Osteochondritis Dissecans

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CHOC Children's
Orthopaedic Institute

Osteochondritis Dissecans

- Developmental condition of the joint
  - Described by Paget as “quiet necrosis”
  - Named by Konig 1888
- Lesion of the articular cartilage & subchondral bone before closure of the growth plate

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Is it OCD?

- OCD vs Normal Variant of Ossification
- Normal Variants
  - Tend to be younger patients age <10
  - Tend to affect both condyles
  - Posterior aspect of condyle
  - Resolves as the child ages

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OCD Stats

- Highest rates
  - appear among patients aged between 10 and 15 y. Male-to-female ratio ~ 2:1
  - ADHD?
- Bilaterality
  - typically in different phases of development, are reported in 15% to 30% of cases

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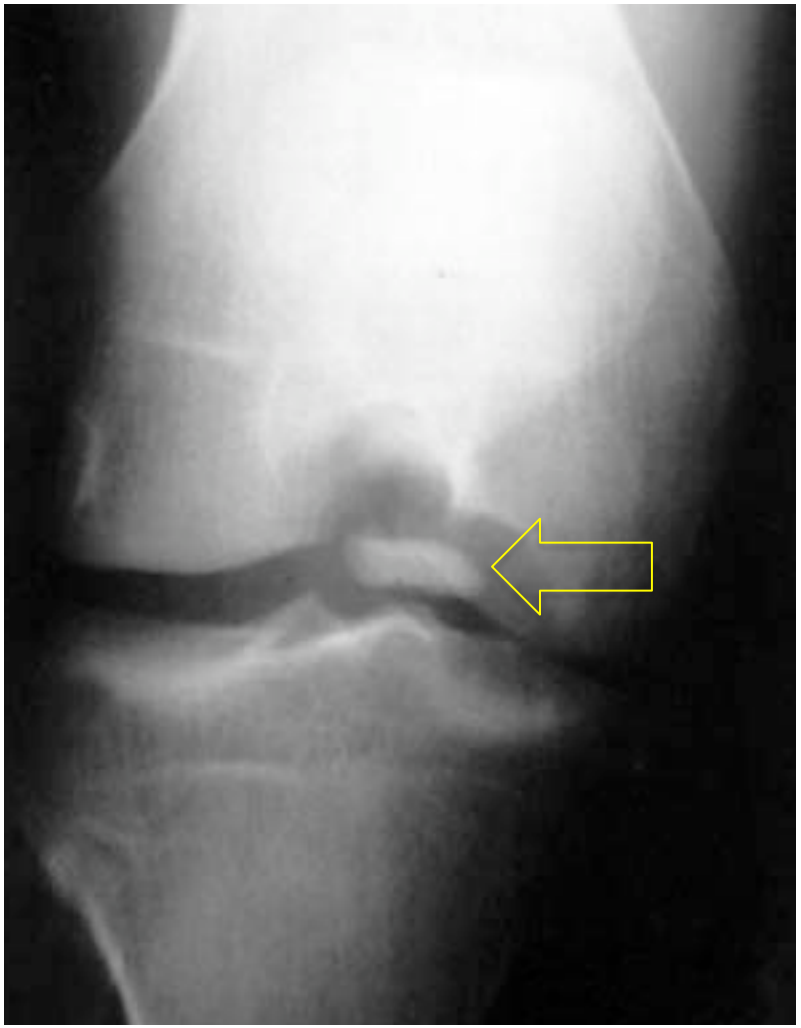
Osteochondritis Dissecans

- Etiology unknown
- Proposed causative factors:
  - Ischemia
  - heredity
  - mechanics (trauma)



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Osteochondritis Dissecans

- Repetitive mechanical trauma or stress, in highly active children & adolescents

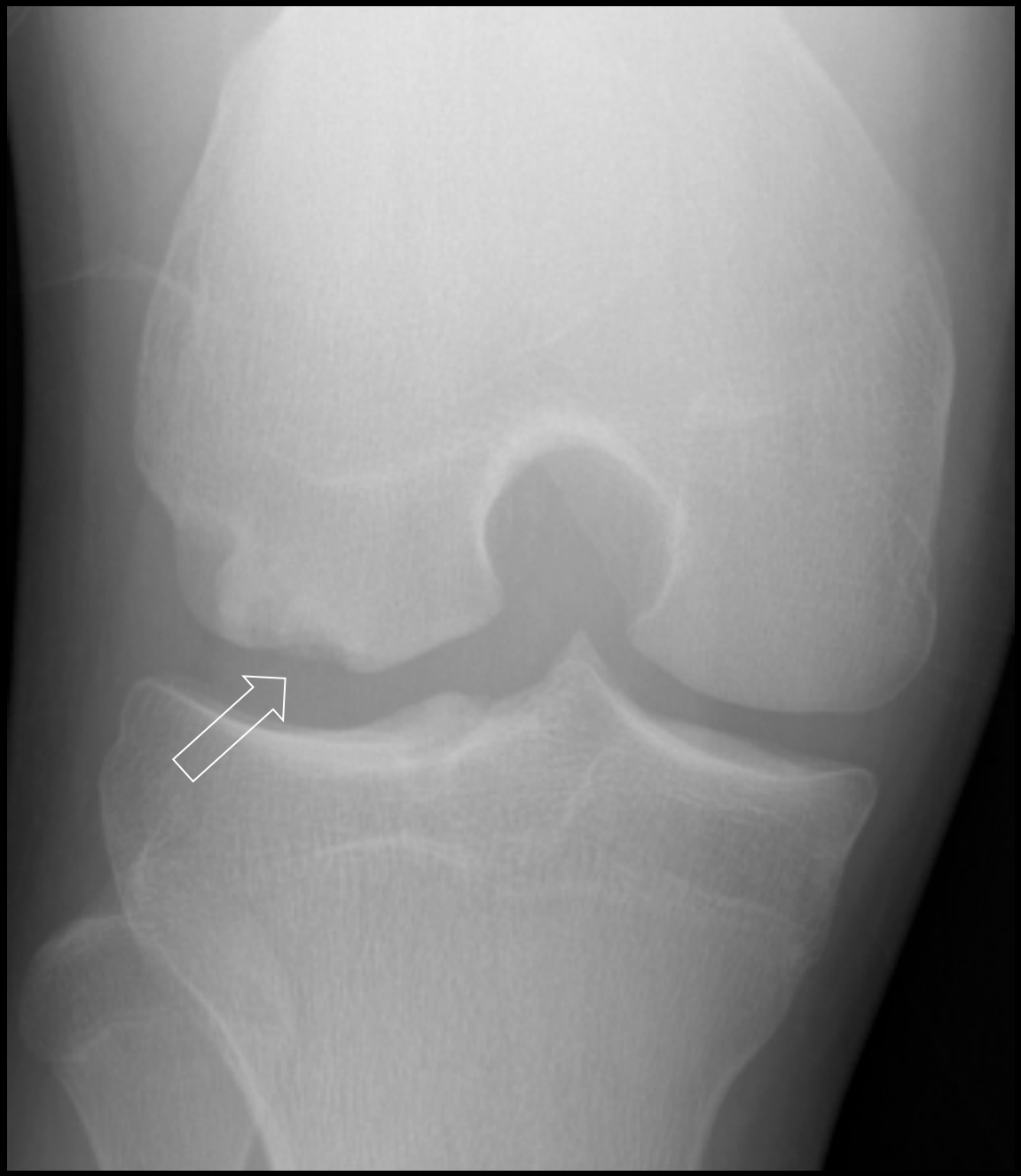
- Impaction of the tibial spine

Osteochondritis Dissecans

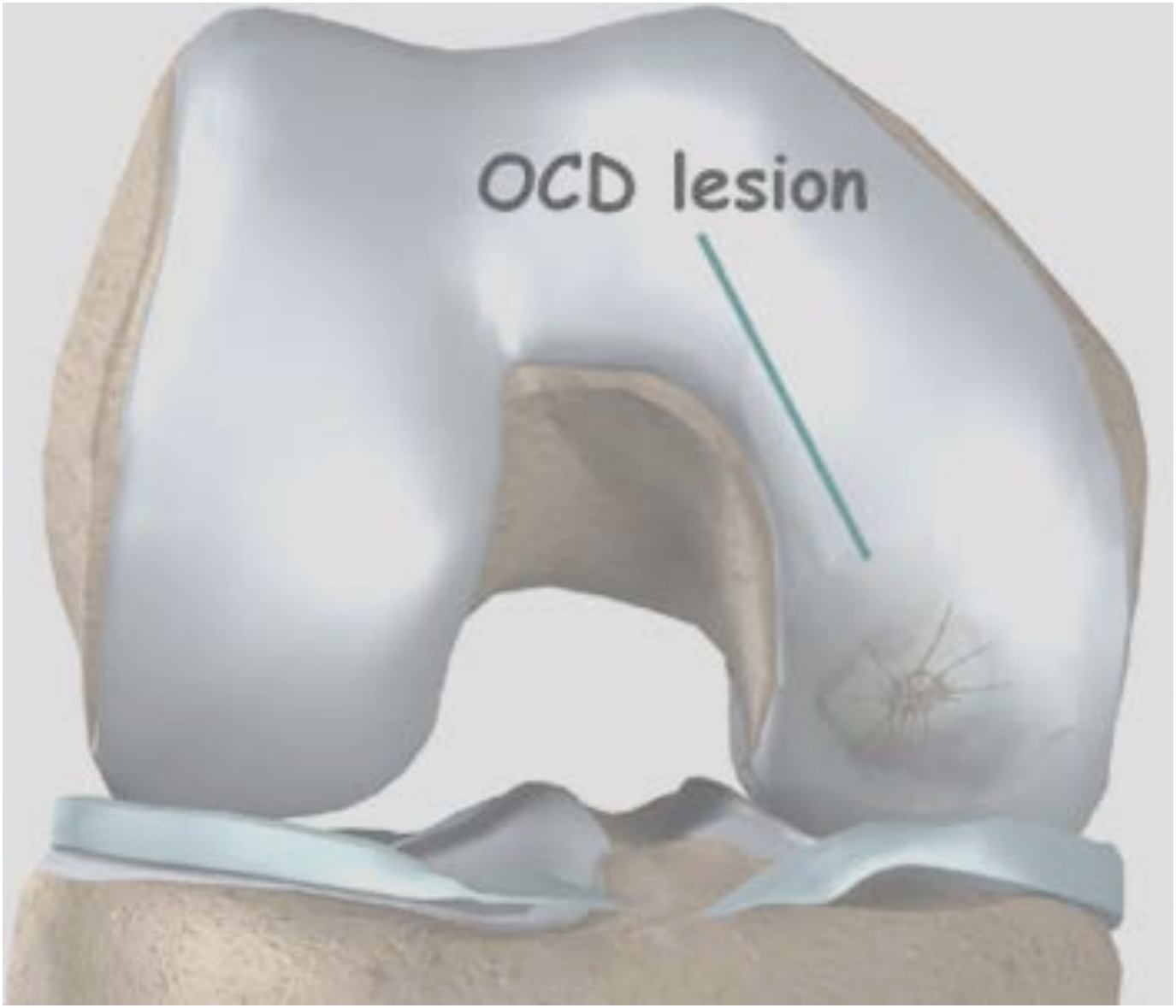
Symptoms, Signs & Imaging

- Nonspecific knee pain
- Activity-related
- Wilson test
- “tunnel view”
- MRI - stability of the subchondral bone, arthrography

AP view – does not always show OCD



Notch view – reveals OCD



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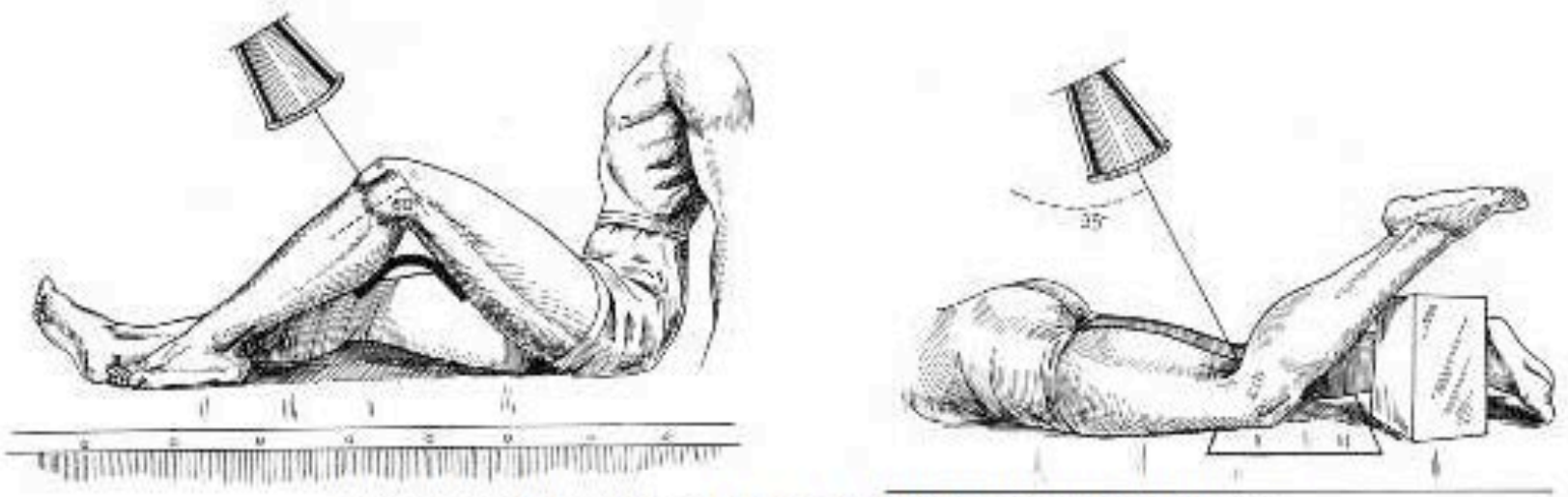
Basic Patient Position

Patient Prone, The patient lies prone on the table with the long axis of the leg aligned to the long axis of the table. The knee is flexed 45 degrees and the ankle supported.

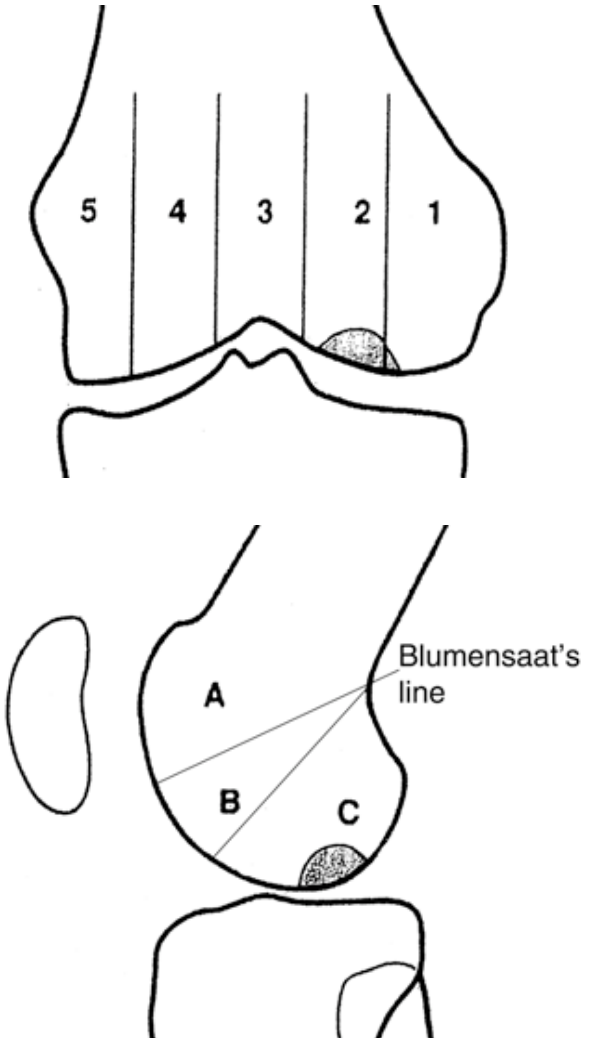
Patient supine, The patient sits on the table with the long axis of the leg aligned to the long axis of the table, the knee is flexed 45 degrees.



