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Unicompartmental Knee Arthroplasty

Brian Perkinson, MD
Orthopaedic Surgery, Hip and Knee Replacement

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Disclosures

- Stryker Consultant
- Biased to partial knee replacements
- I LIKE ROBOTS
- I’ve never done a high tibial osteotomy

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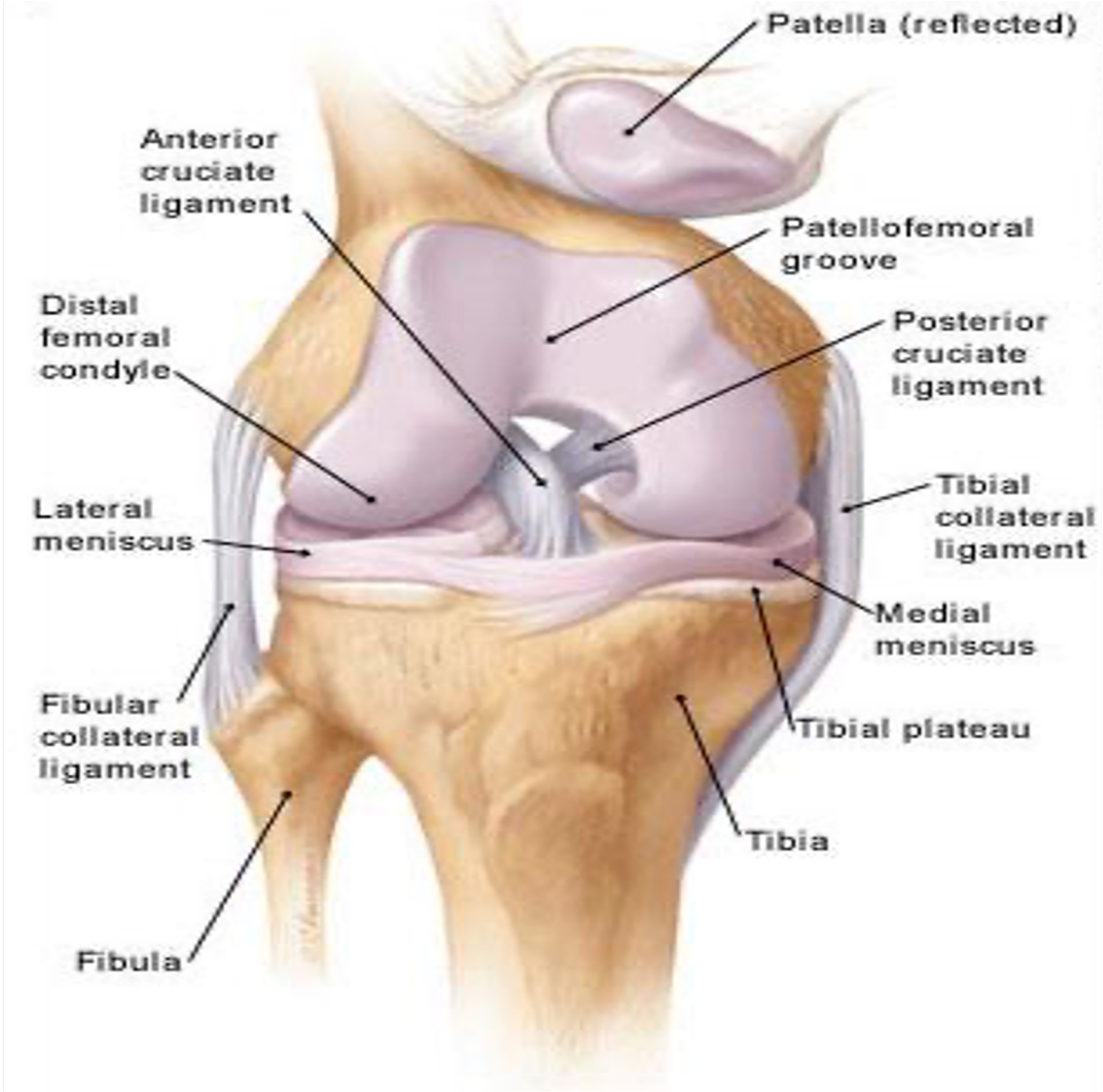
Anatomy of the Knee



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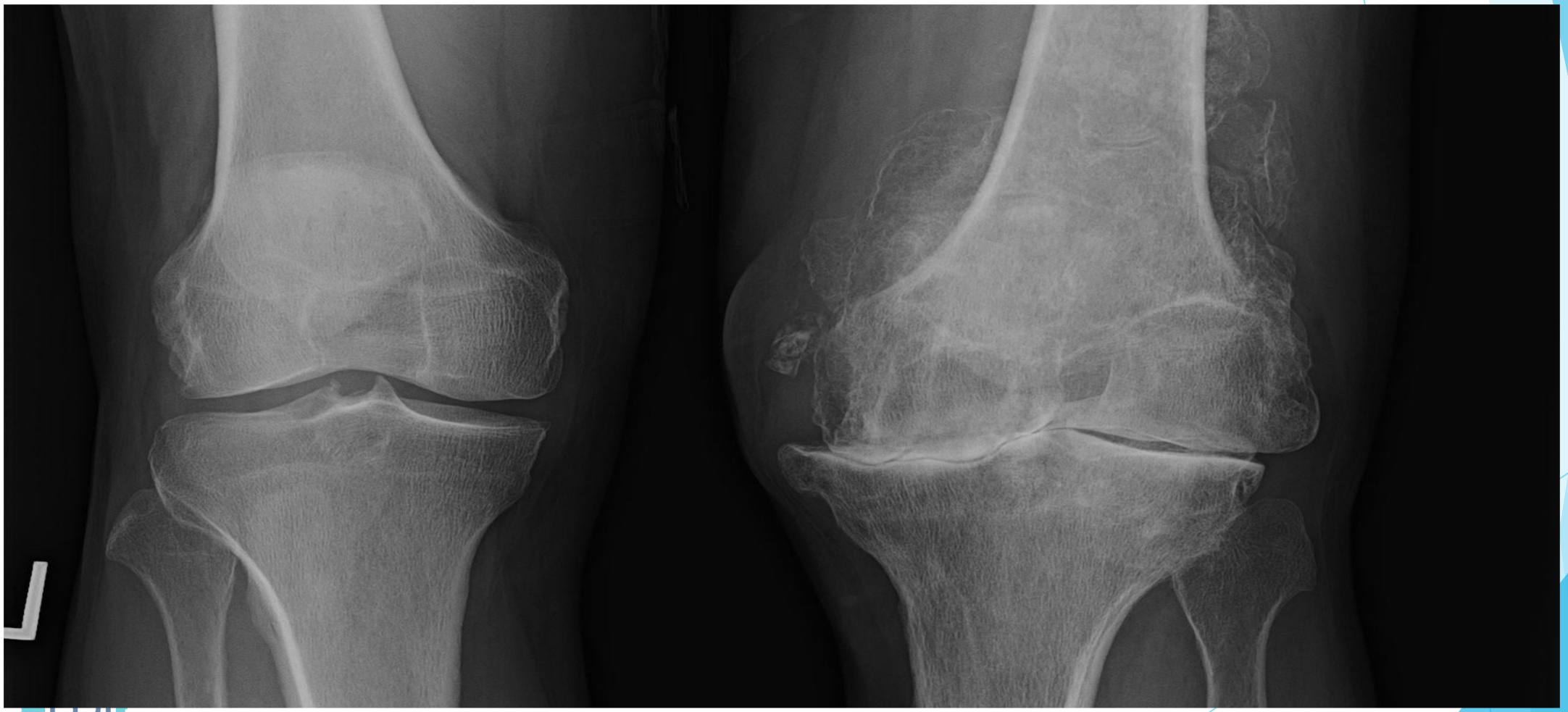
Radiograph Osteoarthritis



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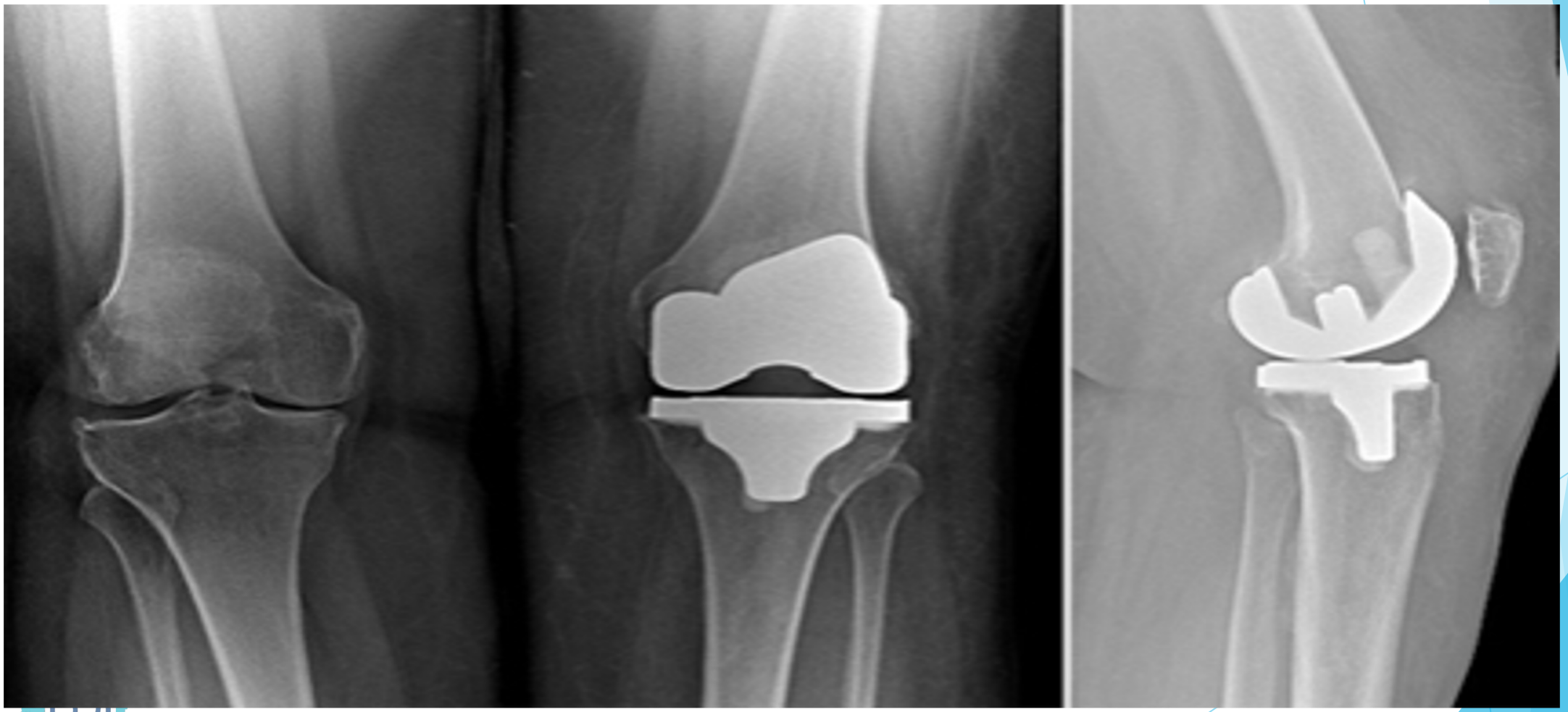
Total knee replacement



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What are the components?

