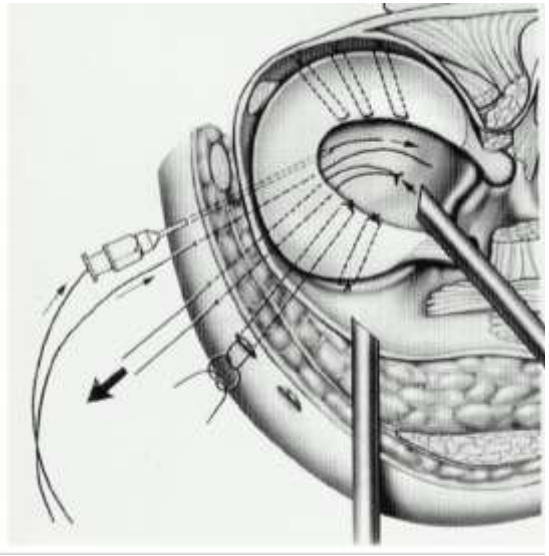


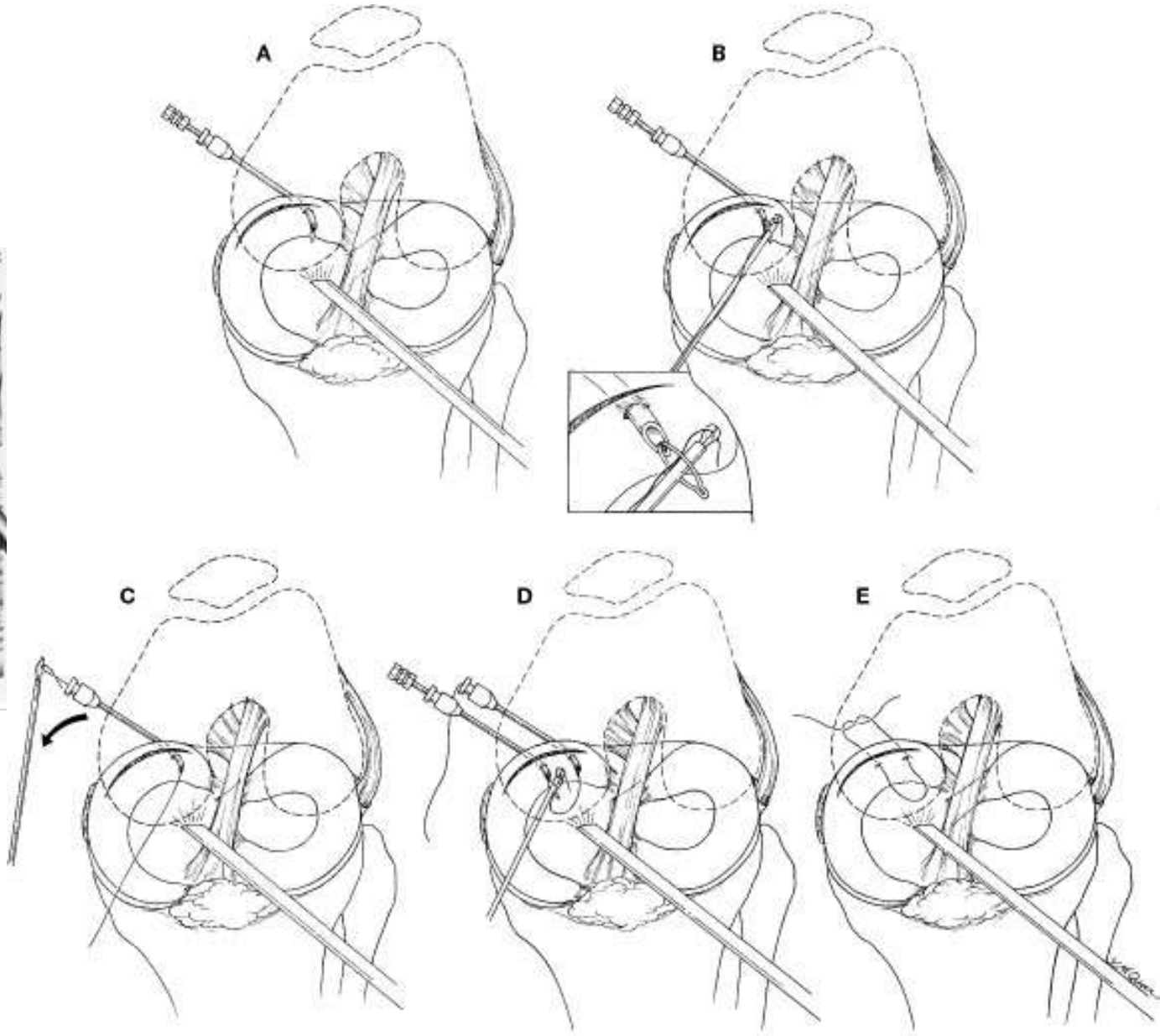


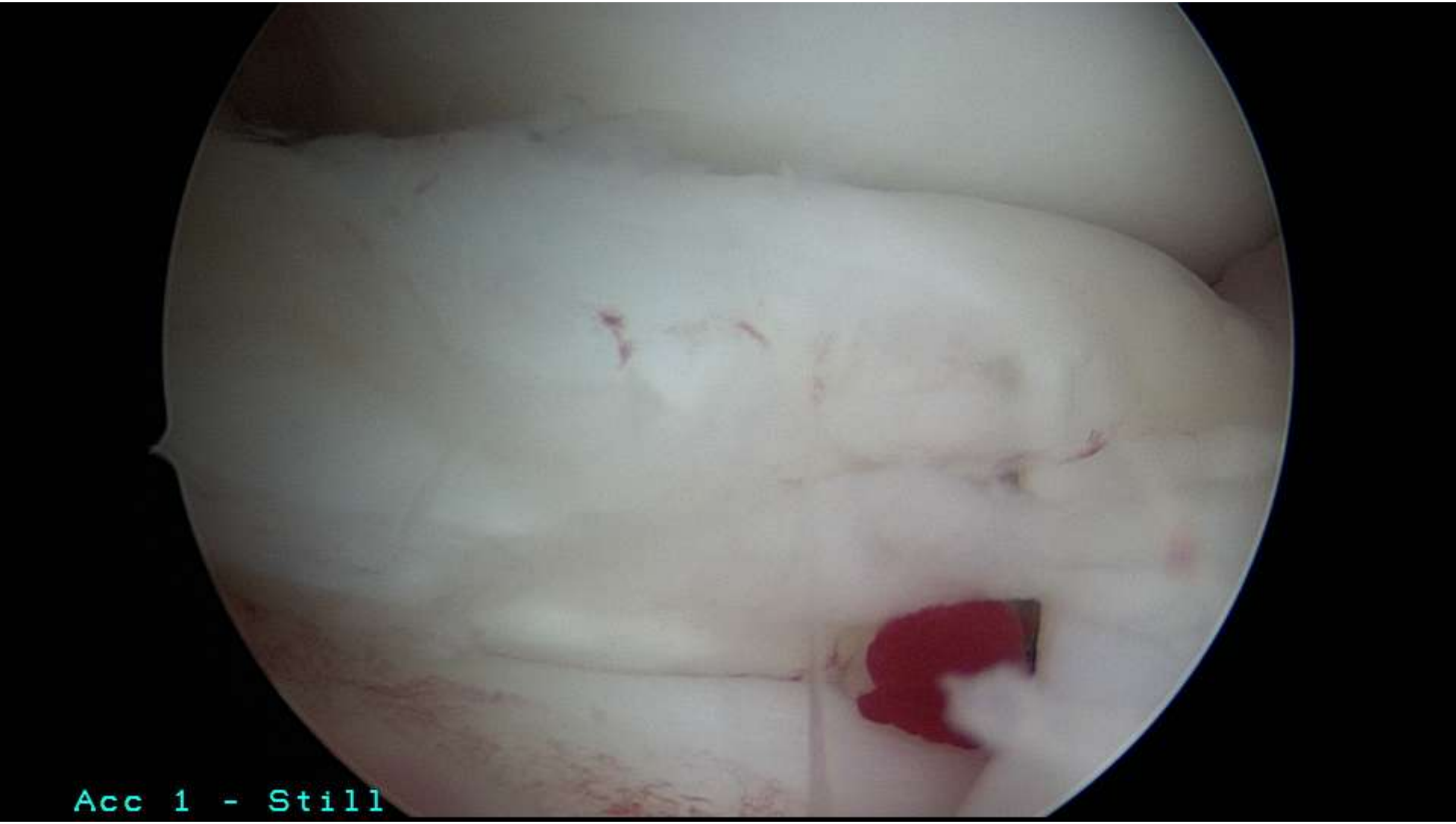


Inside out

Outside In



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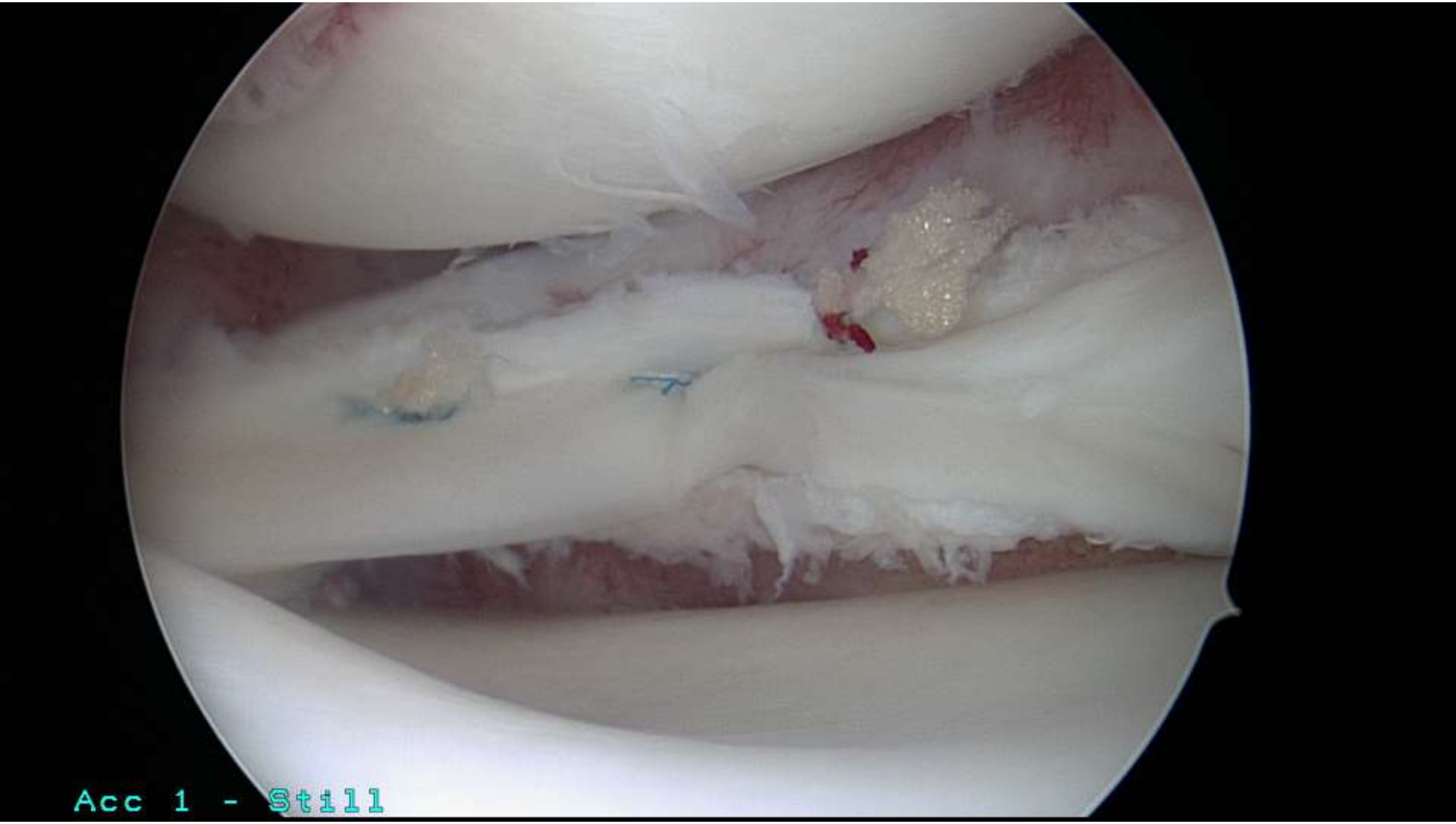