Knee notch views PA and AP Patient Positions

Location

- Cahill described a method of localizing lesions by dividing the knee into 15 distinct alphanumeric zones



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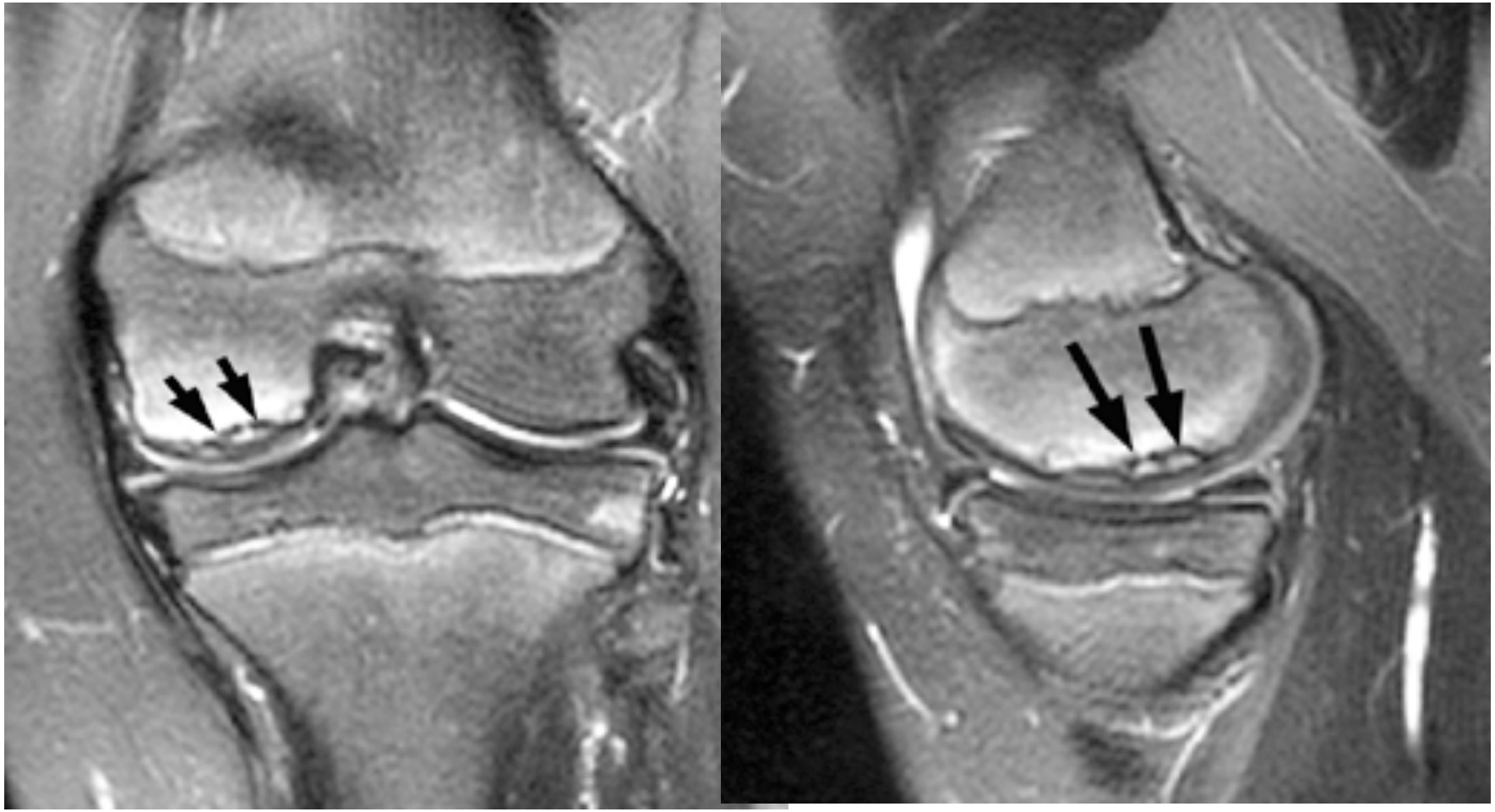
Am J Sports Med 1983;11: 329-335.

Osteochondritis Dissecans

Symptoms, Signs & Imaging



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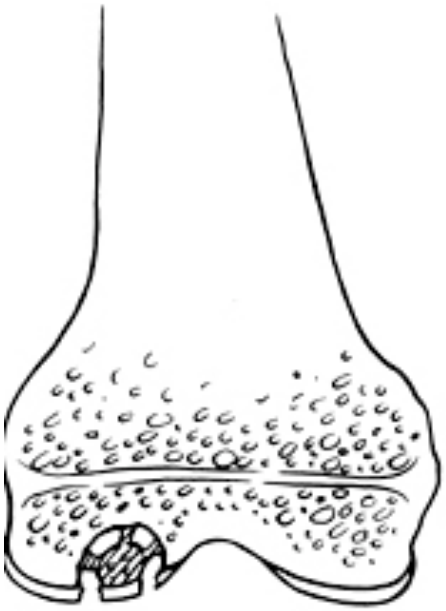
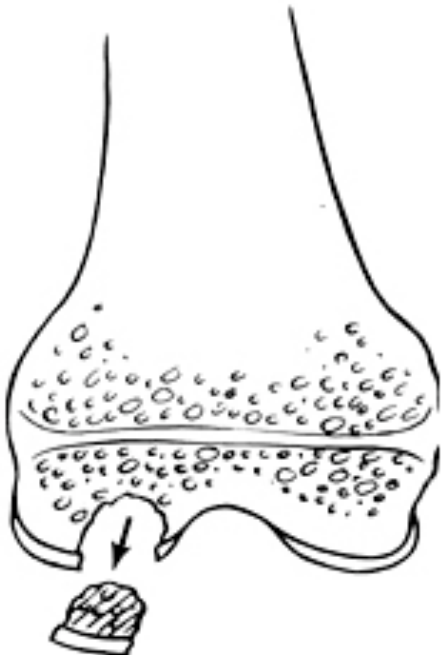
Osteochondritis Dissecans
MRI Staging

Hefti et al. JPO-B 1999

- Stage I: Signal change, NO clear margin
- Stage II: Clear margin, NO Dissection
- Stage III: Partial Dissection of fluid
- Stage IV: Complete Dissection, Fragment In Situ
- Stage V: Free Fragment

Hefti et al. JPO-B 1999





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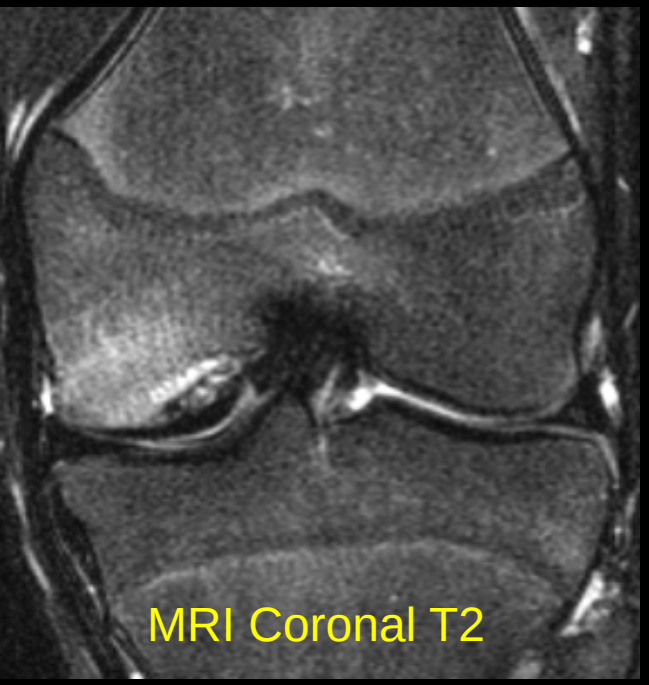
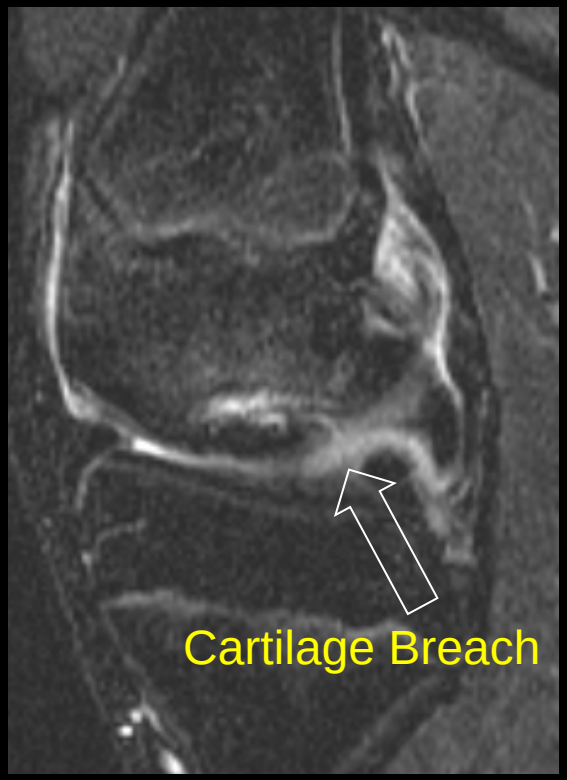
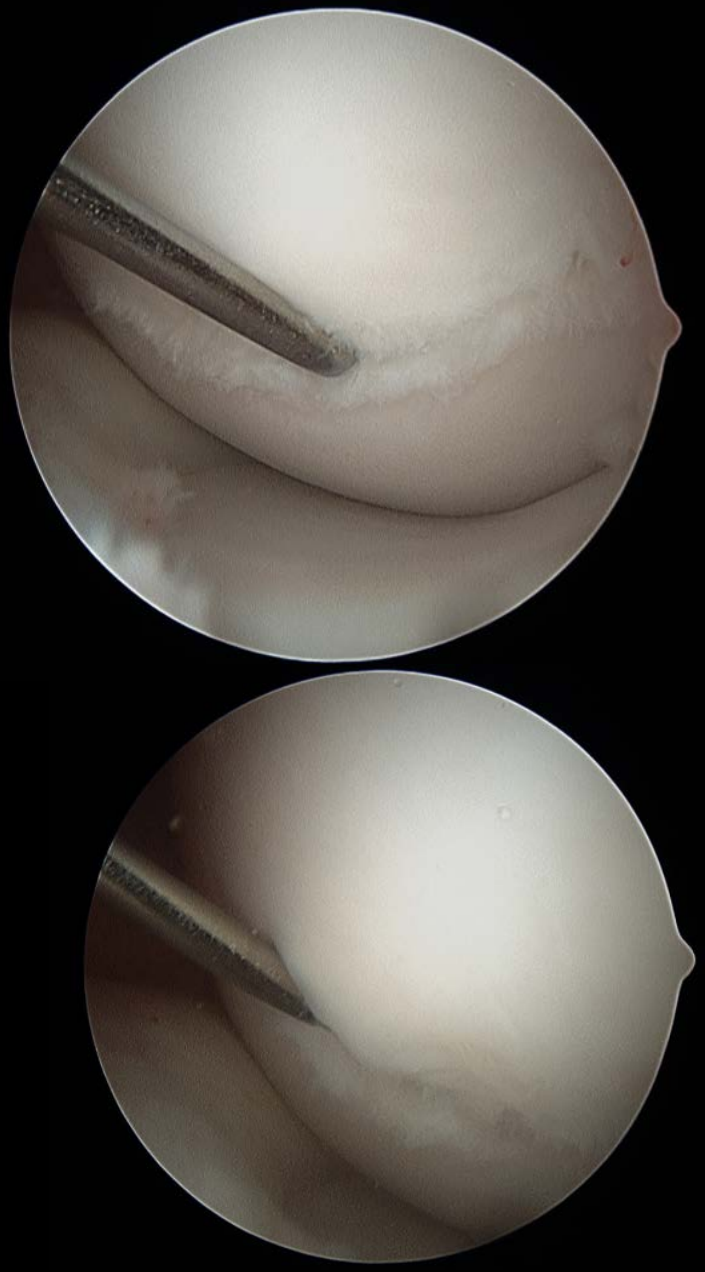
Case Example – Hefti 3

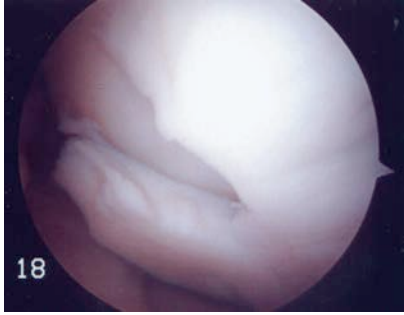






Osteochondritis Dissecans

Natural History



- Patients with open physes fare better than adults.
- Stable at the time of presentation - better
- Patients who are less active have a better result
- Patients with unstable lesions do better with surgery than did those with nonoperative treatment

AAOS Clinical Practice Guideline Summary

Diagnosis and Treatment of Osteochondritis Dissecans

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May 2011, Vol 19, No 5

AAOS Clinical Practice Guidelines

- Consensus recommendations

- In the absence of reliable evidence, it is the opinion of the work group that

symptomatic skeletally immature patients with salvageable unstable or displaced OCD lesions be offered the option of surgery.

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AAOS Clinical Practice Guidelines

- Consensus recommendations

- In the absence of reliable evidence, it is the opinion of the work group that:

symptomatic skeletally mature patients with salvageable unstable or displaced OCD lesions be offered the option of surgery

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AAOS Clinical Practice Guidelines

- Consensus recommendations

- In the absence of reliable evidence, it is the opinion of the work group that

patients who remain symptomatic after treatment for OCD have a history and physical examination, x-rays, and/or MRI to assess healing.

AAOS Clinical Practice Guidelines

- Consensus recommendations

- In the absence of reliable evidence, it is the opinion of the work group that

patients who have received surgical treatment of OCD be offered postoperative physical therapy.

AAOS Clinical Practice Guidelines

- Unable to recommend for or against x-rays on the contralateral asymptomatic knee in patients with confirmed OCD of one knee

AAOS Clinical Practice Guidelines

- Although there is a belief that nonsurgical treatment (eg, casting, bracing, splinting, unloader braces, electrical or ultrasound bone stimulators, activity restriction) would be an option, no prospective studies have determined the efficacy of any of these methods. In fact, no one treatment method for either the stable or unstable lesions has demonstrated superiority.

Osteochondritis Dissecans

Treatment Recommendations

- Open physis + “stable” lesion = Nonoperative treatment
  - Immobilization?
  - Non-weight-bearing cast ~ 4-6w
  - Refraining from sports for 6 months may be efficacious
  - ? Unloader Brace
- X-ray - evaluate bridging of bone
  - @ 3 month intervals
- MRI follow up - 6 mo intervals

Will it Heal?

The Healing Potential of Stable Juvenile Osteochondritis Dissecans Knee Lesions

By Eric J. Wall, MD, Jason Vourazeris, BS, Gregory D. Myer, MS, CSCS, Kathleen H. Emery, MD, Jon G. Divine, MD, Todd G. Nick, PhD, and Timothy E. Hewett, PhD

Investigation performed at Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

Wall E et al. J Bone Joint Surg Am. 2008;90:2655-64

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The Healing Potential of Stable Juvenile Osteochondritis Dissecans Knee Lesions

By Eric J. Wall, MD, Jason Vourazeris, BS, Gregory D. Myer, MS, CSCS, Kathleen H. Emery, MD, Jon G. Divine, MD, Todd G. Nick, PhD, and Timothy E. Hewett, PhD

- 6-12w cylinder/LL cast WB → un-loader brace and activity restriction
- X ray F/U q 6 w
- In 2/3 of immature patients, 6m of non op tx → progressive healing of stable OCD lesions.
  - After 6 months of non-op tx, 16/47 (34%) stable lesions failed to progress toward healing.
  - Lesions with an increased size and associated swelling and/or mechanical symptoms at presentation are less likely to heal.

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J Bone Joint Surg Am. 2008;90:2655-64

Their Protocol

- 6 wks of weight-bearing immobilization in a cylinder or long-leg cast.
- X-ray after six weeks of immobilization showed no reossification of the lesion, the patient continued to wear the cast for four to six additional weeks after three to seven days out of the cast to regain full knee motion.

Wall E et al. J Bone Joint Surg Am. 2008;90:2655-64

Their Protocol

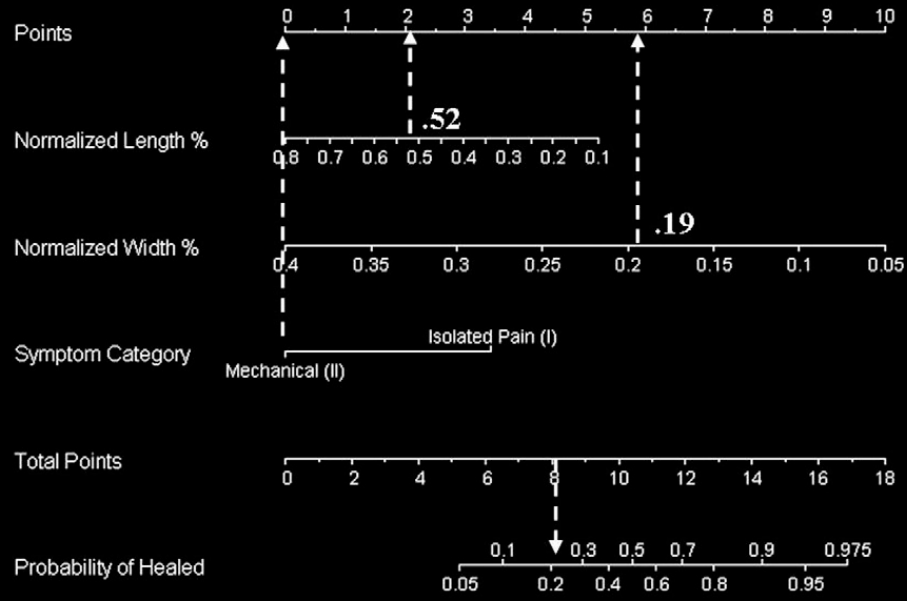
- After casting, the patient was managed with a weight-bearing osteoarthritis brace (CounterForce Brace; Breg, Vista, California) that was adjusted to unload the involved compartment

Wall E et al. J Bone Joint Surg Am. 2008;90:2655-64

Their Protocol

- Running, jumping and sports initially restricted during initial bracing
- Patient was slowly advanced back to full activity while wearing the brace if the lesion showed progression toward healing.
- After total reossification of the lesion, the patient was allowed unrestricted activity without bracing.