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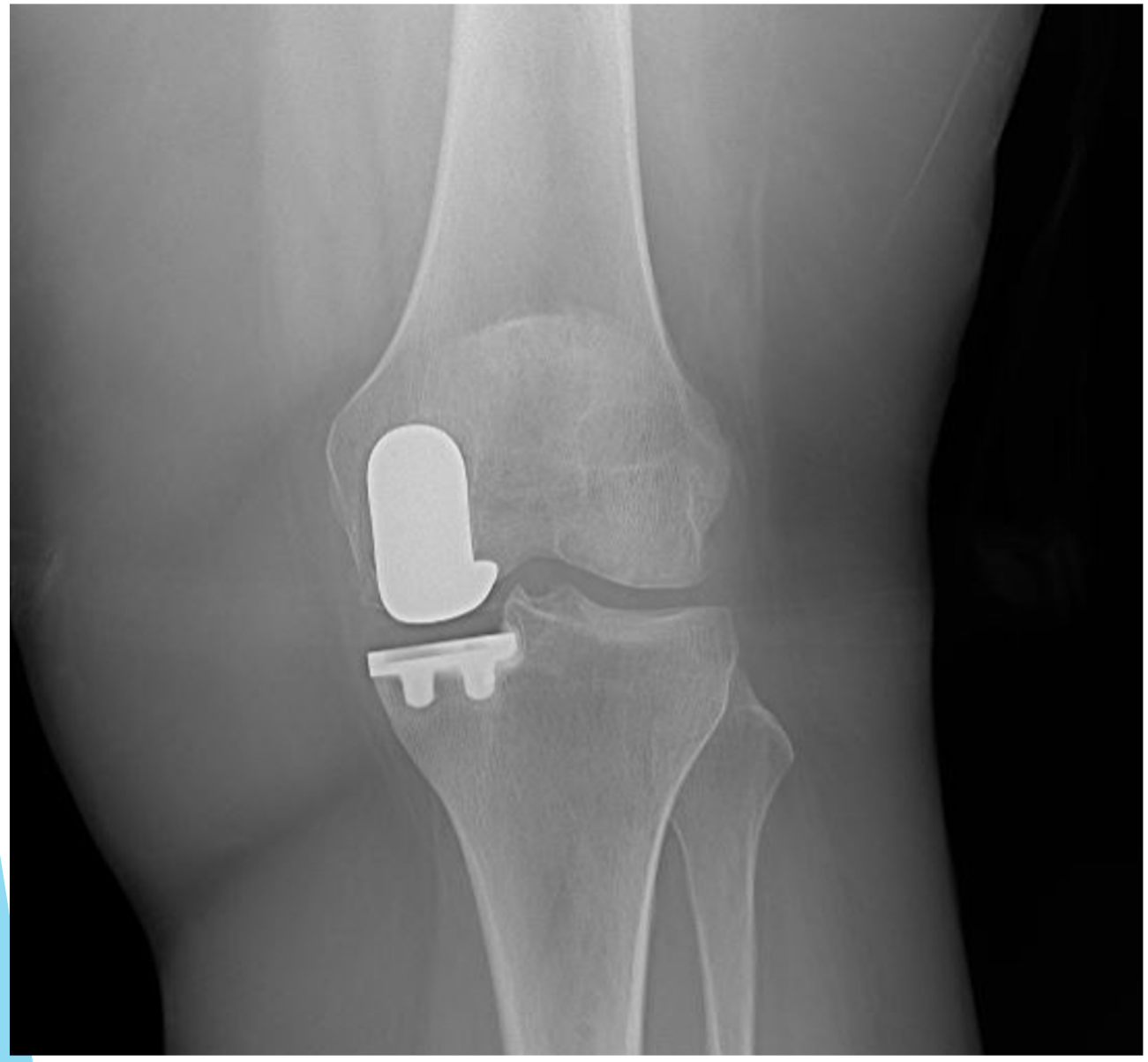
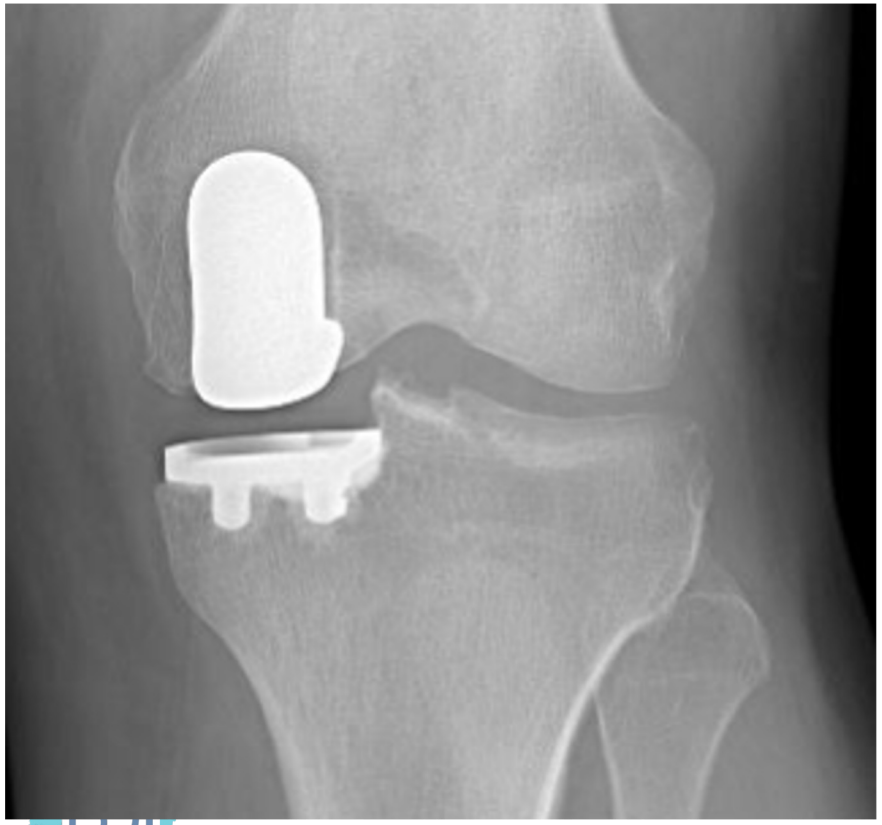
What is a Partial Knee Replacement?



Partial vs Total



VS

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Classic Indications for Partial Knee Replacement (Kozinn & Scott 1989)

1. Non-inflammatory arthritis
2. Arthritis in one compartment of knee
3. No patellofemoral arthritis
4. Age greater than 60
5. Low demand activity
6. < 80kg (180 lbs)
7. No resting pain
8. Flexion greater than 90 degrees
9. Flexion contracture < 5 degrees
10. Angular deformity of < 15 degrees that is passively correctable
11. Ligaments intact (ACL/PCL)

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4.3% of knee arthroplasty candidates met this clinical standard

Ritter et al.

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Classic Indications for Partial Knee Replacement (Kozinn & Scott 1989)

1. Non-inflammatory arthritis
2. Arthritis in one compartment of knee
3. ~~No patellofemoral arthritis~~
4. ~~Age greater than 60~~
5. ~~Low demand activity~~
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10. Angular deformity of < 15 degrees that is passively correctable
11. ~~Ligaments intact (ACL/PCL)~~

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Expanding Indications for Partial Knee Replacement

1. One compartment disease
2. Functional motion of knee
3. Angular deformity of < 15 degrees that is passively correctable
4. No *SEVERE* patellofemoral arthritis

VARIABLES to consider…

- Inflammatory arthritis (meniscal chondrocalcinosis)
- Severe obesity (BMI >35)
- Bone quality
- Conundrum of the 60's
- Negative Lachman's exam - ACL functionally intact

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PreOp Stress Xrays

Medial Compression

Medial Stress

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Evolving Criteria for UKA…

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Primary Arthroplasty

Evidence-Based Indications for Mobile-Bearing Unicompartmental Knee Arthroplasty in a Consecutive Cohort of Thousand Knees

Thomas W. Hamilton, MSc, MBChB, MRCS [a,*], Hemant G. Pandit, FRCS (Orth), DPhil [a,b], Cathy Jenkins, MSc [b], Stephen J. Mellon, PhD [a], Christopher A.F. Dodd, FRCS [b], David W. Murray, FRCS (Orth), MD [a,b]

[a] *Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Botnar Research Centre, Oxford, UK*
[b] *Nuffield Orthopaedic Centre, Oxford University Hospitals NHS Foundation Trust, Oxford, UK*

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Evolving Criteria for UKA…

- Analyzed a prospective series of 1,000 consecutive medial UKA's
- Review demonstrated that 68% of UKA's failed Kozinn & Scott's traditional criteria (contraindication group)
- Pain and function scores equivalent at 10yrs for contraindication and ideal groups
- No difference in 15yr survival score in patients under or over 60yo
- Equivalent functional outcomes found regardless of patellofemoral OA

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Demographics

- TKA's estimated to increase 673% by 2030 (Kurtz et al., AAOS 2006)
- Approximately 620,000 total knee replacement surgeries performed annually in the U.S.
- 4,000,000 people over the age of 50 in U.S. live with a total knee replacement
- Historically, less than 10% of patients with arthritis of the knee are candidates for partial knee replacement

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The numbers are growing…

- Aging “baby boomer” population
- Increasing life expectancy
- Decreasing age of utilization of surgery
- Increasing Obesity?
- TKA’s estimated to increase 673% by 2030

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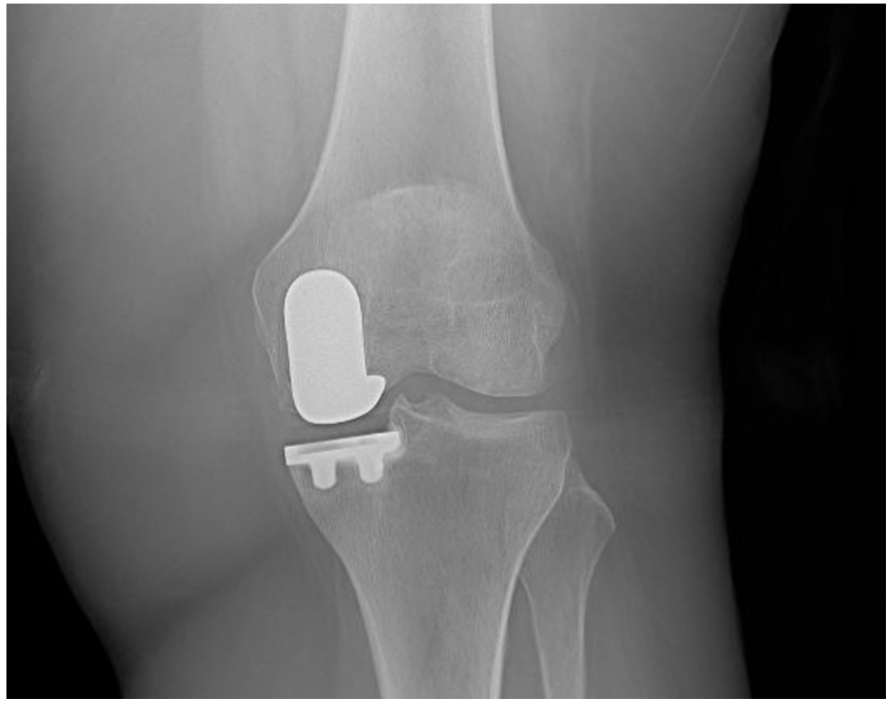
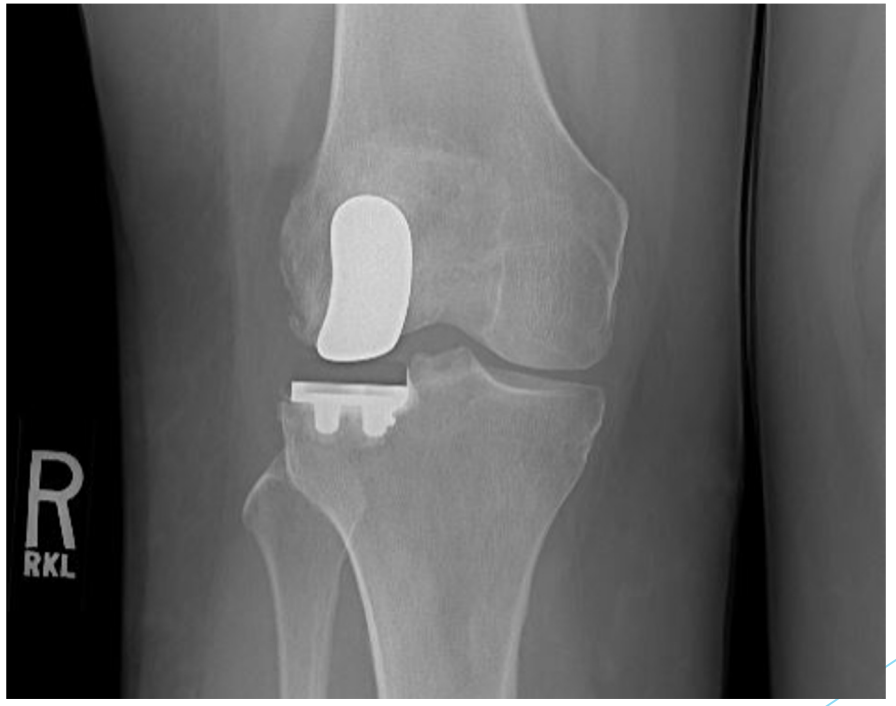
Types of UKA's

Medial 90%



Lateral 10%



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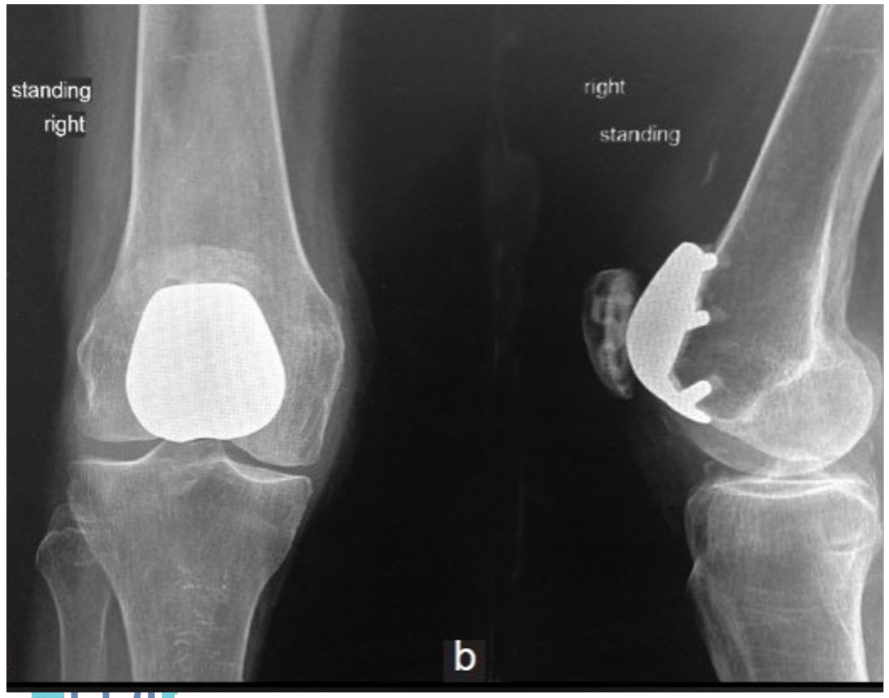
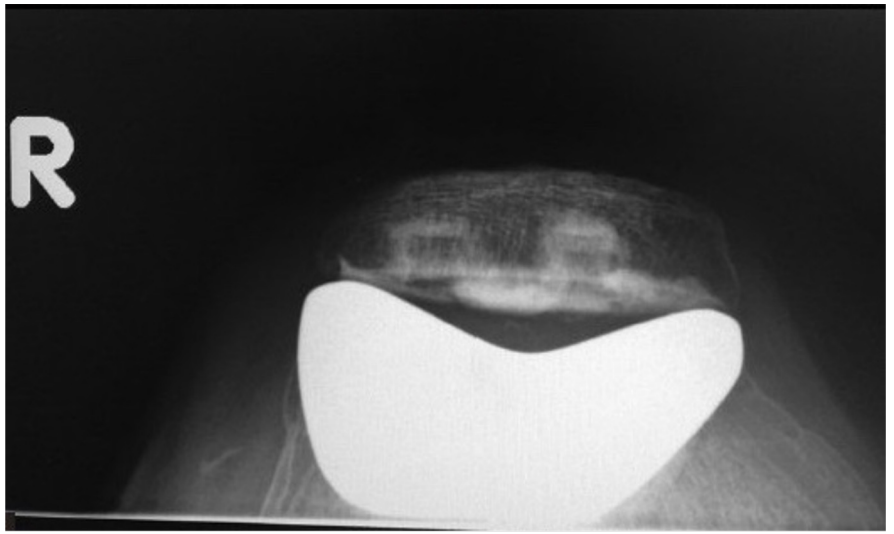
Types of UKA's

