Knee Injuries in Worker's Compensation

Evaluation, Treatment, & Return to Work

WCM
WORK COMP MADNESS

March 11, 2026

System Vice Chair, Musculoskeletal (MSK) Service Line
Regional Section Head of Ortho, Sports, & MSK
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Ochsner-Andrews Sports Medicine Institute

BURNHAM ORTHOPEDICS

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About the Presenter

Jeremy Burnham, MD

Board-Certified Orthopedic Surgery
And Orthopedic Sports Medicine

Ochsner-Andrews Sports Medicine Institute
Baton Rouge, Louisiana

Credentials & Expertise

- Fellowship-trained in Sports Medicine (University of Pittsburgh)
- Residency: University of Kentucky Orthopaedic Surgery
- 50+ peer-reviewed publications
- Former team physician: Pitt Football, Southern Univ. Football, BR Rougarou, Pittsburgh Steelers, Pittsburgh Penguins
- Specializing in ACL, meniscus, and complex knee injuries

IME & SMO

Independent Medical Examinations
Second Medical Opinions

Burnham Orthopedics & Sports Medicine

[redacted]
jeremyburnhammd.com

Disclosures

- Arthrex: Paid Consultant; Research support
- Research Grants from DoD and NIAMS

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On The Shoulders of Giants

Dr. Freddie Fu (1950-2021)

DR. JAMES ANDREWS

Learning Objectives

1

Evaluate Common Knee Injuries

Understand the clinical presentation, physical exam findings, and appropriate imaging for ACL tears, meniscus injuries, and ligament damage in work-related settings

2

Surgical vs. Non-Surgical Decision Making

Learn the evidence-based criteria for when surgery is indicated and when conservative management is appropriate

3

Understand Treatment Options & Outcomes

Review current surgical techniques including ACL reconstruction, meniscus repair, and complex multiligament procedures

4

Return to Work & MMI Timelines

Know expected recovery timelines, return-to-work guidelines, and when maximum medical improvement is typically reached

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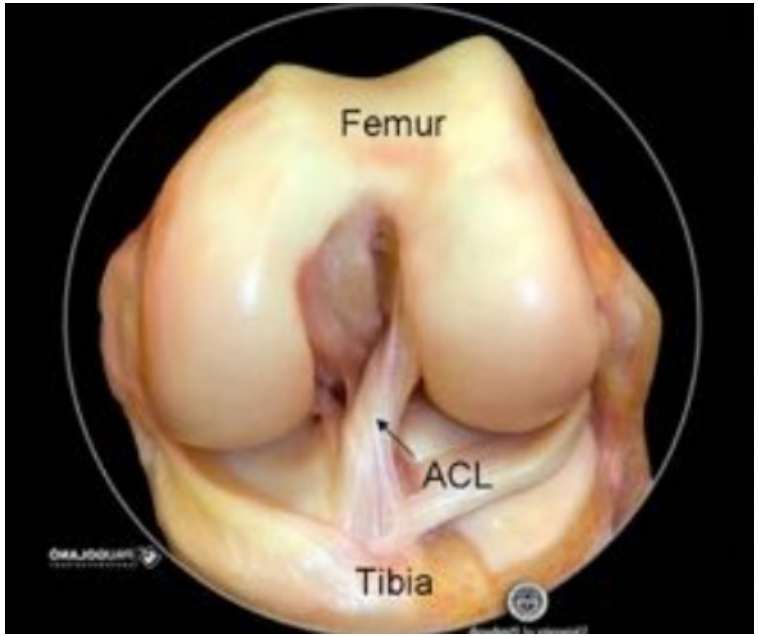
Knee Anatomy Overview



Key Structures

ACL
Primary restraint to anterior tibial translation

PCL
Primary restraint to posterior tibial translation

MCL
Medial stabilizer, most commonly injured ligament

LCL/PLC
Lateral and posterolateral corner stability

Menisci
Shock absorbers, load distributors, stabilizers

Articular Cartilage
Joint surface covering, limited healing capacity

Physical Examination of the Knee

Key Examination Tests

Lachman Test
Most sensitive for ACL tear (sensitivity ~85-95%)

Anterior Drawer
ACL assessment in 90 degrees flexion

Pivot Shift
Rotatory instability, specific for ACL

McMurray Test
Meniscus tear (click with rotation)

Joint Line Tenderness
Localizes meniscal pathology

Valgus/Varus Stress
MCL/LCL integrity at 0 and 30 degrees

Dial Test
Posterolateral corner injury assessment

Clinical Pearls

- Always **compare to contralateral knee**
- Acute swelling within hours = likely hemarthrosis (ACL tear until proven otherwise)
- Delayed swelling (24-48h) more likely meniscus or cartilage
- Effusion + mechanical symptoms (catching/locking) = meniscus tear
- Document ROM, stability, and neurovascular status
- Work injury mechanism matters: slip/fall, twist, direct blow, or repetitive

Imaging: When & What to Order

X-RAYS

- First-line for all knee injuries
- AP, lateral, sunrise views
- Weight-bearing when possible
- Rules out fractures, loose bodies
- Segond fracture = ACL tear
- Joint space narrowing = arthritis

MRI

- Gold standard for soft tissue
- ACL, meniscus, cartilage evaluation
- Order after exam suggests internal derangement
- Bone bruise pattern suggests mechanism
- Essential for surgical planning
- 95%+ sensitivity for ACL/meniscus tears

SPECIAL STUDIES

- CT scan: fracture detail, osteotomy planning
- Stress X-rays: quantify laxity
- Ultrasound: dynamic exam (limited use in knee)
- 3D CT: complex fractures, revision planning

Key Point: Don't skip X-rays and go straight to MRI. X-rays are fast, inexpensive, and can identify fractures that change the entire management plan.

SECTION 02

ACL Injuries

The Most Common Surgical Knee Injury in Active Patients

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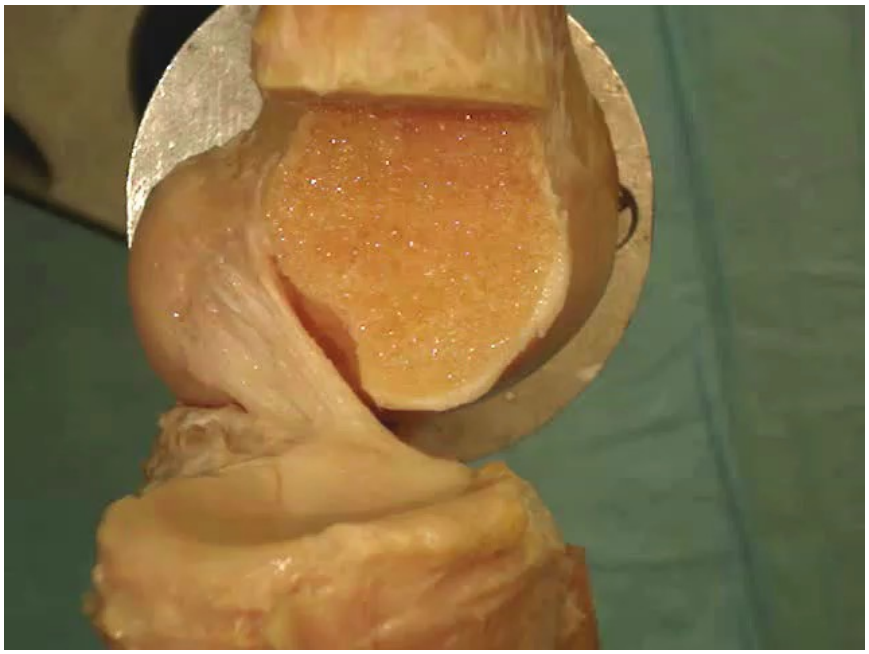
ACL is the primary stabilizer

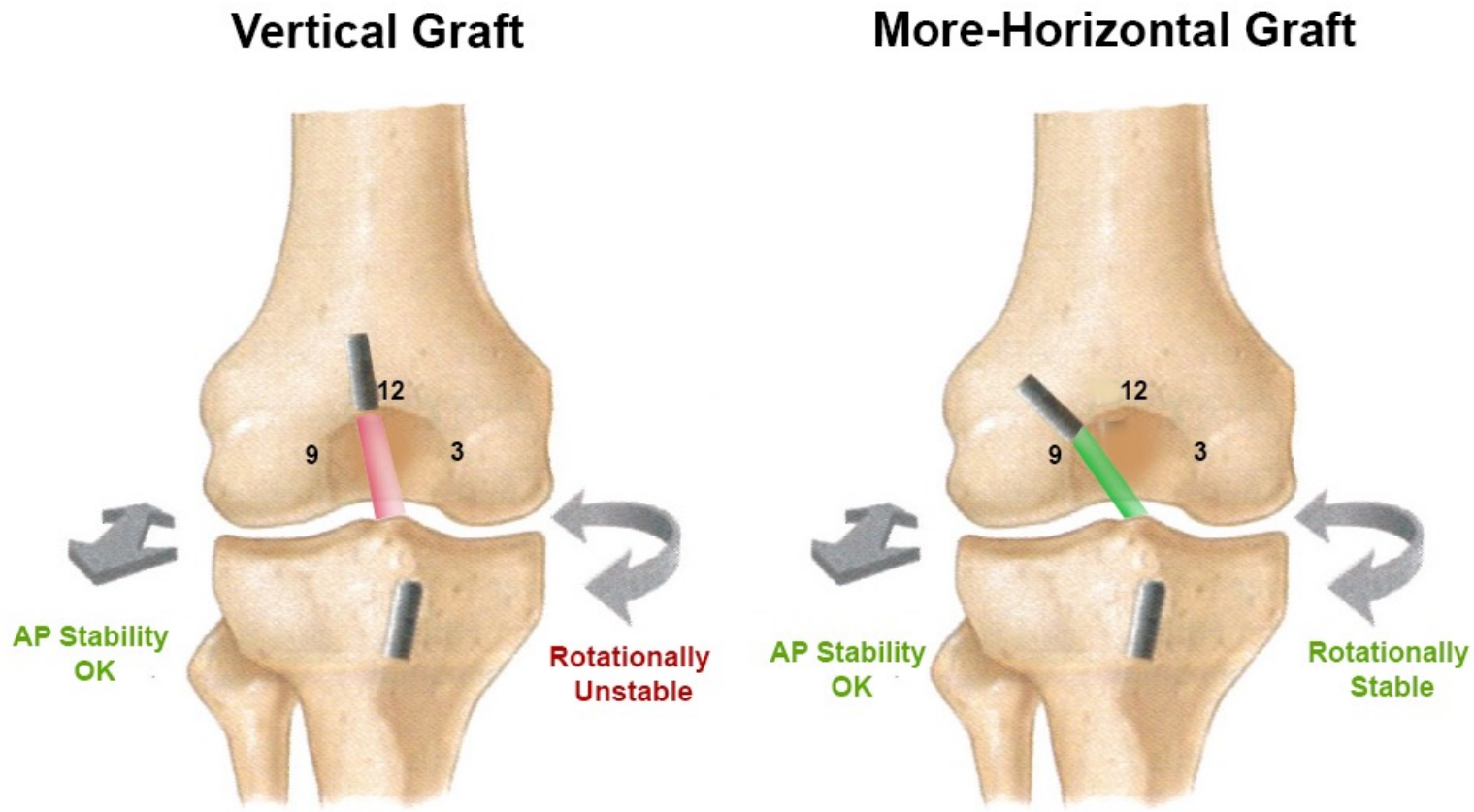


Continuous set of fibers working synergistically

Anteroposterior and rotational stability of the knee

Kopf, Fu et al, AJSM 2014

Importance of Anatomic ACL



ACL Tear: Does This Patient Need Surgery?