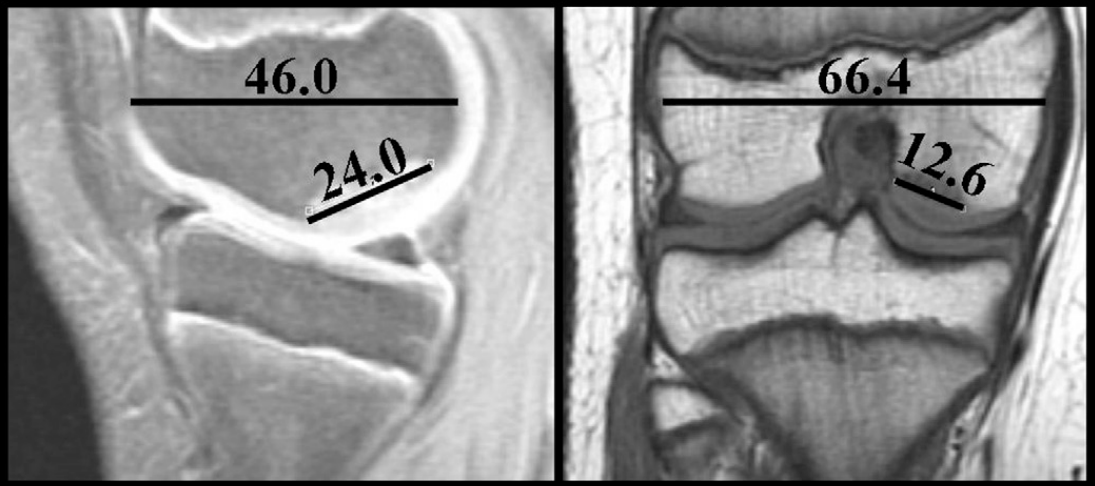
Wall E et al. J Bone Joint Surg Am. 2008;90:2655-64



Points
2
6
0

8 Total Points

21% probability of healed status



Normalized Length

24.0 ÷ 46.0 = .52

Normalized Width

12.6 ÷ 66.4 = .19

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Early bracing may beat casting for JOCD

Multicenter

- 112 knees (103 patients)
- Treatment groups
  - PT & activity modification (37 knees)
  - Unloader bracing + PT and activity modification (45)
  - Casting + PT and activity modification (30 knees)
- 62.5 % (70) of the lesions healed
  - PT & activity modification (22) 59.5% healed
  - *Brace + PT and activity mod (32) 71% healed*
  - Cast + PT and activity modification (16) 53% healed

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Ganley, Kocher (AAOS 2010)

Osteochondritis Dissecans

Treatment Recommendations

- Failure to heal after non-op tx. of 6 mo. / unstable = arthroscopic evaluation & treatment

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Osteochondritis Dissecans

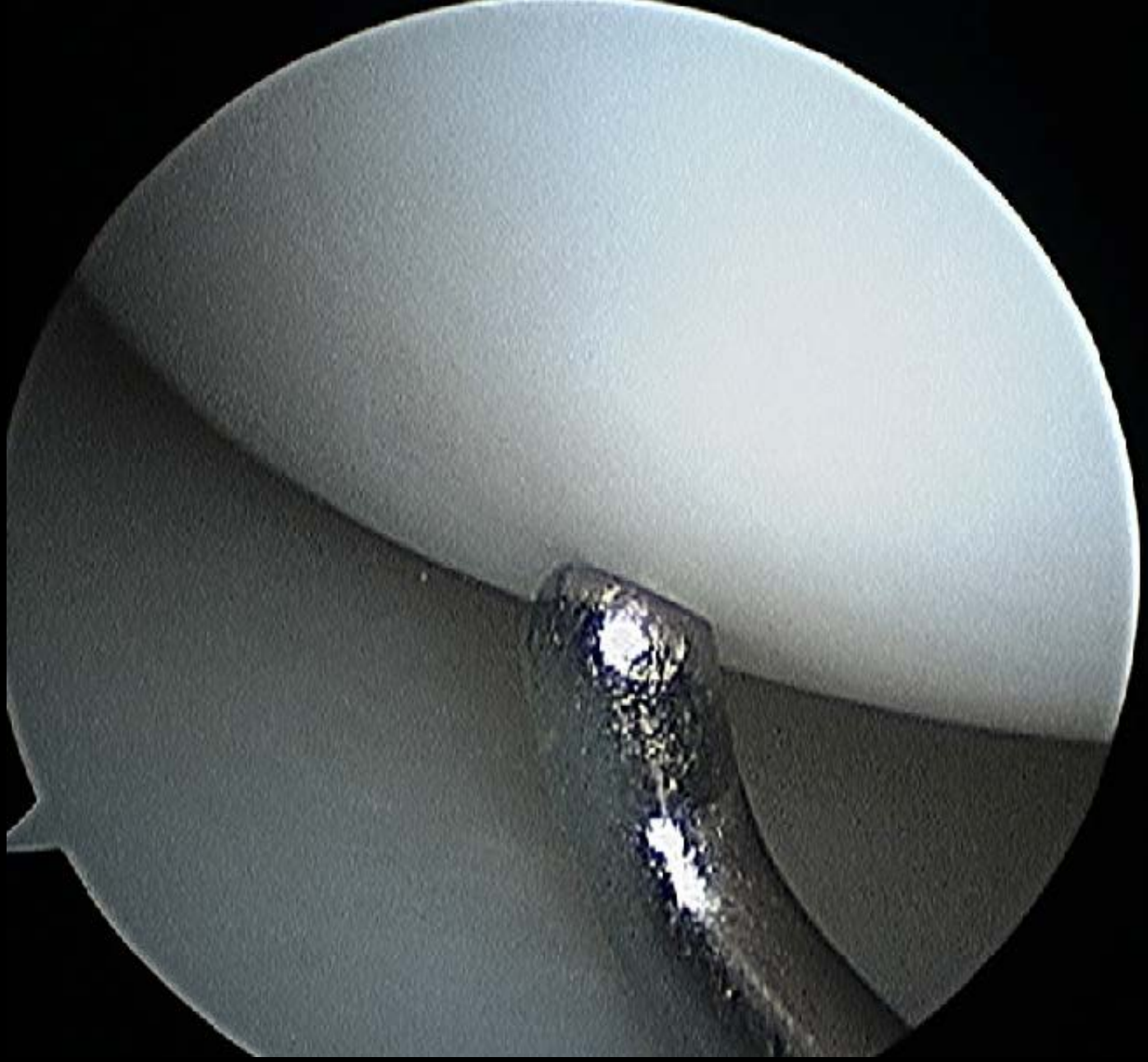
Treatment Recommendations

- Intact lesions are usually drilled in a transarticular or retrograde manner to promote healing
  - vascular in-growth occurs in the small channels

AAOS Clinical Practice Guidelines

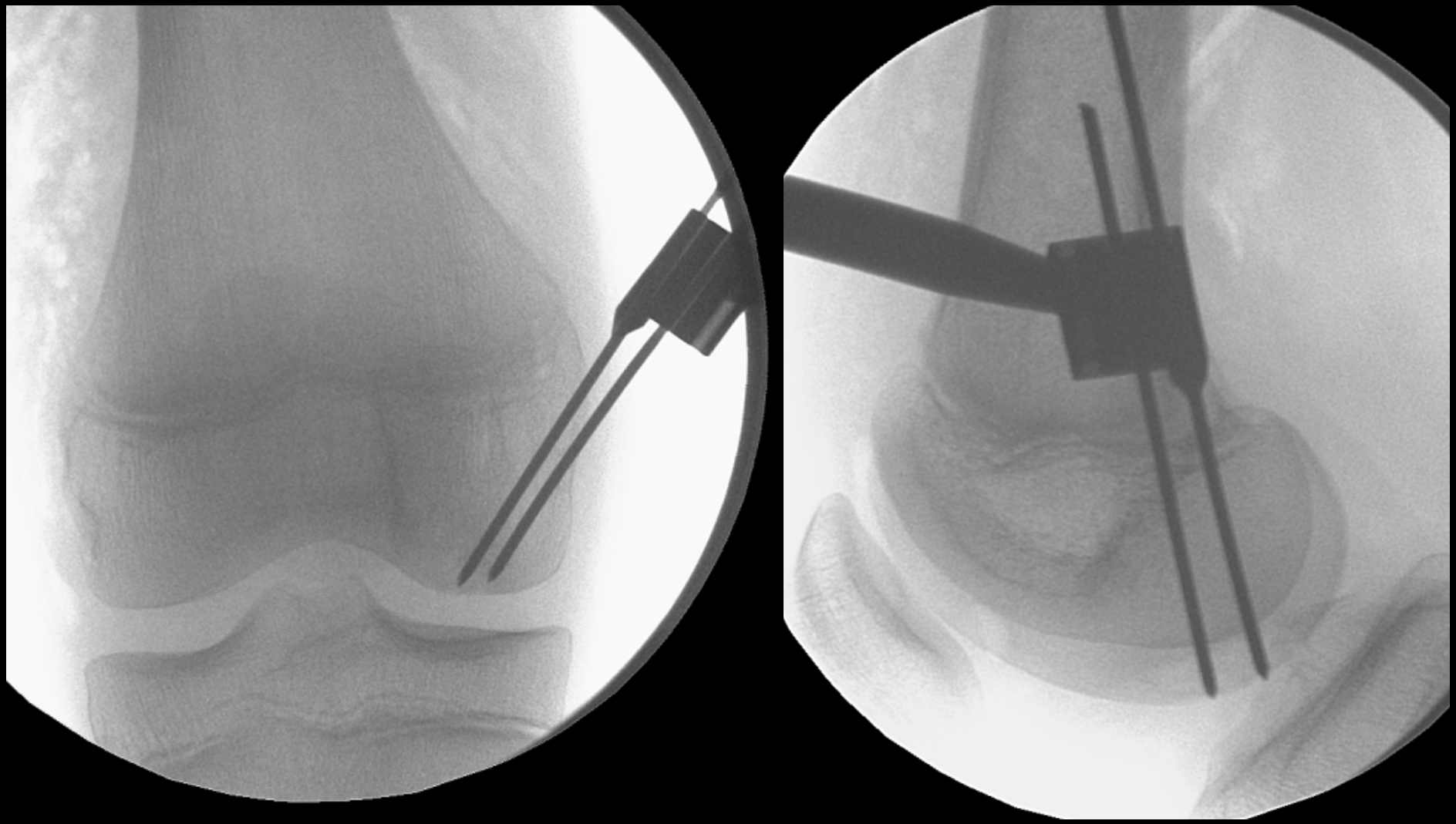
- Unable to recommend for or against arthroscopic drilling in **symptomatic** skeletally immature patients with a stable lesion(s) who have failed to heal with non operative treatment for at least three months.

12 ♀ R knee pain

Stable Lesion

Drilling procedure



Drilling procedure

8 months post-op → HEALED LESION

Osteochondritis Dissecans

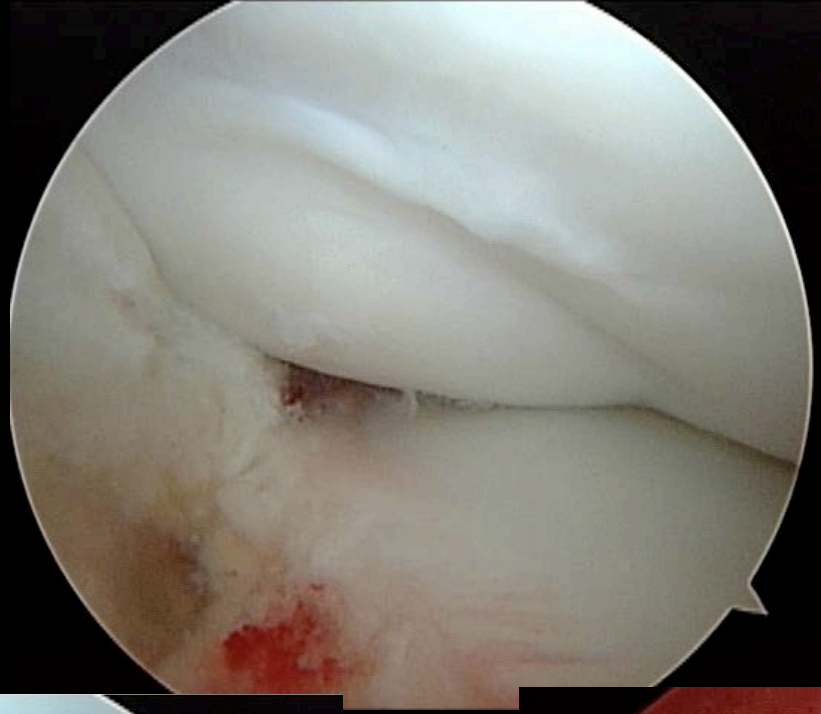
Treatment Recommendations

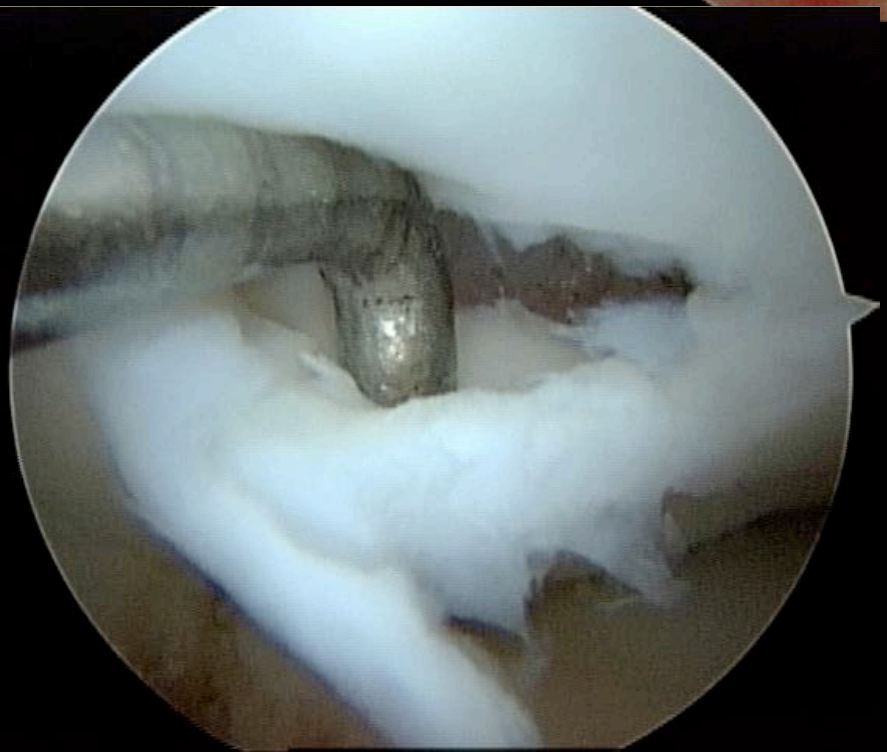
- Partial detachment → internal fixation
- Unsalvageable craters & loose bodies➔ loose body removal & technique to restore the articular surface
  - microfracture
  - osteochondral autograft transfer
  - autologous chondrocyte implantation
  - osteochondral allografts

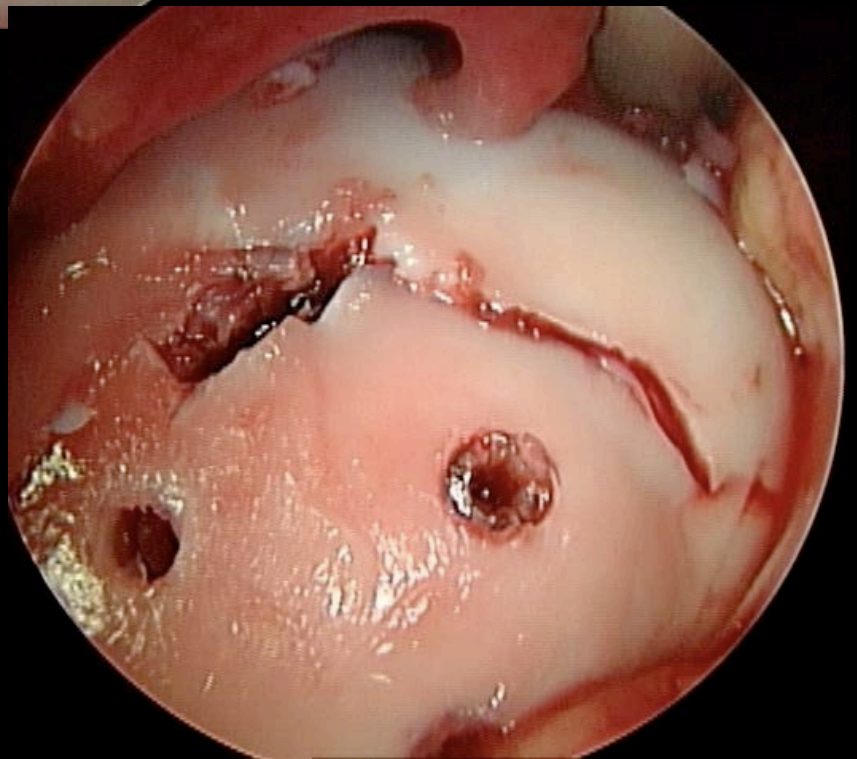
AAOS Clinical Practice Guidelines

- Unable to recommend for or against a specific cartilage repair technique in **symptomatic** skeletally immature patients with unsalvageable fragment.