RARE "elusive"
Patellofemoral





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Mobile-bearing vs Fixed-bearing UKA

- Preference for FIXED bearing:
    1. Surgical technique similar to TKA
    2. Remove failure mode of bearing dislocation
    3. Easier ligament balancing
    4. Decrease risk of over-correction of mechanical axis
    5. Ignore ACL

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Potential Benefits of Partial Knee Replacement

- 2/3 of normal joint retained
- "More normal" knee
- Less invasive procedure
- Early functional recovery[4]
- Greater range of motion, less stiffness[1]
- Preferred to total knee[2]
- Less blood loss[1]
- Lower 5 year complication rate[6]
  - 11% for totals and 4.3% for partial
- Lower rate of infection[3]
- Outpatient surgery

1. Rougraff et al 1991, 2.Cobb et al 1990, 3.Knutson et al 1990, 4. Laurencin et al 1991, 5. Willis-Owen et al 2009, Arno et al 2011, Pandit et al 2011 6. Brown et al. JOA 2012

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United Kingdom Registry Adverse Outcomes of UKA vs TKA

- 25K UKA's matched to 75K TKA by propensity scores
- TKA adverse outcomes
  - Mortality
  - VTE, MI, Stroke
  - Readmission rate
  - LOS
- *"If 100 patients receiving TKA's were to receive UKA's instead, there would be 1 less mortality, but 3 more operations in the first 4 years after surgery."*

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Disadvantages of Partial Knee Replacement

- Revision rate is HIGHER?
- Total knee lasts 20 years, 85% of the time
- Partial knee lasts 15 years, 80% of the time

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Painful TKA
Surgeon's Zen

- No infection
- Well-fixed,well-aligned
- Implant track record good
- No flexion instability
- Adequate Range of motion
- No soft tissue issues - patellar clunk or popliteus catching

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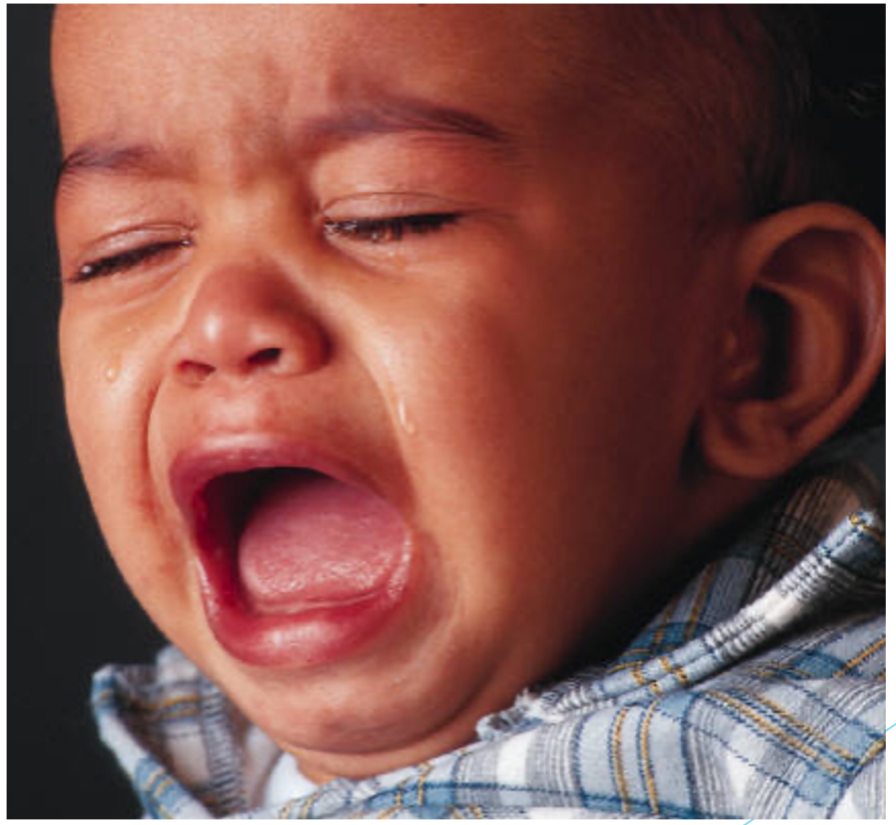
Painful UKA
Surgeon's Nightmare

- No infection
- Well-fixed,well-aligned
- Implant track record good
- No flexion instability
- Adequate Range of motion
- No soft tissue issues



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Surgeon Bias for Revisions

- Surgeons are…
- *Hesitant to revise a painful TKA without know cause*

- But…
- *Quick to revise a painful UKA without know cause*

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Revision for Unexplained Pain in UKA vs TKA

- NJR of England and Wales review of 402,714 knee arthroplasties from 2003-2010 (JBJS)
- 366,965 TKA (91%), 35,749 UKA (9%)
- Revised at max of 8-yrs
- Revision for Unexplained Pain **UKA 23%, TKA 9%**
- 5-yr revision rate for unexplained pain, 1.6% for UKA and 0.2% TKA (8x higher)

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Advantages of Robotic Assisted UKA

- Restoration of native knee biomechanics
- Accurate implant positioning
- Reproducible leg alignment (mechanical axis)
- Improved soft tissue balancing

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Midterm Survivorship of Robotic-assisted Medial UKA

- Prospective, multicenter study to determine:

1. Midterm survivorship
   - 97% Survivorship @ 5.7 yrs
   - Mean time to revision 2.27 yrs
   - 432 knees, 13 failures = 11 revisions to TKA, 2 UKA component revisions
2. Modes of failures
   - Most common failure mode – 7/13 aseptic loosening of tibia
3. Satisfaction
   - 91% satisfied or very satisfied

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Survivorship and Patient Satisfaction Rates of Robotic-Assisted Unicompartmental Knee Arthroplasty: A 10-Year Follow-Up Study

Rushabh M. Vakharia, M.D.[1,2], Tsun Yee Law, M.D., M.B.A.[1], Martin W. Roche, M.D.[2]

= Maimonides Medical Center, Department of Orthopaedic Surgery, Brooklyn, NY; [2] = Holy Cross Hospital, Orthopaedic Research Institute, Ft. Lauderdale, I

- 98% 10-yr survivorship with robotic-assisted medial UKA's
- Patient Satisfaction rates 97%
  - 81% Very Satisfied
  - 16% Satisfied
- 2 Revisions
  - Advance of lateral compartment OA at 5yr
  - Poly exchanged for Infection at 5 weeks post Op

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Revision of Partial Knee

- Partial knee arthroplasty can be converted to a total knee arthroplasty with outcomes comparable to a primary total knee replacement
  - If performed by joint specialist
  - If no severe bone loss

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Partial knee replacement

- *"Am I a candidate for partial knee replacement?"*
- 1/3 of patients are potentially candidates
- Must go to a surgeon who performs high volume partial knee replacement

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Partial knee replacement

- *"Am I a candidate for partial knee replacement?"*
- 1/3 of patients are potentially candidates
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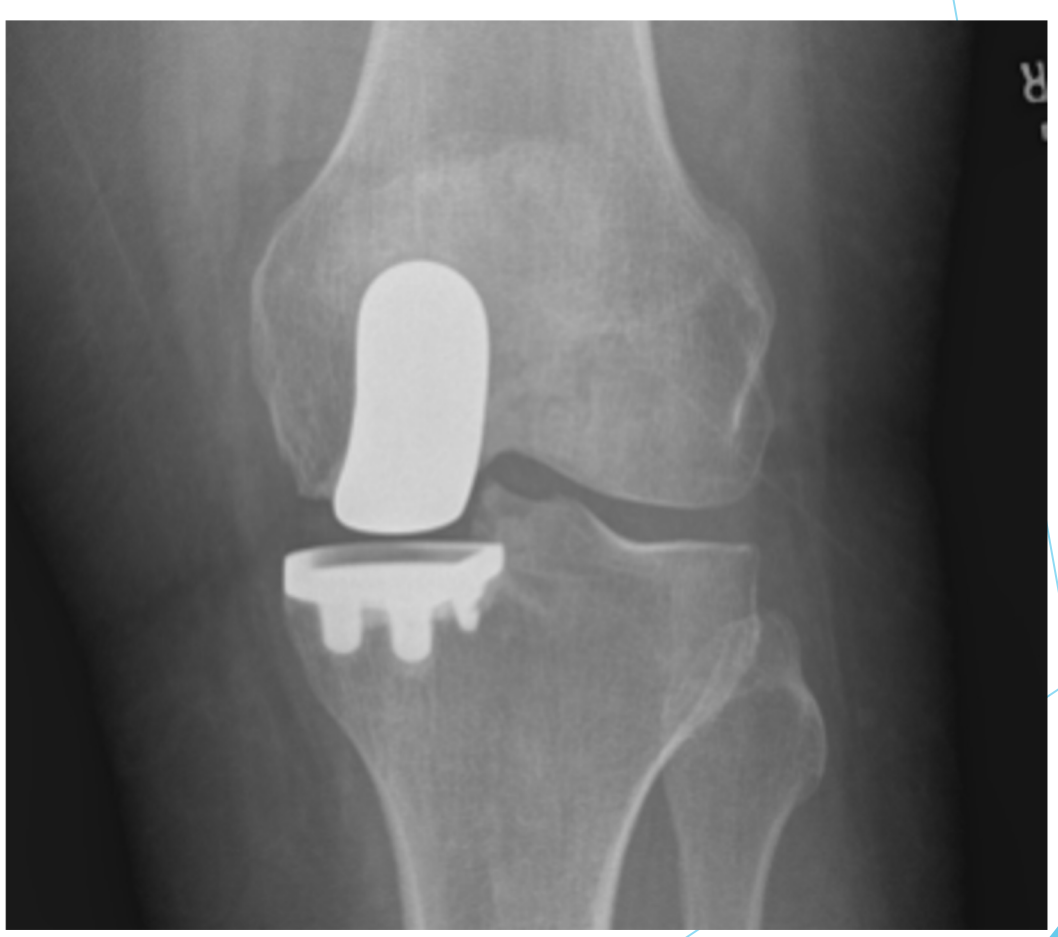
Partial Knee Replacement – Case Studies

Before

After



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CASE 2 – 35yoM post traumatic MFC fx