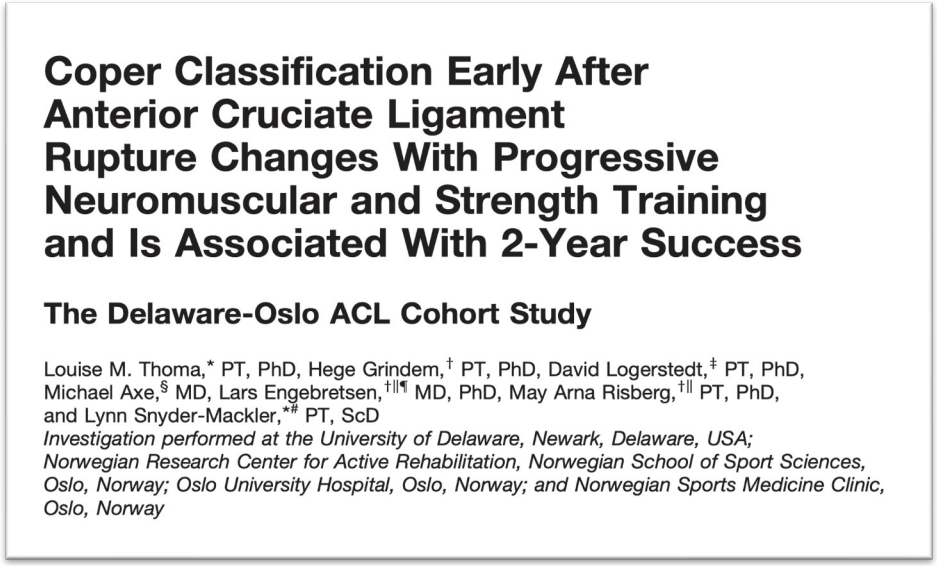
SURGICAL CANDIDATES

- Young, active patients (especially < 40)
- High-demand jobs: construction, first responders, military
- Associated meniscus tear requiring repair
- Combined ligament injuries
- Recurrent instability episodes
- Desire to return to pivoting/cutting activities
- Failure of conservative management

NON-OPERATIVE CANDIDATES

- Lower-demand occupation (desk work, sedentary)
- Older patients without instability
- Partial tears with stable knee
- No meniscus tear requiring surgery
- Patient preference after counseling
- Significant medical comorbidities
- Some patients do well without surgery (copers)

Delaware-Oslo ACL Cohort: 2-Year Outcomes



Coper Classification Early After Anterior Cruciate Ligament Rupture Changes With Progressive Neuromuscular and Strength Training and Is Associated With 2-Year Success

The Delaware-Oslo ACL Cohort Study

Louise M. Thoma,* PT, PhD, Hege Grindem,† PT, PhD, David Logerstedt,‡ PT, PhD, Michael Axe,§ MD, Lars Engebretsen,†||¶ MD, PhD, May Arna Risberg,†|| PT, PhD, and Lynn Snyder-Mackler,*# PT, ScD
Investigation performed at the University of Delaware, Newark, Delaware, USA; Norwegian Research Center for Active Rehabilitation, Norwegian School of Sport Sciences, Oslo, Norway; Oslo University Hospital, Oslo, Norway; and Norwegian Sports Medicine Clinic, Oslo, Norway

Key Findings (AJSM 2019)

45%
Potential non-copers became copers after neuromuscular training

2.9x
Chance of success for non-op copers vs. non-copers with ACLR

Copers had better outcomes regardless of whether they had surgery or not. Screening for coping ability is critical in treatment planning.

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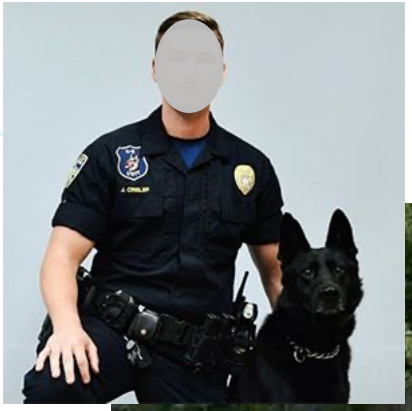
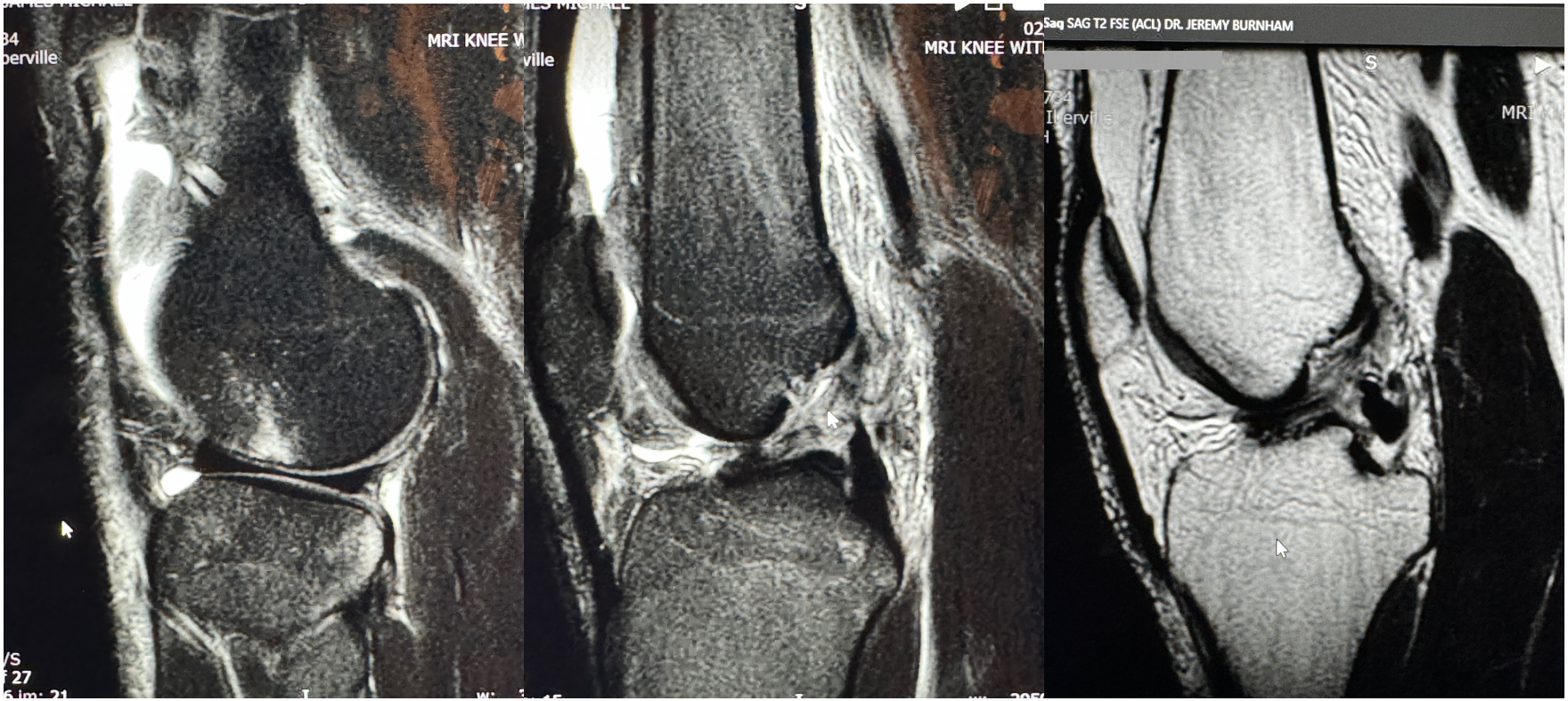
Case #1 - JC

- 34-yr old male SWAT canine officer
- Playing basketball, landed awkwardly, felt pop in his right knee
- Physical Exam – right knee
  - Large effusion
  - ROM 5 to 110
  - 2B Lachman, 1+ pivot
  - Stable to varus/valgus
  - (-) post drawer, (-) dial
  - Neutral alignment
  - NVID



Case #1 – JC - Imaging



Treatment Recommendations?

Young, Active Male with High Demand Job

Full Thickness ACL Tear

Laxity on Exam

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Case #1 - JC

- 34-yr old male SWAT canine officer
- Full thickness ACL tear
- Upcoming national canine law enforcement competition, would not be able to adhere to post-operative restrictions & timeline
- Opted for non-operative management
- Started graduated, phased neuromuscular strengthening and return to activity program

Initial Percentage	86.8069899
Age	34
Sex f=0,m=1	1
SL Hop >90%=1, <90%=0	1
KOS-ADLS	100
Post 5wk Rehab	70.4745698
Age	34
Sex	1
IKDC	95

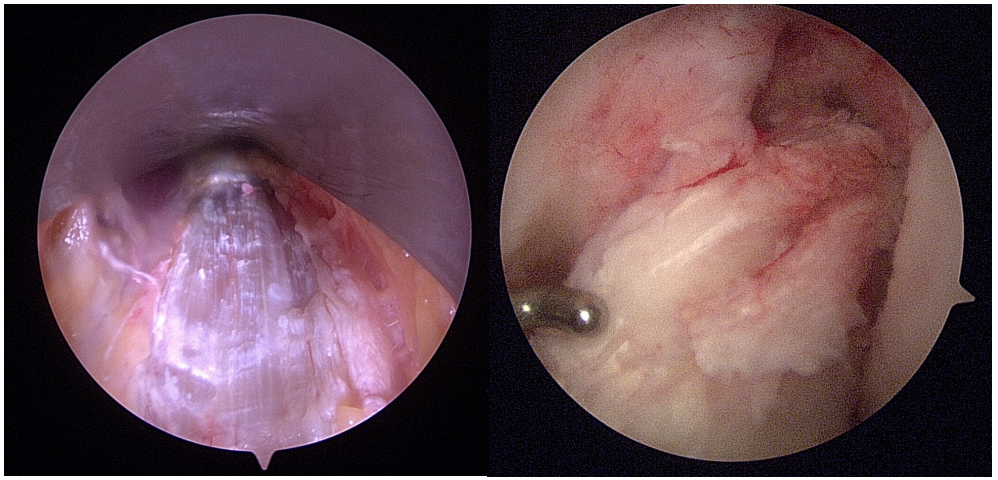
Less than 1-year post-injury

- ✓ 1st Place Overall
- ✓ 1st Place Criminal Apprehension
- ✓ 2nd Place Obedience

ACL Reconstruction: In the Operating Room

Surgical Steps

1. Arthroscopic evaluation of the entire joint
2. Address meniscus tears (repair when possible)
3. Graft harvest (autograft) or preparation (allograft)
4. Femoral and tibial tunnel drilling
5. Graft passage and fixation
6. Stability testing under anesthesia



ACL reconstruction technique video

- Procedure time: typically 50-90 minutes
- Outpatient surgery (same day discharge)
- Concomitant procedures may extend OR time

Pre-Surgical Optimization

Getting the knee 'ready' for surgery significantly improves outcomes and return-to-work timelines

Pre-Operative Goals

- Full extension (0 degrees) - most important goal
- Flexion to at least 120 degrees
- Minimal swelling / effusion resolved
- Good quadriceps activation (straight leg raise without lag)
- Psychologically ready and motivated
- Smoking cessation (if applicable)
- BMI optimization when possible

Workers' Comp Considerations

- **Pre-hab** (2-6 weeks PT before surgery) improves outcomes
- **Waiting is NOT wasting time**, it's investing in a better result
- Rushing to surgery with a stiff, swollen knee = worse outcomes
- Authorization for pre-op PT is strongly recommended
- Nicotine cessation programs: 4-6 weeks minimum before surgery

ACL Reconstruction: Graft Choices

Bone-Patellar Tendon-Bone (BTB)

Pros: Gold standard, bone-to-bone healing, strong fixation

Cons: Anterior knee pain, kneeling discomfort

Young athletes, laborers who don't kneel

Quadriceps Tendon (QT)

Pros: Strong, versatile, less donor site morbidity than BTB

Cons: Newer technique, soft tissue fixation

My preferred graft for most patients

Hamstring Tendon

Pros: Less anterior knee pain, smaller incision

Cons: Hamstring weakness, tunnel widening

Patients who need hamstring strength for job

Allograft (Donor Tissue)