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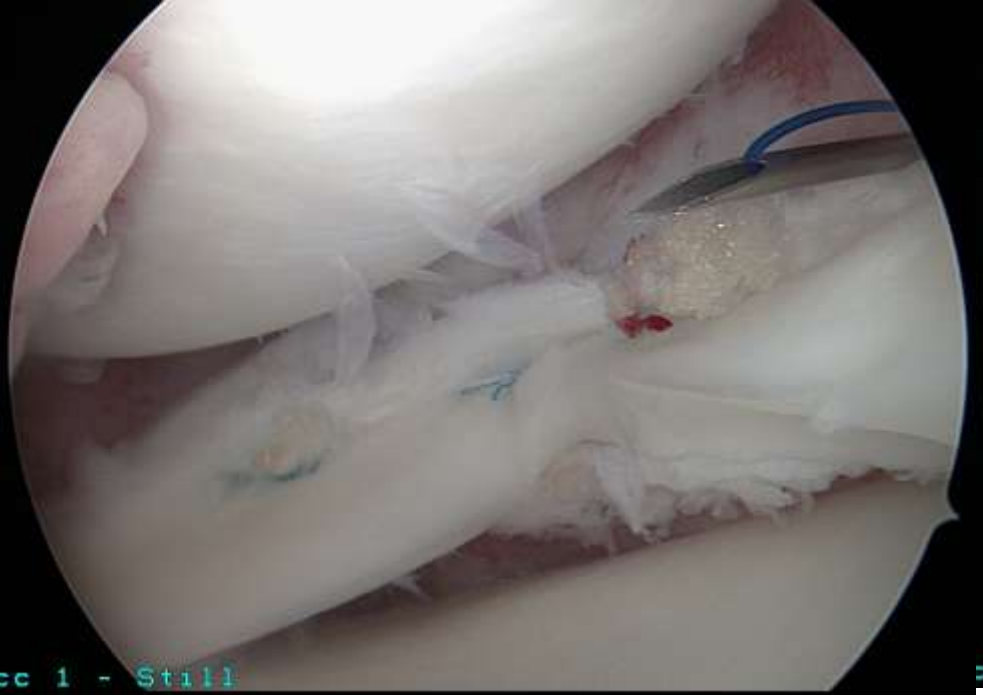
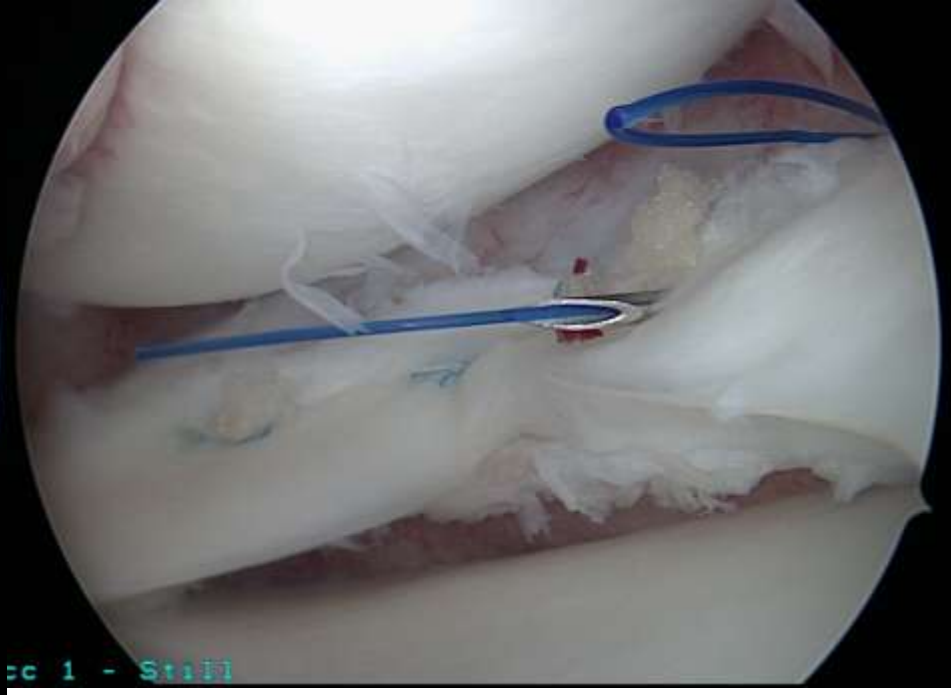
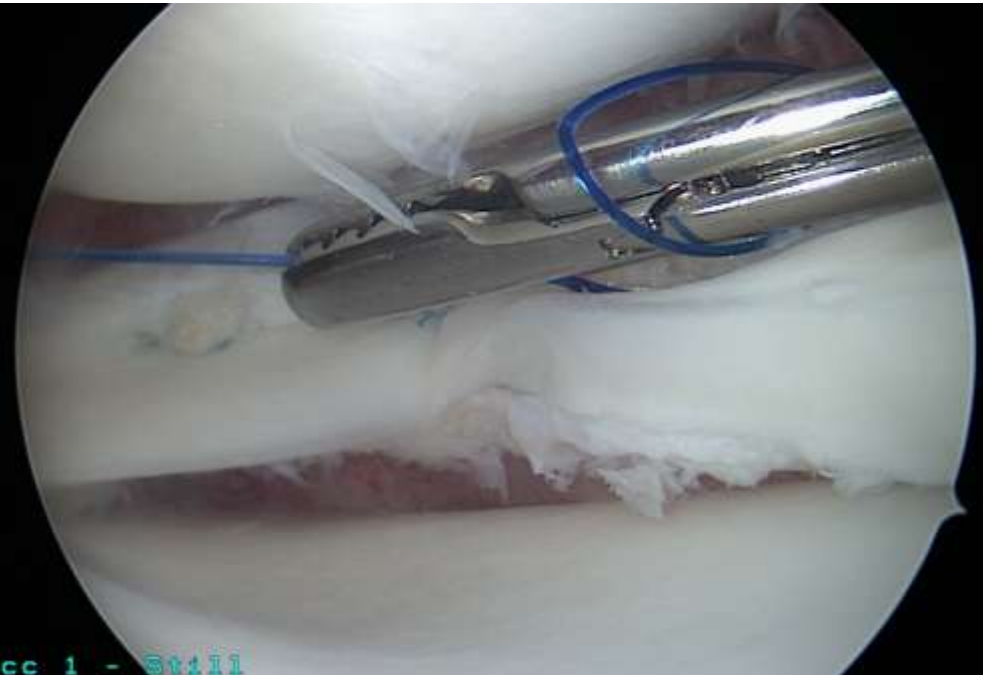
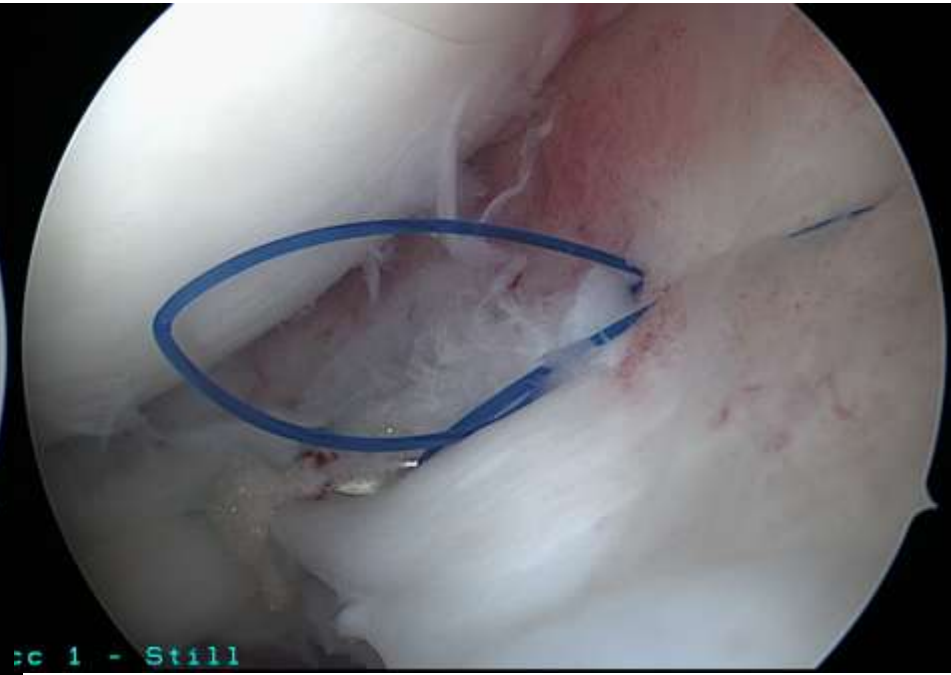
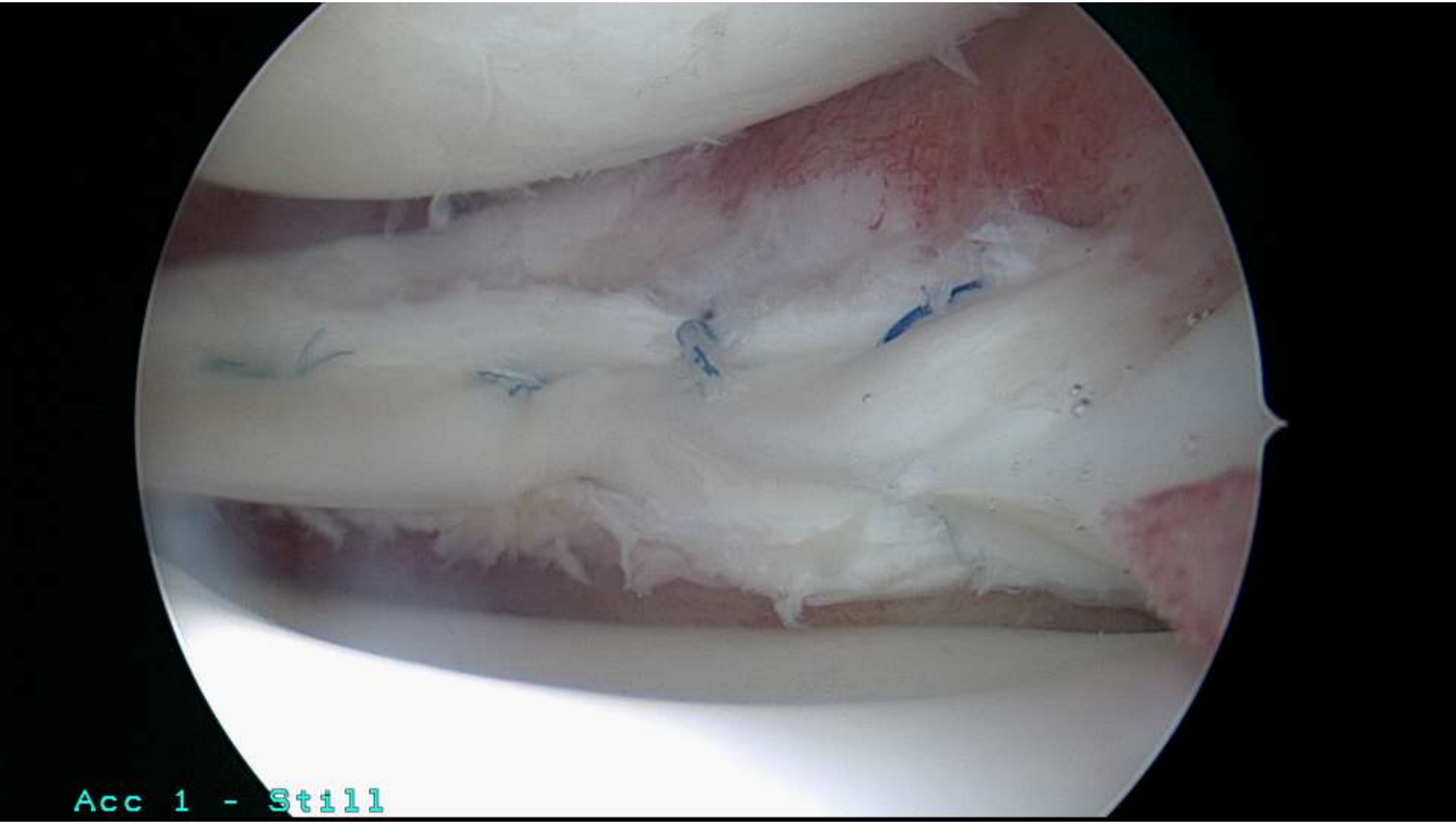