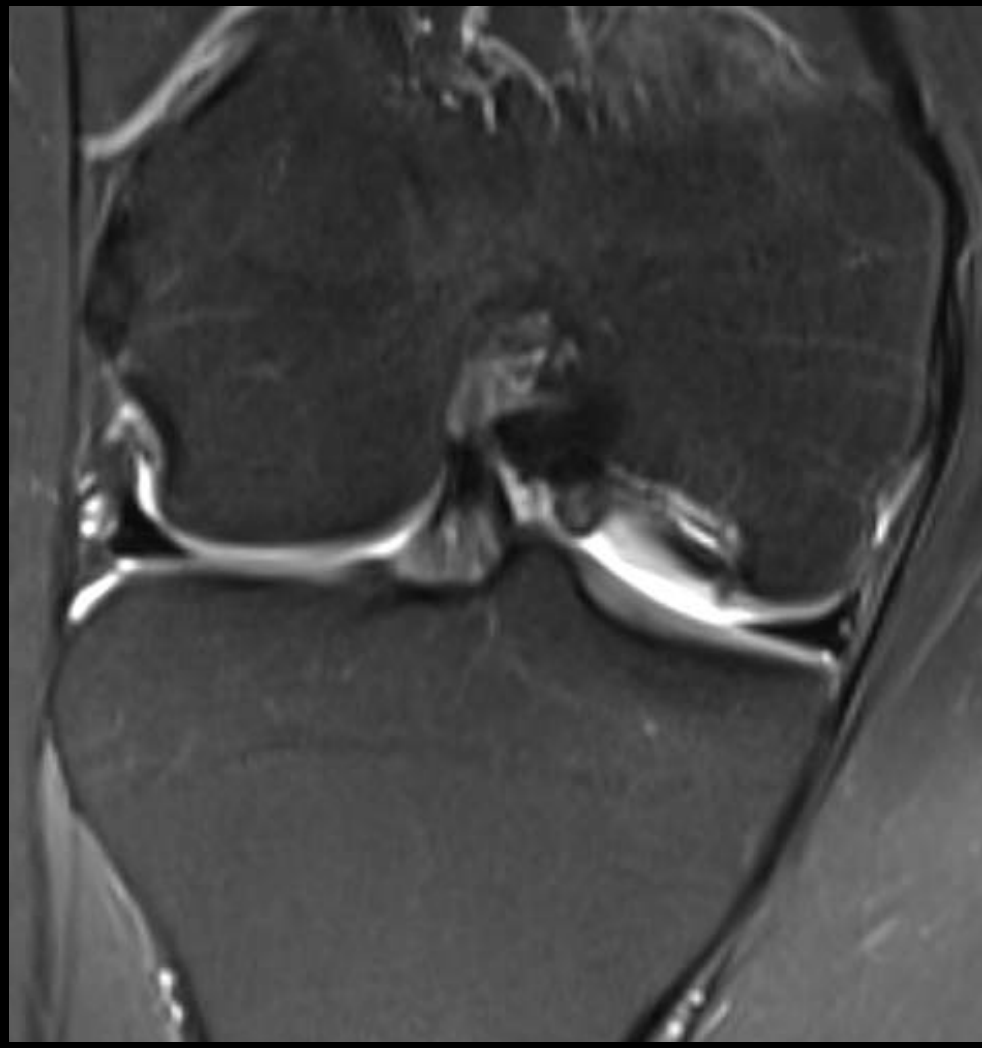
14 ♂ R knee pain x 3 y

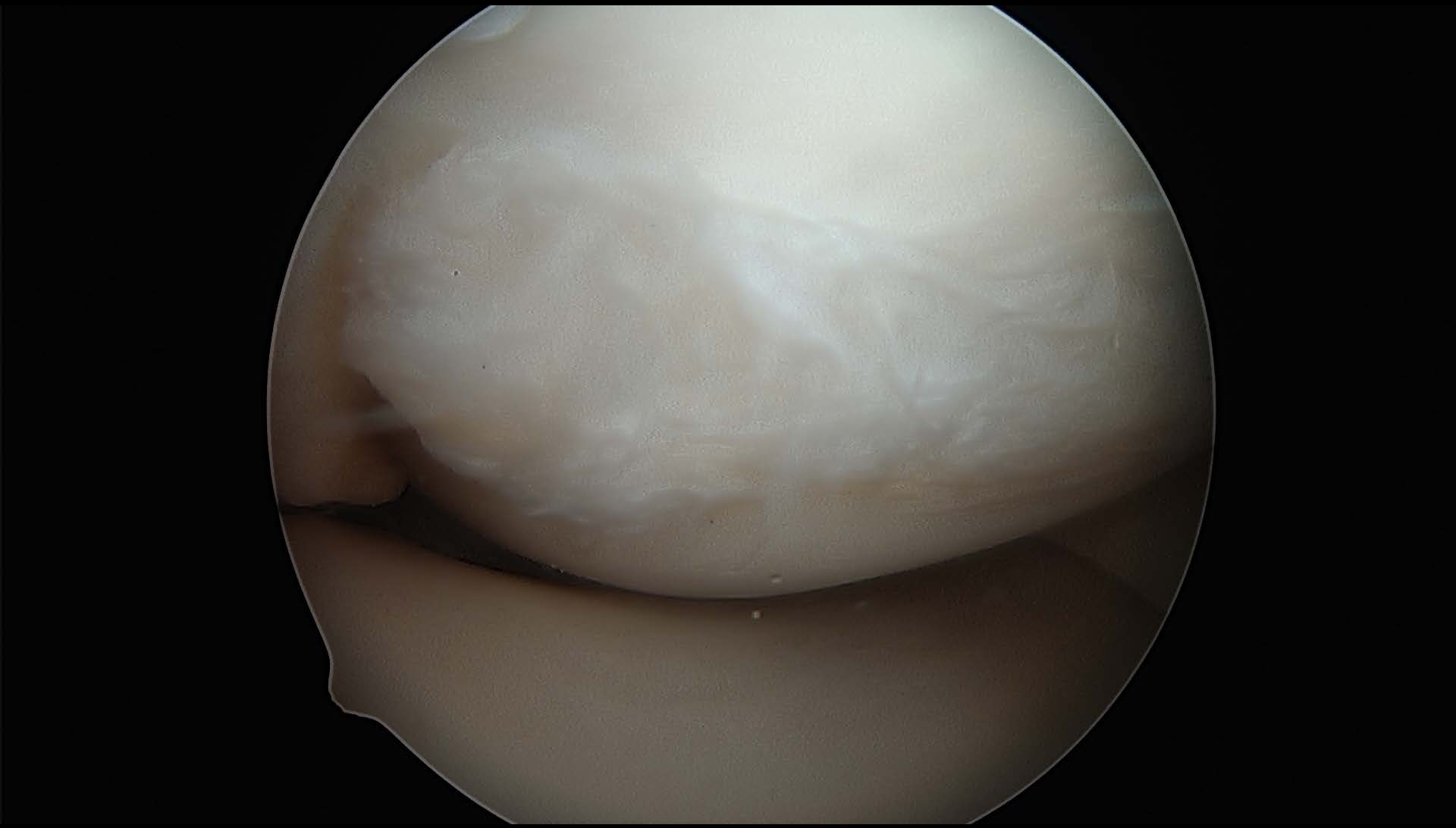


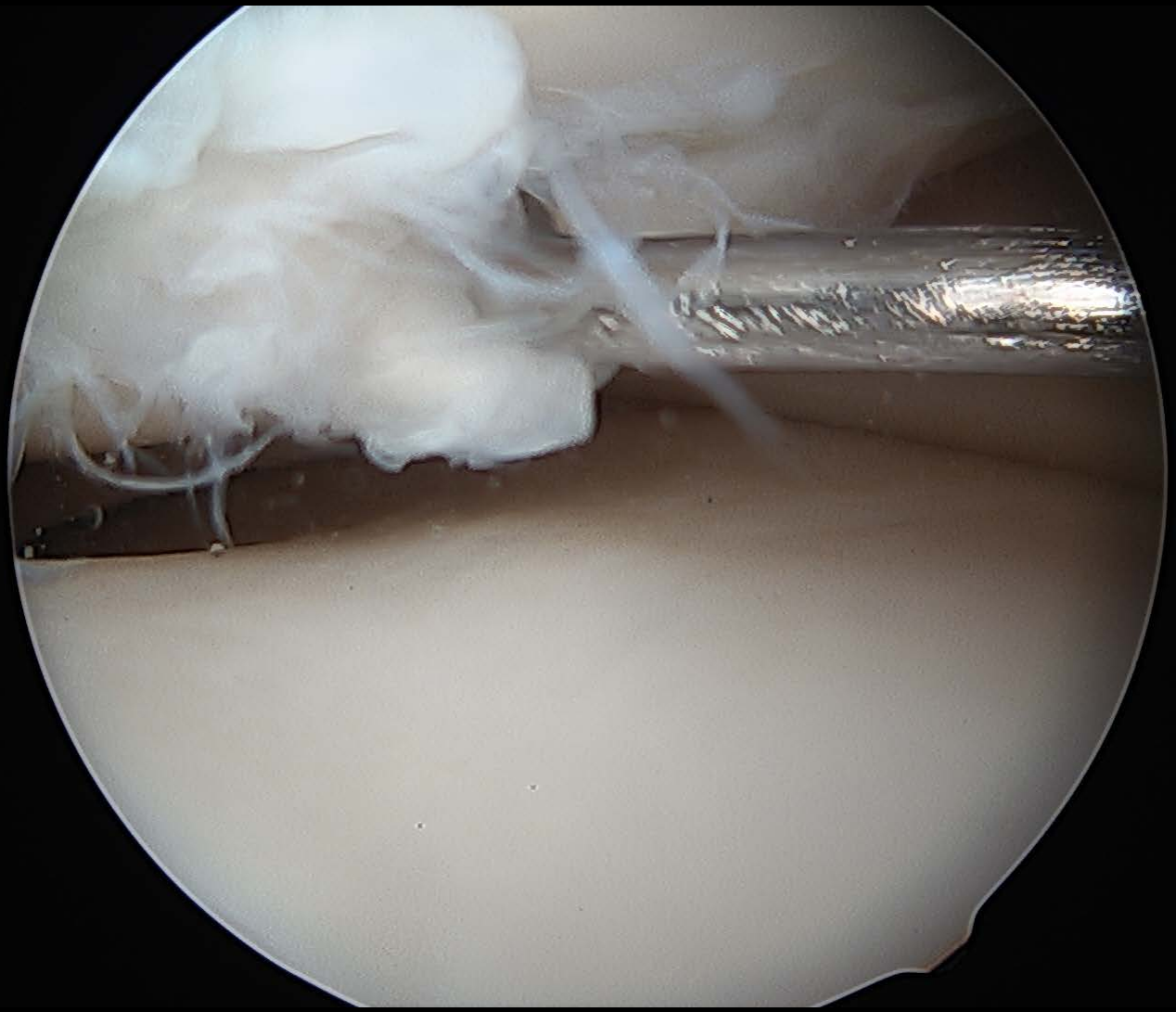


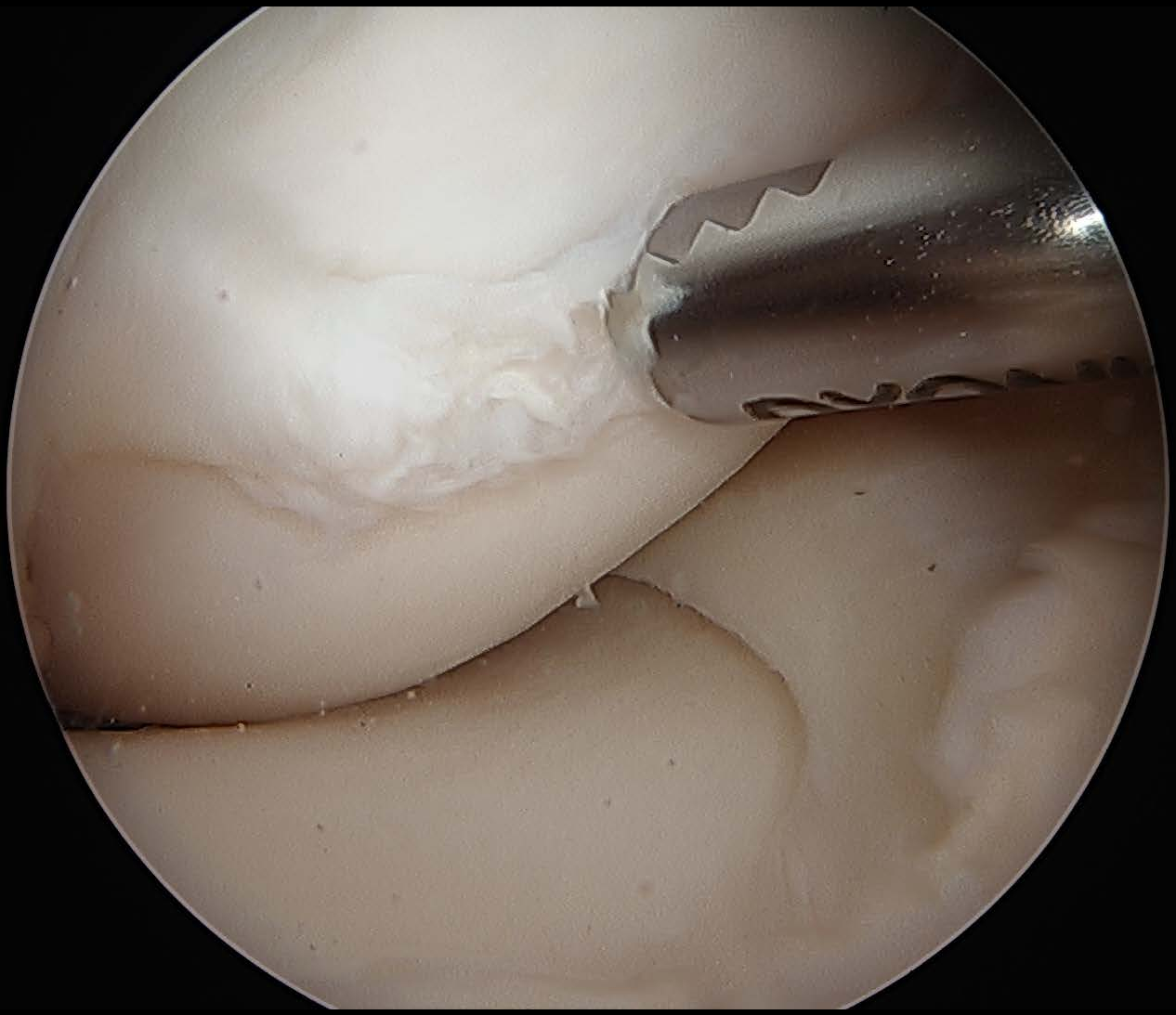


19 F chronic pain R knee

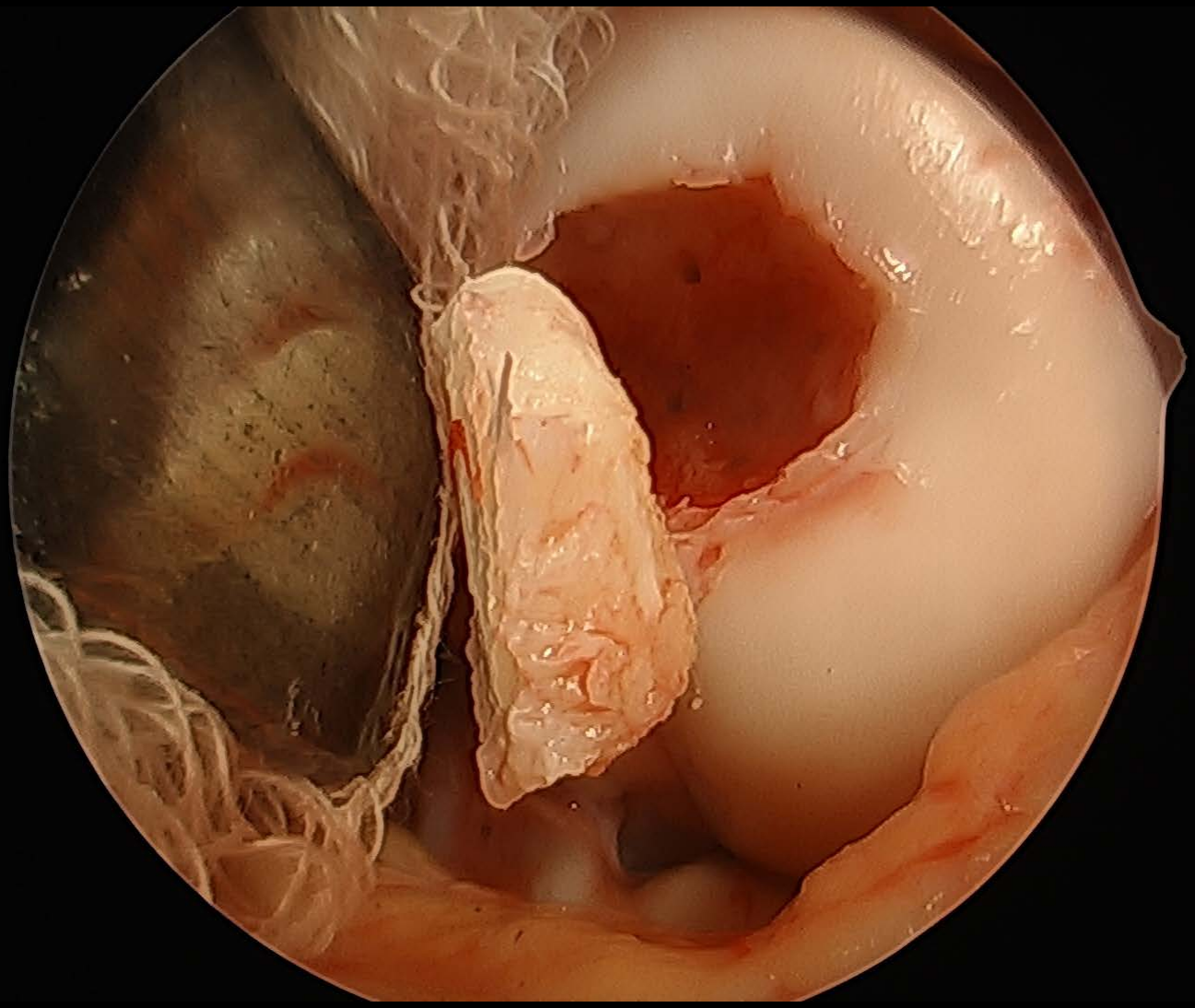




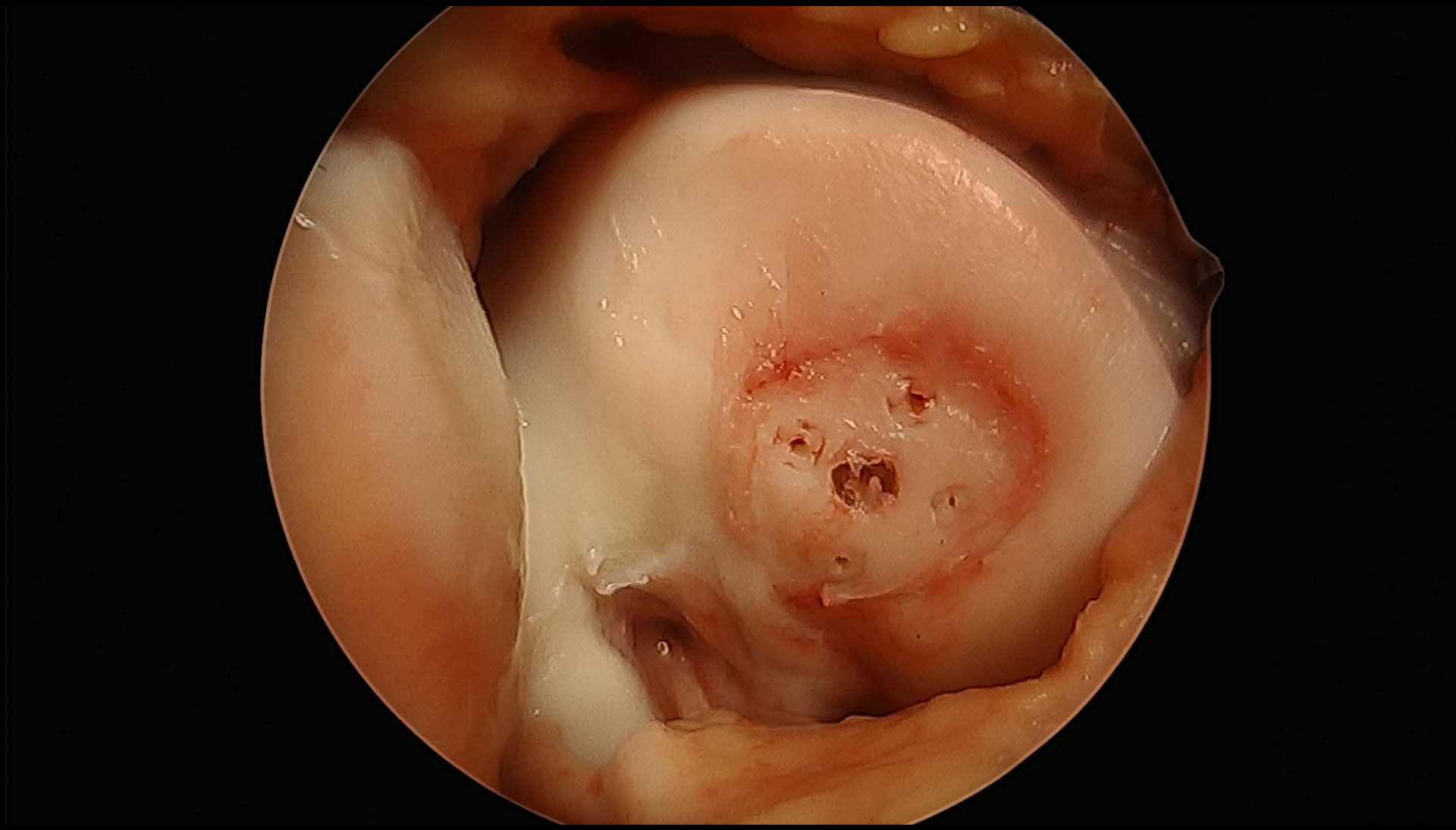




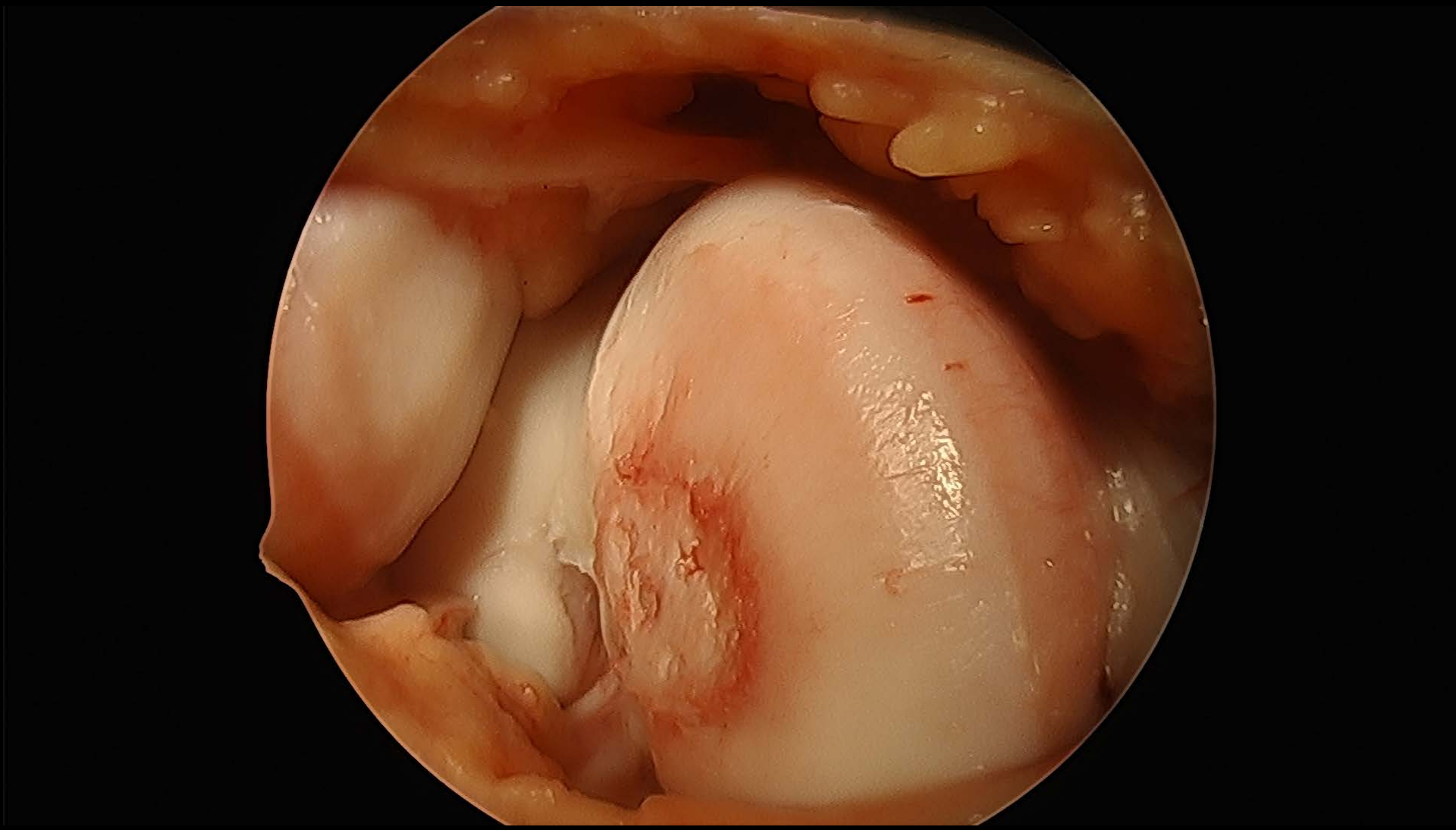