Pros: No donor site morbidity, shorter initial recovery

Cons: Higher re-tear rate in young patients

Older/lower demand, revision, multiligament

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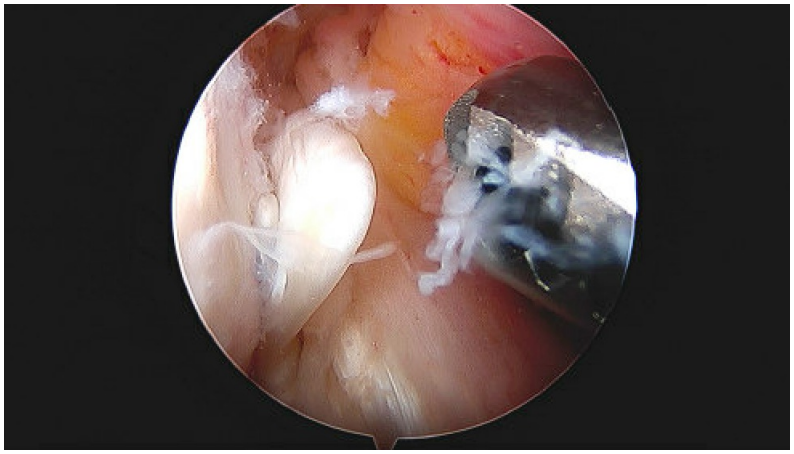
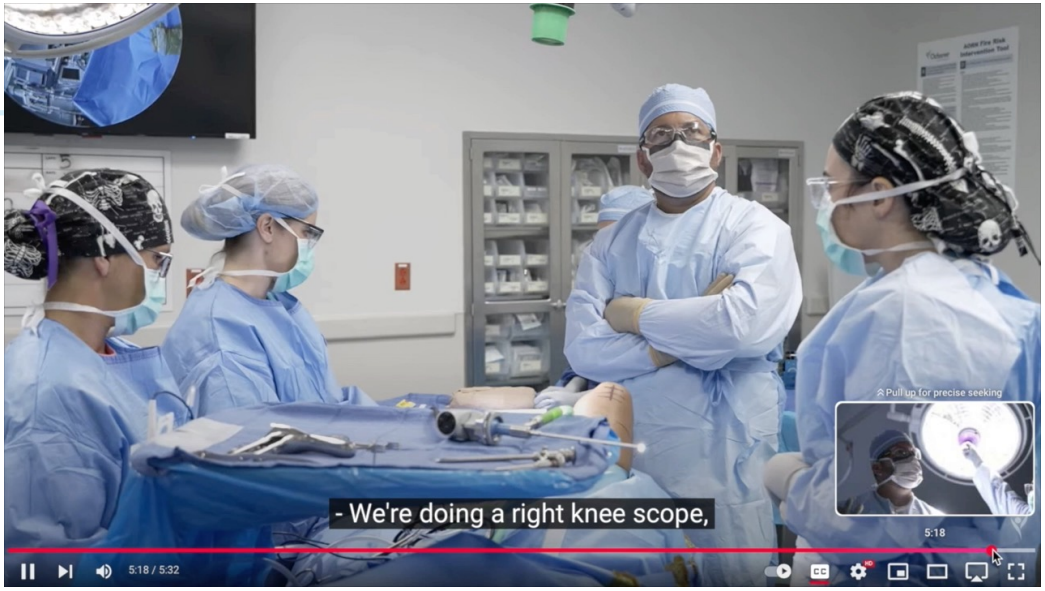
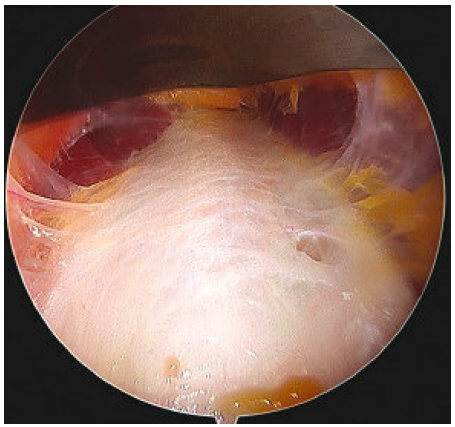
ACL Recon Case

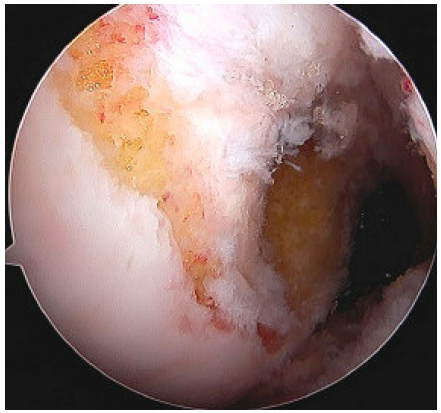
- 30 y/o dietician and high-level hybrid athlete/obstacle course athlete
- Full thickness ACL tear
- No meniscus tear
- Posterior tibial slope = 8°
- No anterolateral capsule injury
- Neutral Alignment

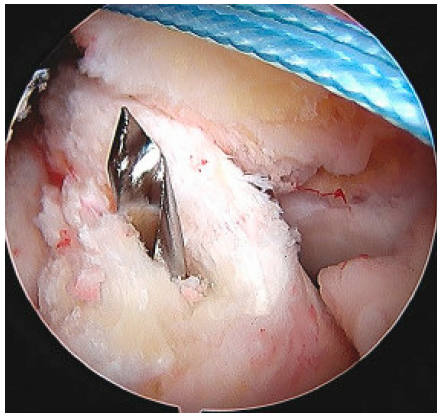
ACL Recon Case

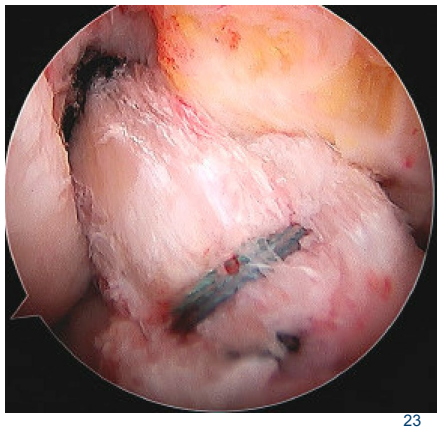












Case 1: Rehabilitation

Case 1: Successful Return to Competition

Concomitant Procedures: Doing More to Get It Right

Lateral Extra-Articular Tenodesis (LET)

- Added procedure to reduce re-tear risk
- STABILITY Trial: reduced graft failure by ~50%
- Especially beneficial in young, high-risk patients
- Adds ~15 minutes to surgery
- I perform this routinely in high-risk patients

Meniscus Repair During ACL Reconstruction

- ~50% of ACL tears have associated meniscus injury
- Repair success higher with concurrent ACLR
- Preserving meniscus prevents arthritis
- May extend rehab timeline (protect repair)
- Long-term cost savings vs meniscectomy

Why This Matters for Workers' Comp

- Additional procedures at initial surgery reduce need for future surgeries
- **Meniscus repair protects the joint** long-term, reducing future disability claims
- **LET reduces ACL re-tear rate**, lowering revision surgery costs
- Slightly longer initial rehab but better long-term outcomes and lower total cost

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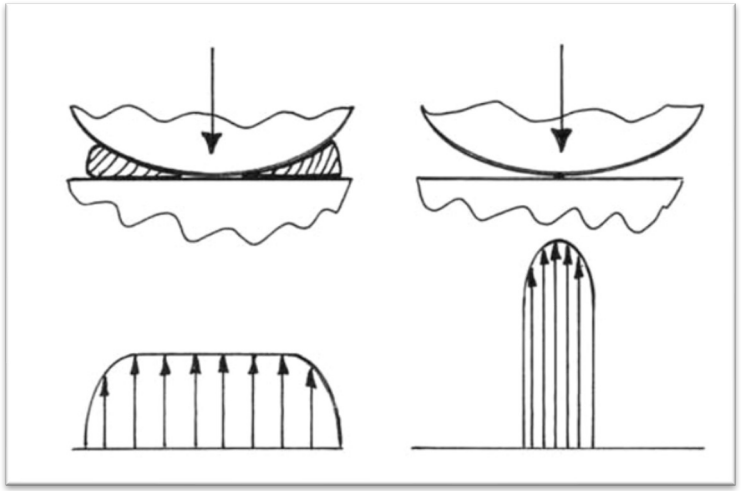
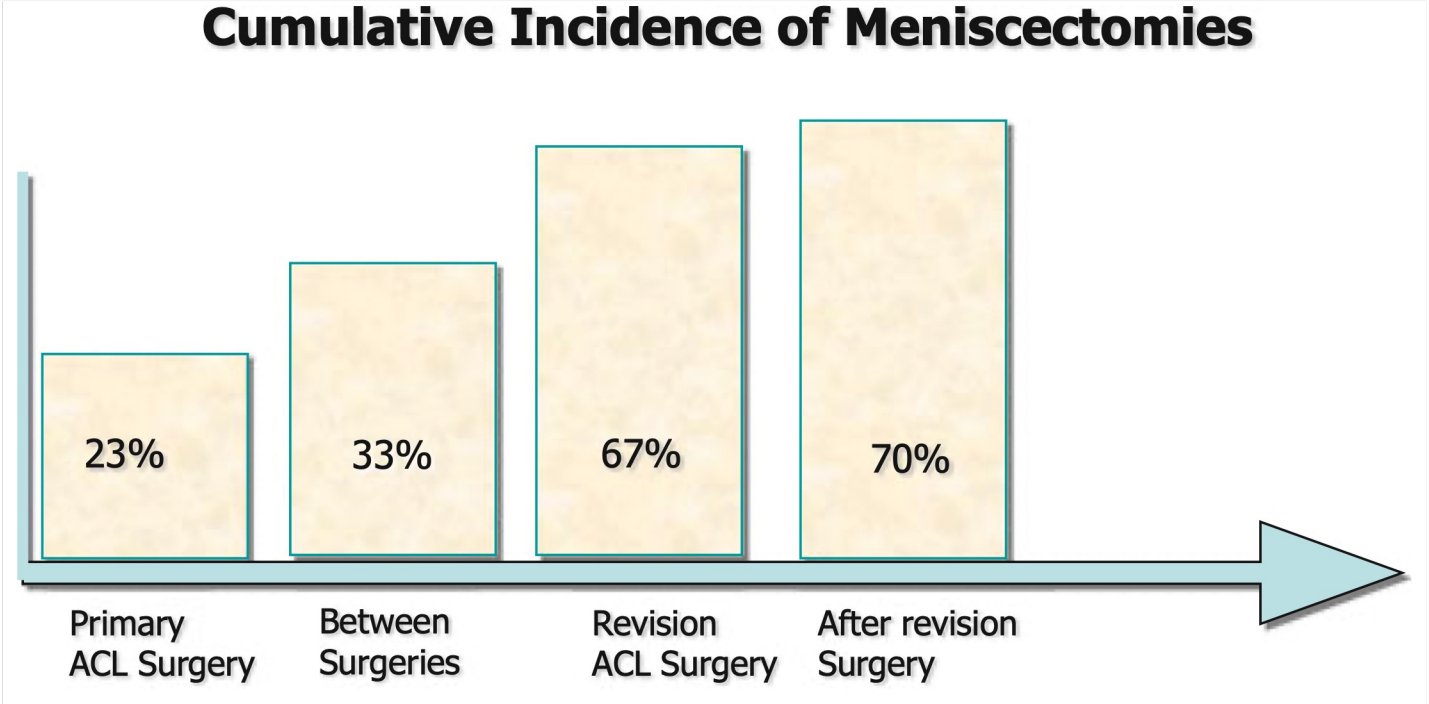
Meniscectomy



McDermott, Amis JBJS (Br) 2006

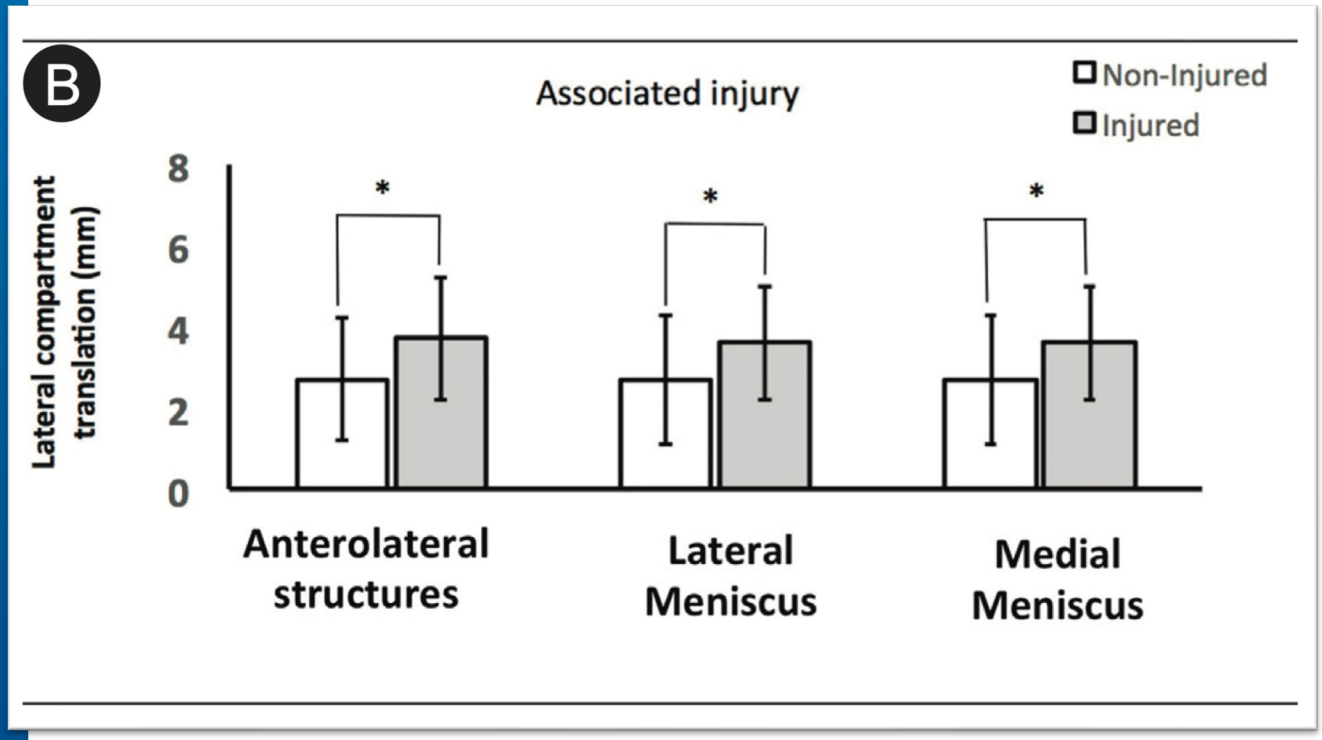
The Meniscus is An Important Secondary Stabilizer