OUTSIDE-IN MENISCAL REPAIR STEPS



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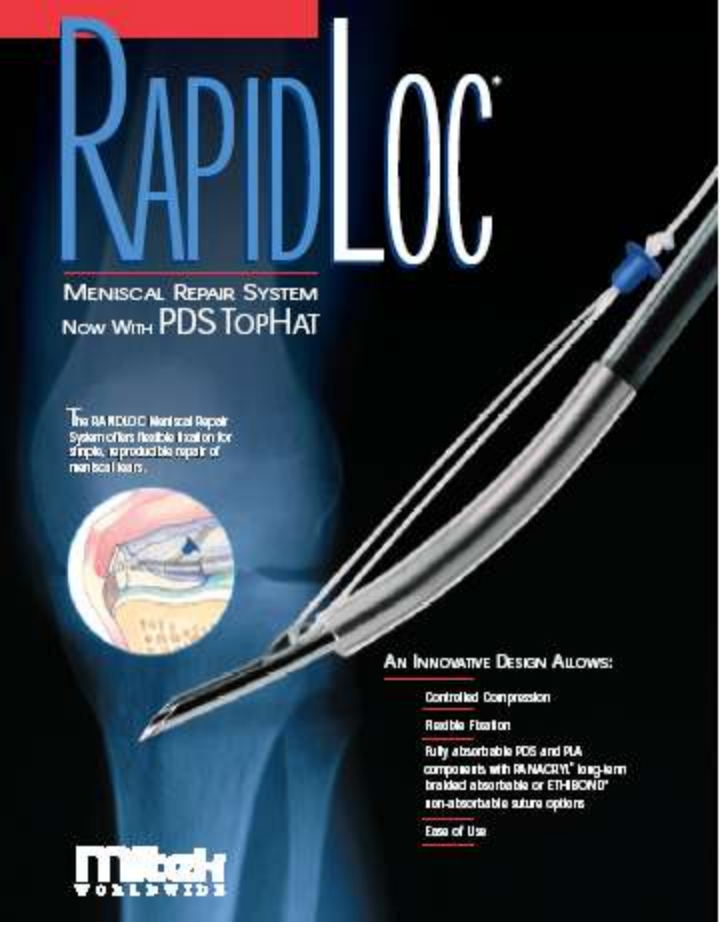
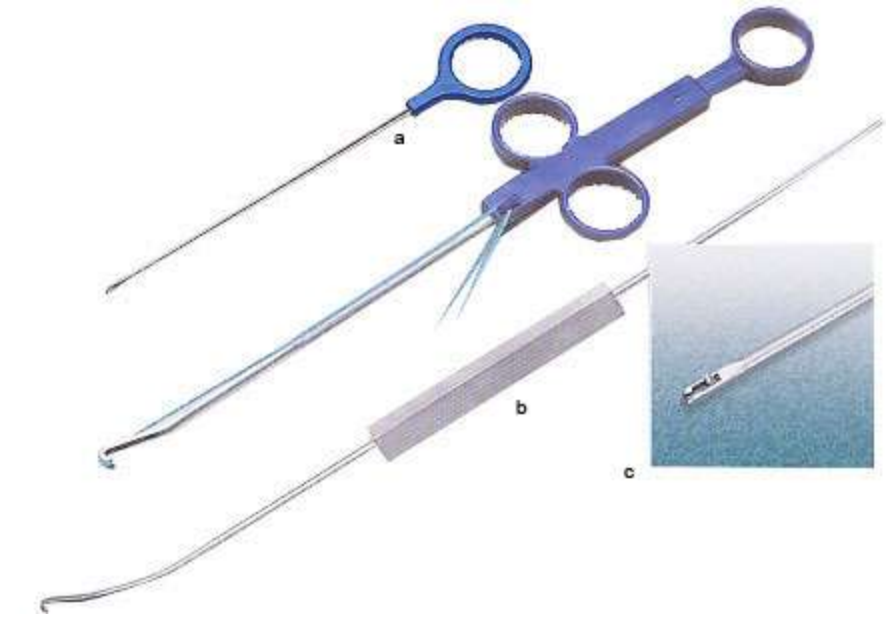
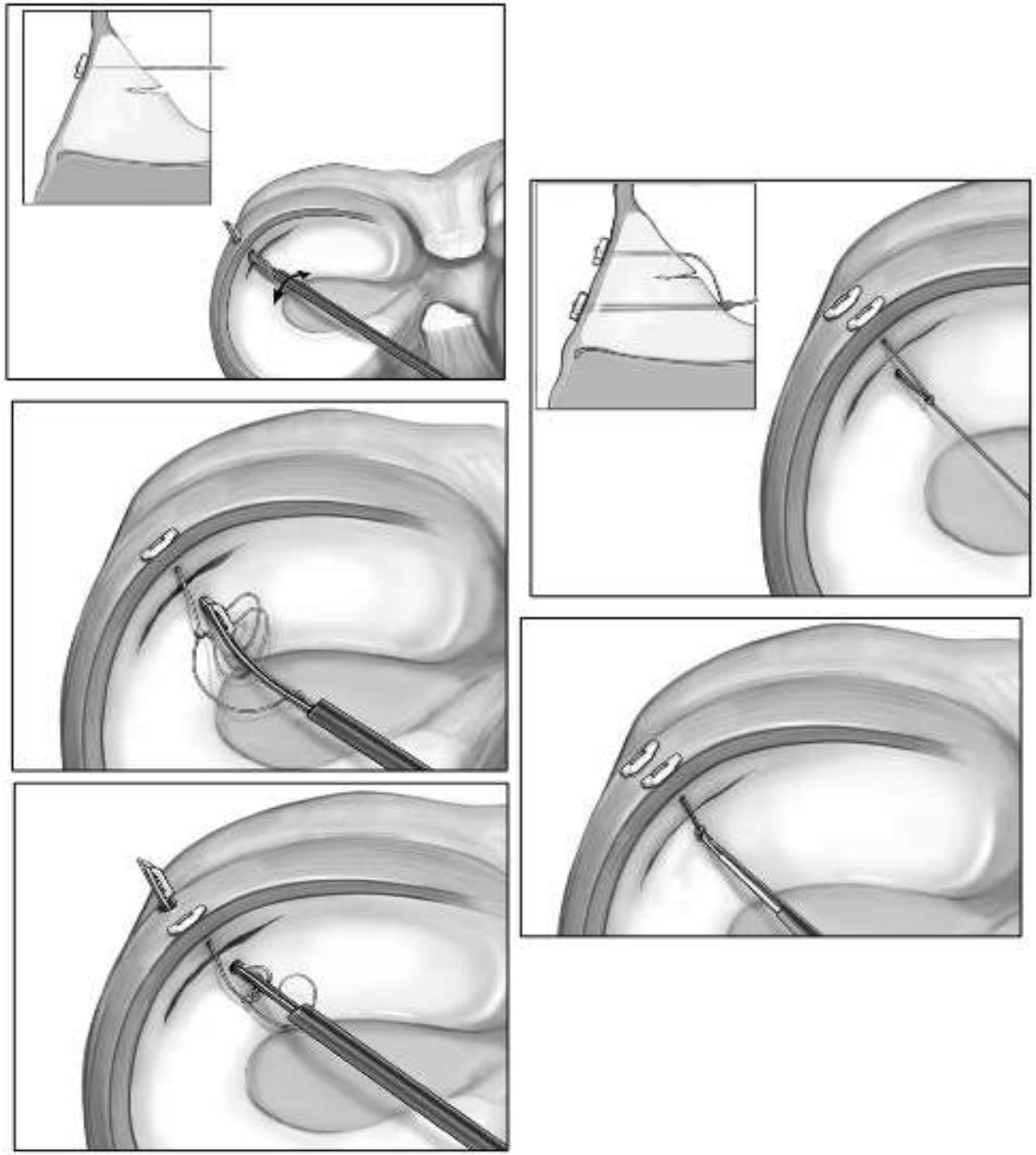




All- Inside repair devices

Strength of fixation

Device	Author	Load to failure (N)	Shear (N)	Gapping (mm)	Failure
Arthrotek	Barber	28.9			Pull out
Arrow	Kocabey McDermott Rankin	39.755 34.2 95.9	27.67	2.18	Rim pullout
T fix	Kocabey McDermott Rankin	45.892 49.1 99.4	57.47	3.47	
RapidLok	Barber	43.28			Backstop or suture
FasT-Fix	Barber Chang	70.9 145.9		3.9	Knot
Viper	Chang	111.2		3.9	
Suture	Mcdermott Rankin Chang	107.65 72.7 202 133.4	64.15	3.29 2.3	



All Inside

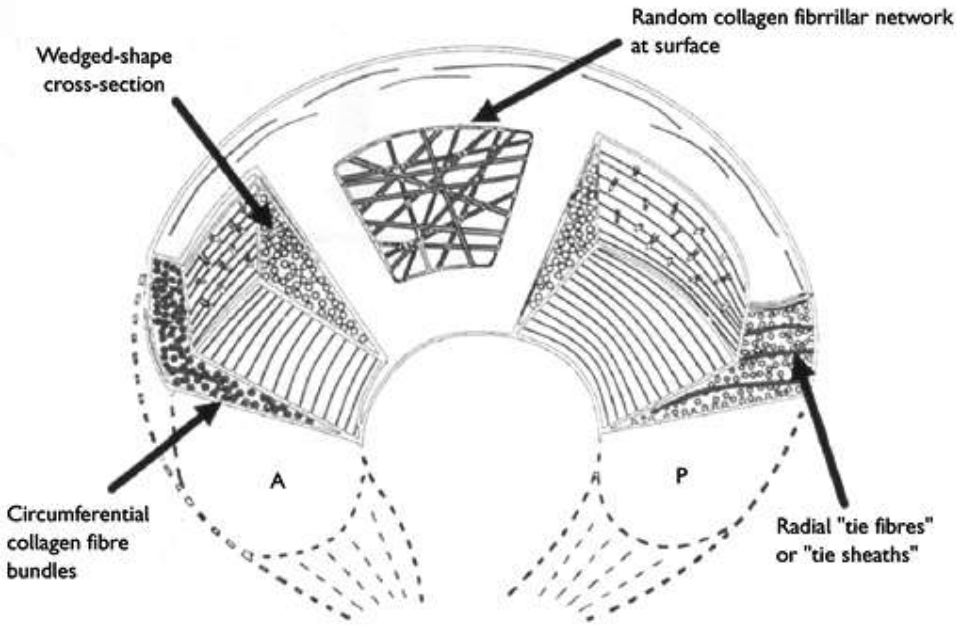
Adv / Disadv

Type of Repair	Indications	Advantages	Disadvantages
Inside-Out	All tears except direct posterior	Highest mechanical strength	Incisions Neurovascular injury
Outside-In	Anterior horn (lateral meniscus)	Less risk of neurovascular injury	Arthroscopic knot tying
All-Inside	Body and posterior tears	No incisions Less risk of neurovascular injury More flexible fixation of fragments ?Decreased operative times	Increased cost Implant migration Foreign body reaction, Inflammation Chondral injury Device failures Lower mechanical strength

Jarit GJ, Bosco JA 3rd. Bull NYU Hosp Jt Dis. 2010;68(2):84-90.
Meniscal repair and reconstruction.

Suture type and placement

- Sutures are best placed 3-5mm apart 3mm from tear edge.
- Vertical or oblique sutures are stronger (125N) but Horizontal sutures using FasT-Fix (89N) have still shown good
biomechanical strengt



Kocabey Arthroscopy 2006; Nyl

Postop Rehab

- No prospective randomised studies to compare various rehabilitation programmes.

- Restriction of flexion beyond 90 degrees is preferred to avoid shear forces on the meniscus. Similar forces also occur in the last few degrees of extension.

- Weight bearing is controversial. Both Shelbourne(1996) and Barber(1994) have shown satisfactory results with meniscal repair combined with accelerated rehabilitation. Consider accelerated rehab in repair with ACL recon but more cautious approach in isolated meniscal tears

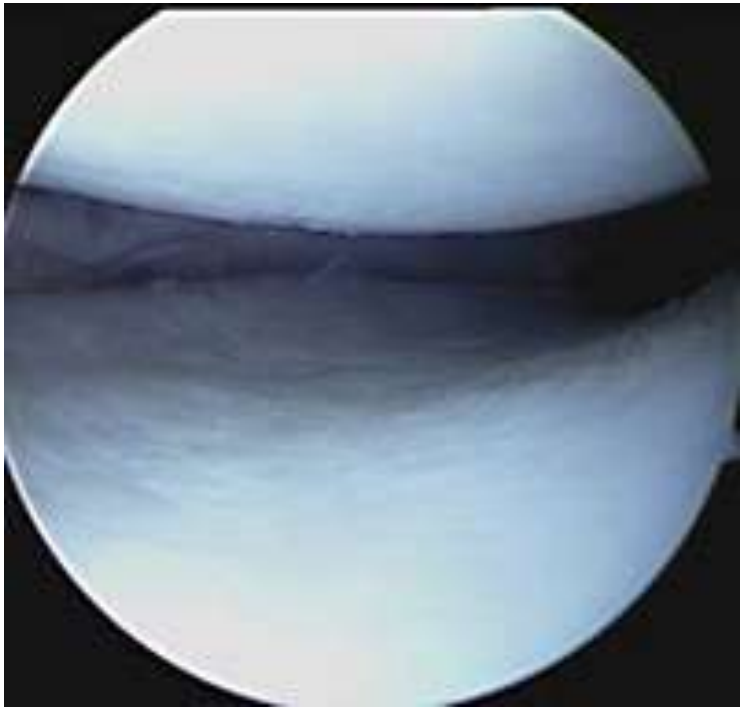
RESULTS OF ALL-INSIDE TECHNIQUES

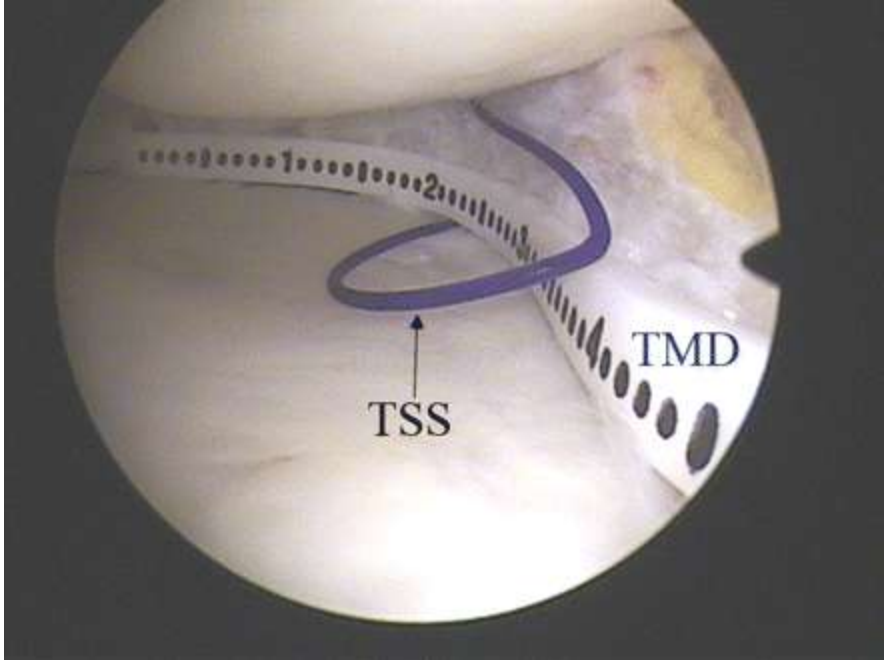
Study	Number	Fixation	Follow-up	ACL	Success
Cannon and Vittori	90	Inside-out	10mths	Stable-22 Recon-68	50% 93%
Miller et al	79	Inside-out	3.25 yrs	Stable Recon	84% 93%
Morgan et al;	74	Inside-out	8.5 mths	Injured	84%
Buseck and Noyes	66	Inside-out	1 yr	Recon	80% Complete 14% Partial
Tenuta and Arciero	54	Inside-out	11 mths	Stable 14 Recon 40	57% 90%
Ahn	39	FasT-Fix	19 mths	Recon	97.4%
Horibe	132	Inside-out			73% complete 17% incomplete

Is there any option for patients with previous meniscectomies to prevent future risk of OA?