Unstable Lesion



Open Treatment with Back fill bone grafting



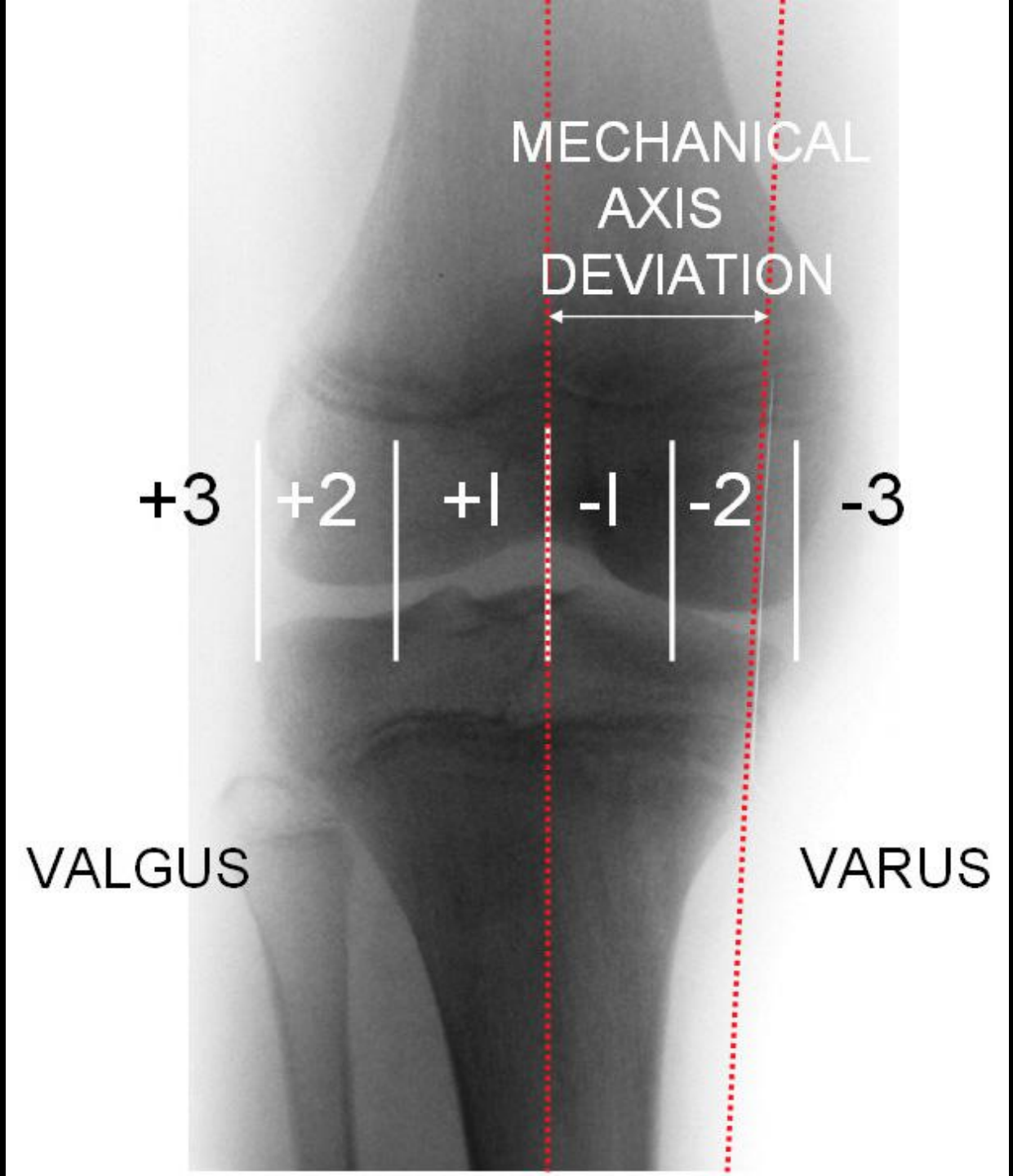
Fixation with absorbable screws and darst

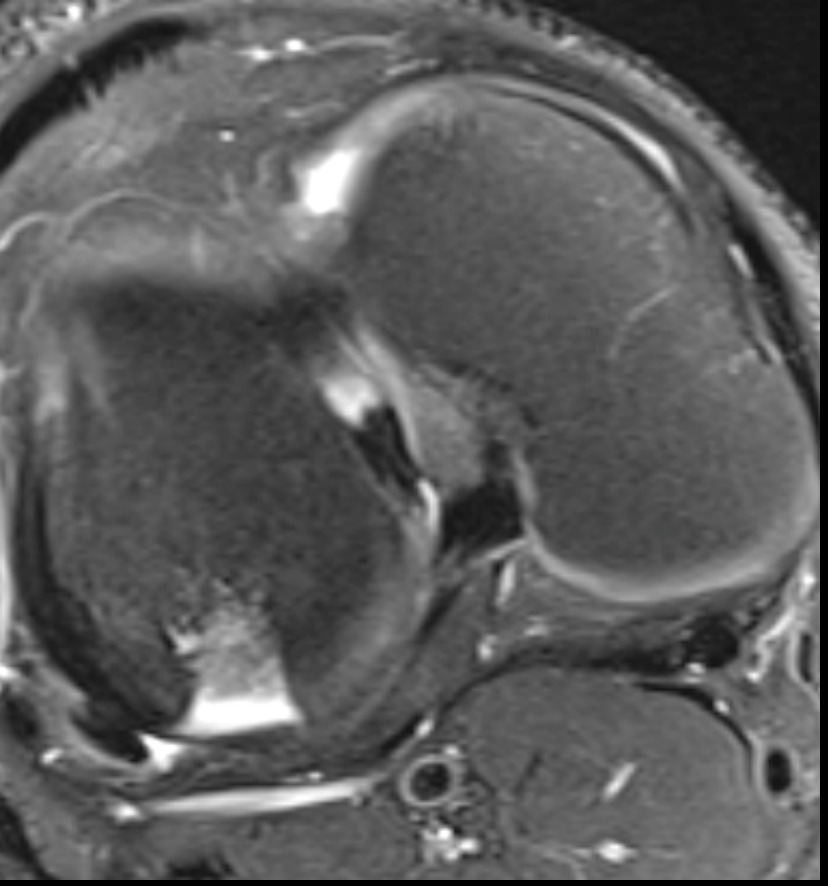


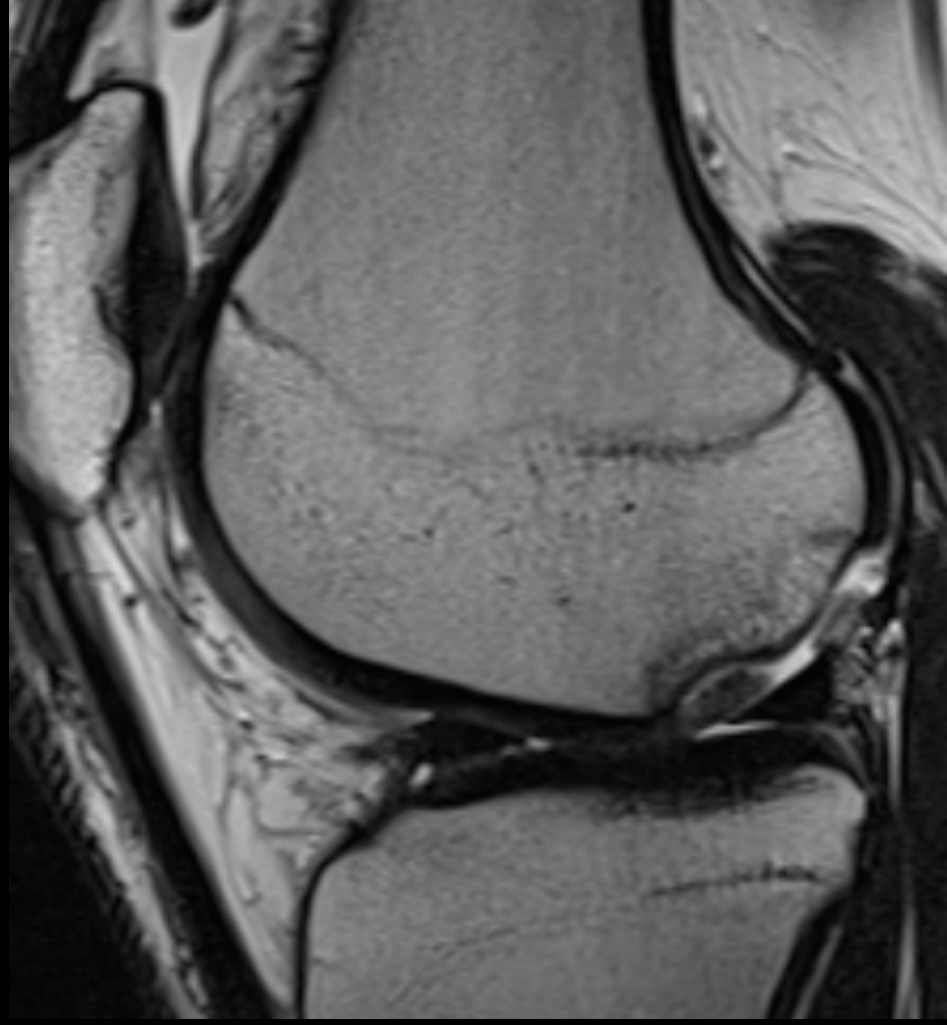
6 mo post op → healed

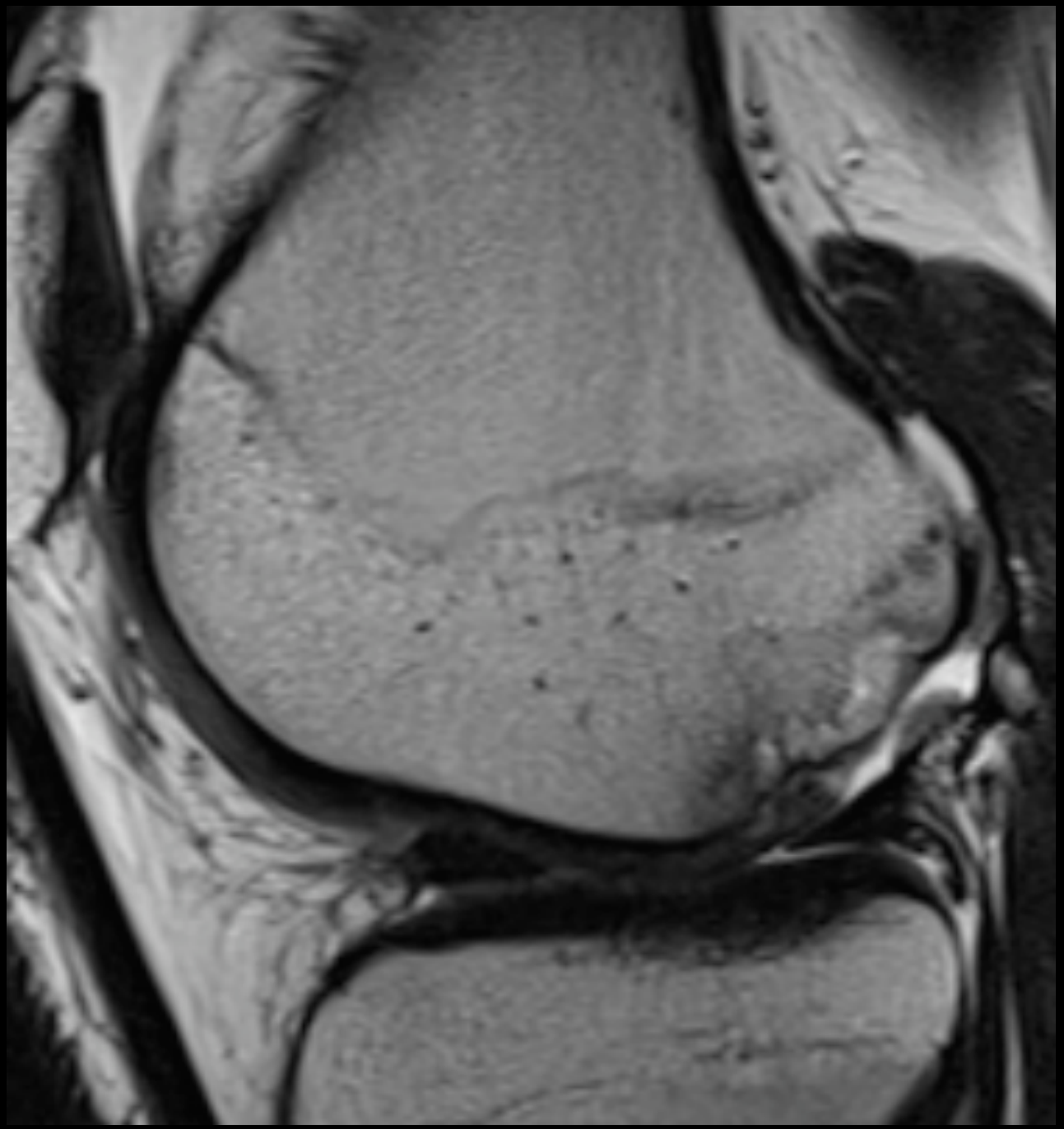
16 ♂ soccer player with lateral sided R knee pain