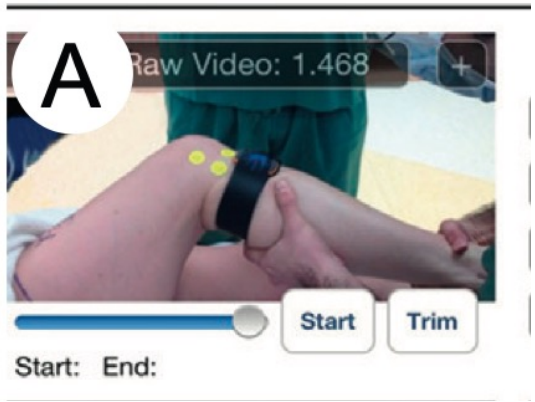


Trojani, KSSTA, 2011

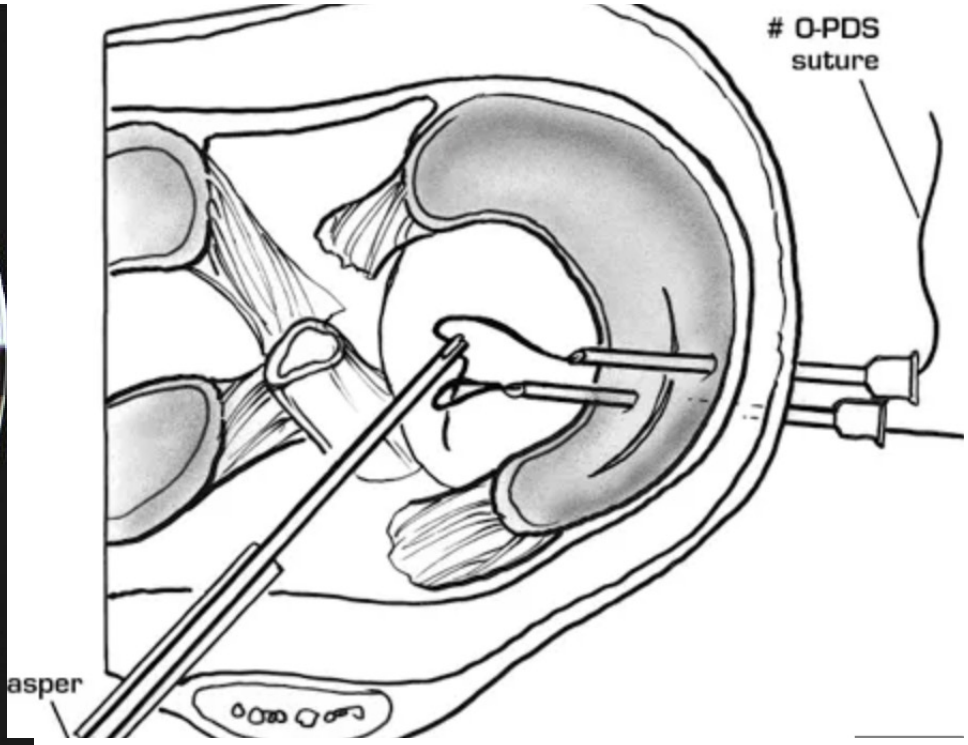
Secondary Stabilizers of the Anterior Cruciate Ligament—Deficient Knee

Ata A. Rahnemai-Azar, MD,[*,†] Jason Zlotnicki, MD,[*,†] Jeremy M. Burnham, MD,[†] Daniel Guenther, MD,[*,†] Ashish Soni, MD,[*,†] Richard E. Debski, PHD,[*,†,‡] and Volker Musahl, MD[*,†,‡]

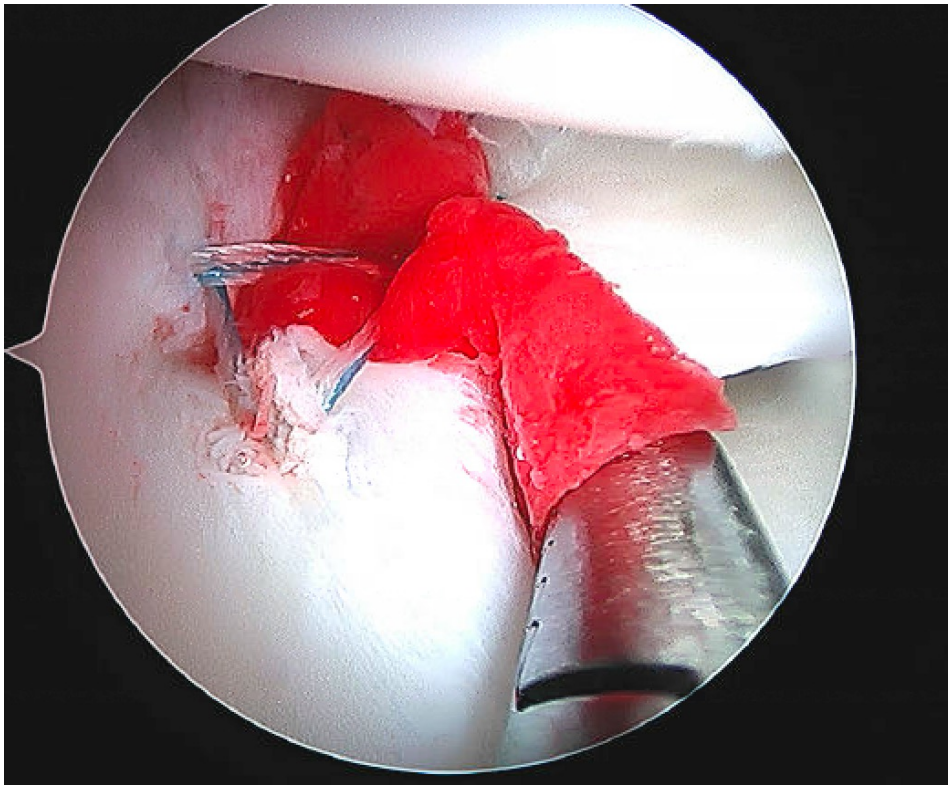


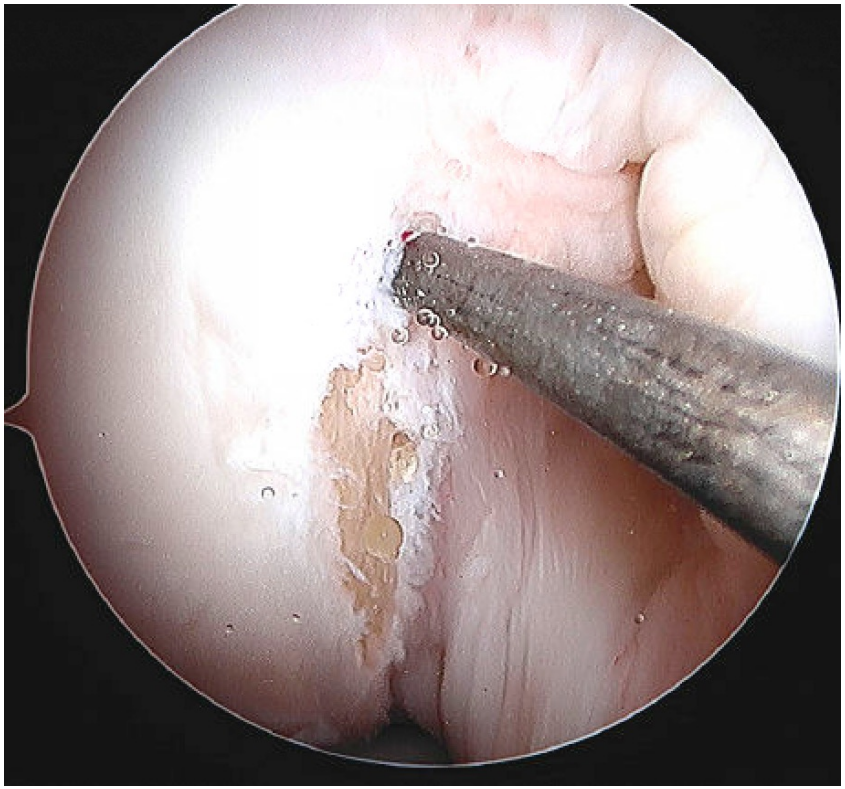


Meniscus Case Study



Meniscus Case Study





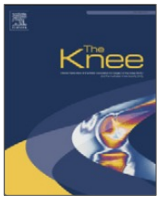
Meniscus Case Study

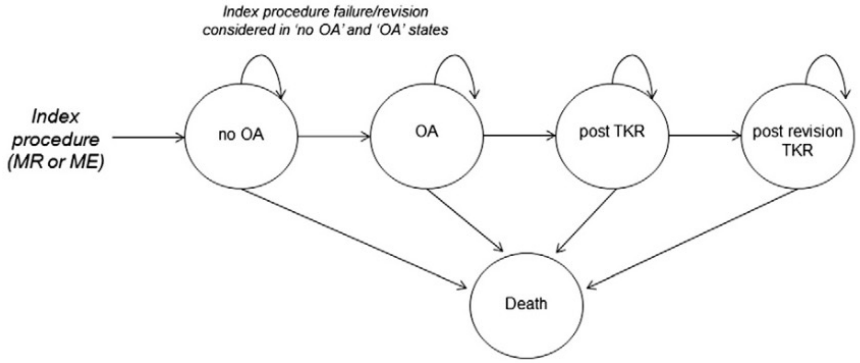
Repair vs. Meniscectomy

The cost-effectiveness of meniscal repair versus partial meniscectomy: A model-based projection for the United States

Brian T. Feeley [a,*], Shan Liu [b,c], Abigail M. Garner [b], Alan L. Zhang [a], Jan B. Pietzsch [b,d]

[a] University of California, San Francisco, San Francisco, CA, USA
[b] Wing Tech Inc., Menlo, Park, CA, USA
[c] University of Washington, Seattle, WA, USA
[d] Stanford University, Stanford, CA, USA





If 10% of meniscectomies changed to repairs, would save $43 million

- Repairs **may fail more, but still more cost effective**
- Improves Outcomes
- Decreases overall costs of treatment

LET – Lateral Extra-articular Tenodesis

Critical Factors to Address Rotatory Instability Associated with ACL Injury

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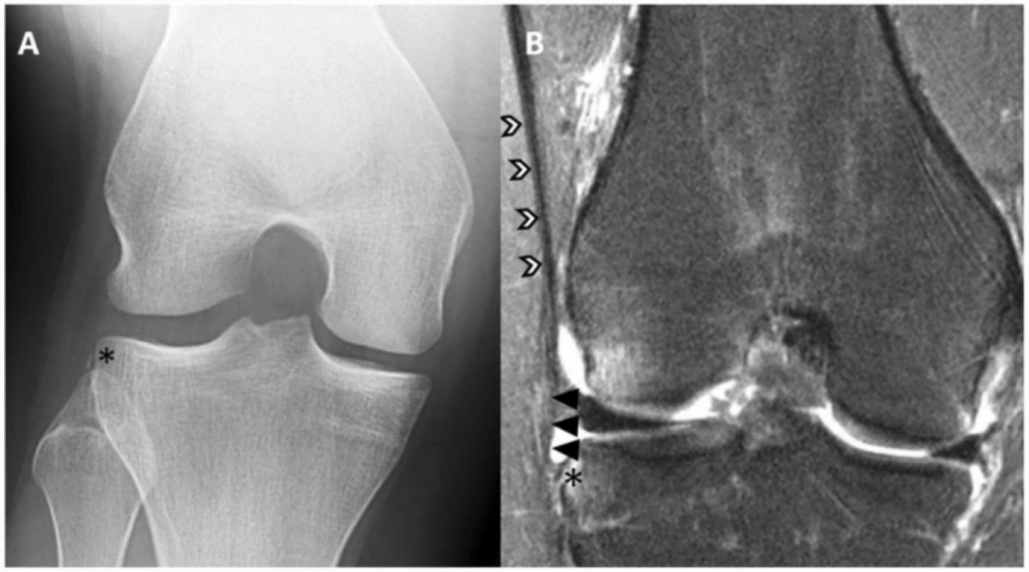
Anterolateral Rotatory Knee Instability