Meniscal implants

- Approved by FDA
- Tissue-engineered collagen scaffold,
- Enables the body's own tissue to fill the meniscal defect
- Collagen meniscus implant gets infiltrated with fibrous connective tissue and differentiates to become meniscus-like fibrochondrocytic tissue.

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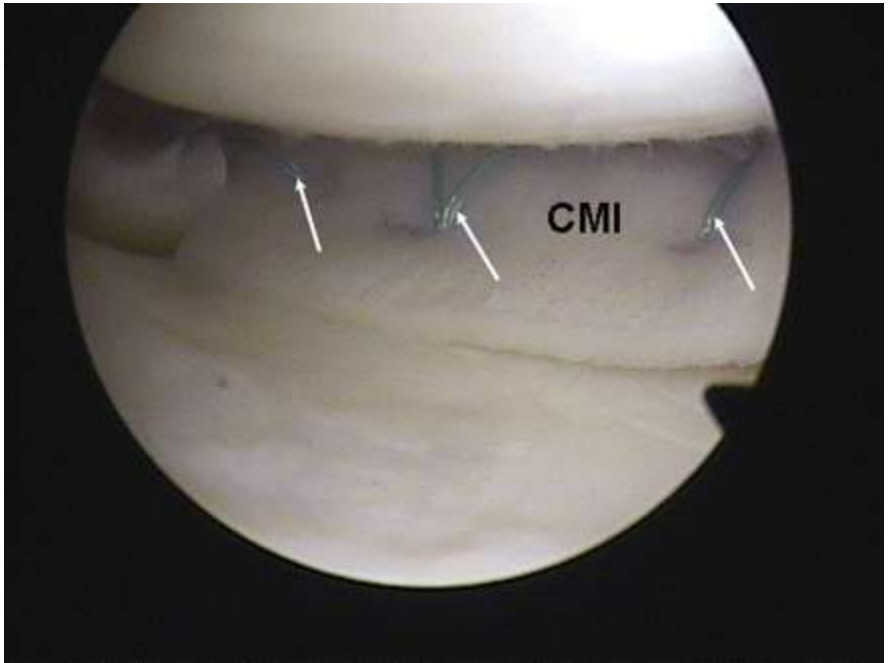
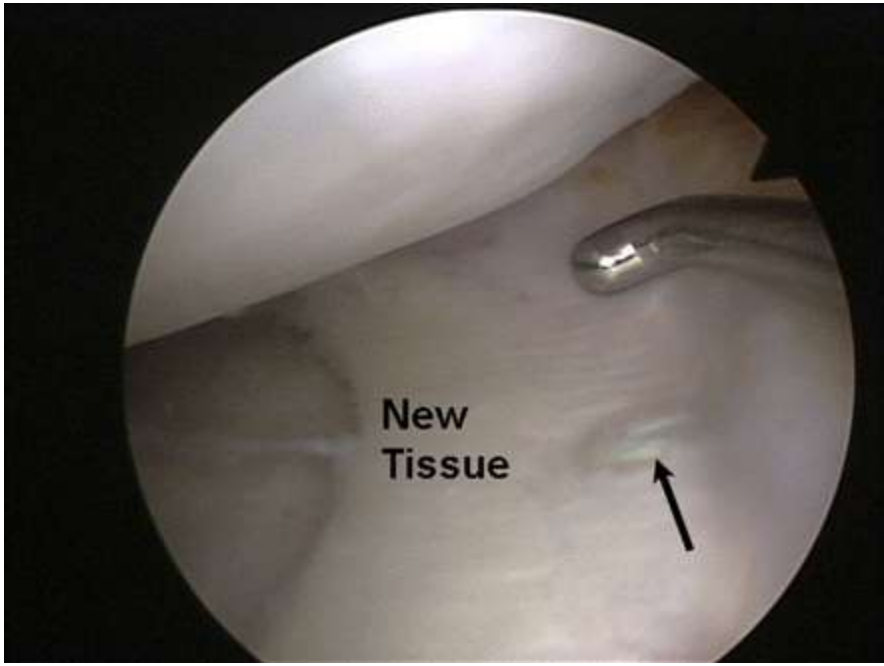
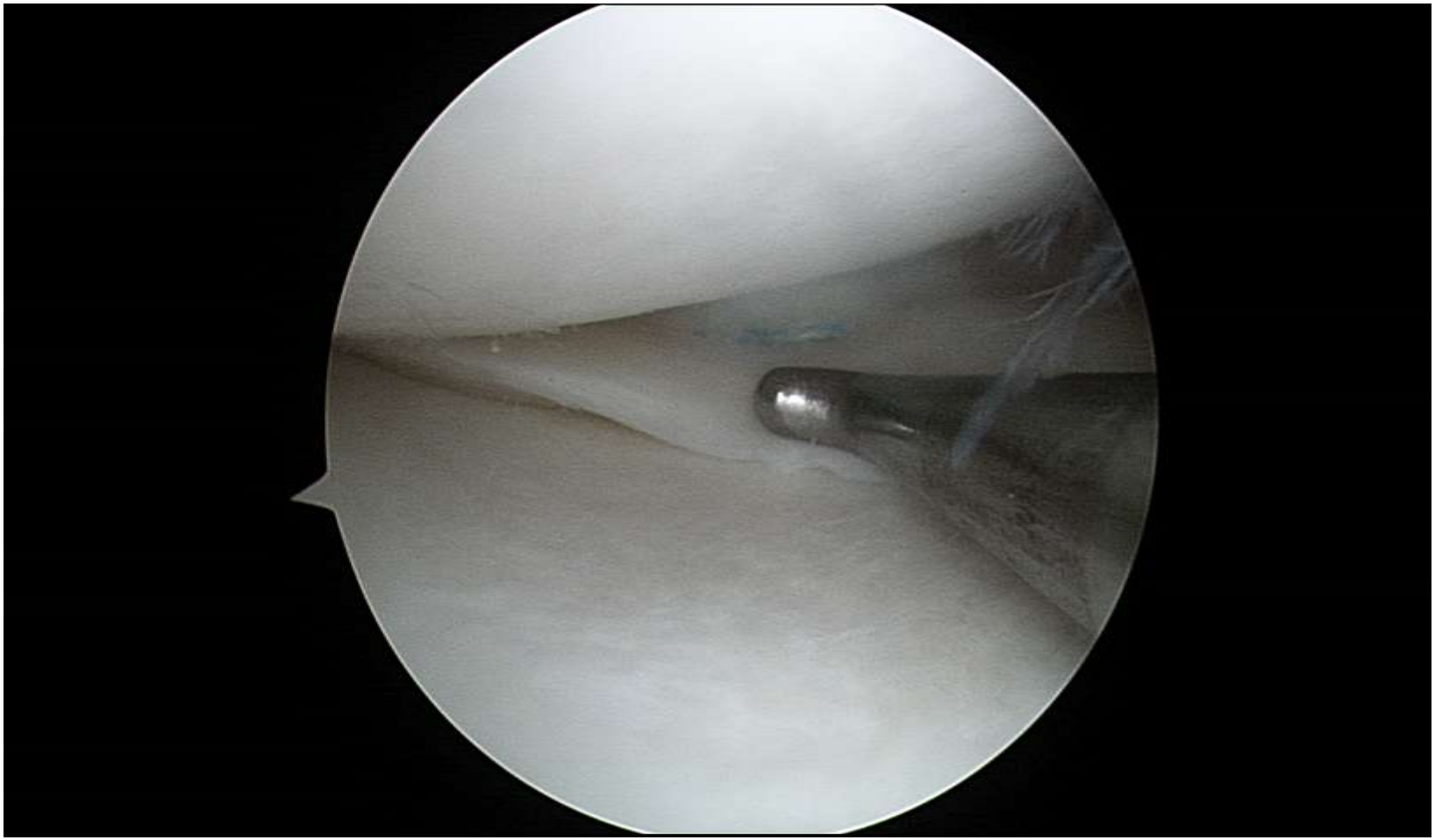
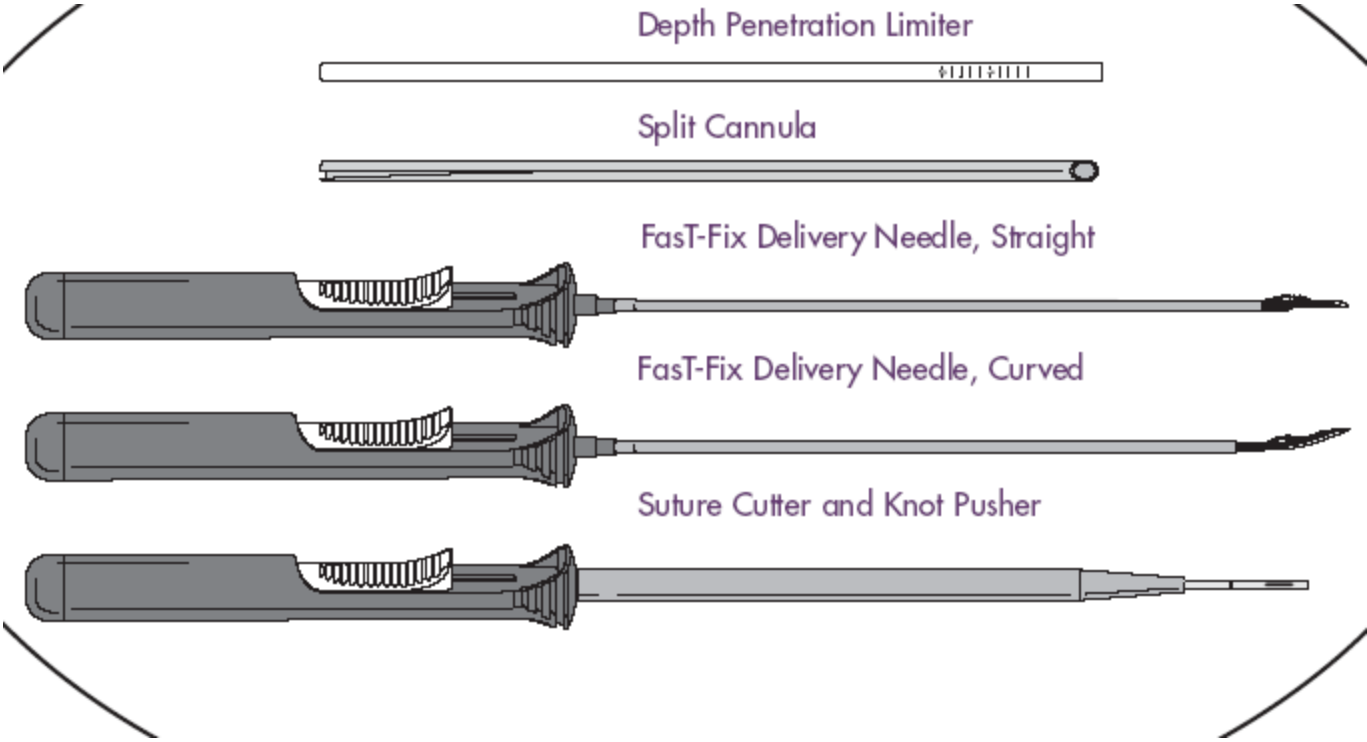