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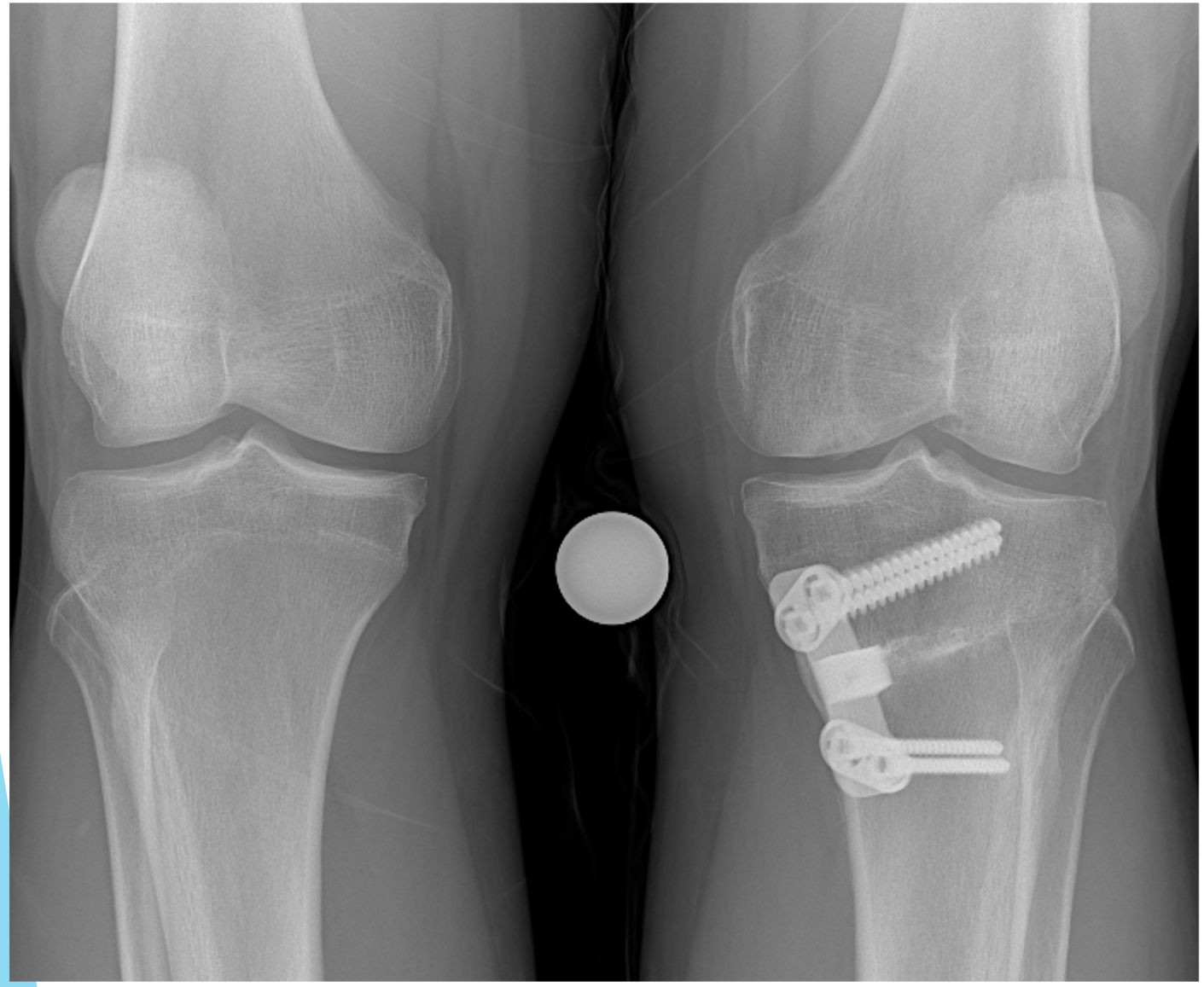
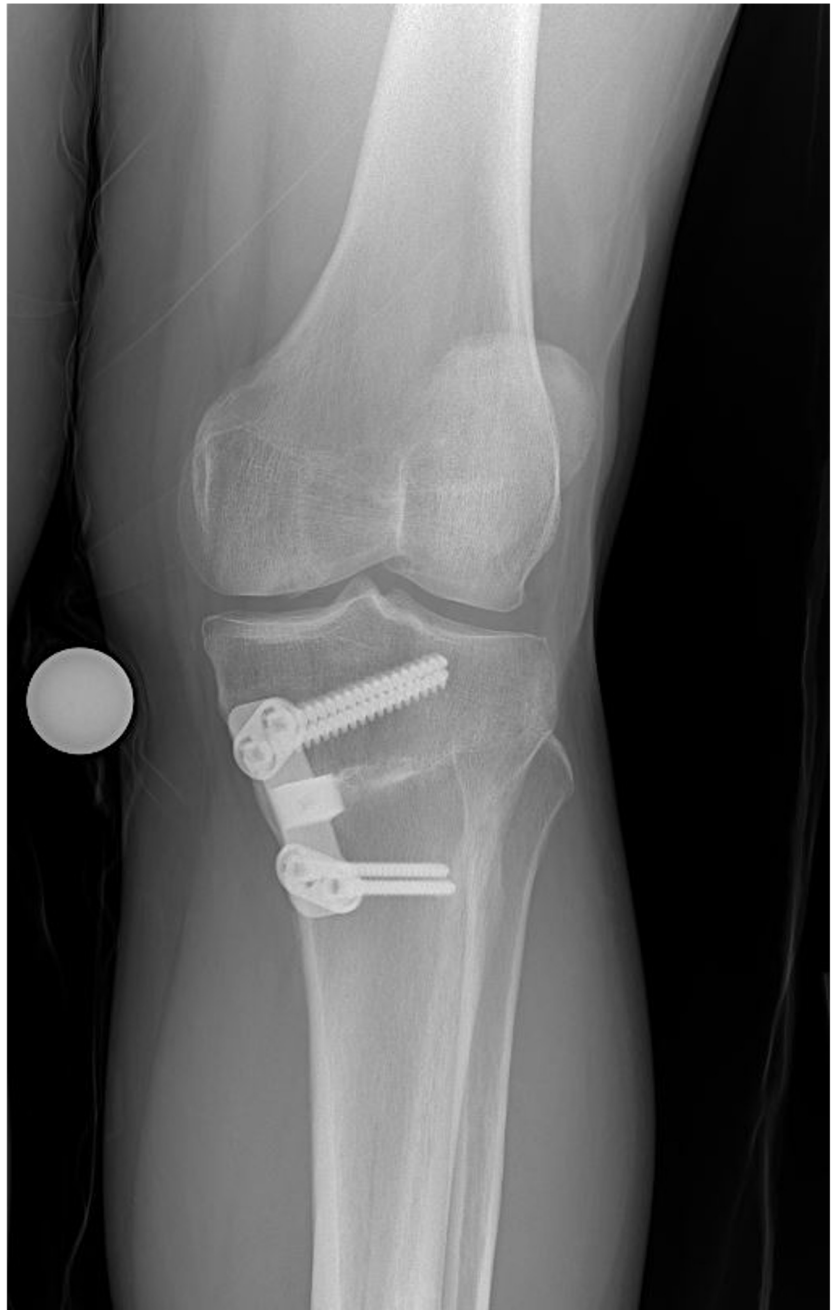
CASE 3 – 27yo MS/P HTO & MFC OATS



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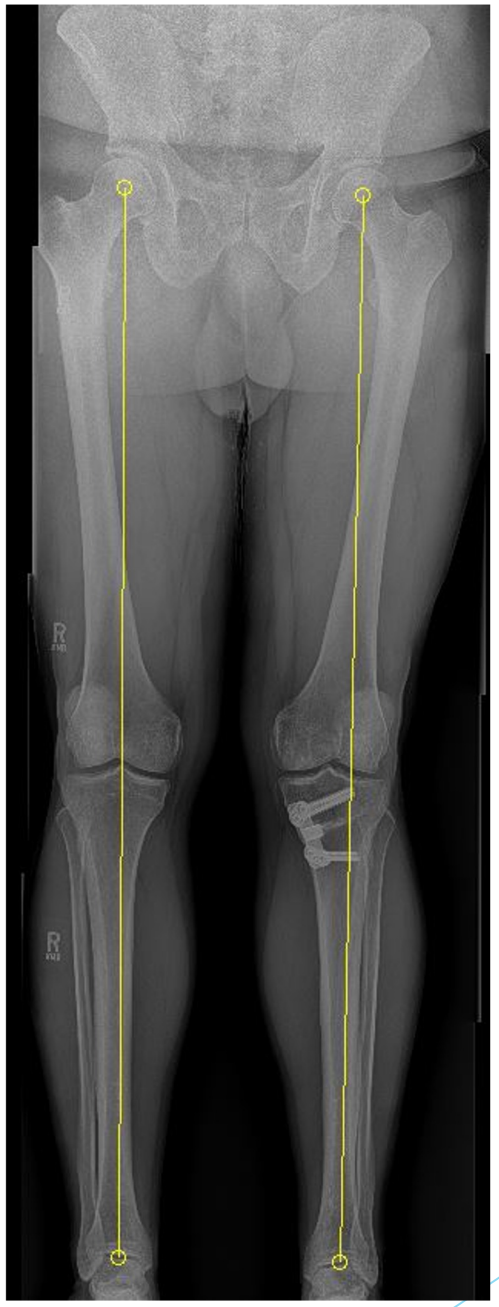
VALGUS Inducing HTO



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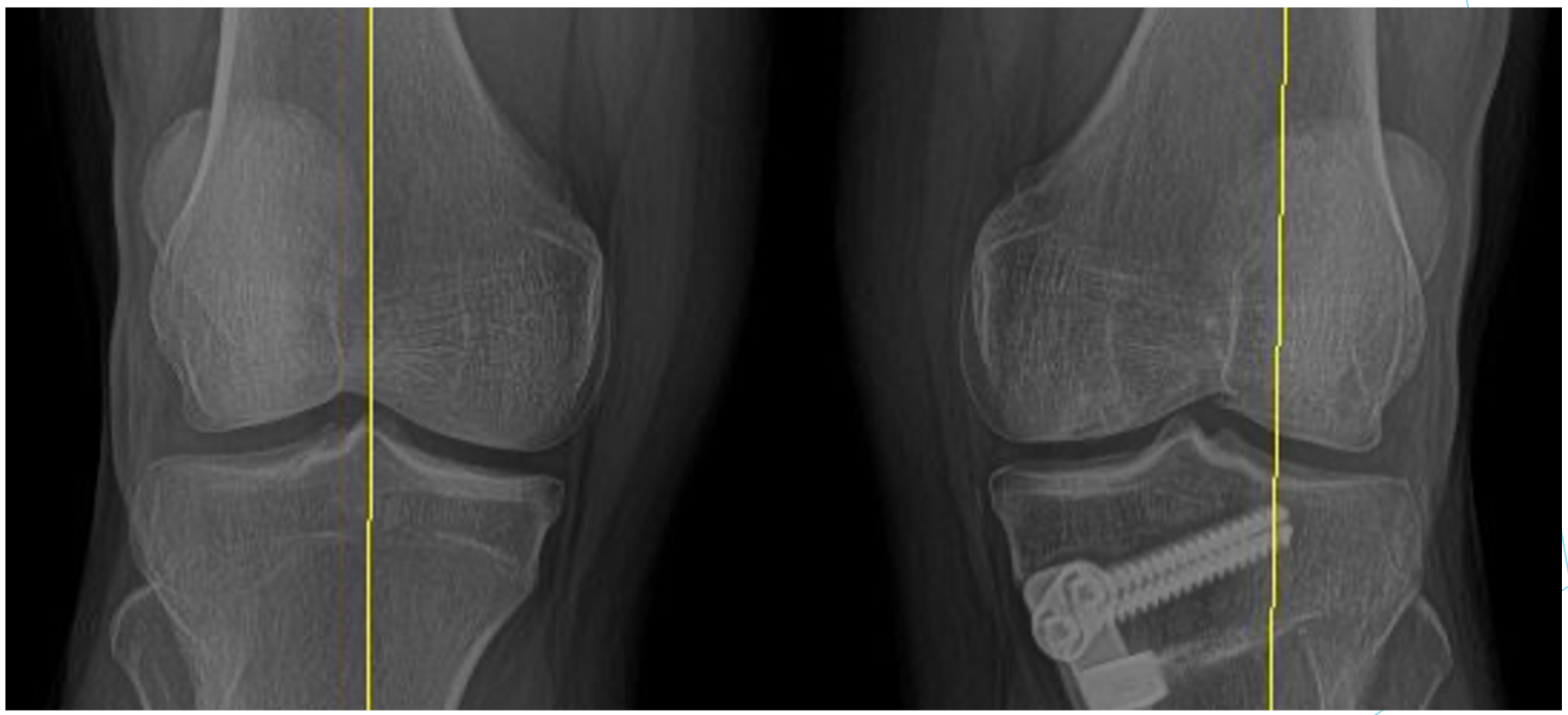

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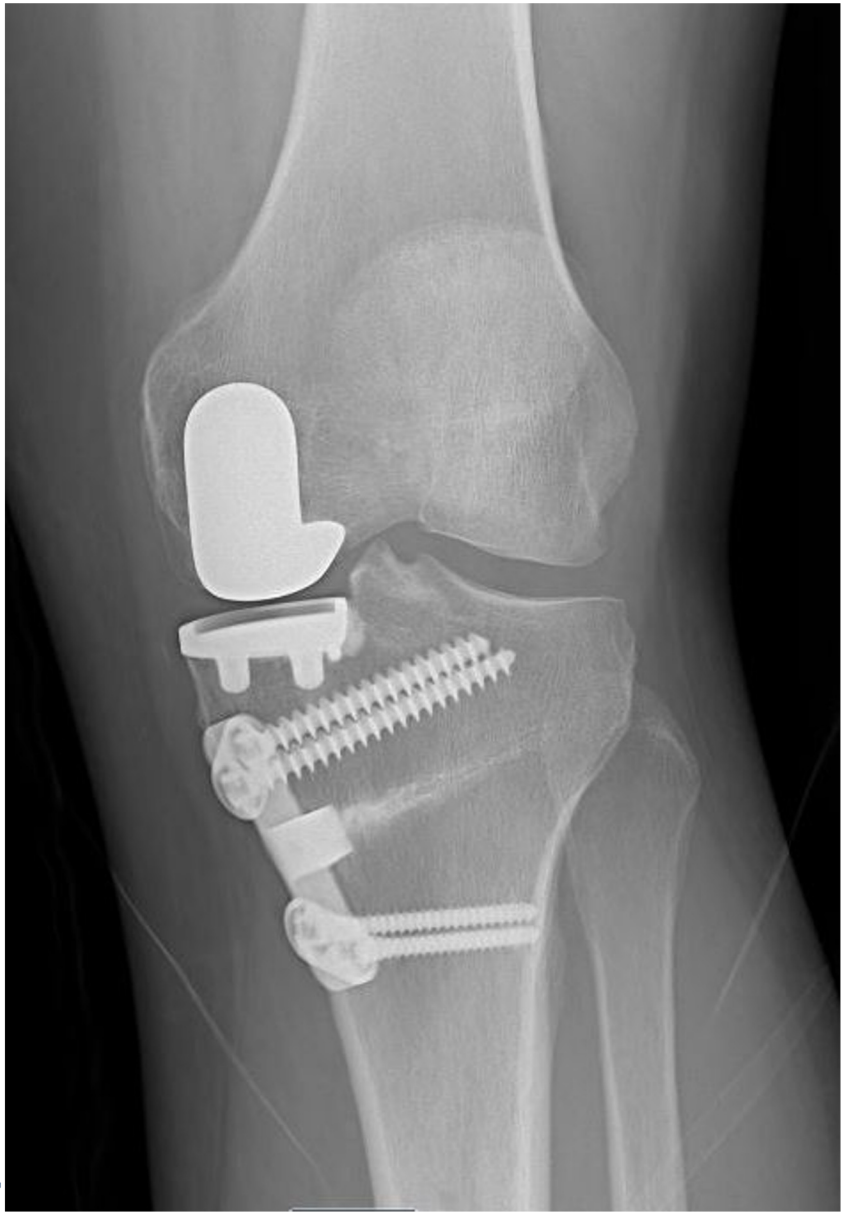