- First described by Segond in 1870
  - Segond fracture
- Exists in conjunction with ACL injury or ACL dysfunction
- **Subluxation of LFC posterior to LTP**
- Secondary stabilizers
  - Meniscus
  - **Anterolateral capsule**
  - ITB
- Bony anatomy
  - Posterior tibial slope
  - Posterior condylar offset

Fig. 1

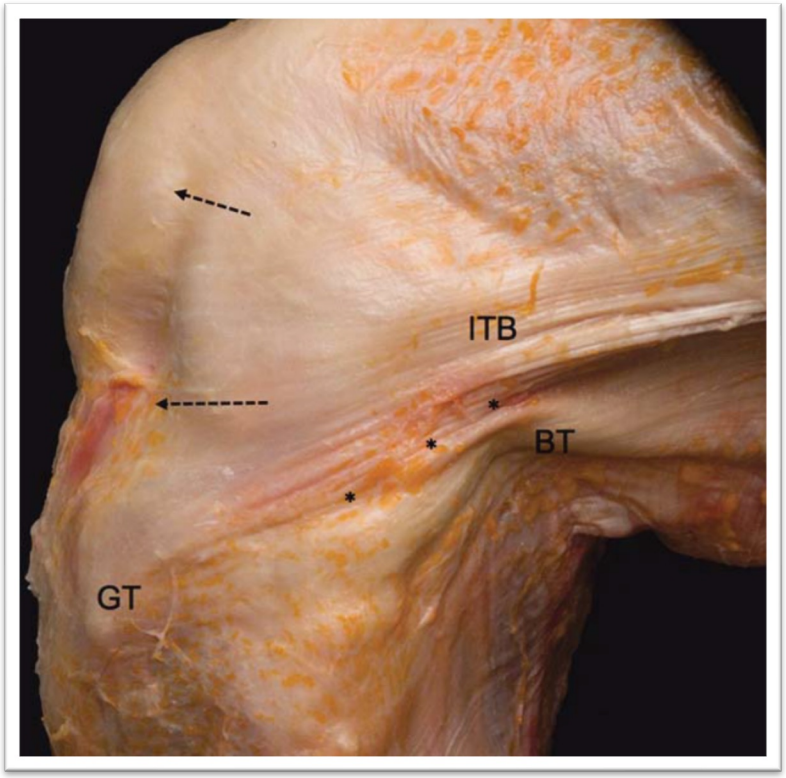


Radiograph (**a**) and magnetic resonance imaging exam (**b**) of a Segond fracture with injury to the anterolateral capsule. The black star denotes the Segond fracture, or an avulsion fracture off the lateral tibial plateau. The black and white errors denote the iliotibial band, while the black arrows demonstrate the anterolateral capsule

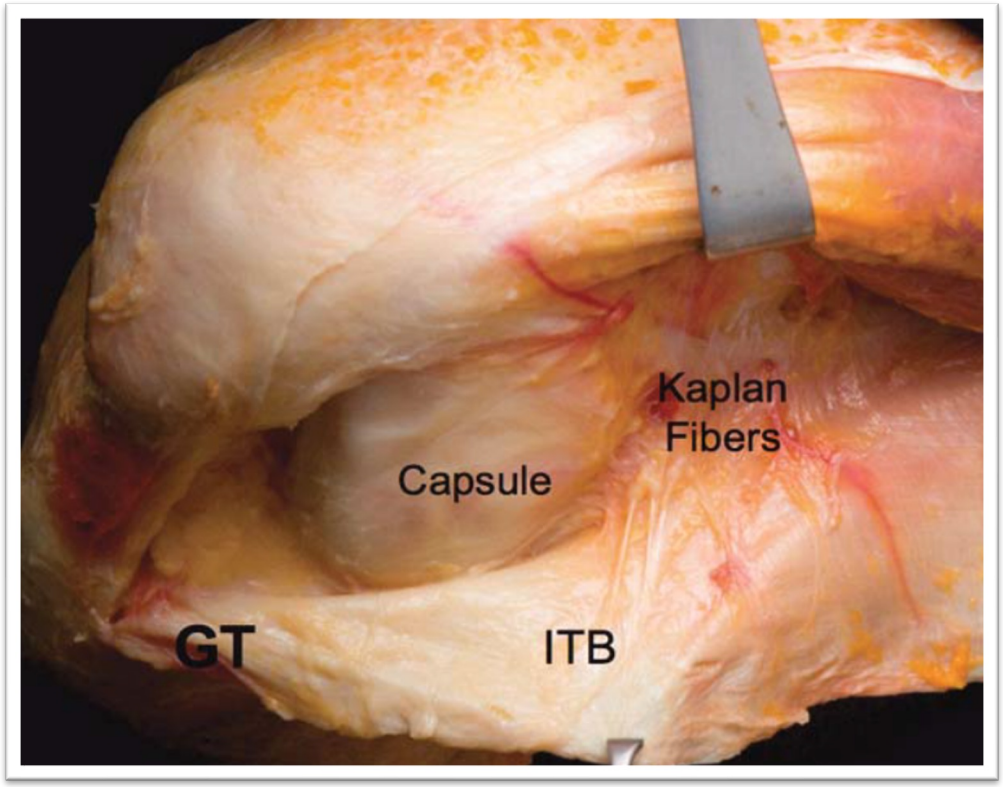
Herbst, Burnham, Musahl OJSM 2017

Hughes, Musahl et al JEO 2019

Anterolateral Complex - Superficial Layer



Herbst, Burnham, Musahl KSSTA 2017

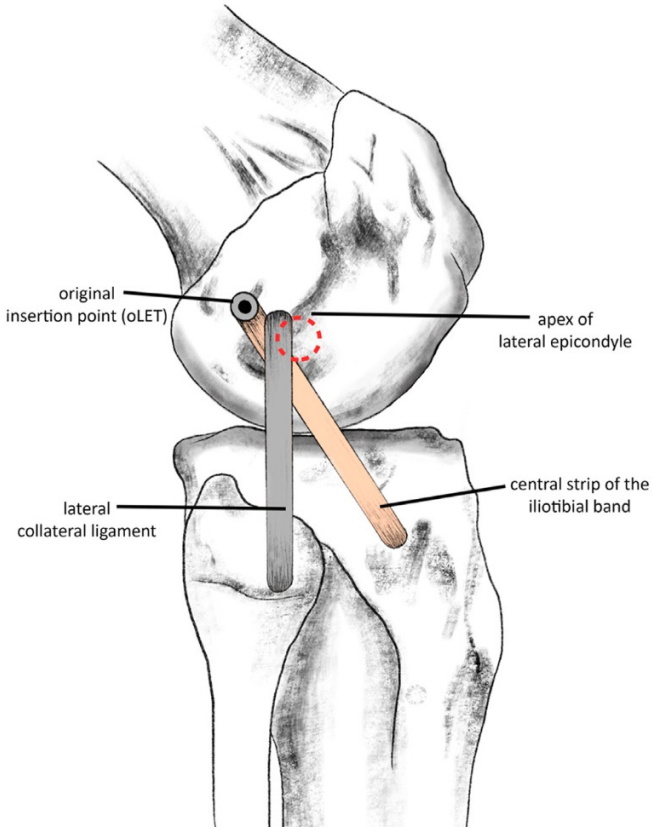


Herbst, Burnham, Musahl OJSM 2017

Preferred LET Technique – Modified Lemaire

Sigloch, Coppola, Mayr
Arthroscopy 2025

- Central strip of Iliotibial Band (ITB)
- 1 cm in width, leaving posterior cuff for repair
- 8-10 cm in length
- Leave attached at Gerdy's
- Pass deep to the LCL
- Fix at the femur posterior and proximal to the Lateral Epicondyle (LE)



ACL + LET Outcomes

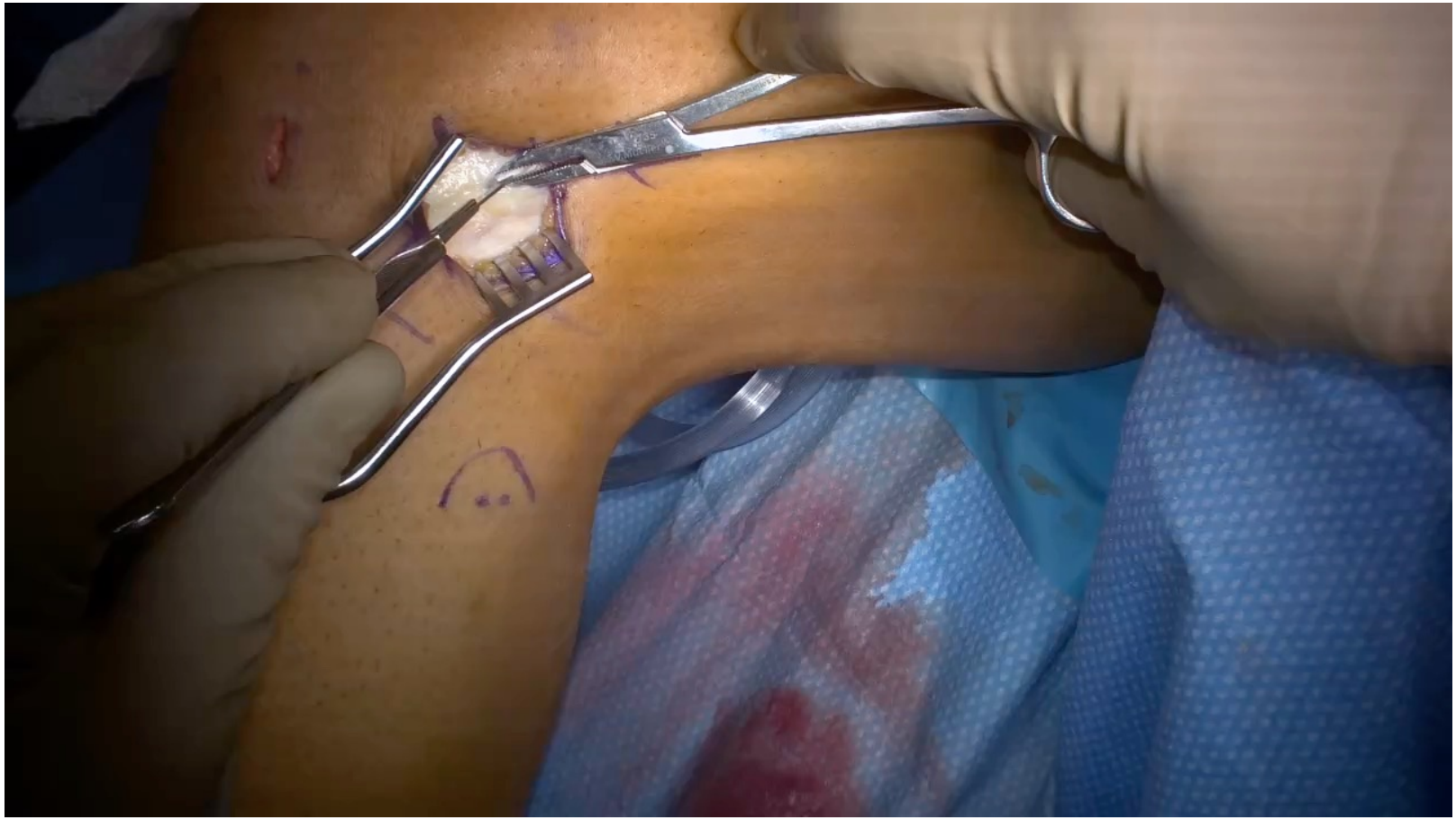
STABILITY

- STABILITY 1
  - Multicenter RCT (**Hamstring** +/- LET); 618 high risk patients
  - Re-tear rates
    - Hamstring auto: 11%
    - Hamstring + LET: 4%
- STABILITY 2
  - Multicenter RCT (BTB/**Quad** +/- LET)
  - Enrolled 1,242 patients (ends May 2025)

- PANTHER GROUP
  - LET should be considered in revision cases or cases of increased anterolateral instability
  - Level V Evidence