CMI

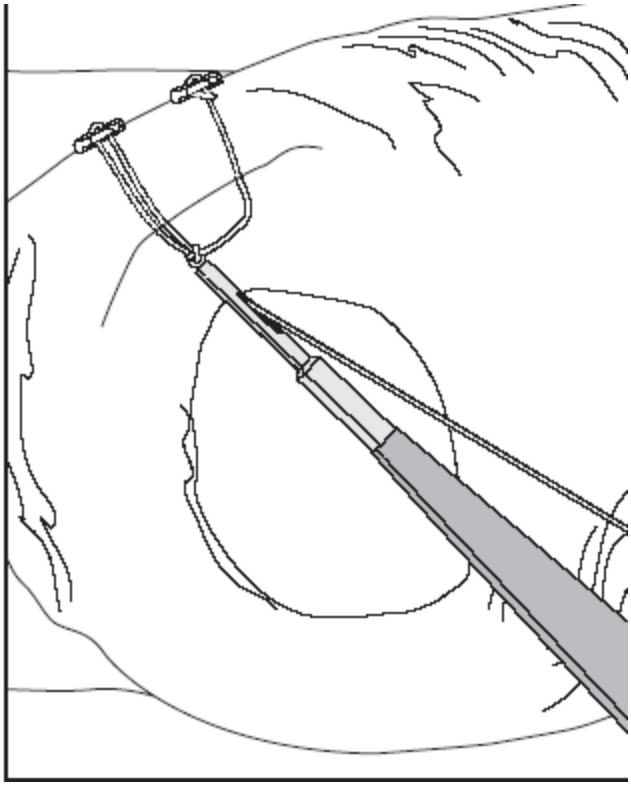

New
Tissue

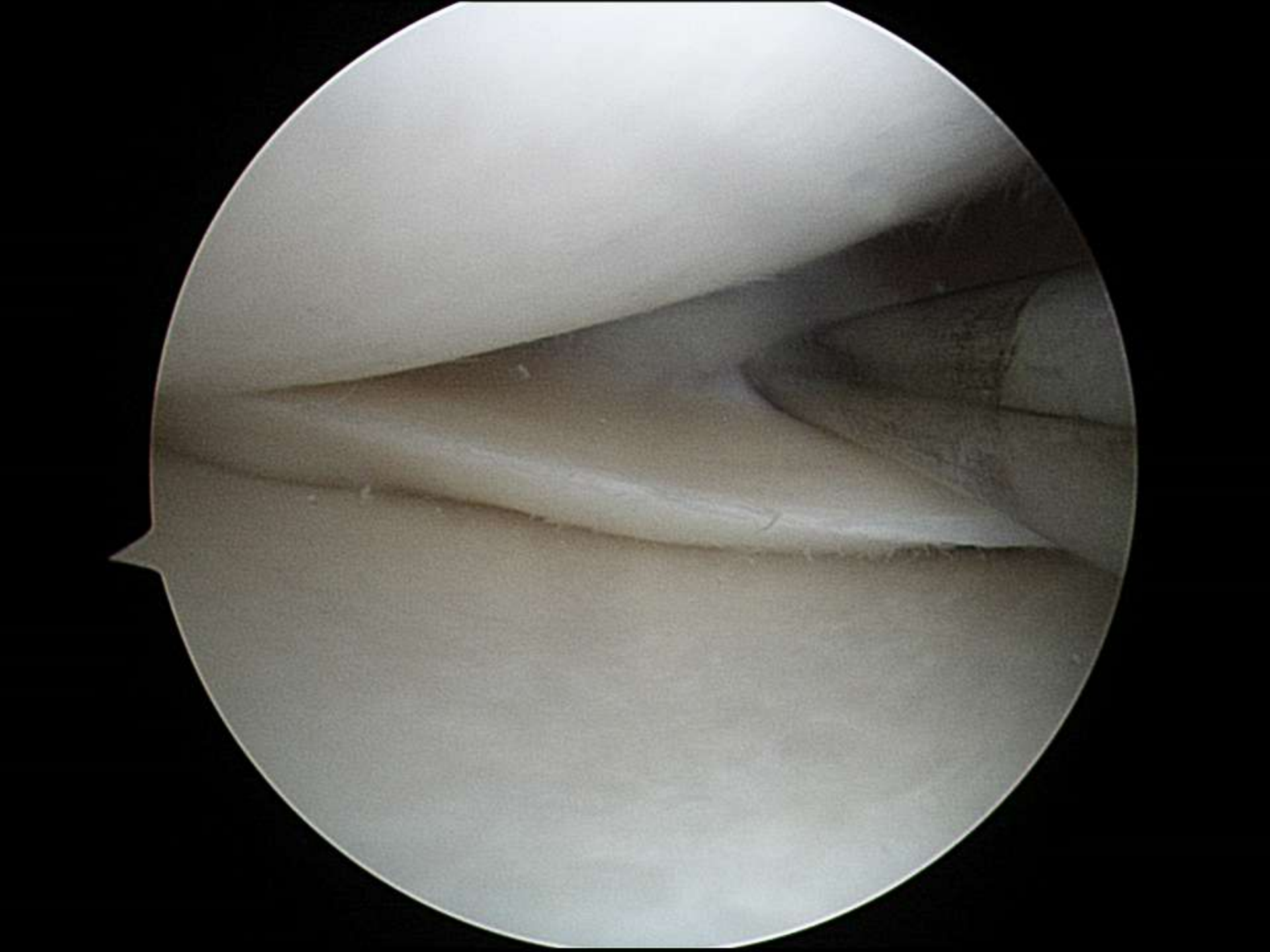
Meniscal repair steps

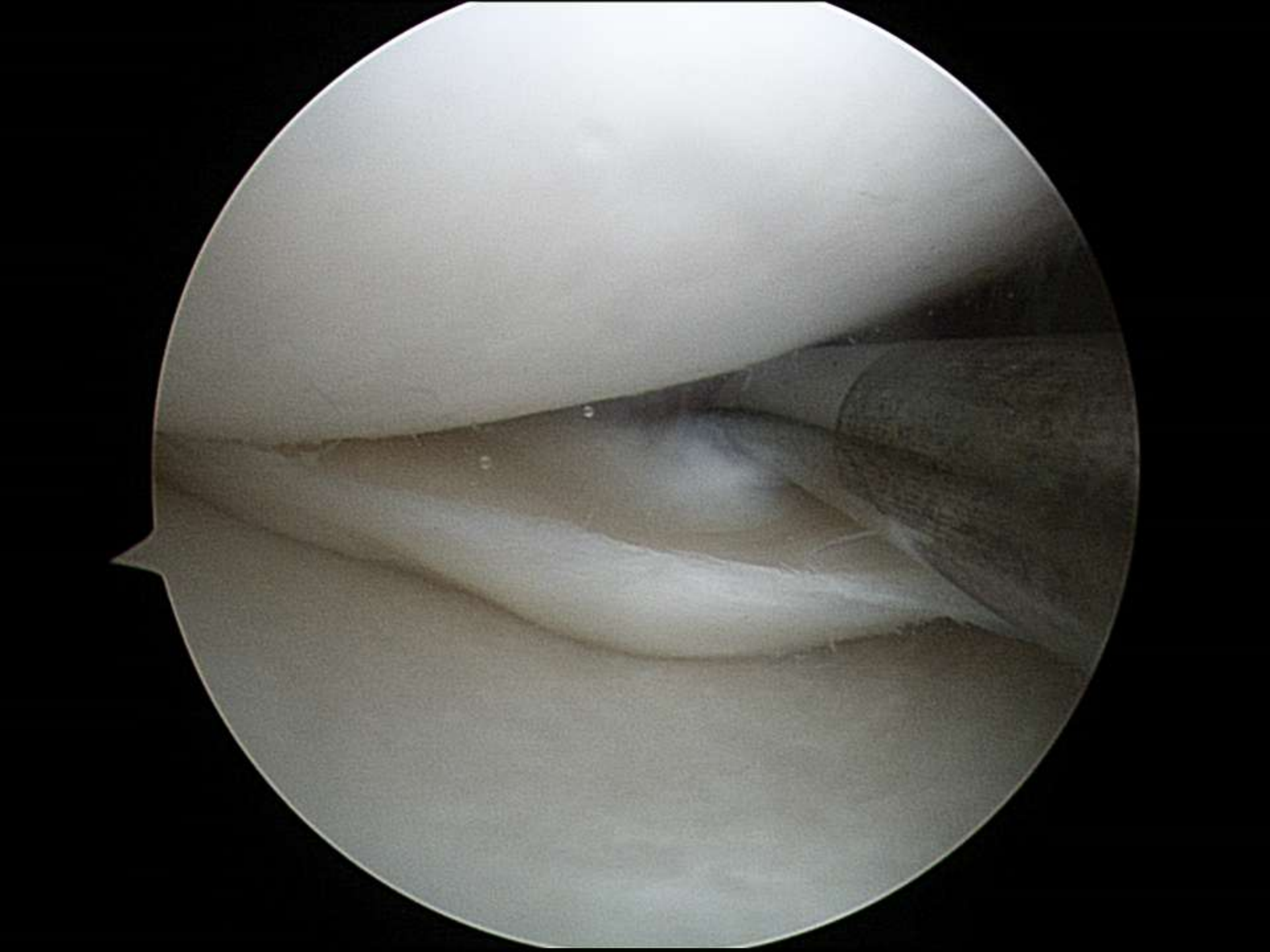
All-inside meniscal repair using Fast-fix