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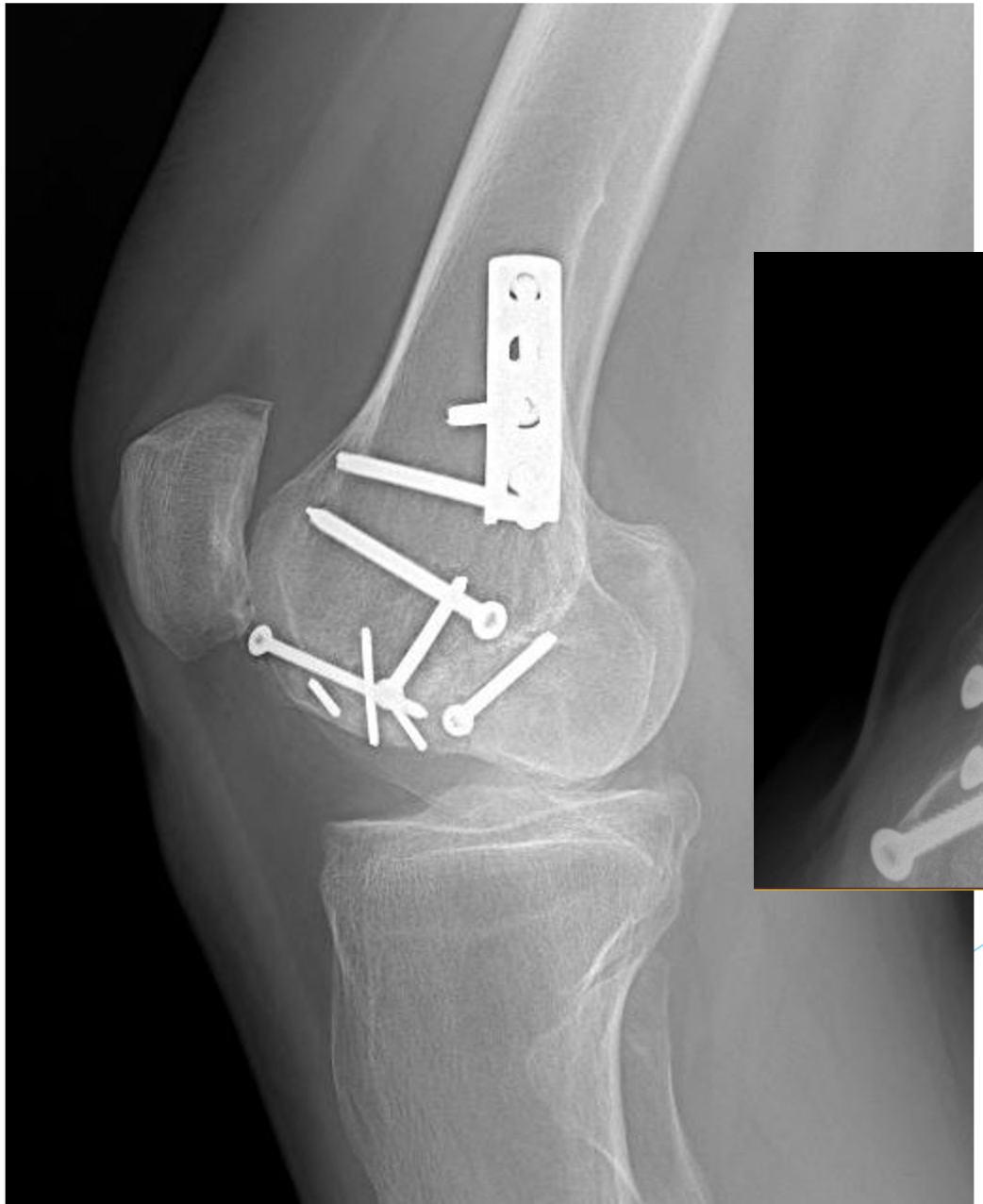
CASE 4 – 42yoM s/p ORIF intrarticular distal femur fx



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MAKOplasty®

Partial Knee Replacement

Brian T. Perkinson, M.D.

Orthopaedic Surgery, Adult Reconstruction of the Hip and Knee

Bone & Joint Institute of Tennessee

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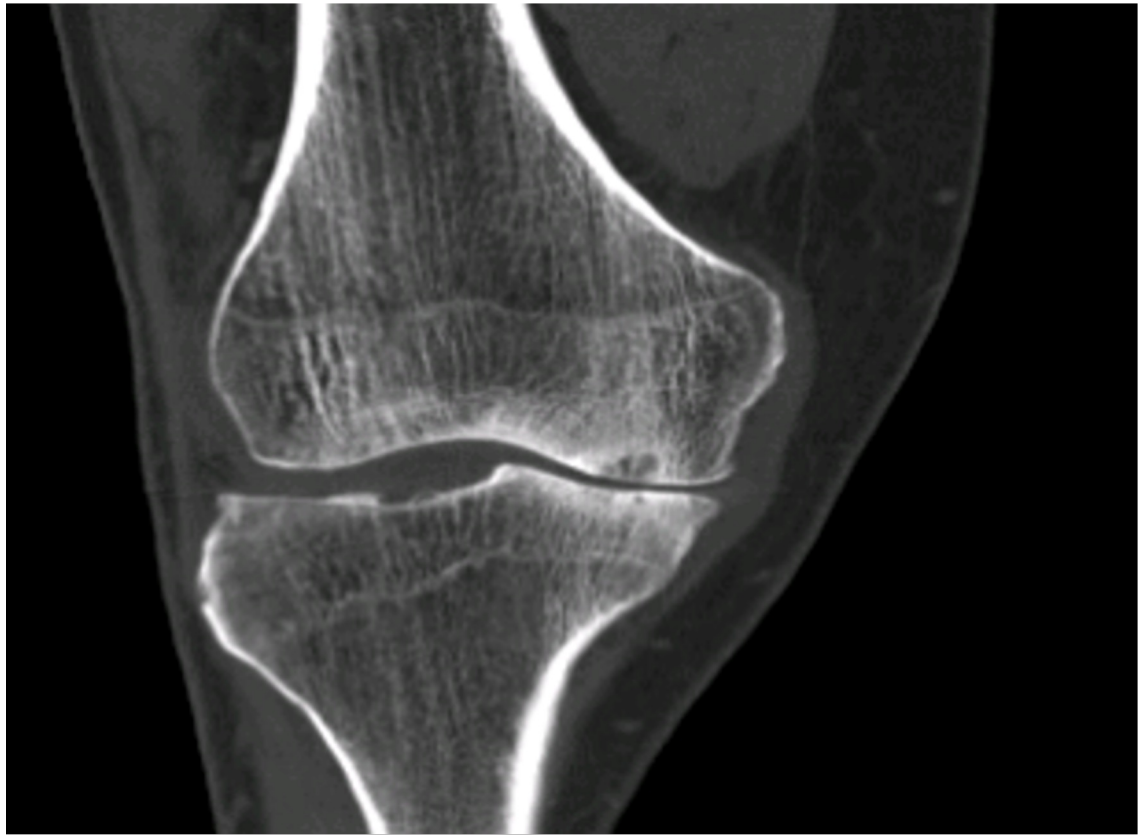
CT Scan of Osteoarthritis



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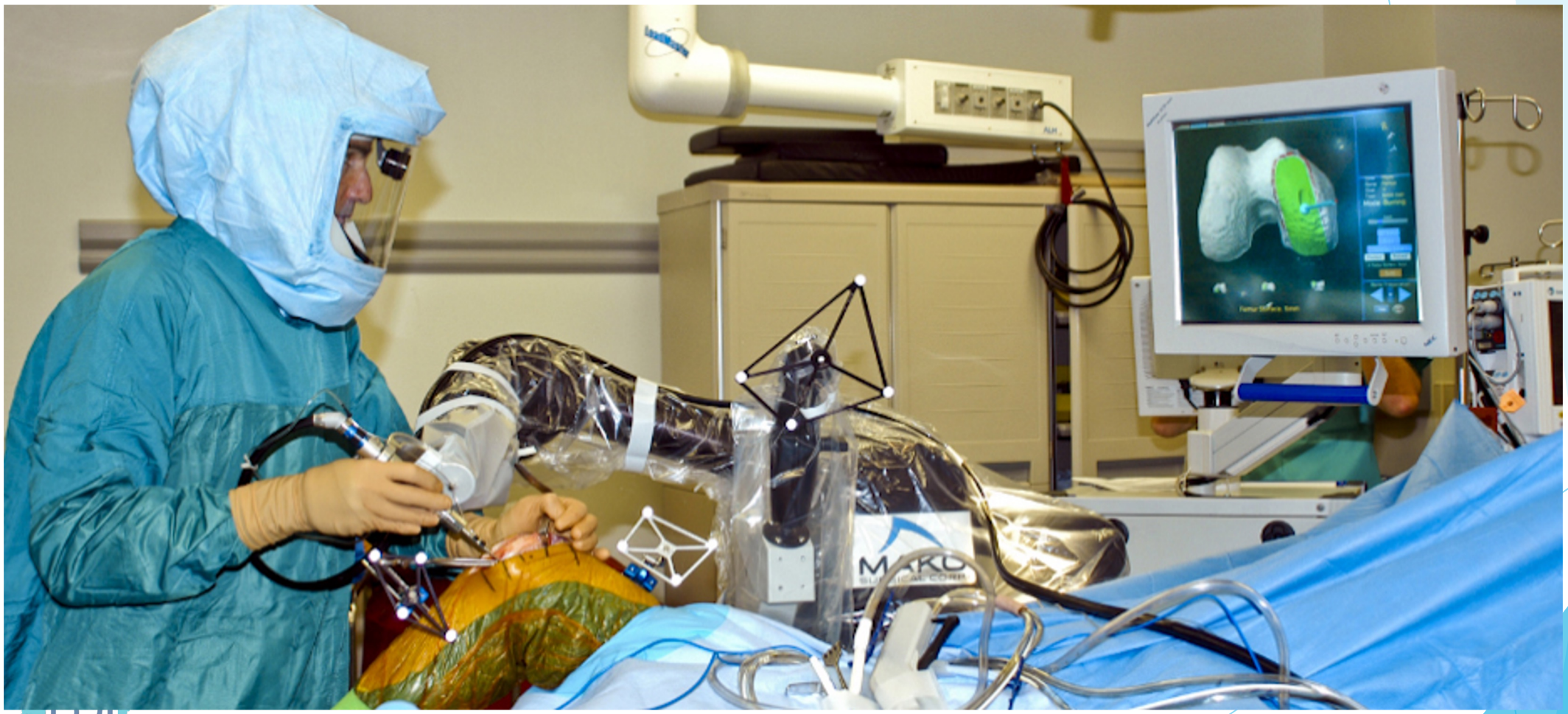
Operating Room Setup



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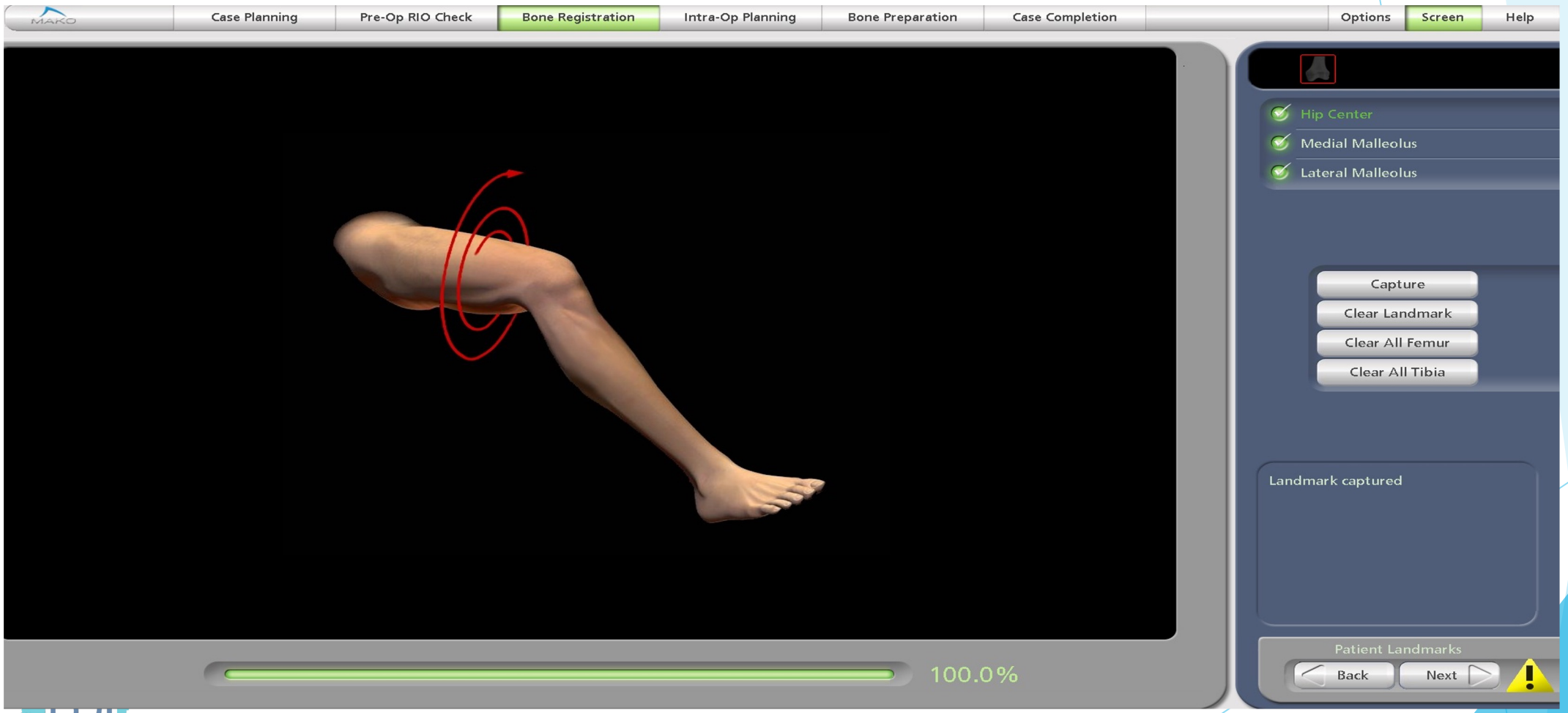
MAKO® Partial knee replacement