Case Study: LET Case

Surgical Technique Video – Loop & Tack LET



Posterior Tibial Slope

Critical Factors to Address Rotatory Instability Associated with ACL Injury

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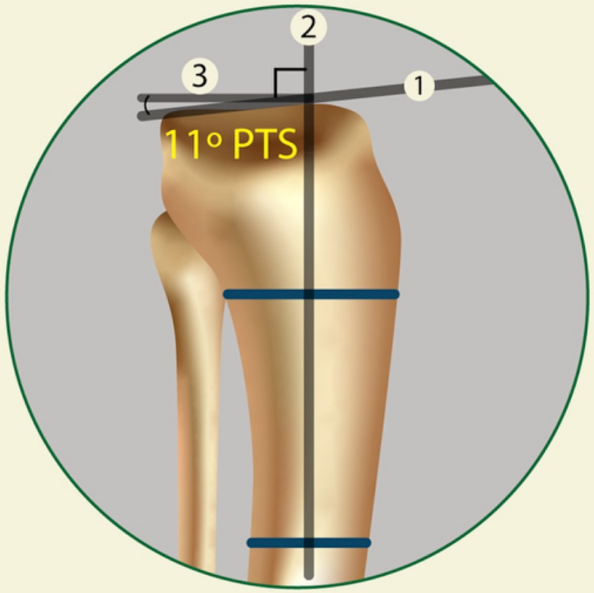
Posterior Tibial Slope

Arthroscopy
The Journal of Arthroscopic and Related Surgery

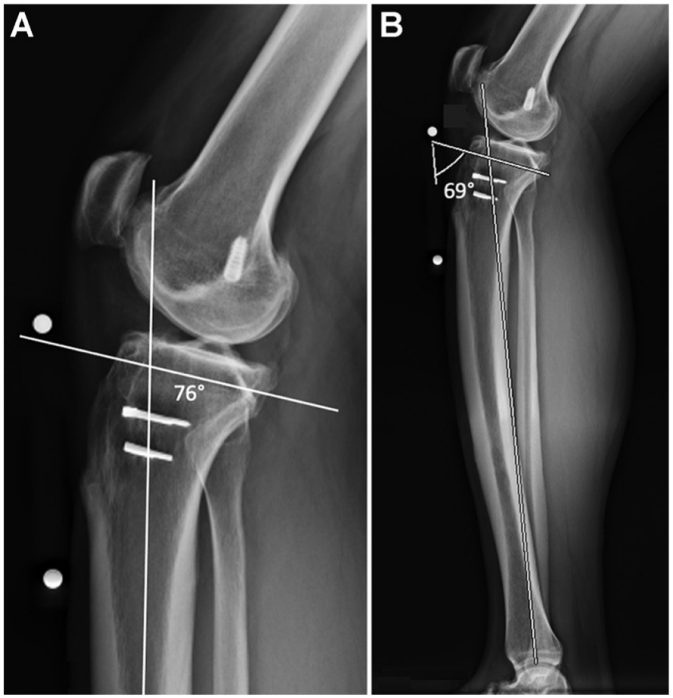


- True lateral knee x-ray
- Draw line 1 intersecting anterior and posterior aspects of tibial plateau
- Draw line 2 connecting tibial center at two locations on anatomic axis (blue lines)
- Draw line 3 perpendicular to line 2
- PTS is the angle between lines 1 and 3

Robert S. Dean, BS, Christopher M. Larson, MD, Brian R. Waterman, MD
https://www.arthroscopyjournal.org/

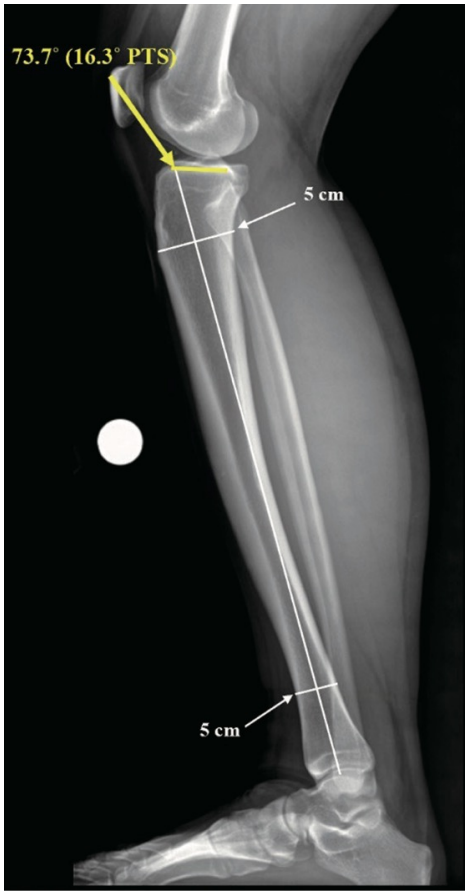
Posterior Tibial Slope

Stone, Tollefson, Shoemaker, LaPrade
AOJ 2024



Mansour, Steward, Warth, Lowe
OJSM 2024

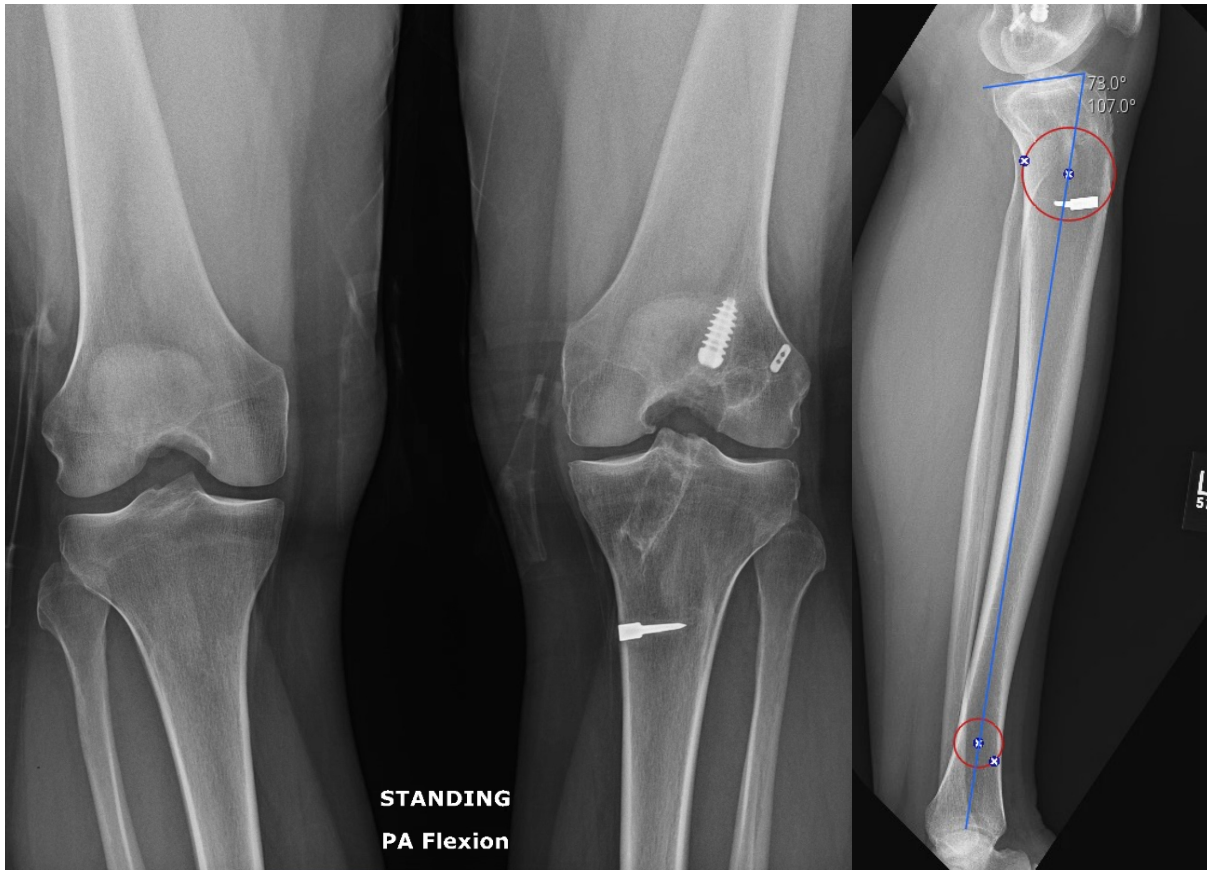
- PTS measurements obtained on FLL radiographs are not interchangeable with those obtained on SSK radiographs
- 2/3 of patients had over a 2-degree difference on PTS measurements between radiographs



Case Study: Multiple ACL Revisions with Elevated PTS

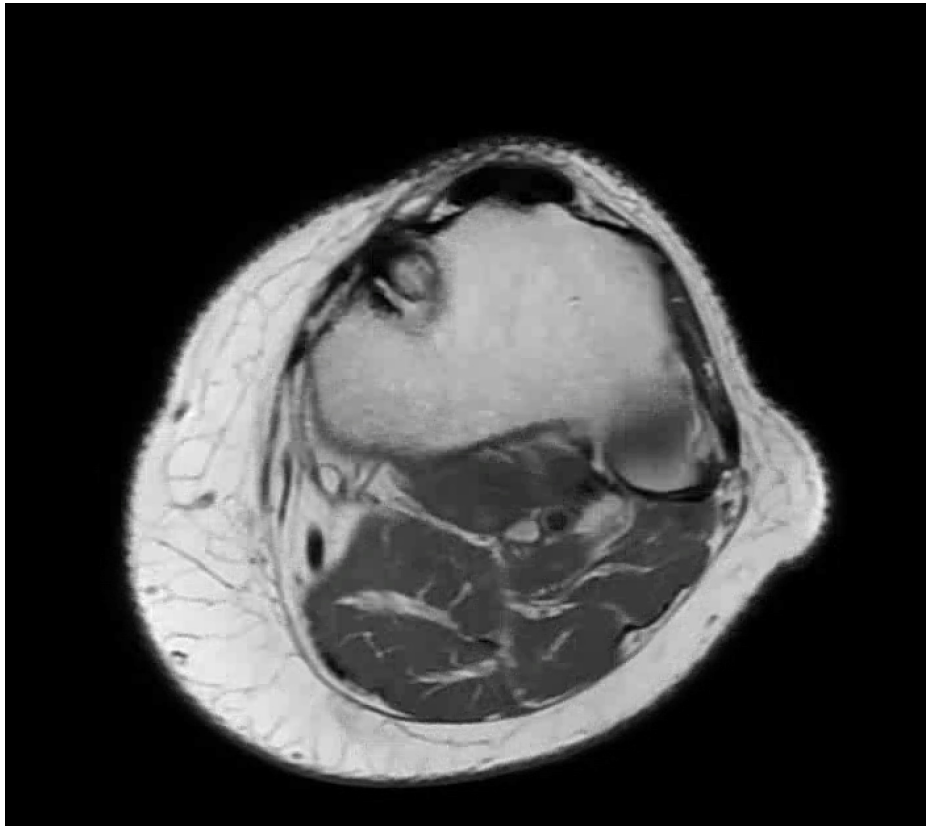
History of Present Injury (HPI)

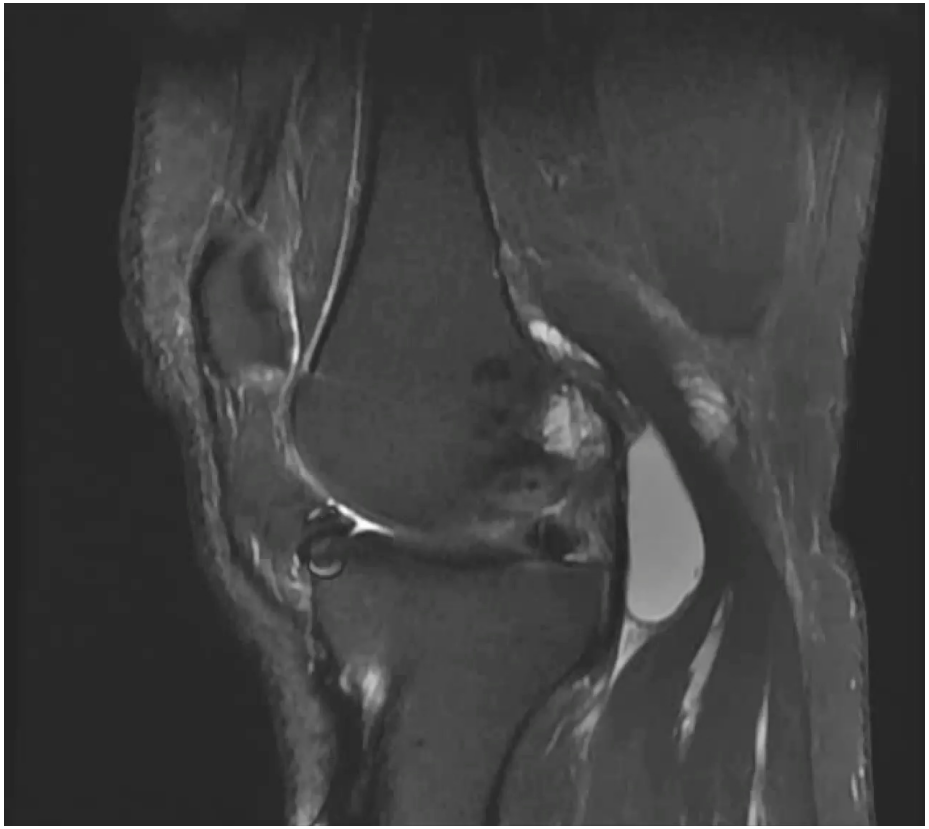
- 42-year-old male plant supervisor
- Left knee pivot injury walking down steps at plant
- Previous history of 2 prior ACL reconstructions
  - BTB autograft in 2000
  - Allograft & ?Meniscus Surgery in 2018
- Main complaints are left knee pain and instability