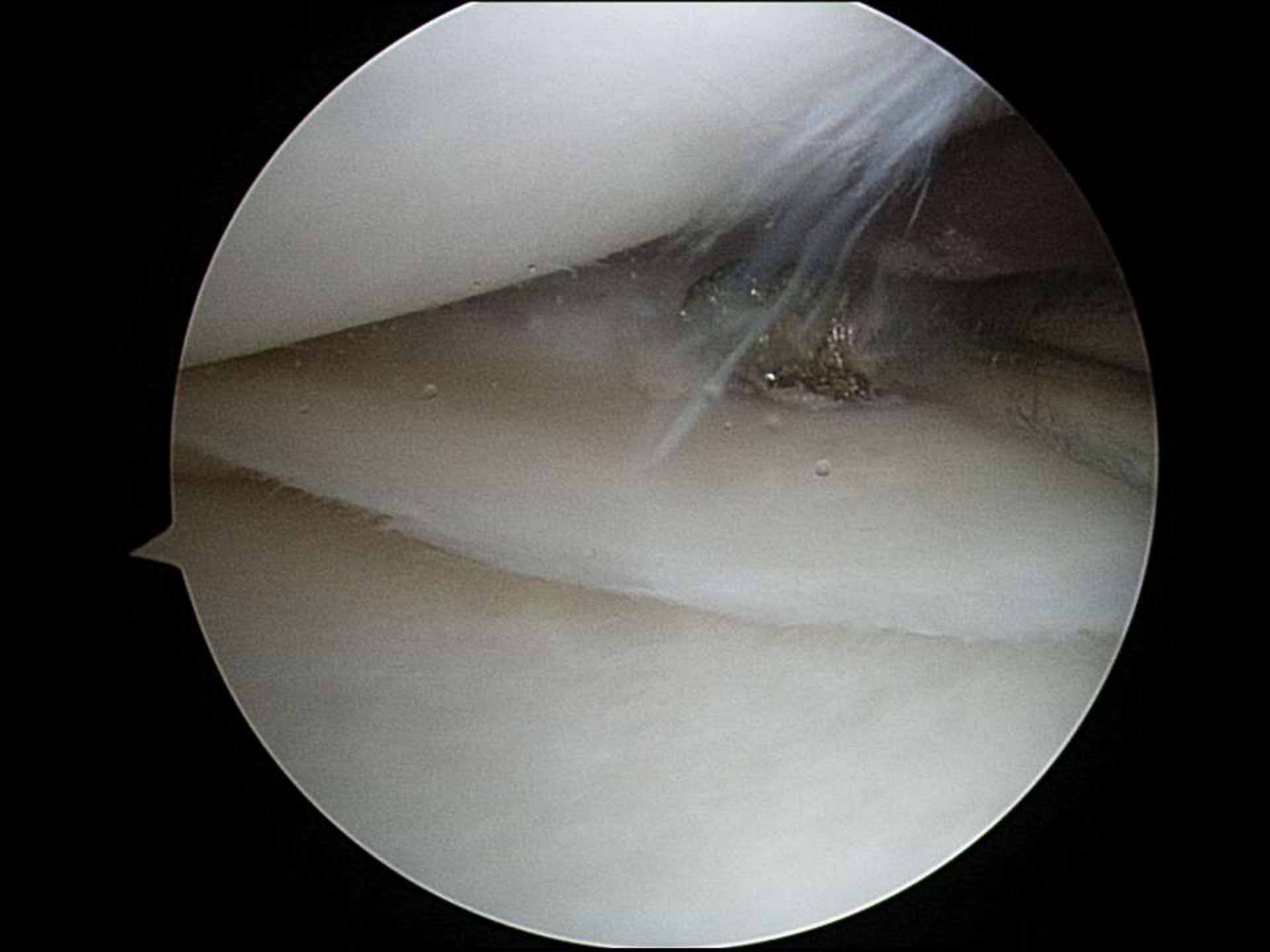


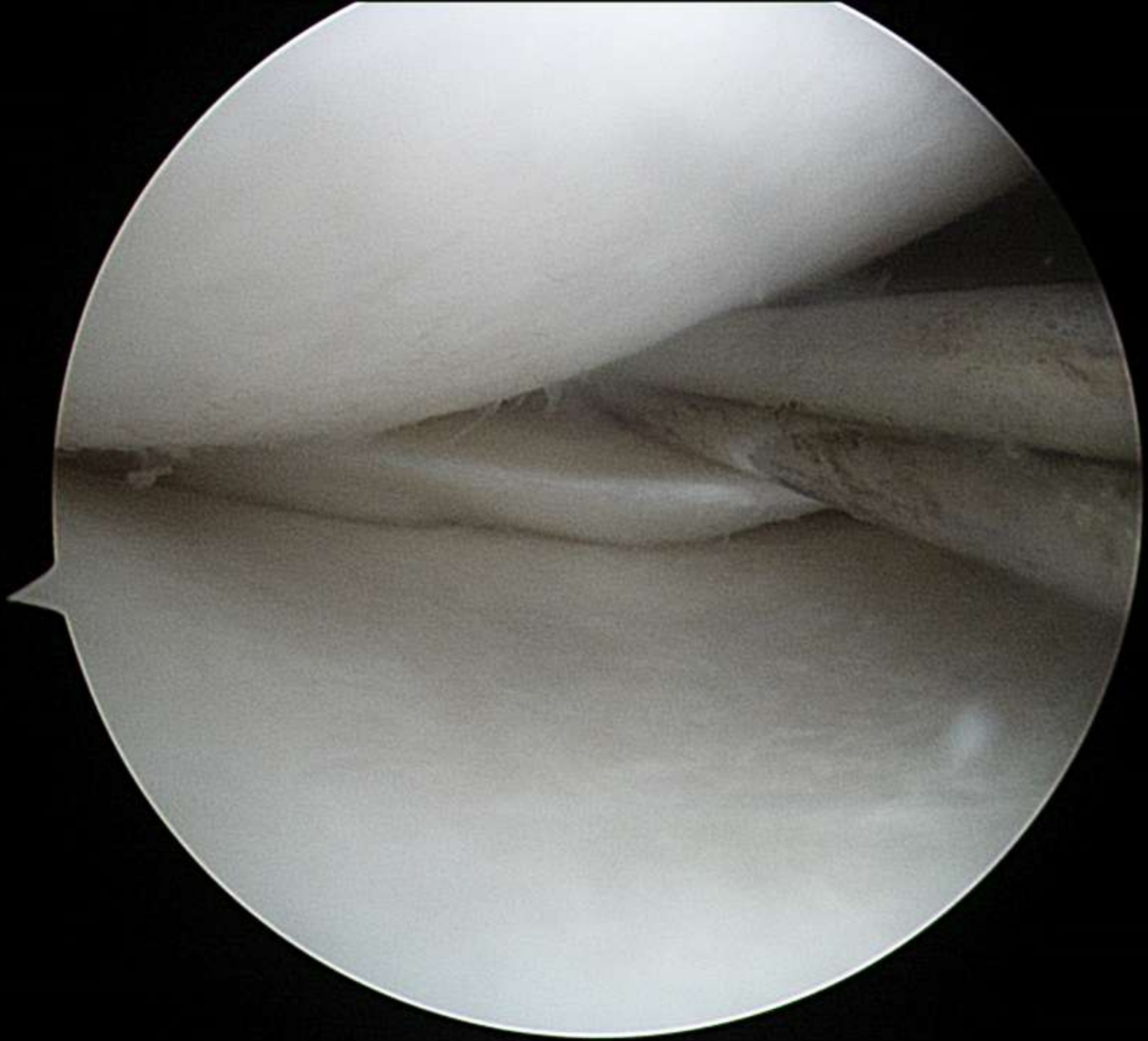

Depth Penetration Limiter
Split Cannula
FasT-Fix Delivery Needle, Straight
FasT-Fix Delivery Needle, Curved
Suture Cutter and Knot Pusher