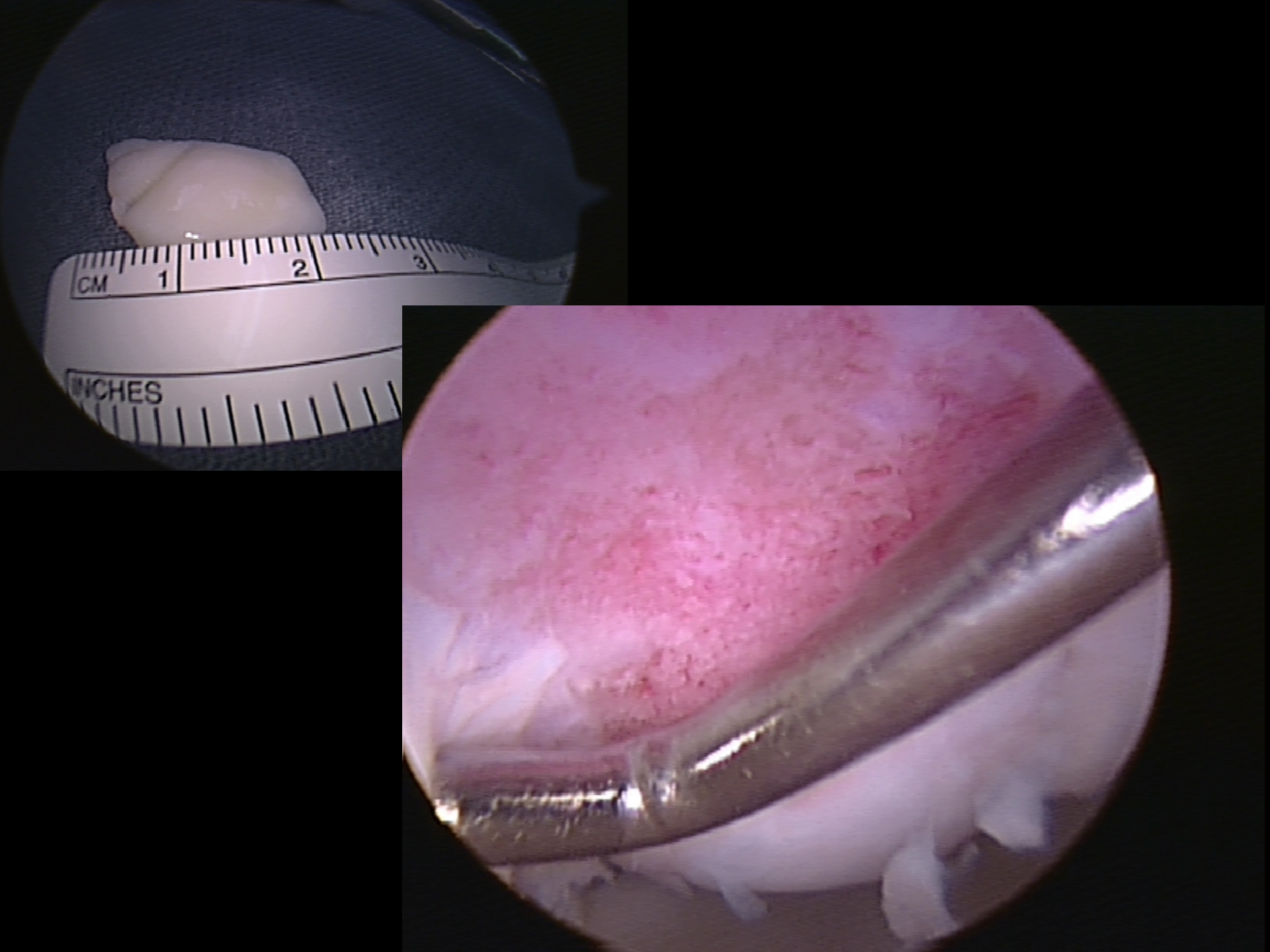
Genu Valgum Right


MECHANICAL
AXIS
DEVIATION
+3
+2
+I
-I
-2
-3
VALGUS
VARUS

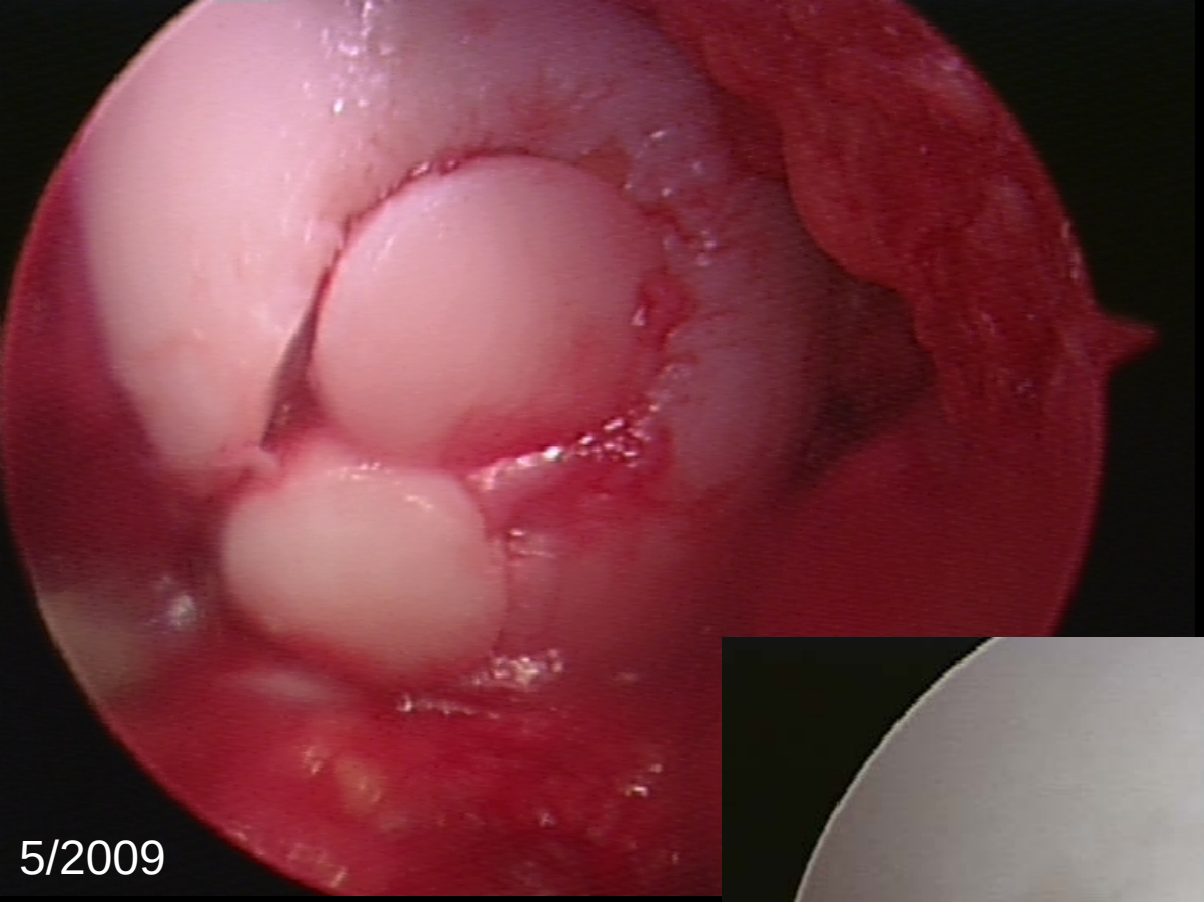







CM
1
2
3
INCHES

Osteochondral Autograft



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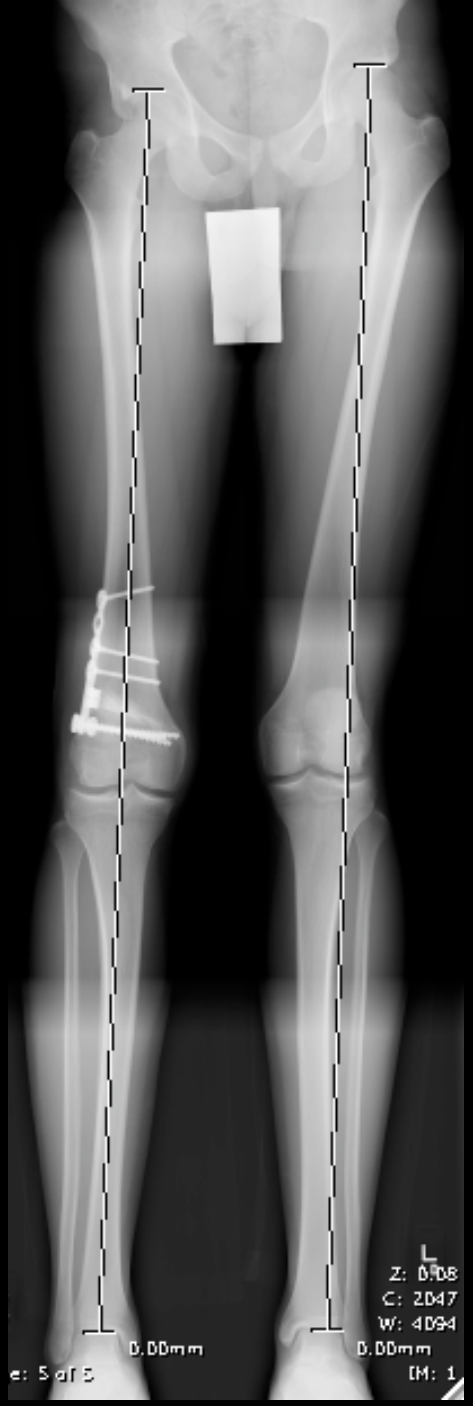

Osteotomy

1 y follow up

Association Between Mechanical Axis of the Leg and Osteochondritis Dissecans of the Knee: Radiographic Study on 103 Knees

- Found an association between medial condyle OCD and varus axis and between lateral condyle OCD and valgus axis. This evokes higher loading of the affected than of the unaffected knee compartment.
- Axial alignment may be a cofactor in OCD of the femoral condyles

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Jacobi et al. Am J Sports Med. 2010 Mar 29

A Prospective, Randomized Clinical Study of Osteochondral Autologous Transplantation Versus Microfracture for the Treatment of Osteochondritis Dissecans in the Knee Joint in Children

Rimtautas Gudas, PhD, MD, Rasa Simonaitytė, MD, Emilis Čekanauskas, MD, and Ramūnas Tamošiūnas, MD

- 50 children with a mean age of 14.3 years & symptomatic OCD lesions of the femoral condyle were randomized → either the OAT or MF
- Children with ICRS grade 3 or 4 (OCD) in the medial or lateral femoral condyle were included in the study.

J Pediatr Orthop 2009;29:741–748

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Rimtautas Gudas, PhD, MD, Rasa Simonaitytė, MD, Emilis Čekanauskas, MD, and Ramūnas Tamošiūnas, MD

Conclusions: At an average of 4.2 years follow-up, our prospective, randomized, clinical study in children under the age of 18 years has shown significant superiority of the mosaic-type OAT over MF for the treatment of osteochondritis dissecans defects in the knee. However, our study has shown that both MF and OAT give encouraging clinical results for children under the age of 18 years.

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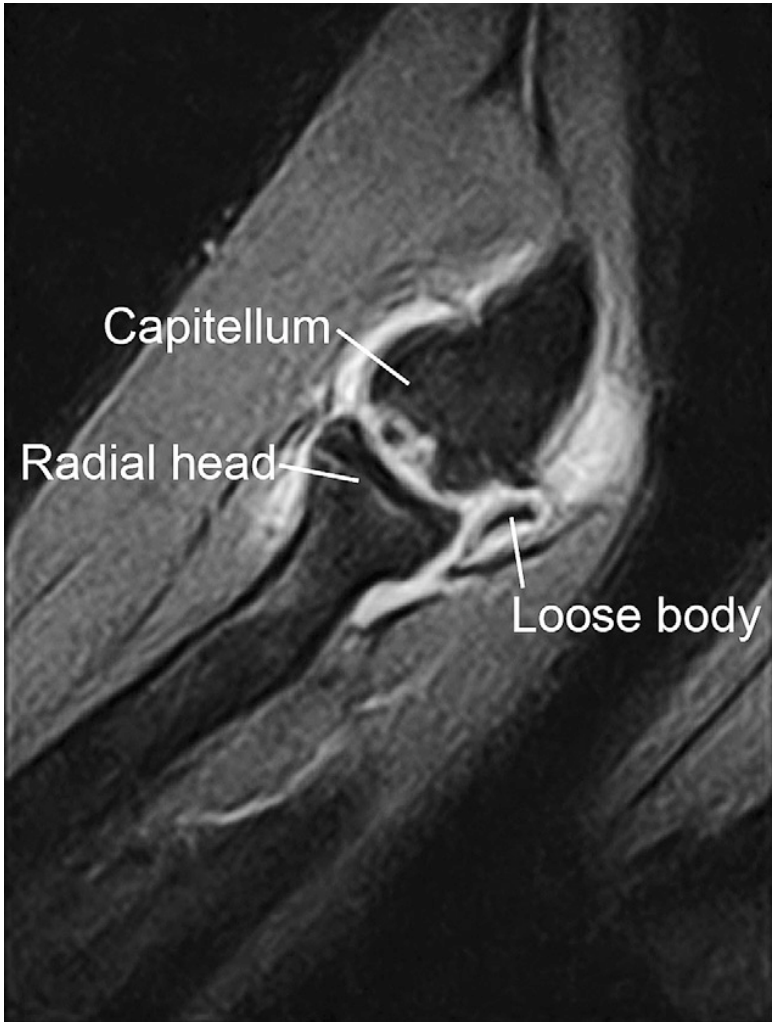
J Pediatr Orthop 2009;29:741–748

Osteochondritis Dissecans - Capitellum



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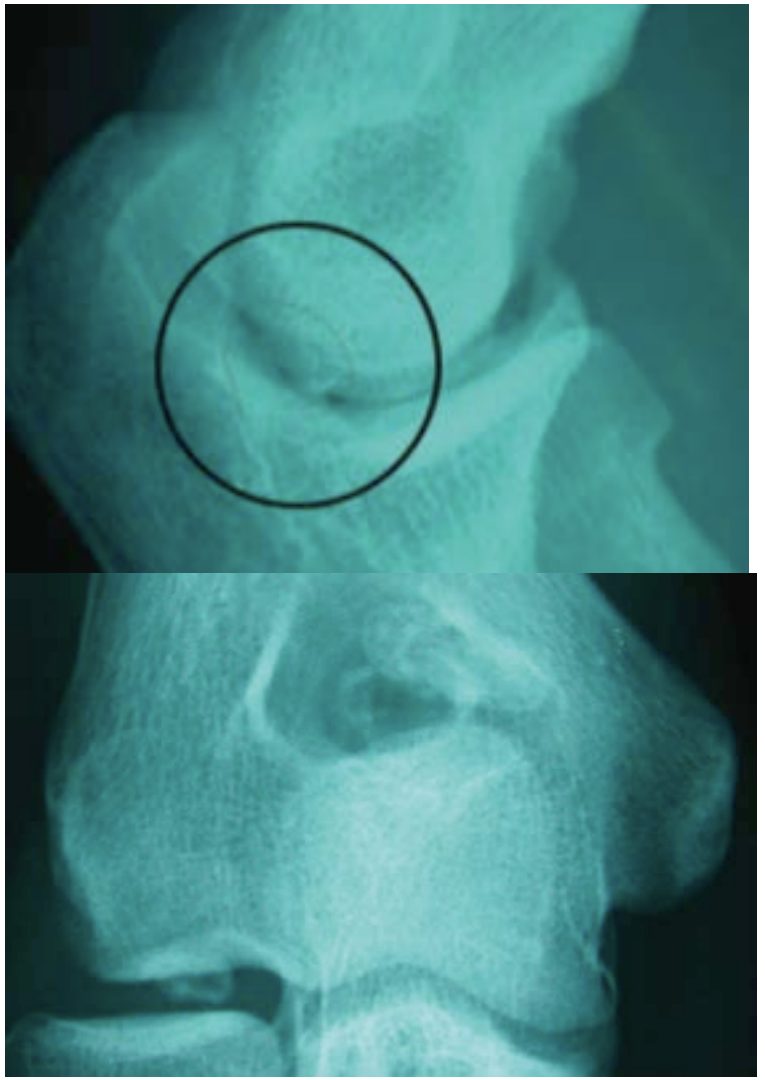
Capitellar Osteochondritis Dissecans

- JOCD - posttraumatic AVN

- Panner Disease
  - <10 y; atraumatic
  - variation in ossification
  - self-limited & resolves spontaneously