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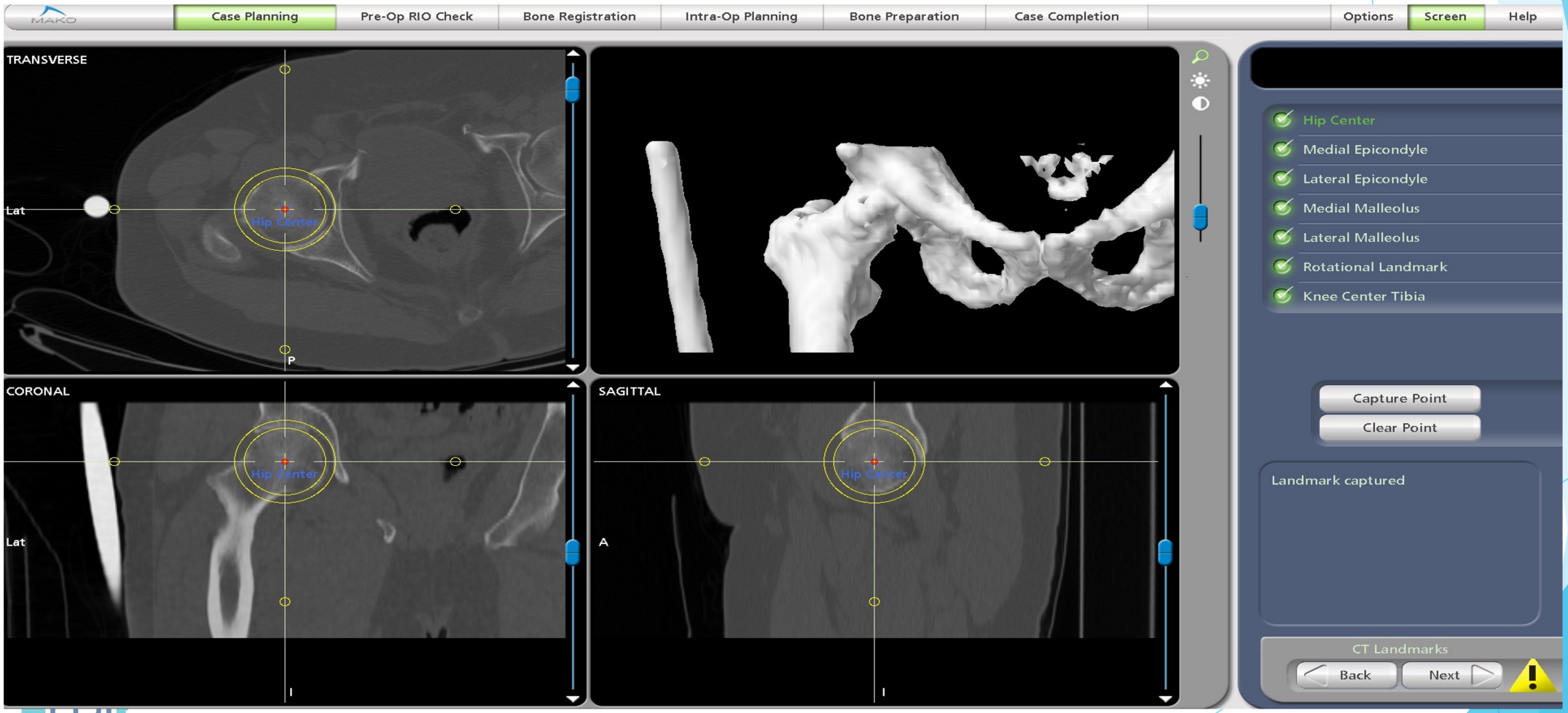

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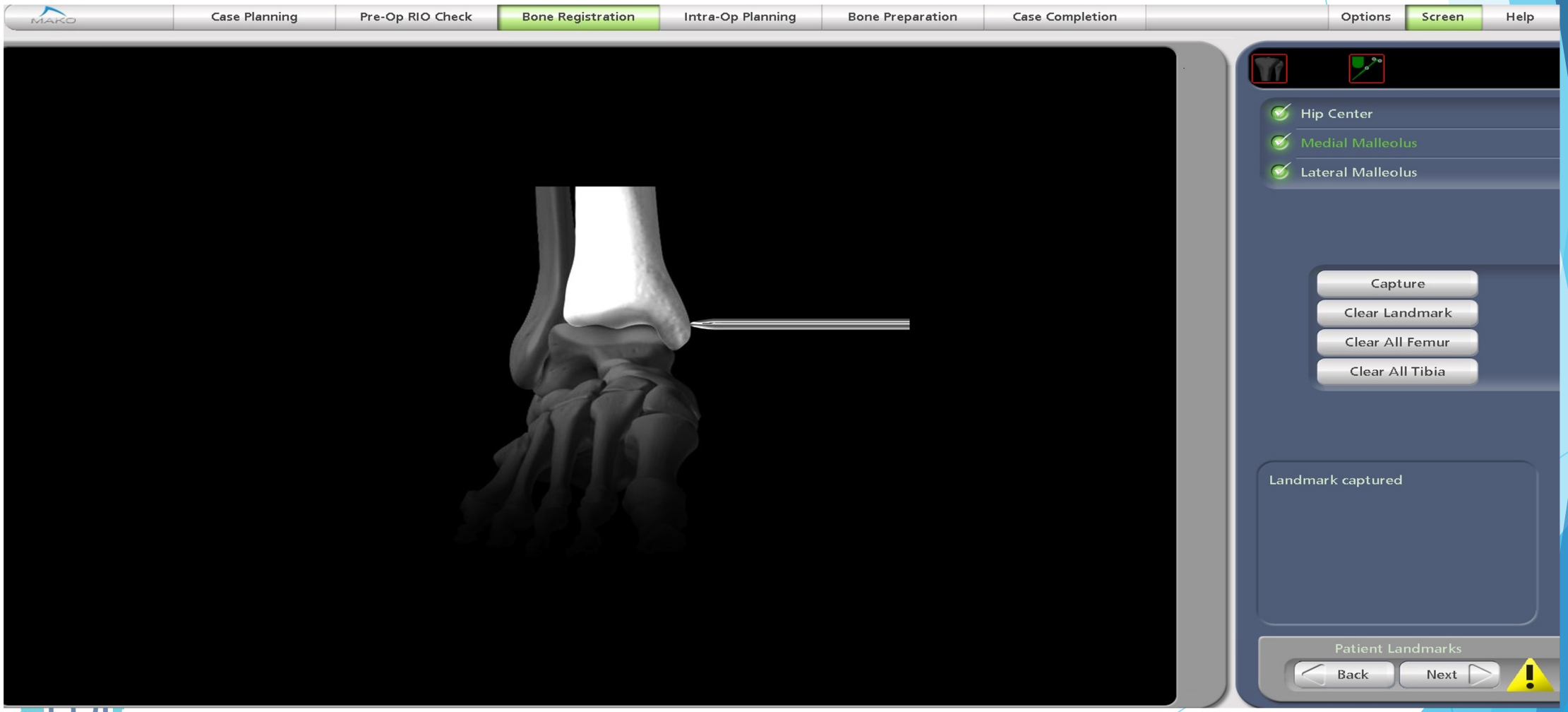

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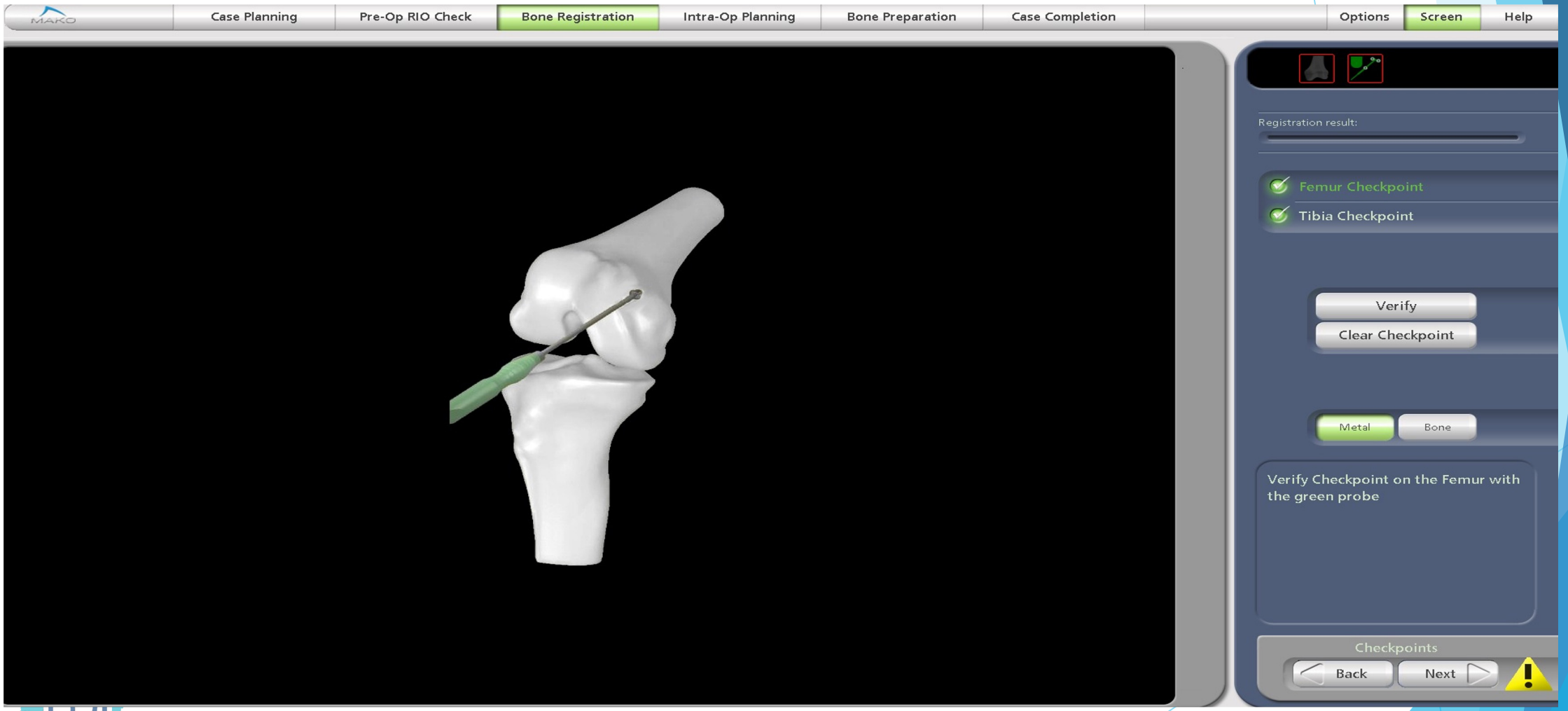