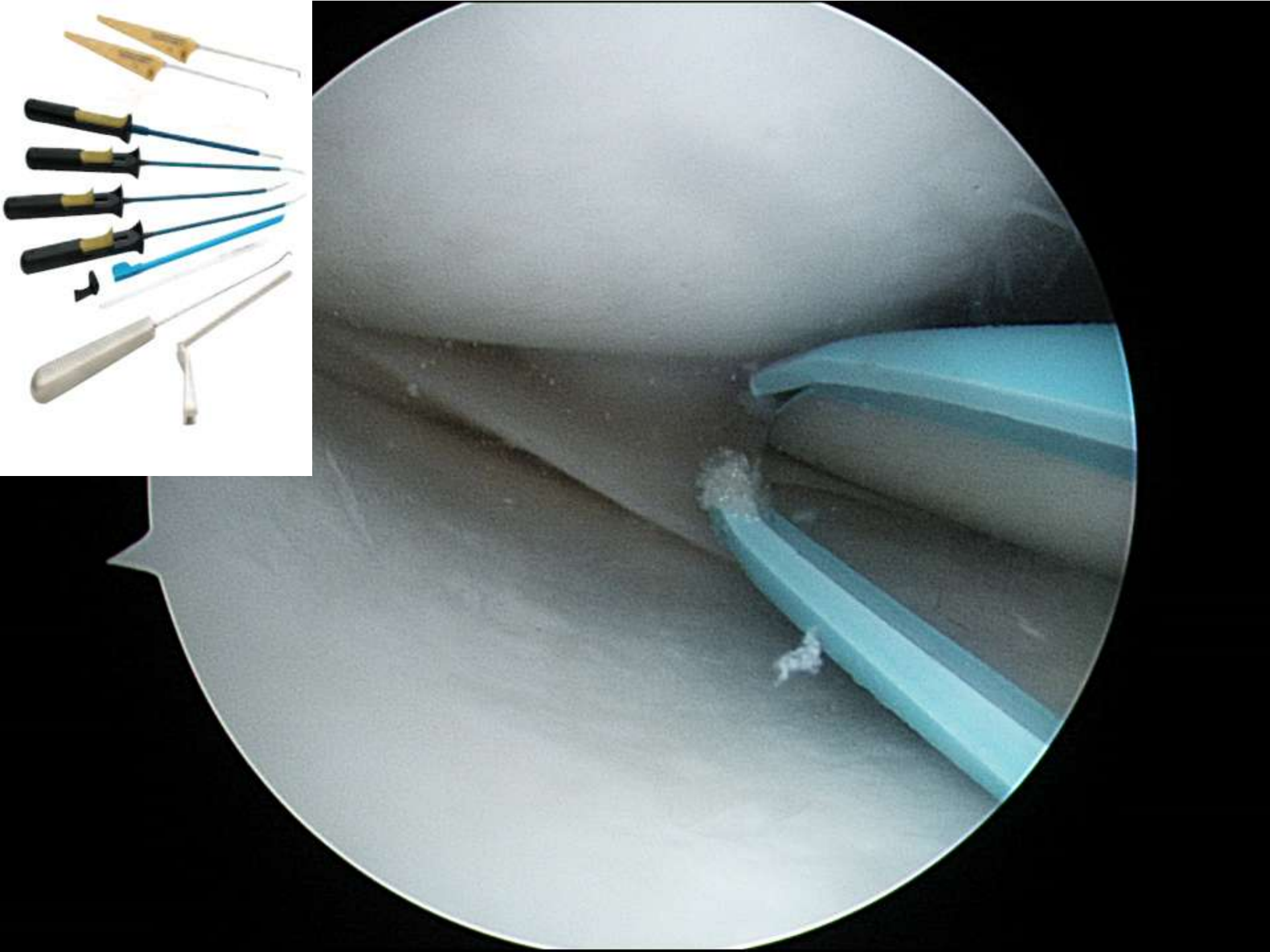


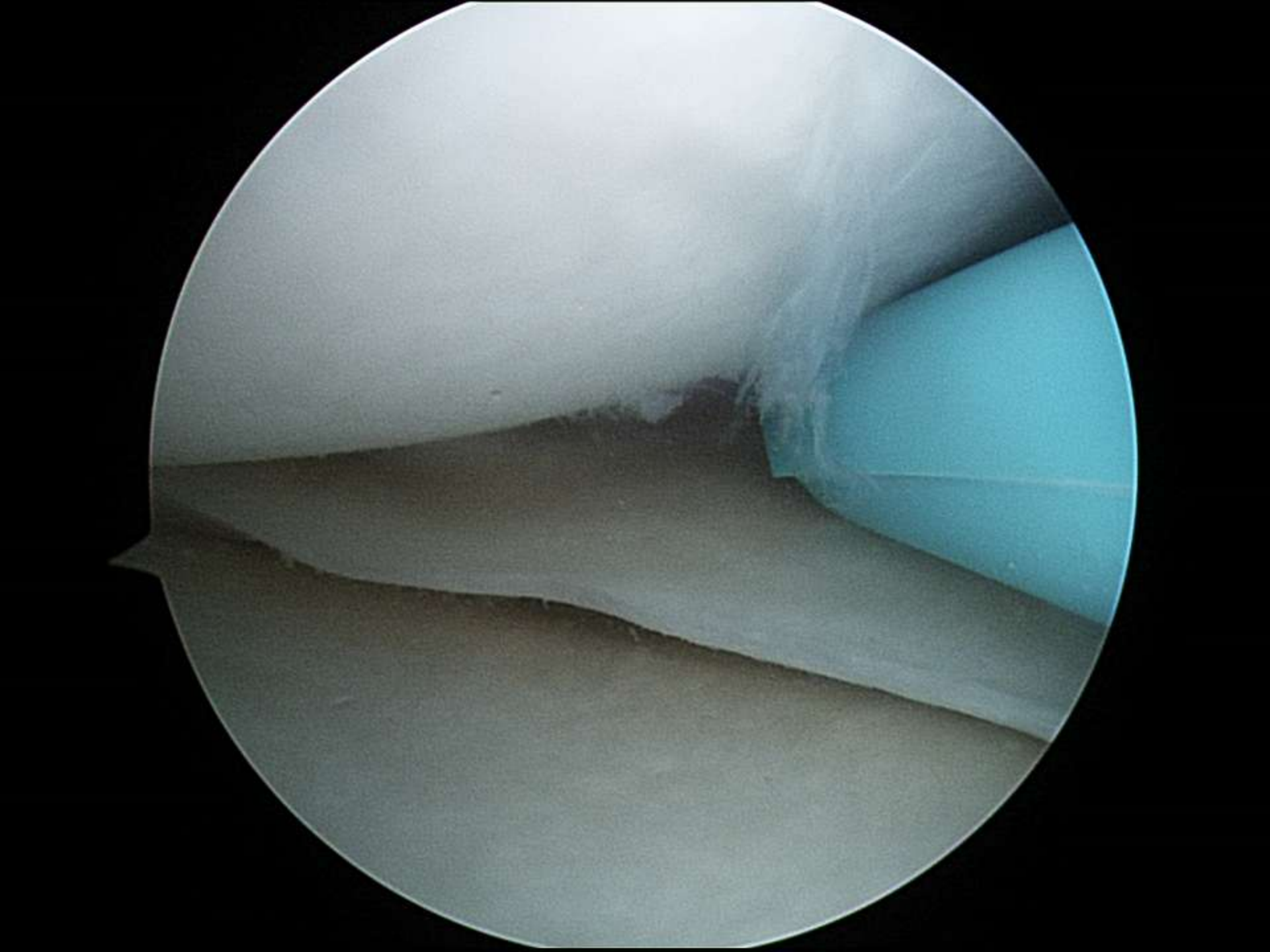


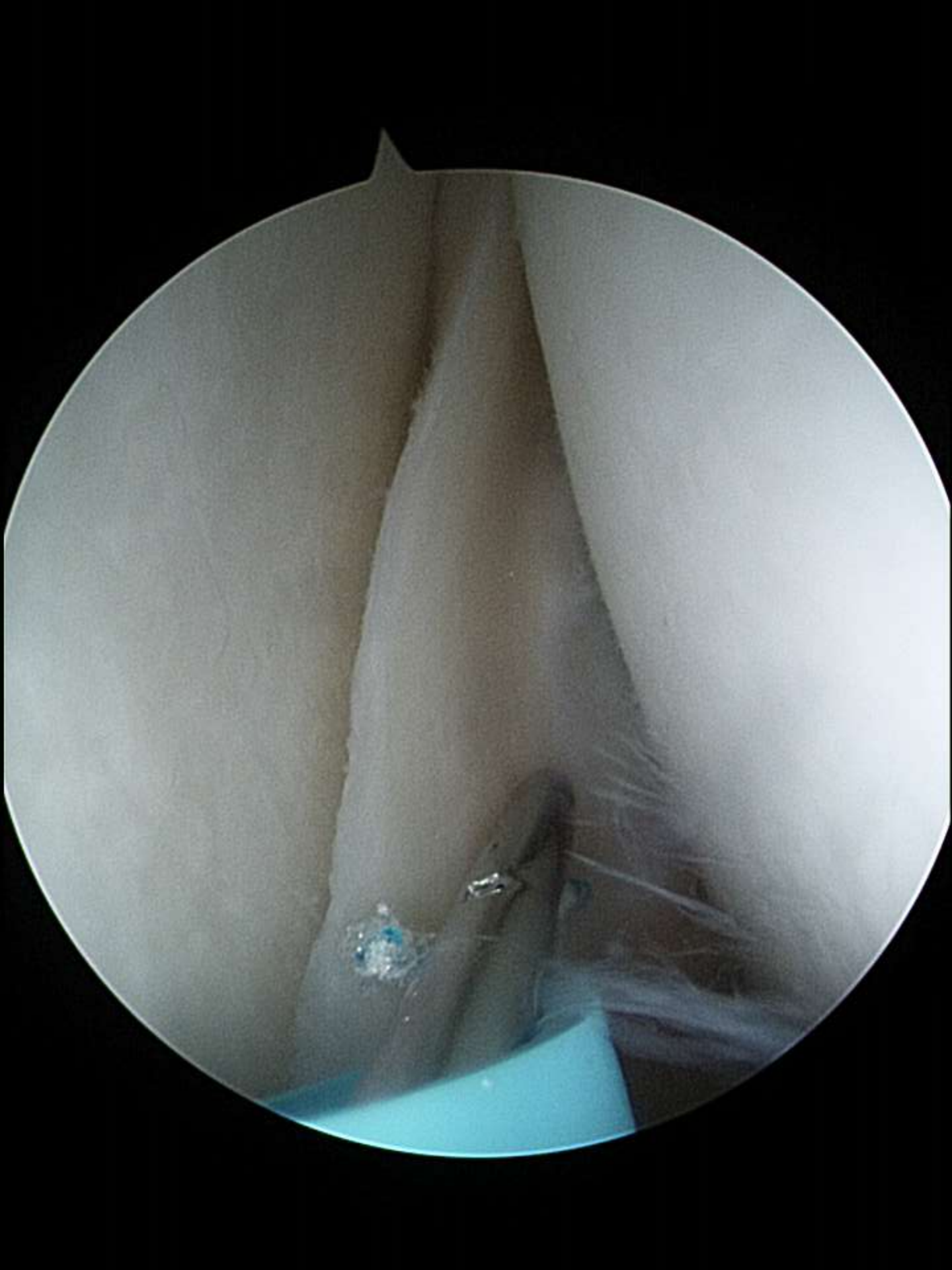


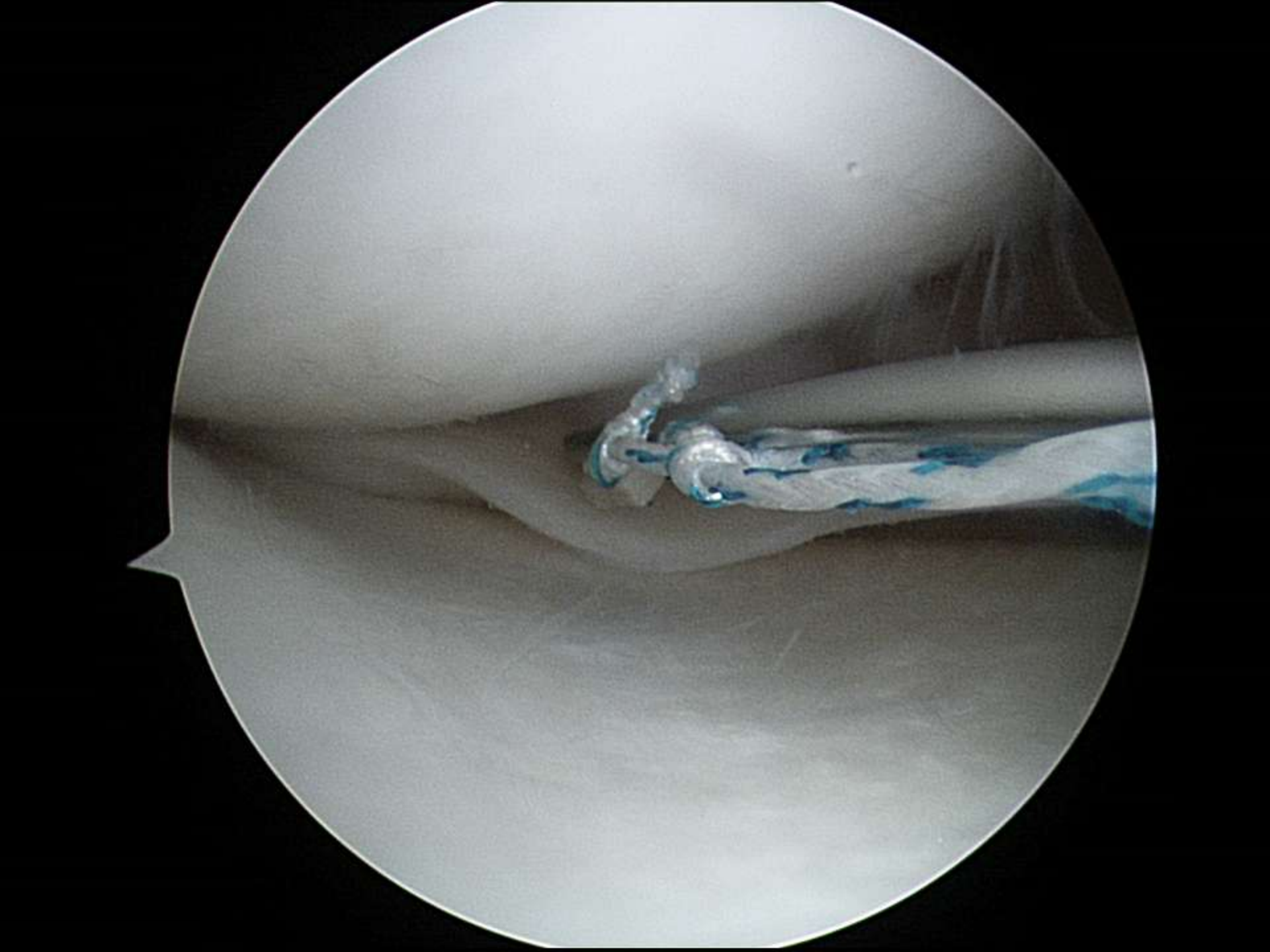


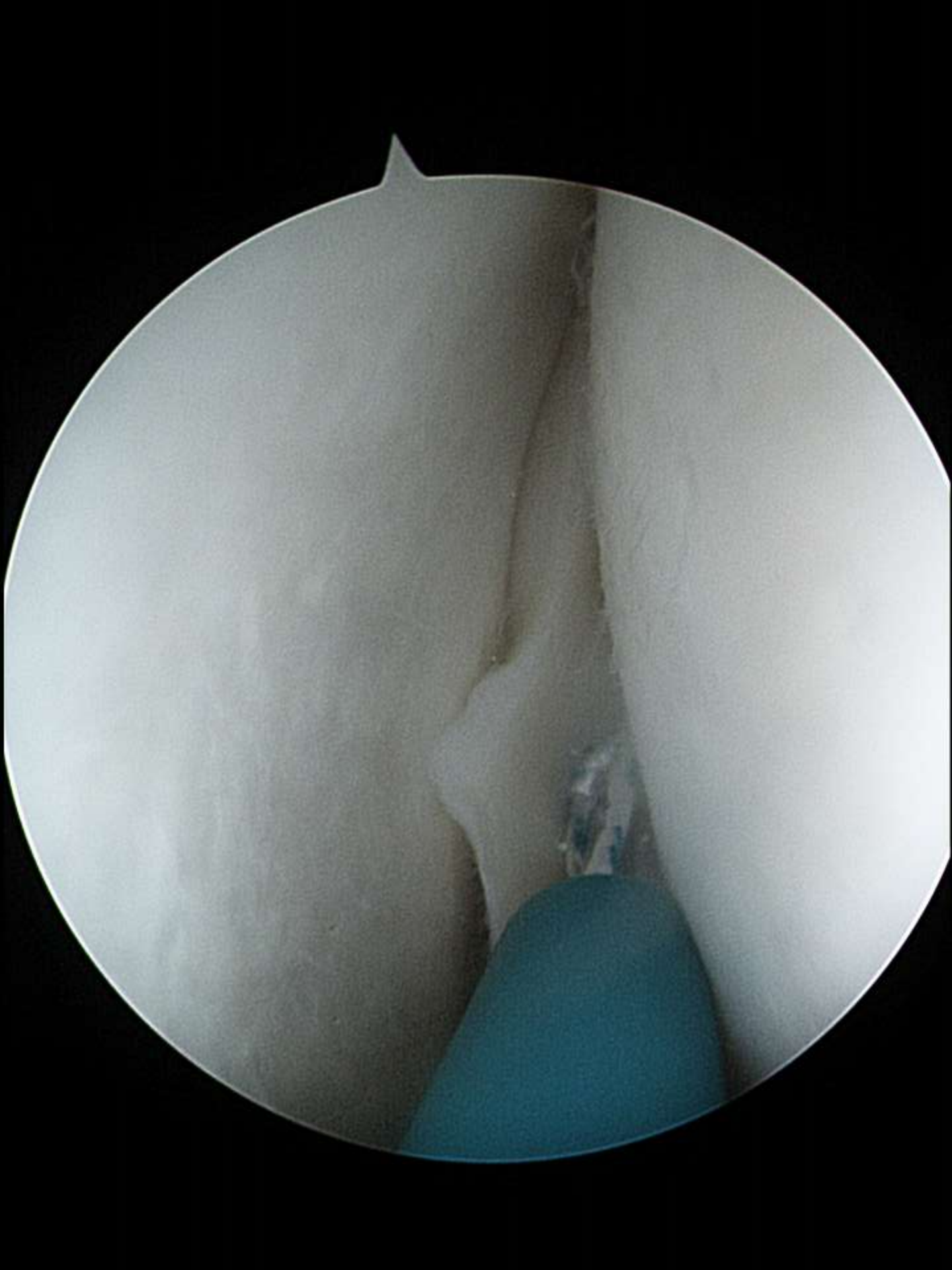