Case Study: Multiple ACL Revisions with Elevated PTS

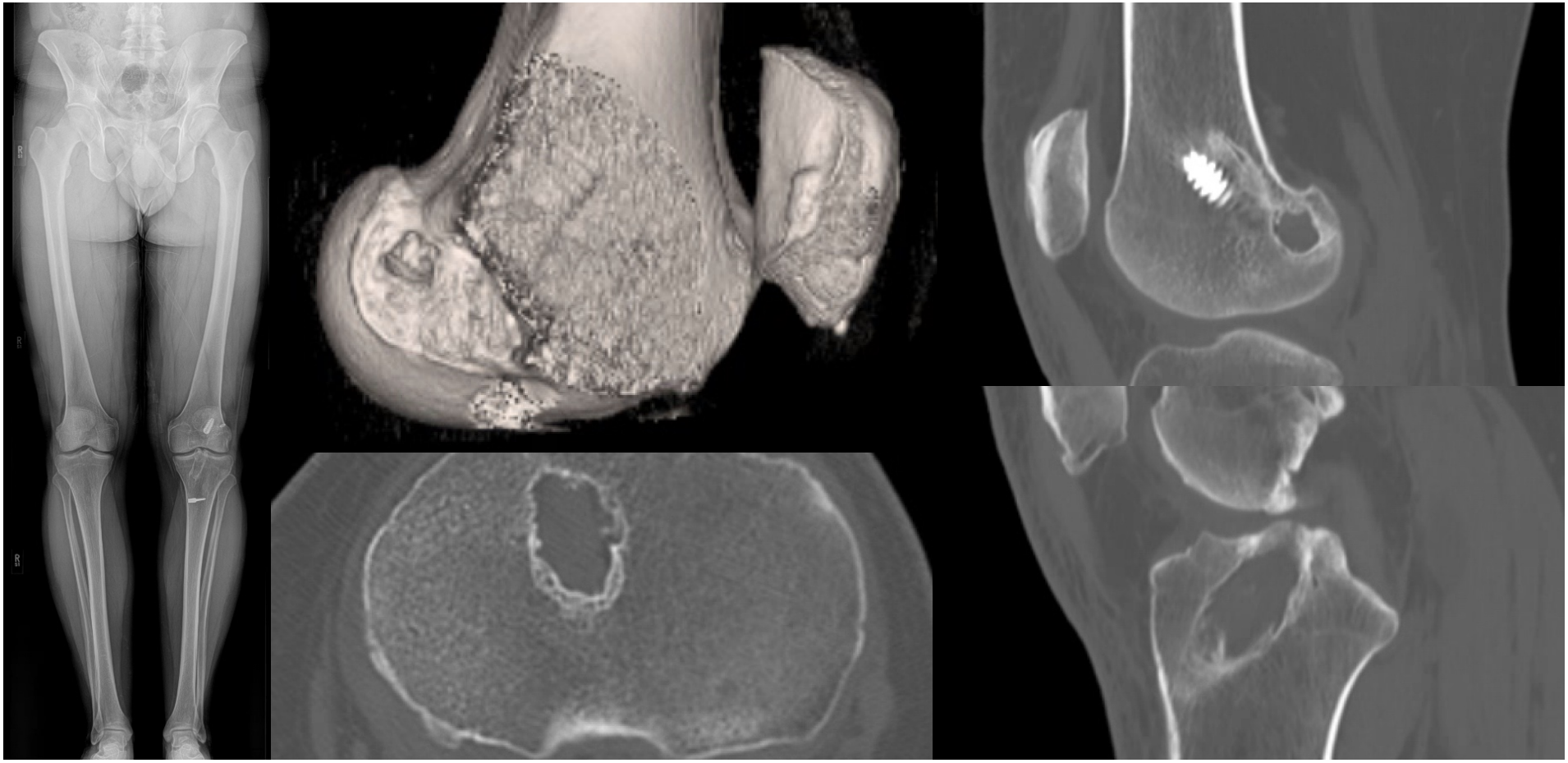
Initial Imaging





Case Study: Multiple ACL Revisions with Elevated PTS

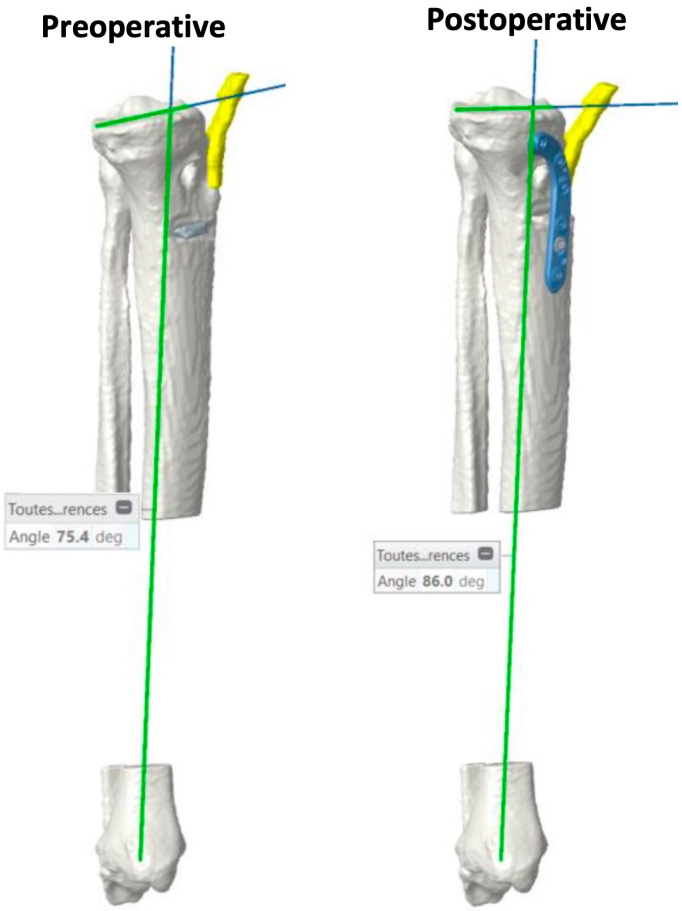
Initial Imaging



Case Study: Multiple ACL Revisions with Elevated PTS

Surgical Planning

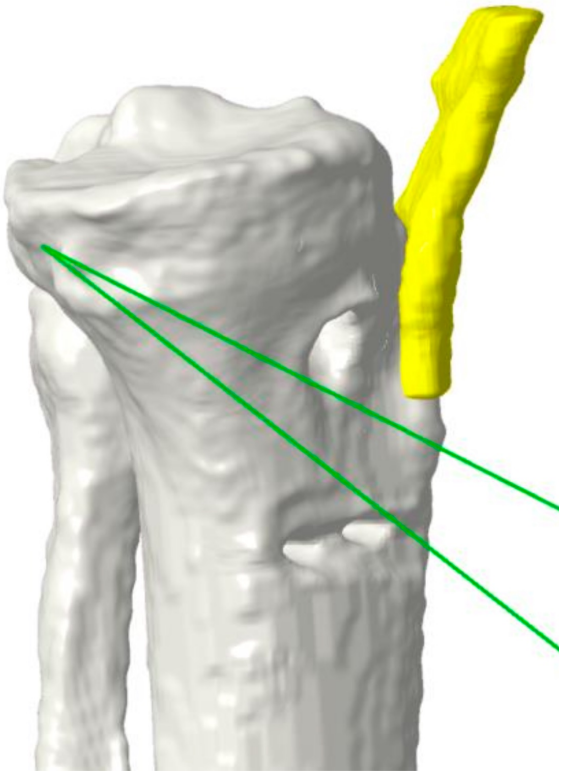
- Posterior tibial slope measurements
  - 17 degrees on full length radiograph
  - 15 degrees on CT
- Tibial bone tunnel
  - 16mm and 17mm diameters
    measurements on sagittal and axial slices
- Surgical Plan
  - 2-Stage procedure
    - Bone grafting, HW removal, slope osteotomy
    - Revision ACL with quad tendon & LET

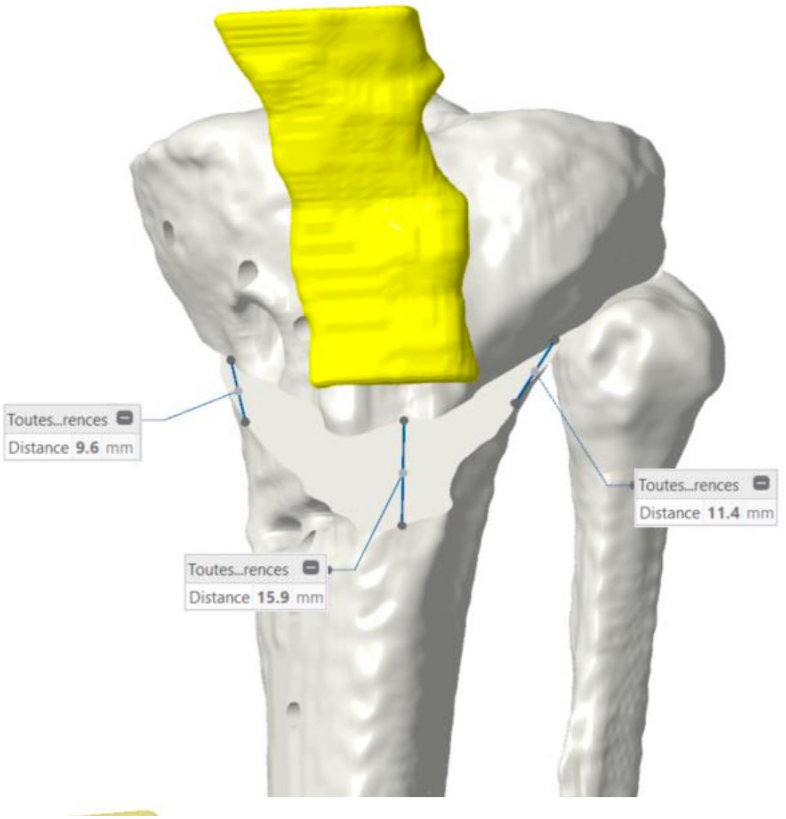


Case Study: Multiple ACL Revisions with Elevated PTS

Surgical Planning

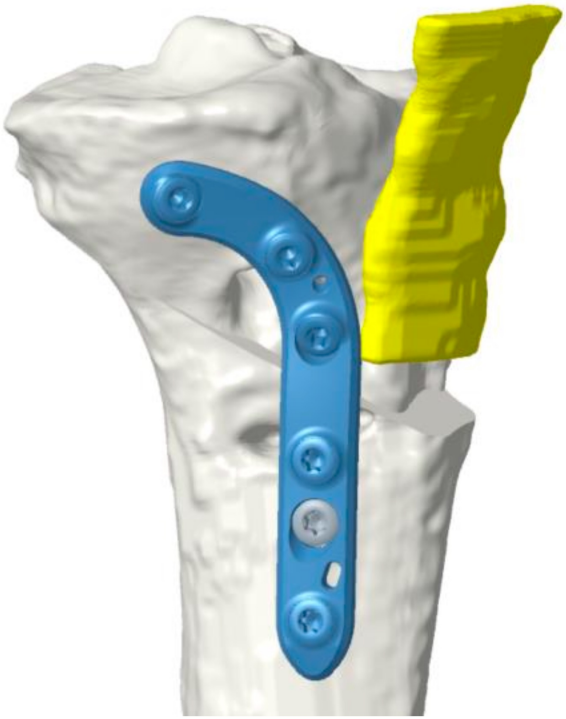
- Planned for an infratubercle approach
- 16mm bone wedge planned for removal
- Anteromedial locking plate that would allow room for ACL tibial tunnel if needed