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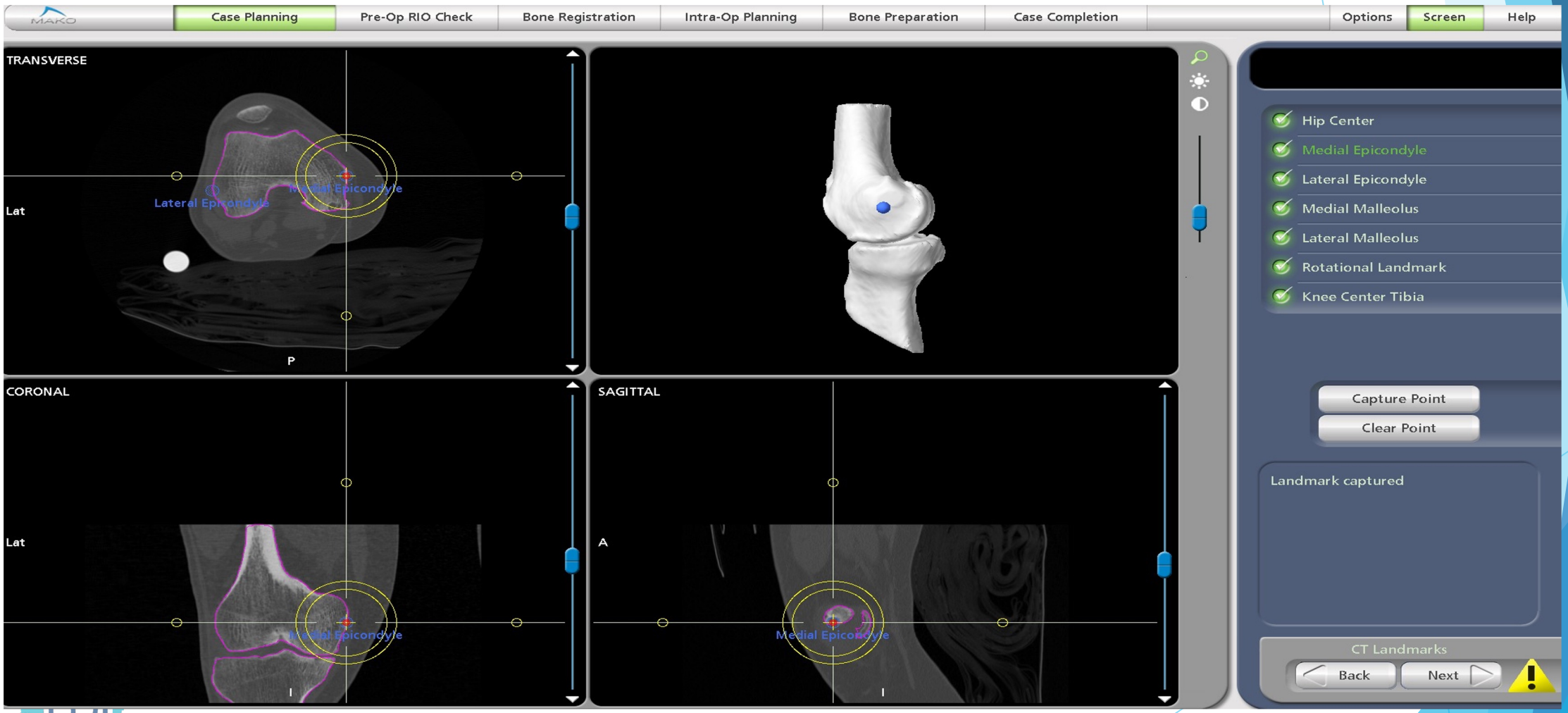

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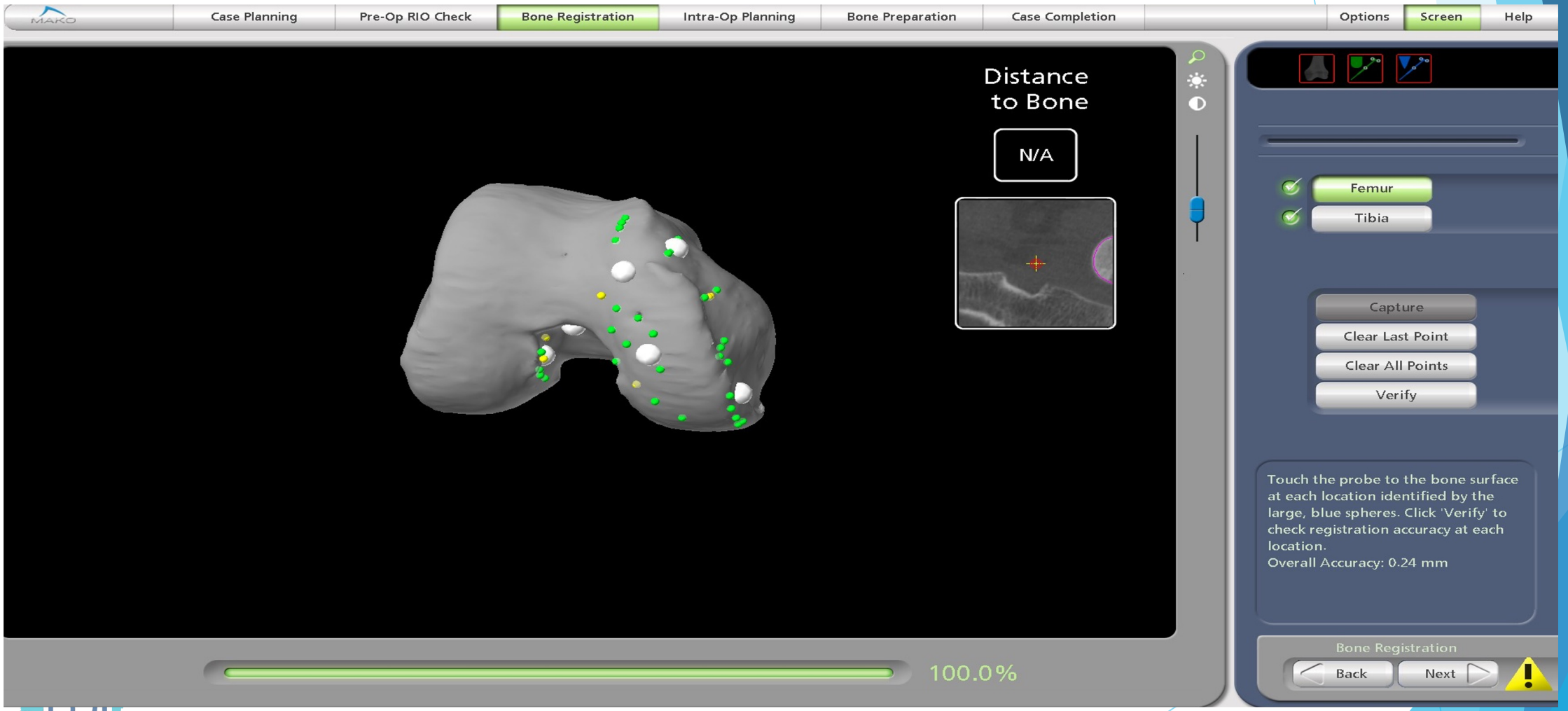

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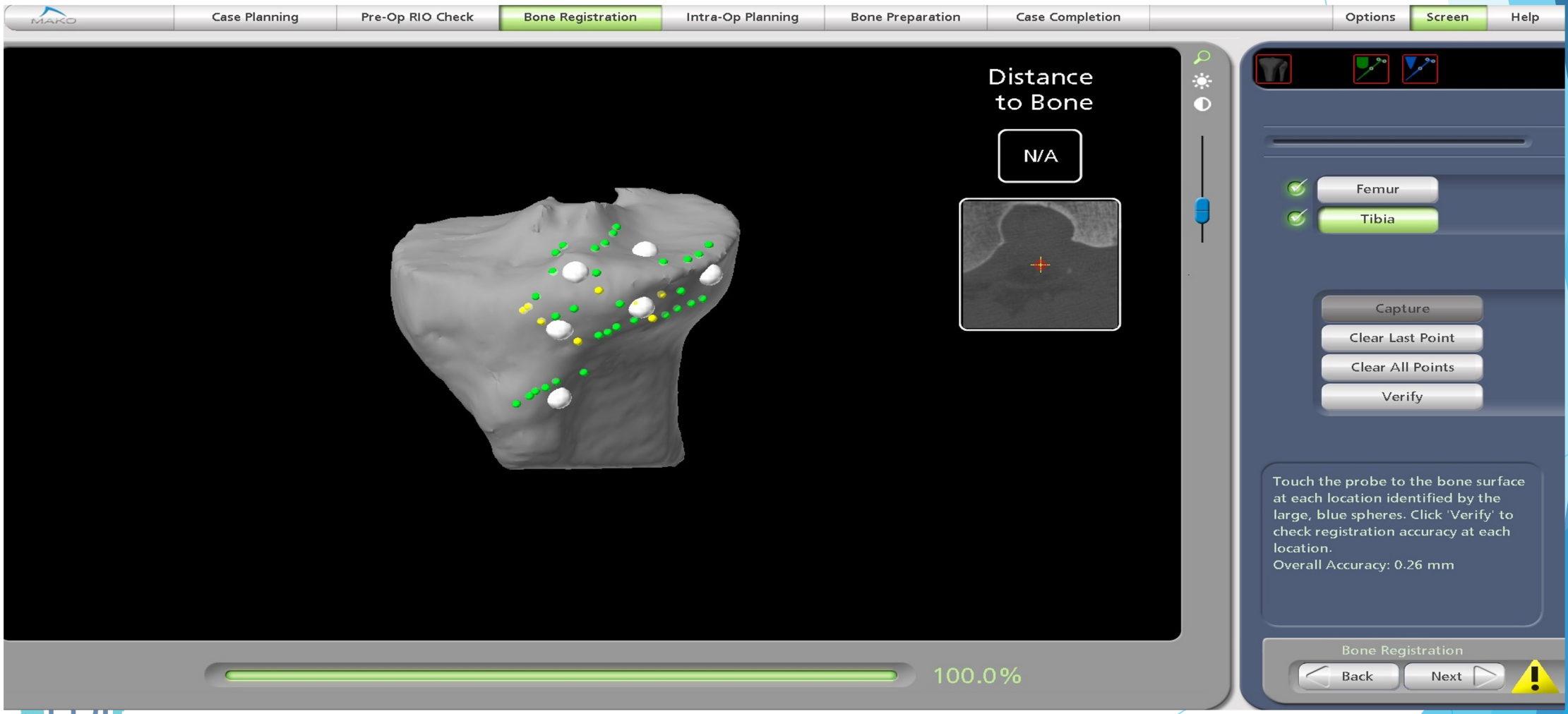

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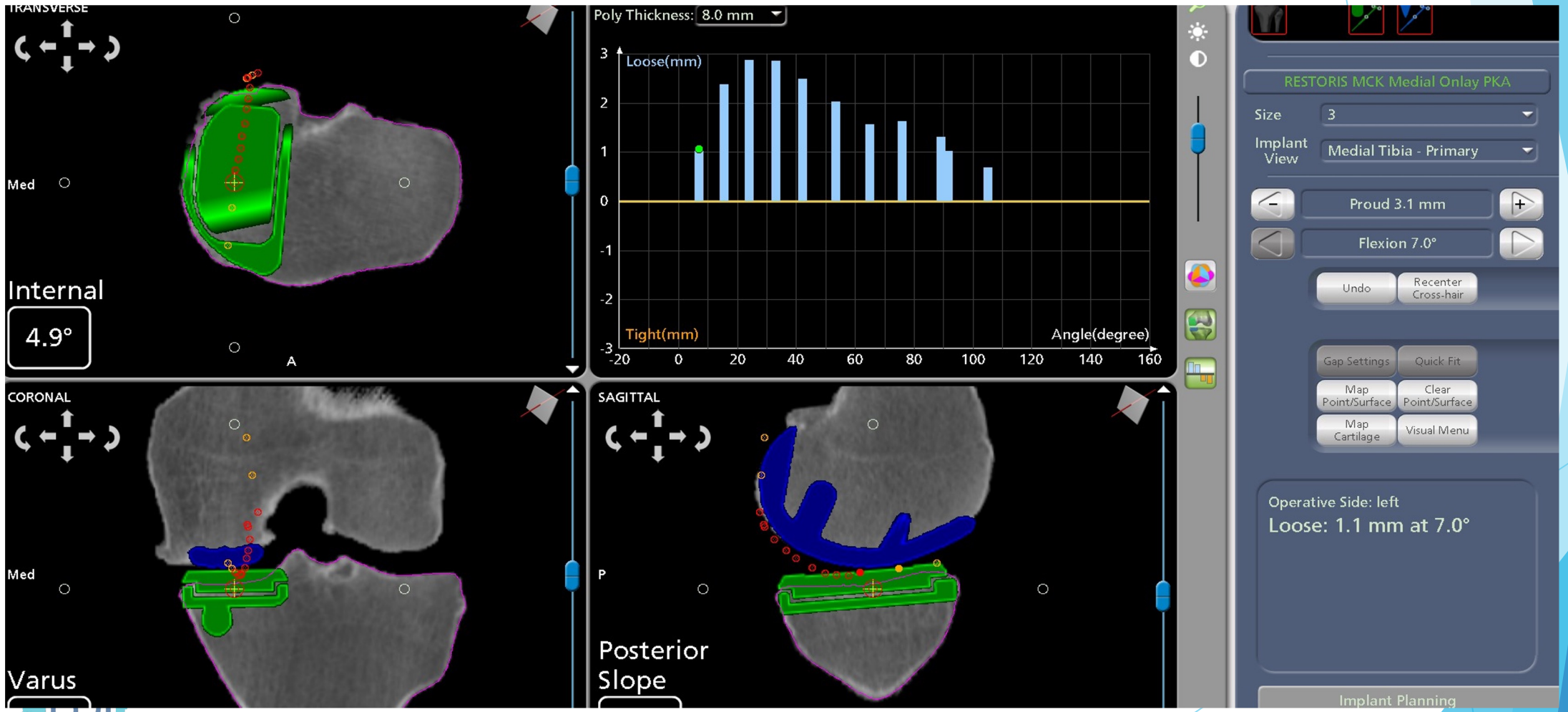