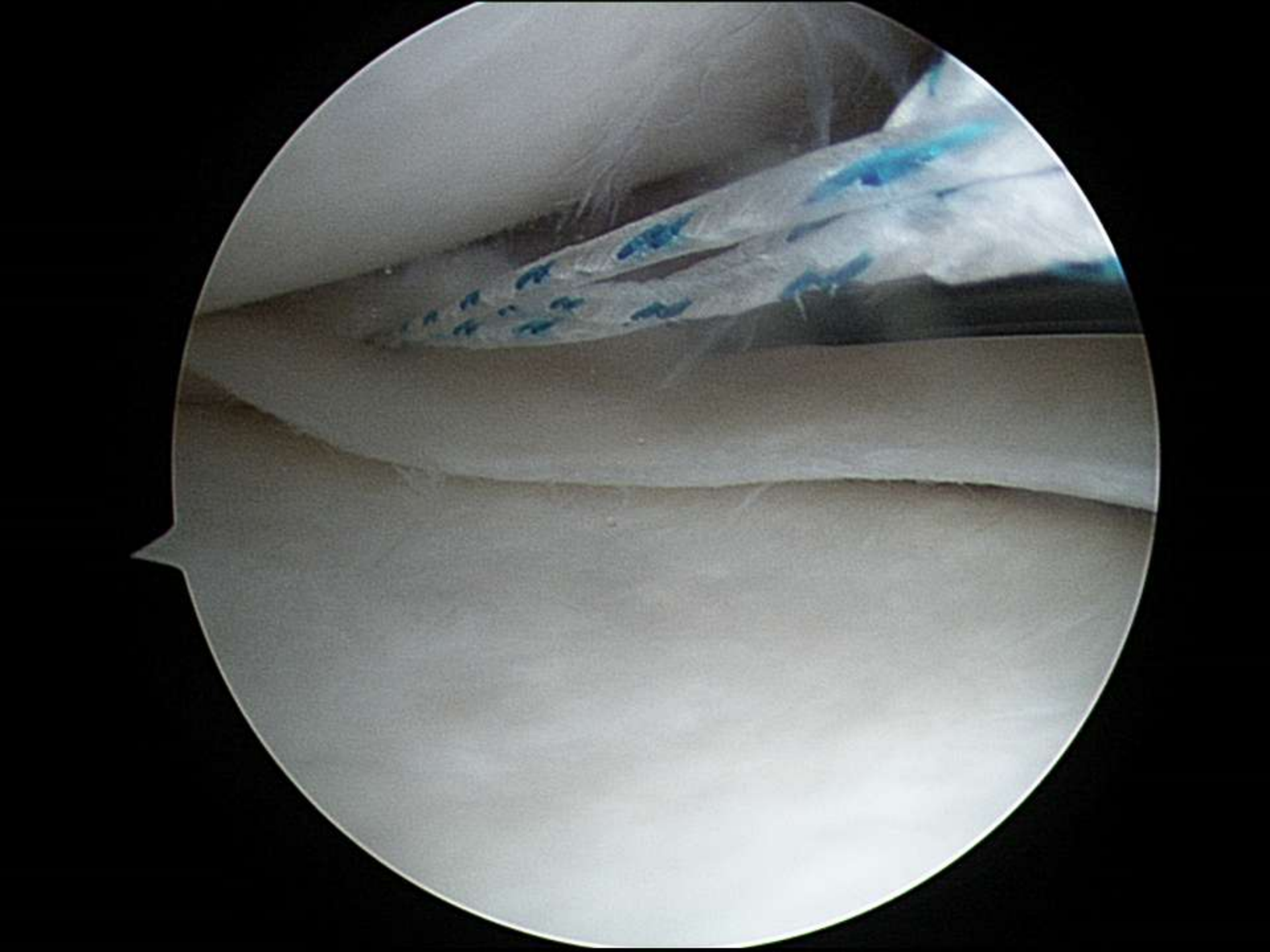


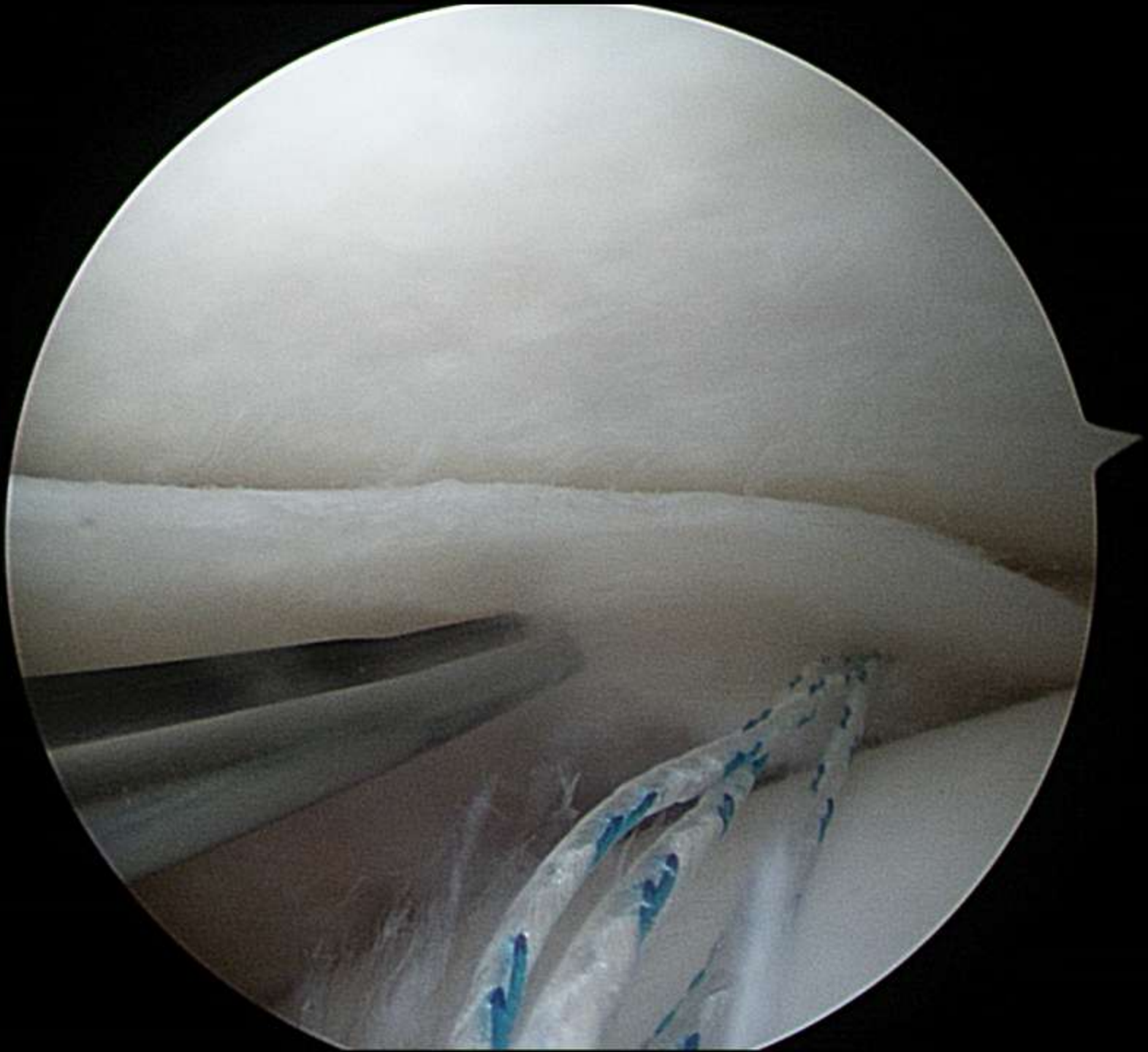


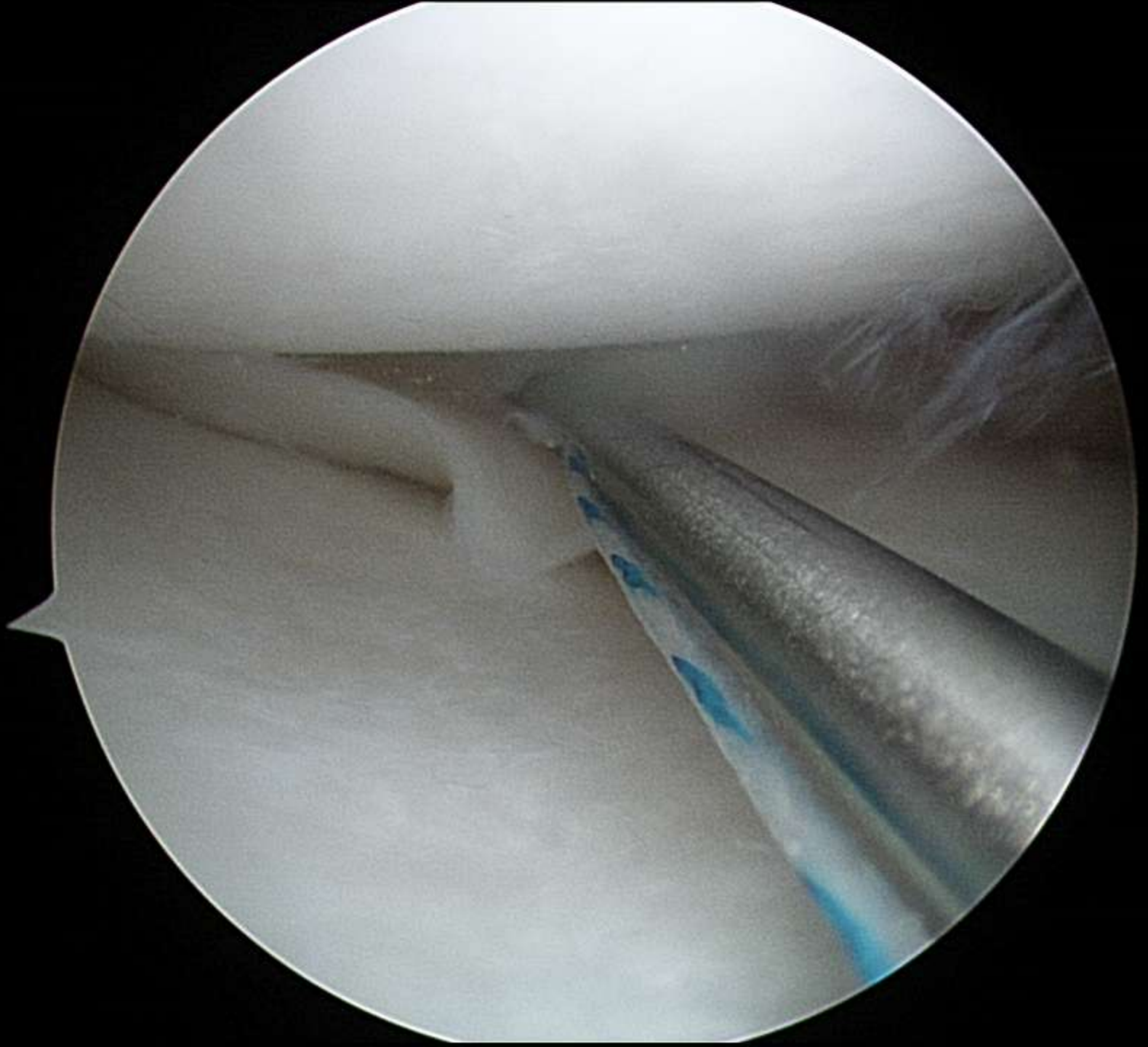


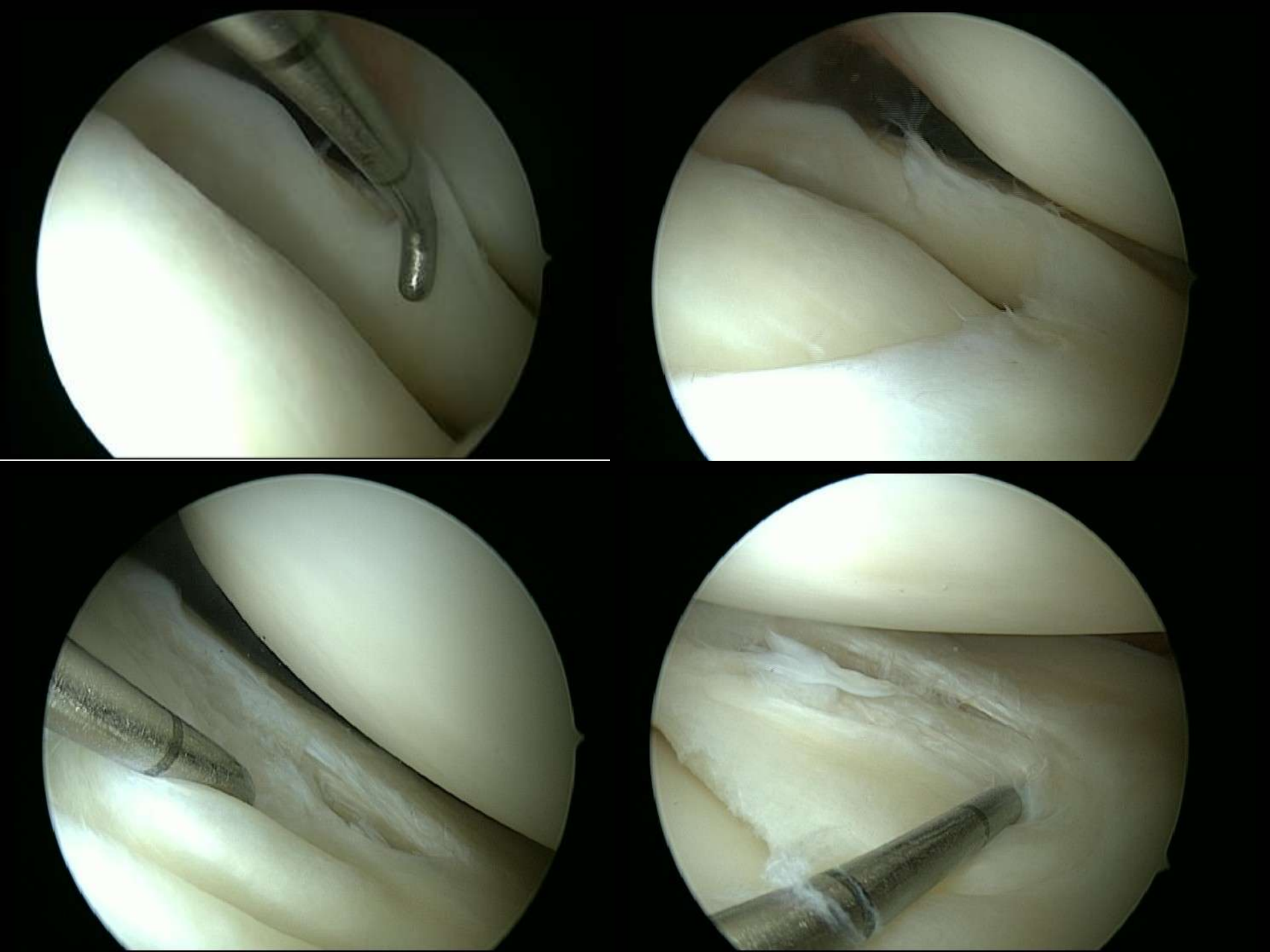




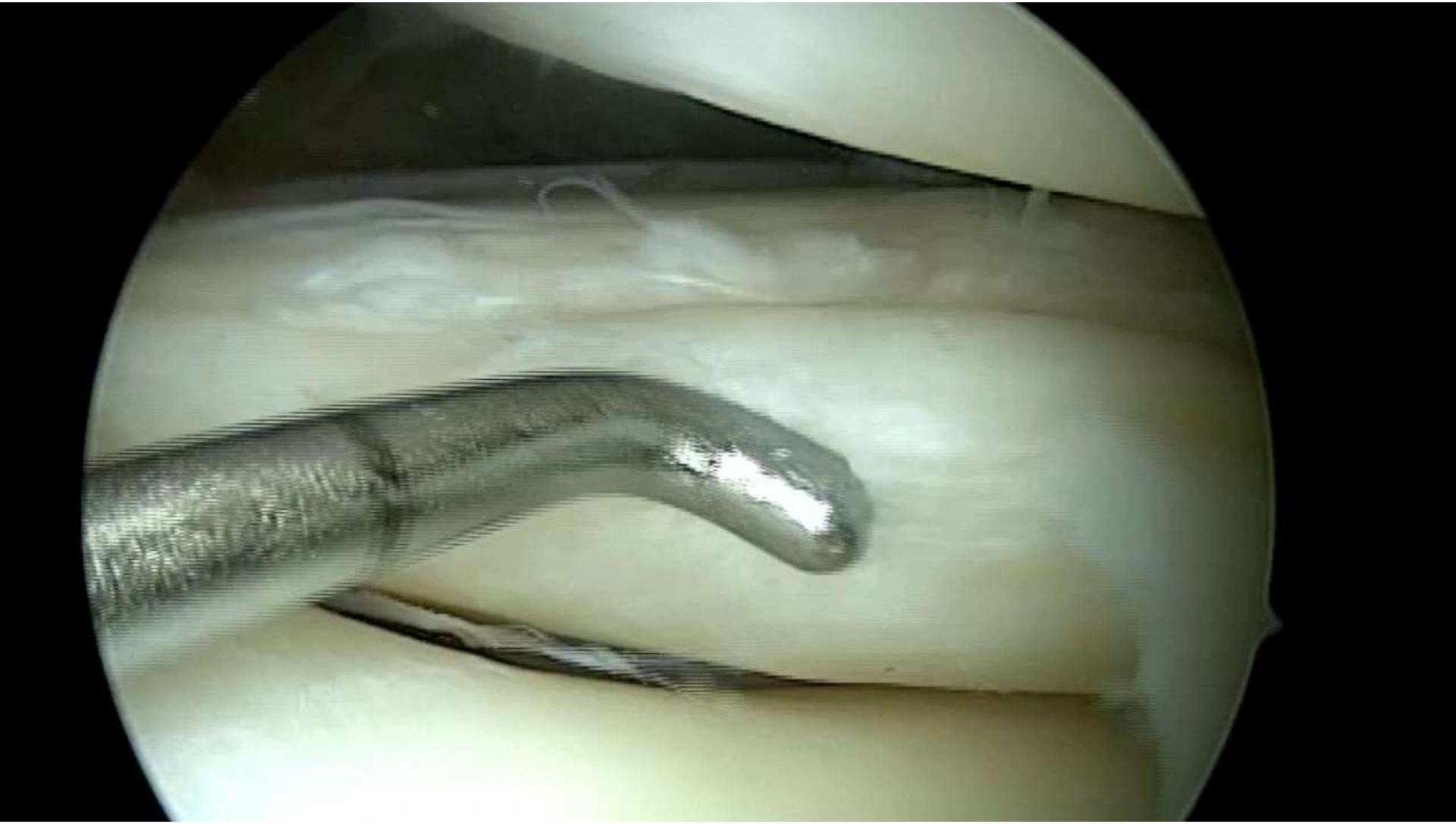








Meniscus repair



Questions?