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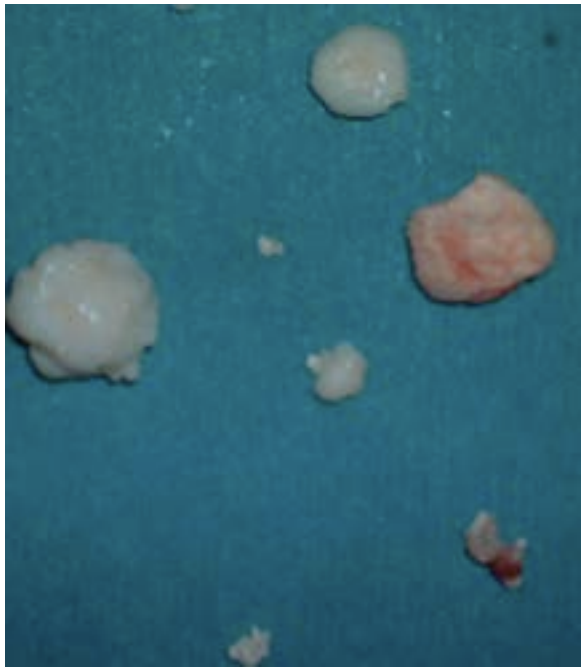
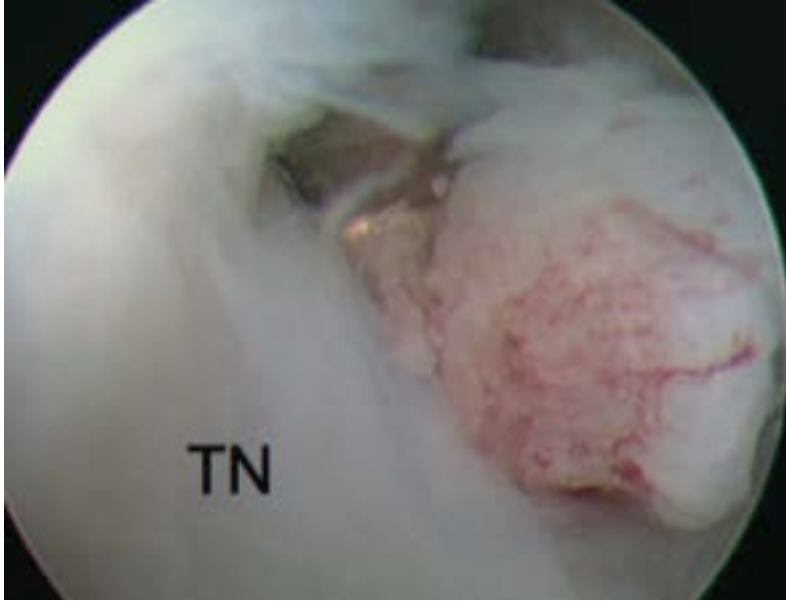
True Capitellar OCD

- Excessive compression forces on the lateral side of the joint (radiocapitellar joint) during the throwing motion
  - microfractures
  - edema
  - AVN
  - potential loose body formation



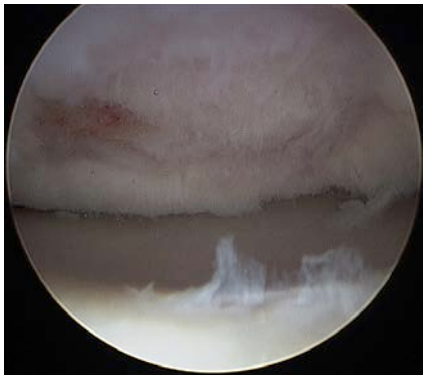
Capitellar OCD

Treatment based on MRI & Arthroscopy



- MRI stable
  - rest & throwing cessation
  - ~12 months to heal
  - drilling of the involved fragment may promote vascular in growth & healing of the lesion
- Unstable
  - base should be freshened & fixed with pins, screws, or bioabsorbable nails
  - Small, unstable lesions or loose bodies are removed.

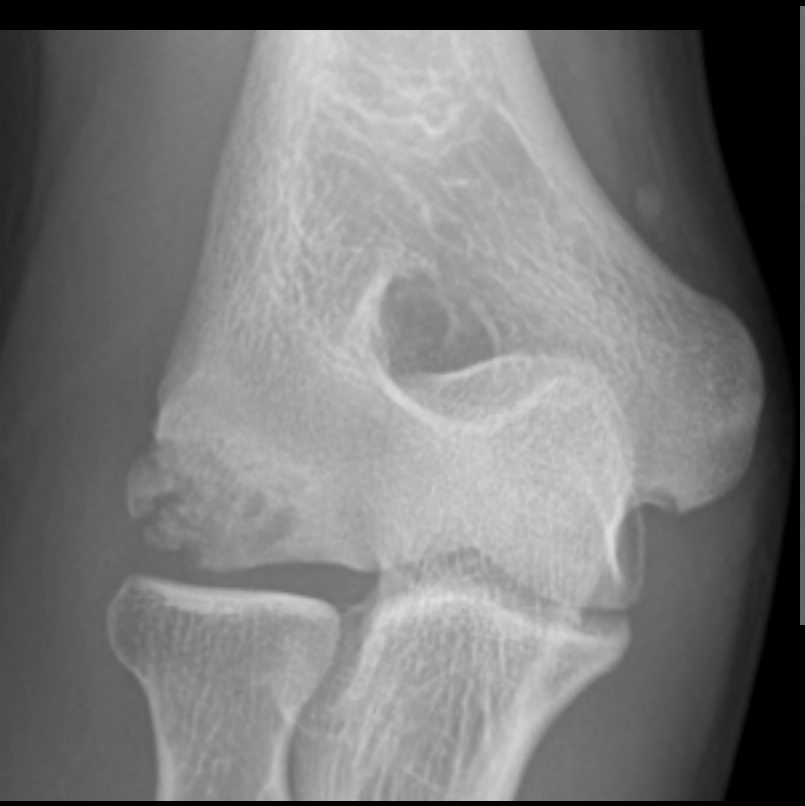
Natural History

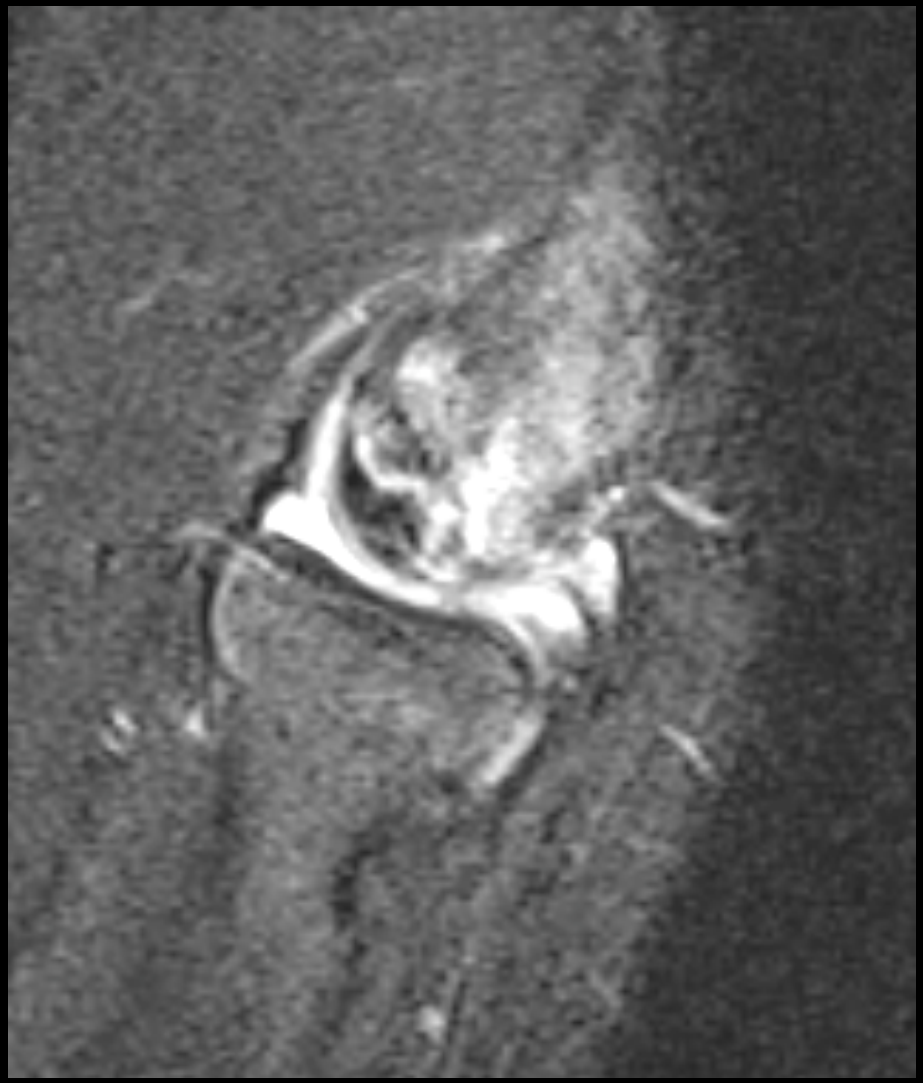


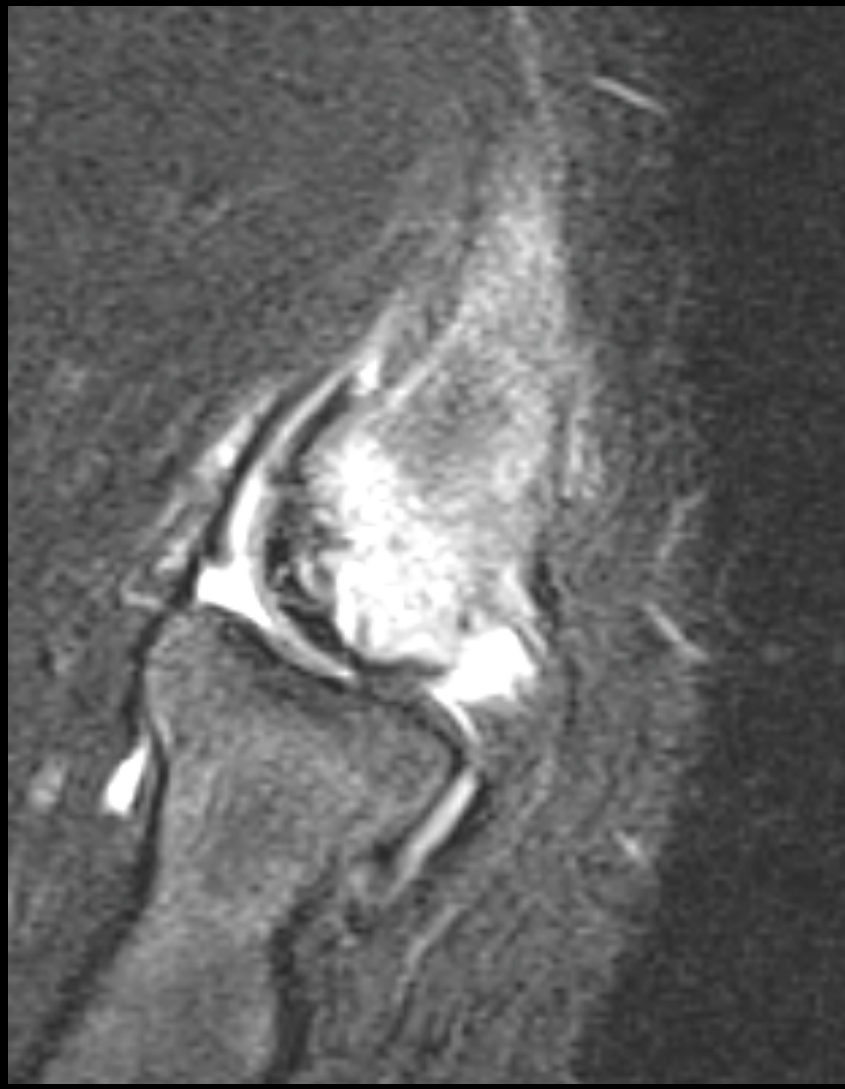
- Limited capacity for healing.
  - Lesion progression with fragmentation and formation of loose bodies can occur despite aggressive treatment.

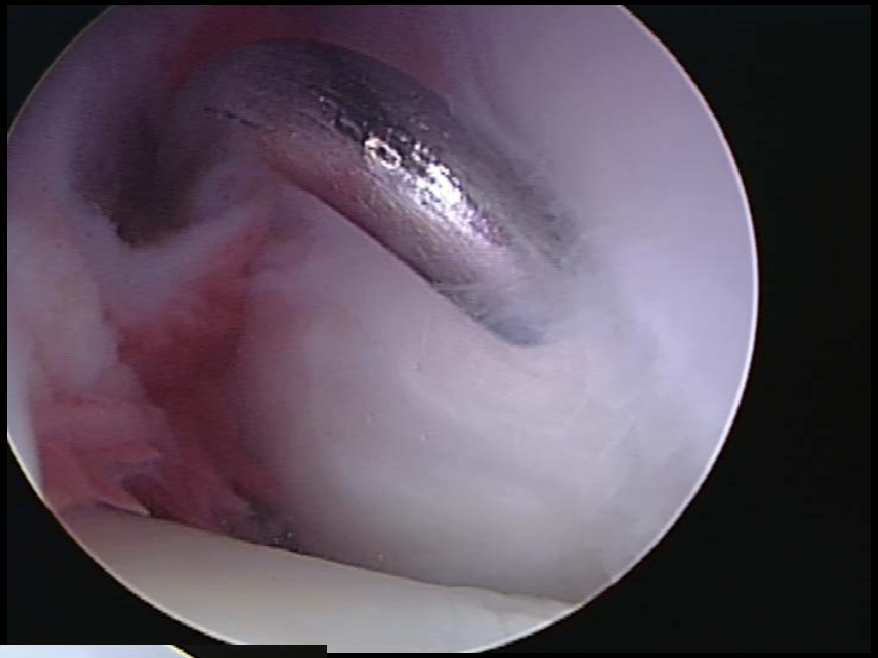
- Long-term results demonstrate the presence of degenerative joint disease and continued elbow symptoms in approximately half of all affected patients

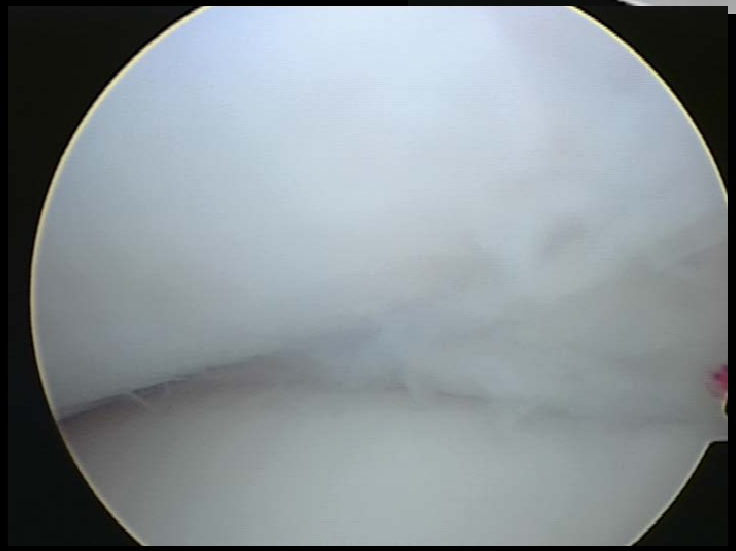
14 ♂ baseball player, R elbow pain











Drilling of OCD Capitellum


pre


3 mo post

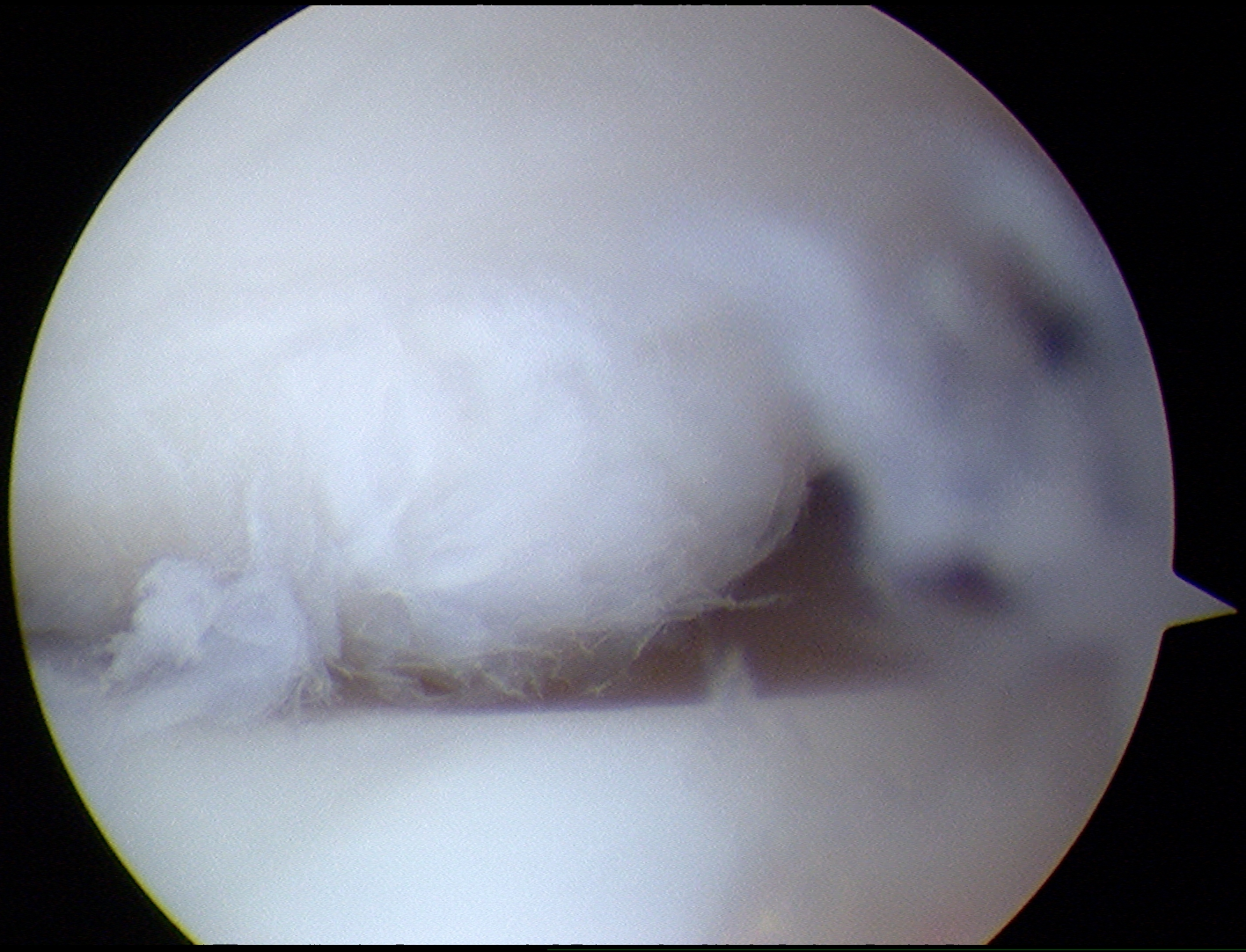
Short-term Results of Arthroscopic Treatment of Osteochondritis Dissecans in Skeletally Immature Patients