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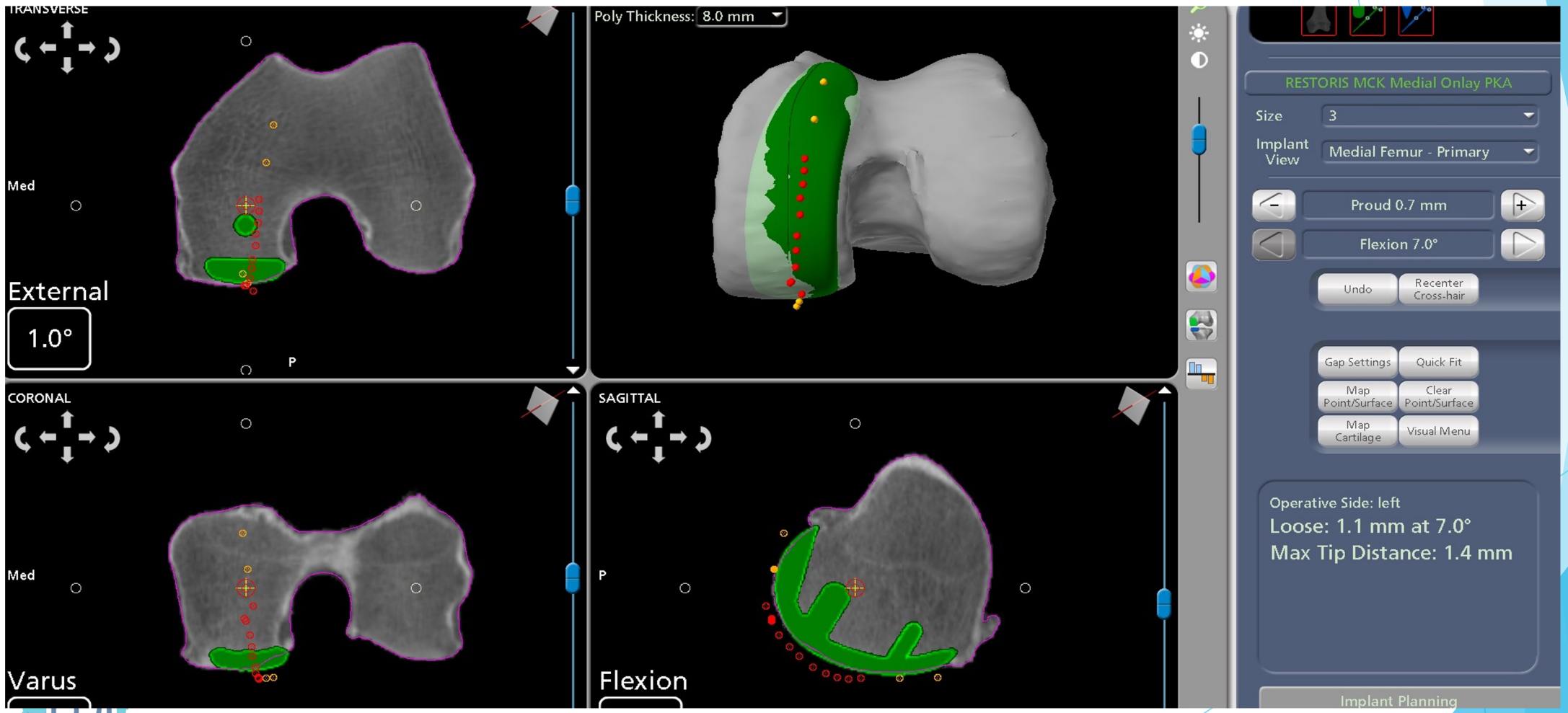

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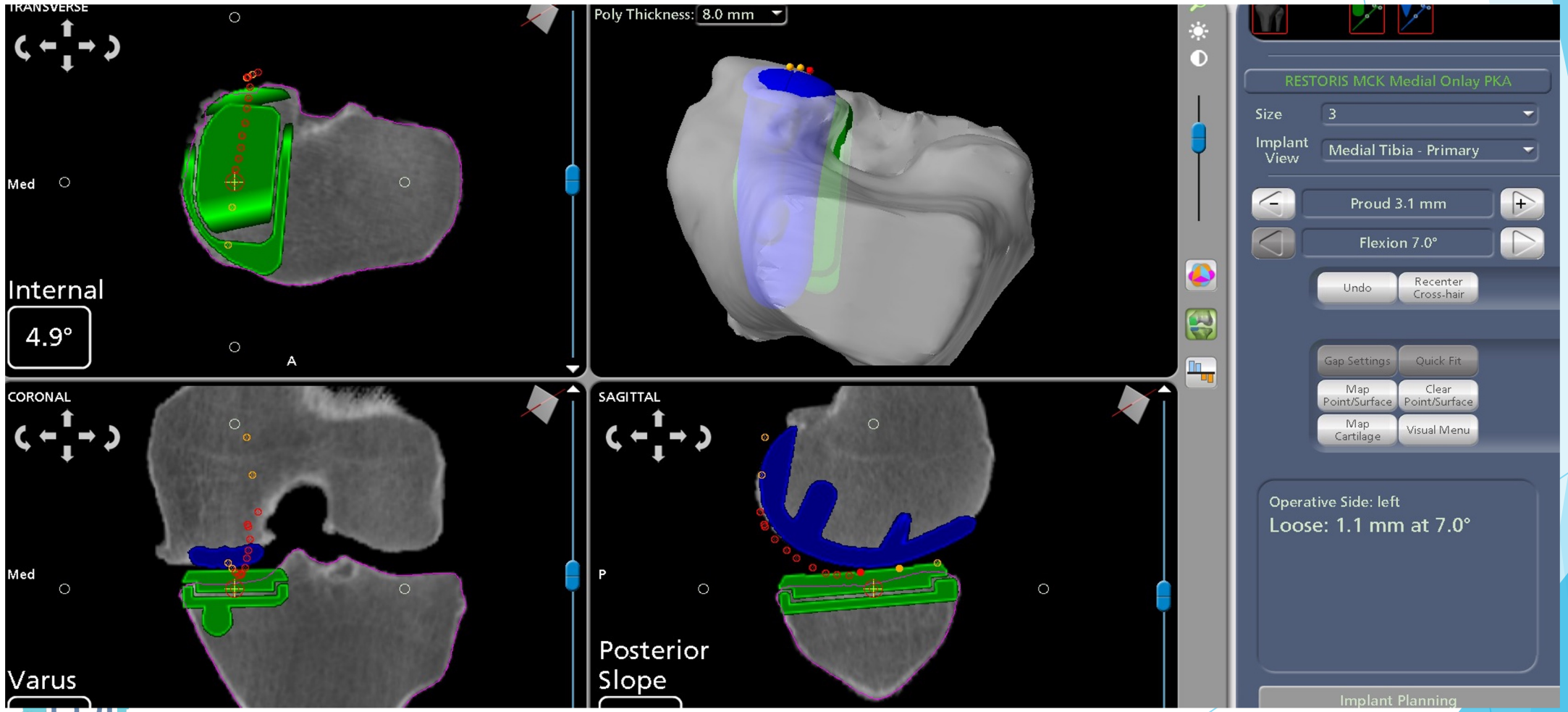

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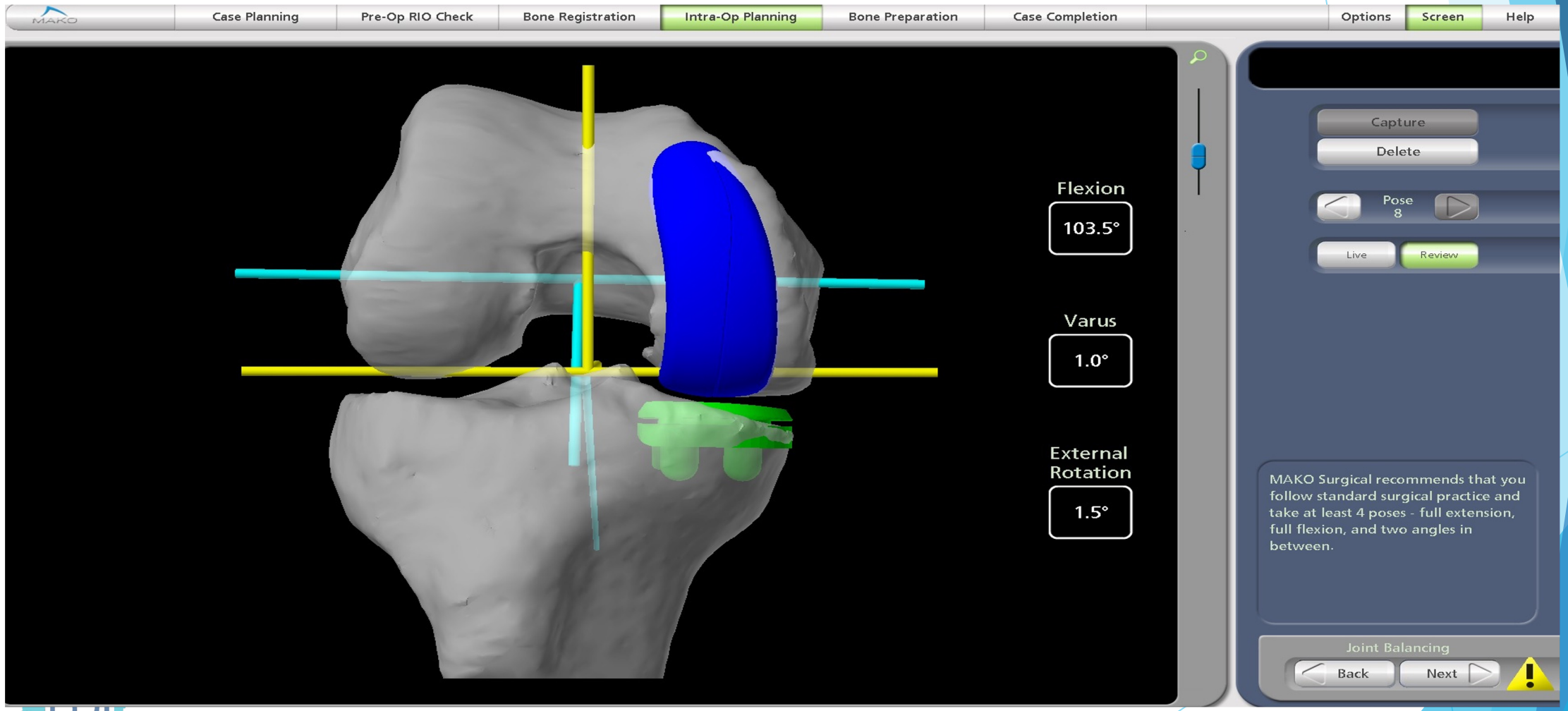

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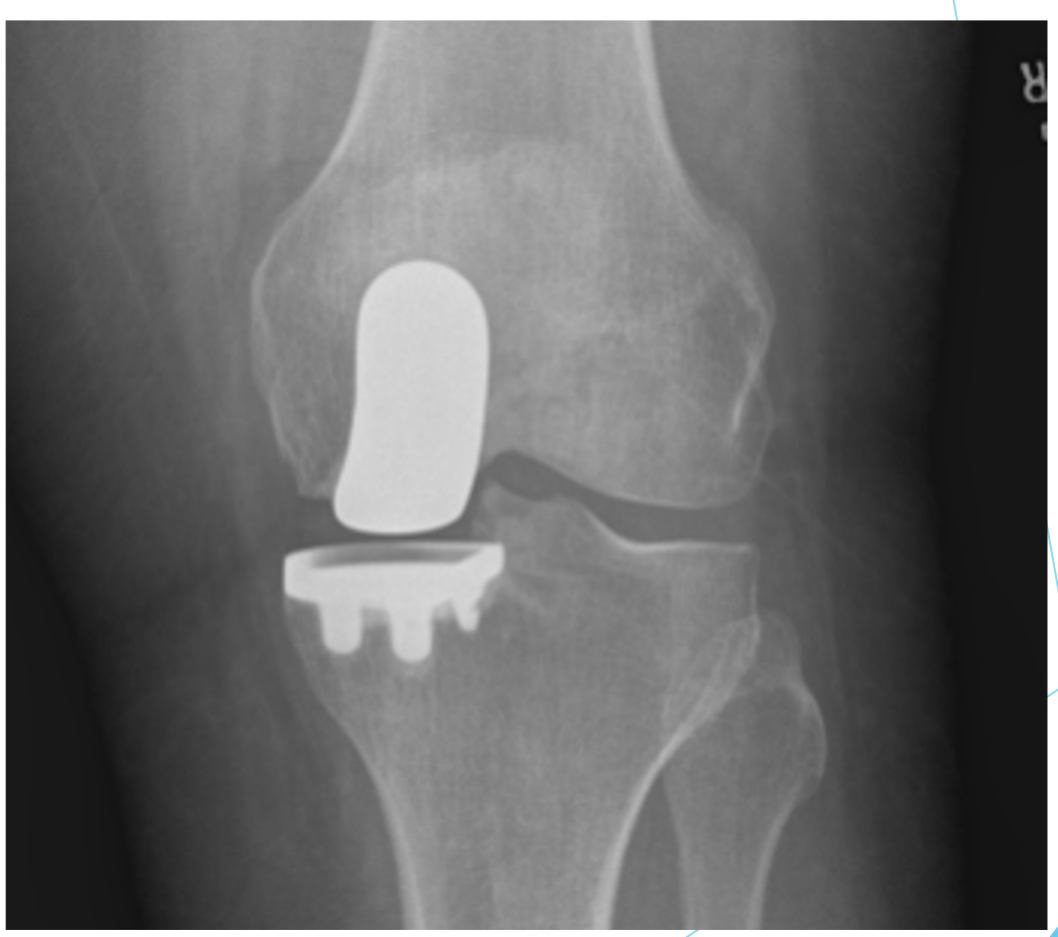
Partial Knee Replacement

Before

After



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