John E. Tis, MD, Eric W. Edmonds, MD,† Tracey Bastrom, MA,† and Henry G. Chambers, MD†*

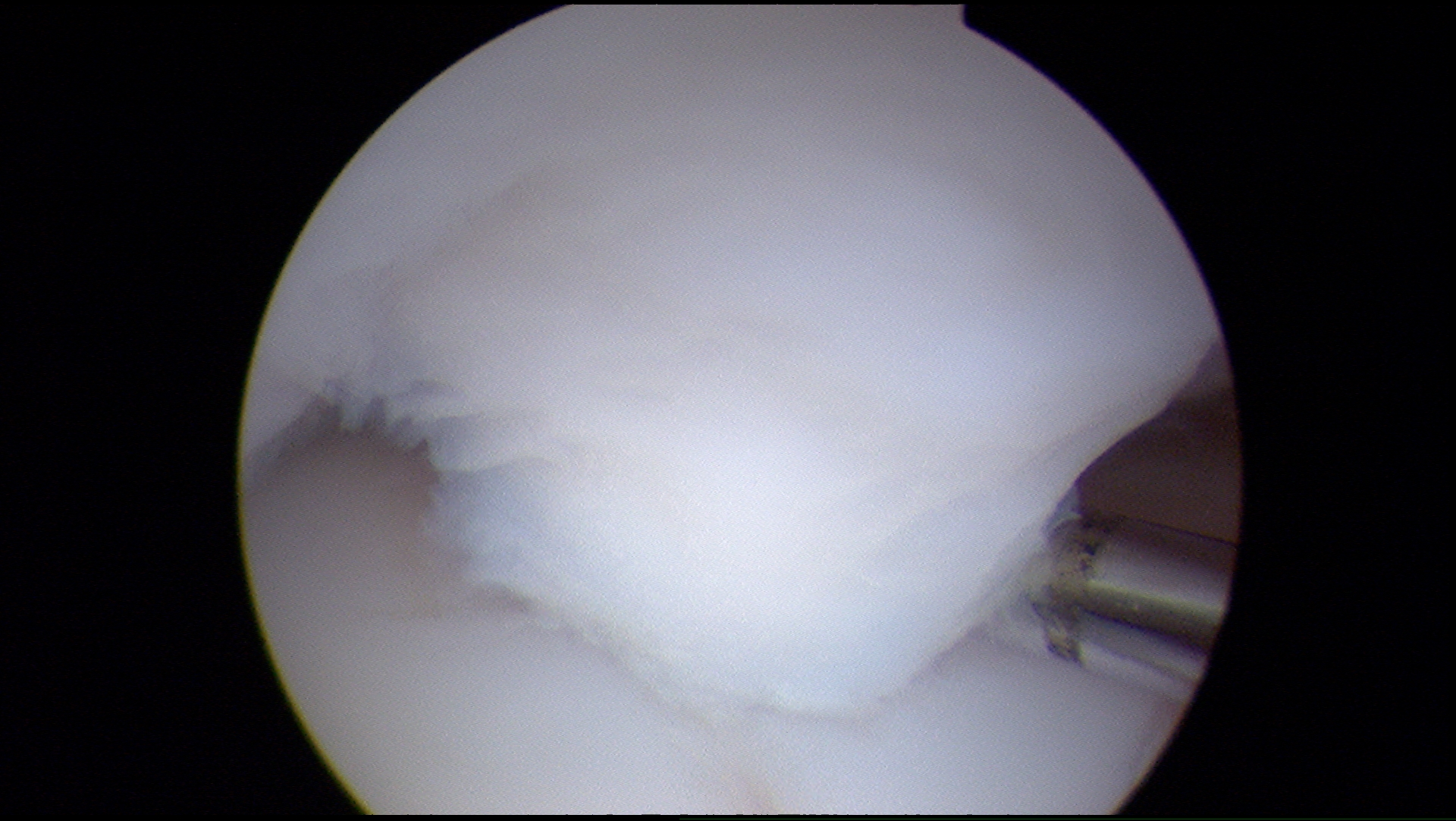
- Treatment of children with OCD lesions of the capitellum with arthroscopic-assisted debridement and fenestration of the sclerotic rim (trans-humeral if overlaying cartilage is intact), plus fixation of the overlaying cartilage if not securely attached to the subchondral bone permits the return to physical activity, but may not allow return to the injury-inducing sport

J Pediatr Orthop 2012;32:226–231

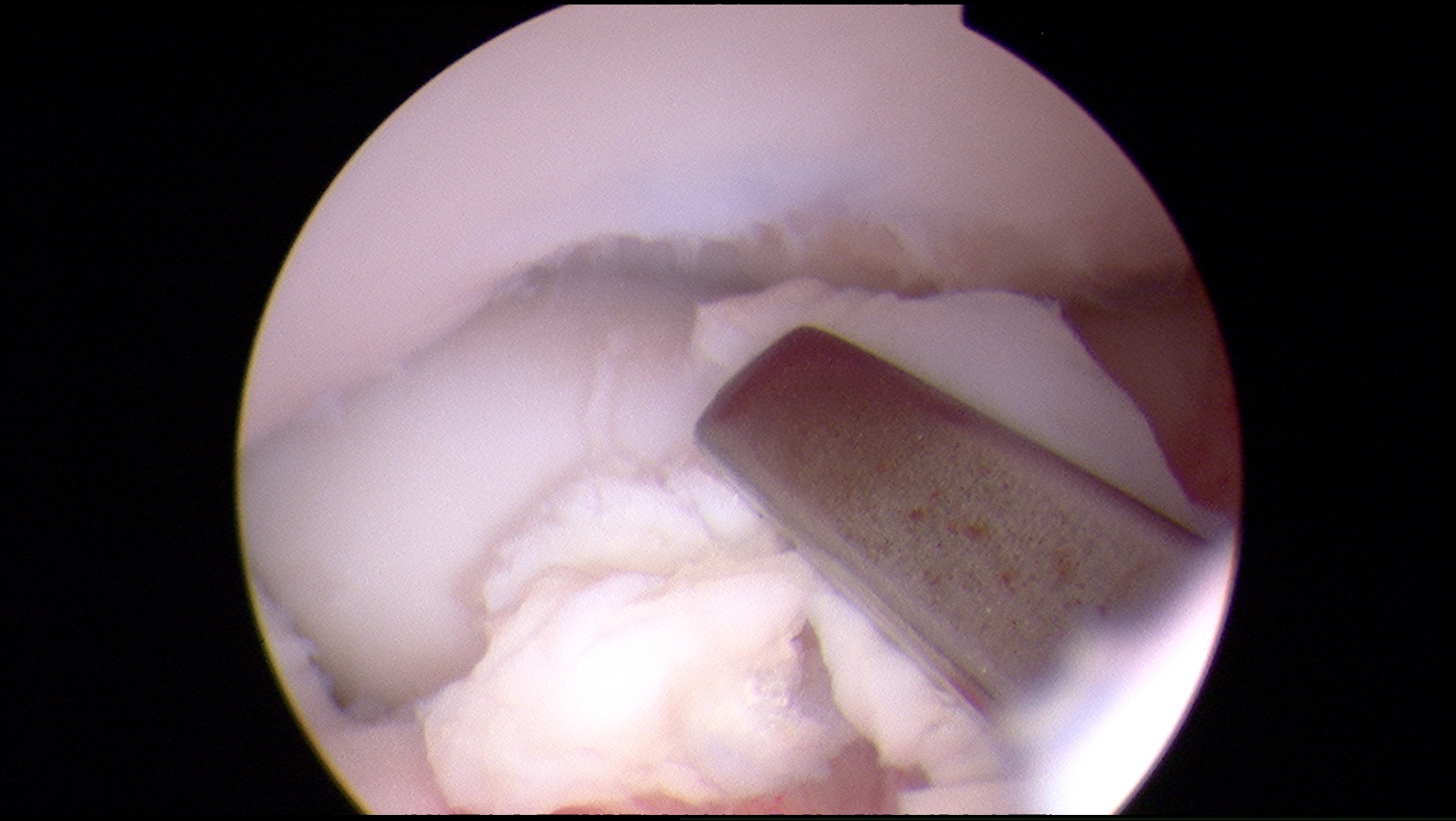
13 ♂ baseball player – pitcher chronic R elbow pain despite rest

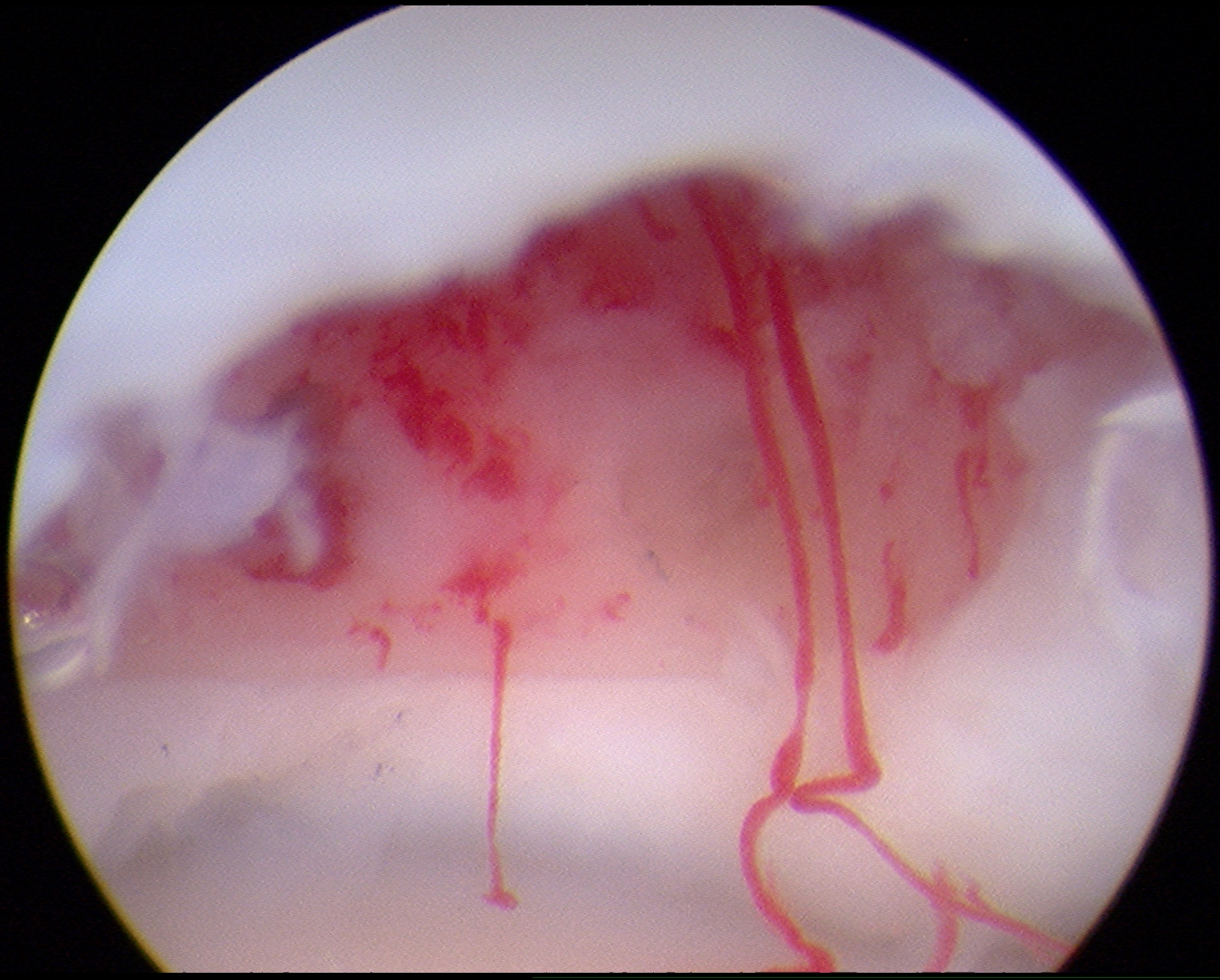
Unstable Lesion



Unstable Lesion



Cartilage fragmentation - Lose Bodies removed



Microfracture / Marrow Stimulation Procedure

Arthroscopic Management of Osteochondritis Dissecans of the Capitellum: Mid-term Results in Adolescent Athletes

Kristofer J. Jones, MD, Brent B. Wiesel, MD,†*
Wudbhav N. Sankar, MD,‡ and Theodore J. Ganley, MD‡

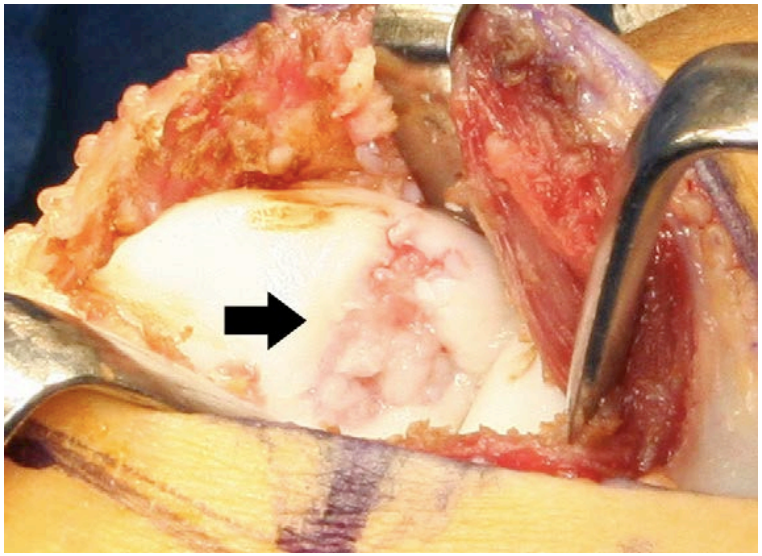
- Arthroscopic management of capitellar OCD in adolescent athletes results in significantly improved range of motion and a high rate of return to athletics. Accompanying arthrotomy may be required for large loose body removal or bone grafting

J Pediatr Orthop 2010;30:8–13

Autologous Osteochondral Mosaicplasty for Osteochondritis Dissecans of the Elbow in Teenage Athletes

By Norimasa Iwasaki, MD, PhD, Hiroyuki Kato, MD, PhD, Jyunichi Ishikawa, MD, PhD, Tatsuya Masuko, MD, PhD, Tadanao Funakoshi, MD, PhD, and Akio Minami, MD, PhD

- 19 teenage male patients who were competitive athletes and had advanced lesions of OCD underwent mosaicplasties.
  - Mean age 14.2y
- All patients except one had an excellent or good clinical result.
  - 17 returned to sport.



J Bone Joint Surg Am. 2009;91:2359-66

CHOC Children's Orthopaedic Institute

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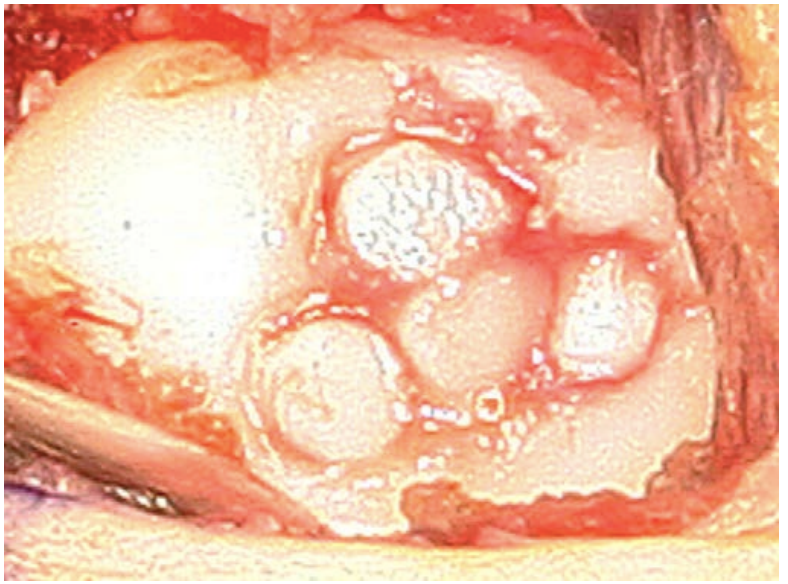
- Kocher lateral approach between the anconeus and the extensor carpi ulnaris.
- Lateral parapatellar miniarthrotomy of the contralateral knee
- small-sized (mean, 3.5 mm in diameter; range, 2.7 to 6.0 mm in diameter and 10 to 15 mm in length) plugs



J Bone Joint Surg Am. 2009;91:2359-66

Thank You

www.youthsportsortho.com

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