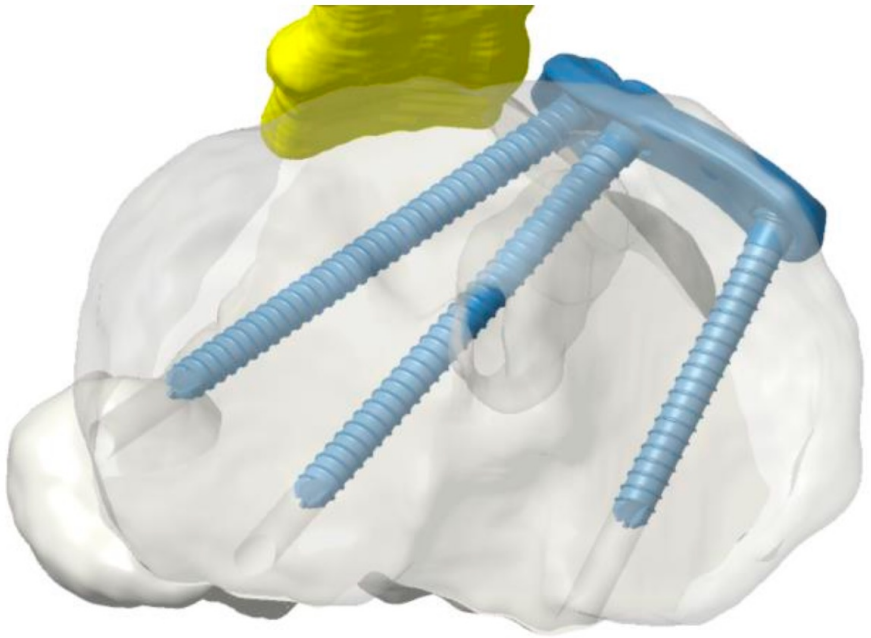




Case Study: Multiple ACL Revisions with Elevated PTS

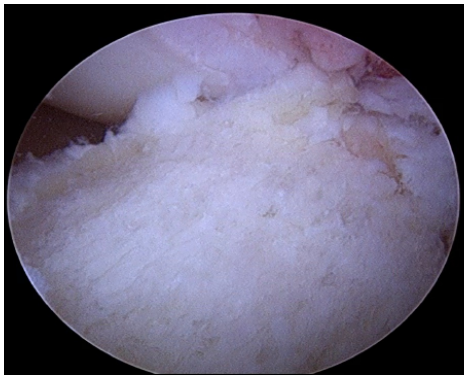
Surgical Planning

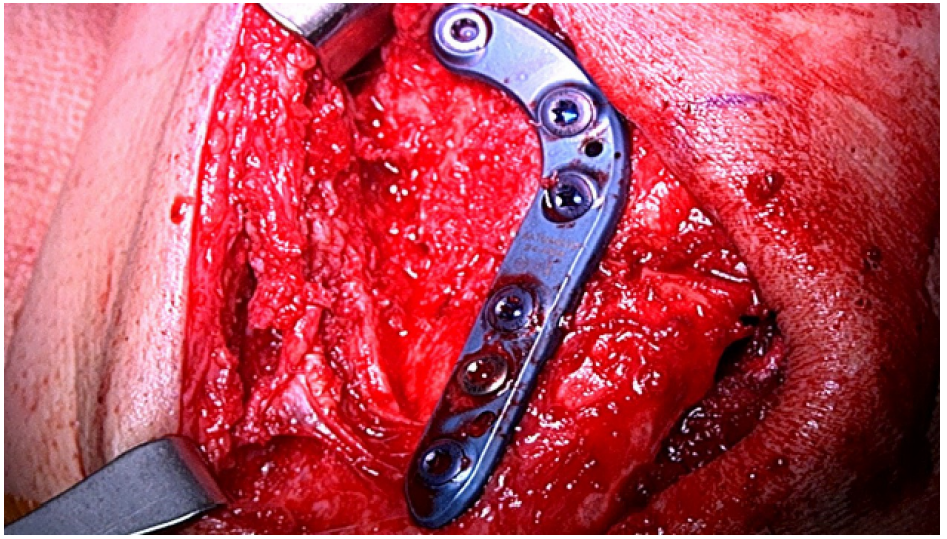


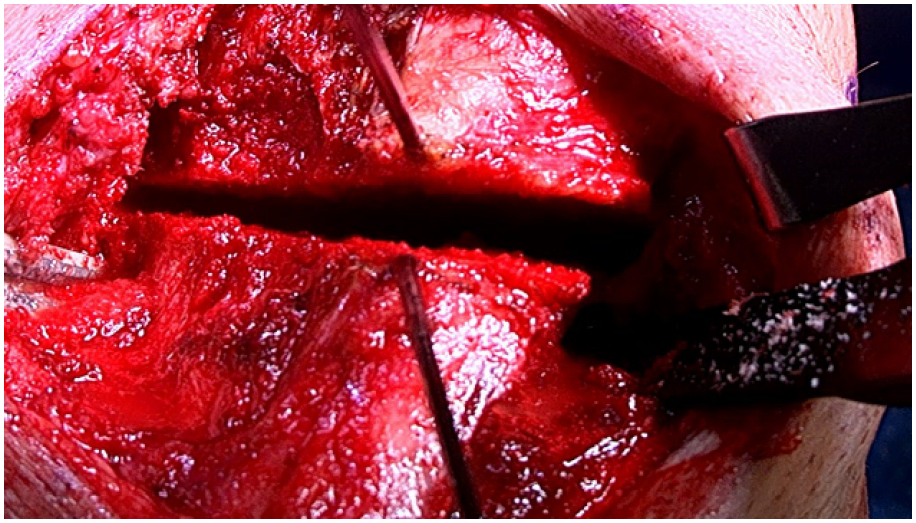


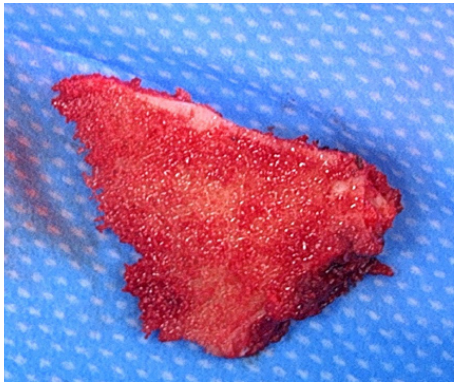
Case Study: Multiple ACL Revisions with Elevated PTS

Intraoperative Pictures (Stage 1)





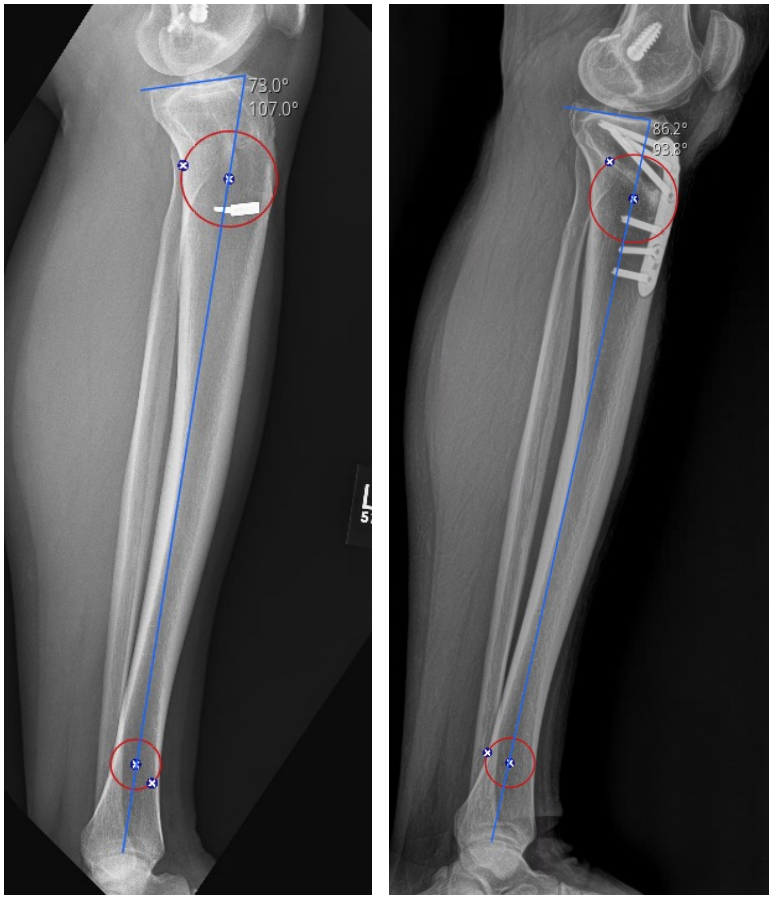




Case Study: Multiple ACL Revisions with Elevated PTS

Postoperative Results (Stage 1)

- Posterior Tibial Slope
  - Preop: 17 degrees
  - Postop: 4 degrees



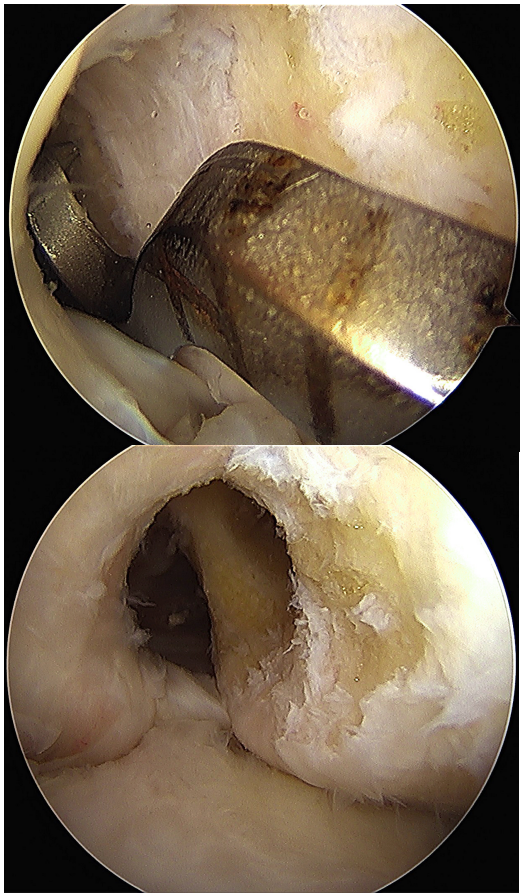
Case Study: Multiple ACL Revisions with Elevated PTS

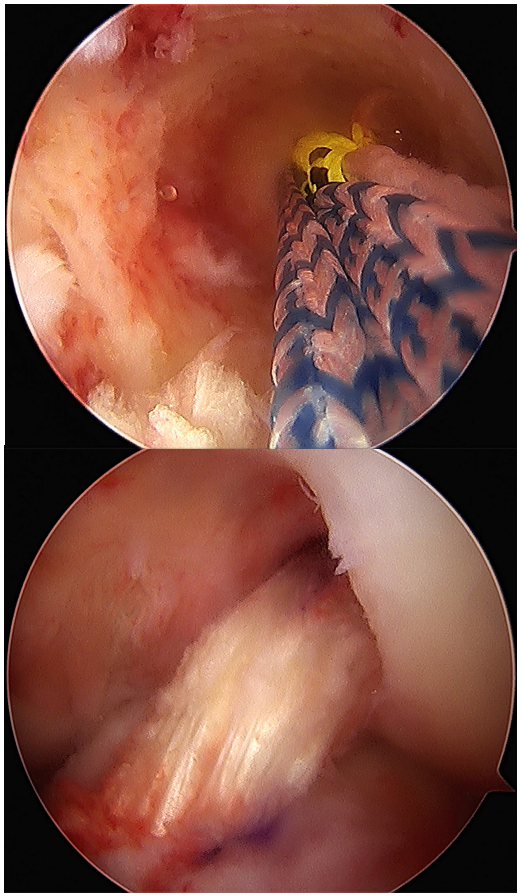
4 months s/p Stage 1

- Instability symptoms have improved
- Main complaint is tenderness directly over the plate
- CT scan and radiographs demonstrated healed osteotomy and tunnels
- Planned for Stage 2 revision with HWR, Quad ACL, and LET

Case Study: Multiple ACL Revisions with Elevated PTS

Intraoperative Pictures (Stage 2 – 8 months s/p Stage 1)





Case Study: Multiple ACL Revisions with Elevated PTS

Intraoperative Pictures (Stage 2)

SECTION 04

Other Knee Injuries

MCL, Multiligament & Complex Cases

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MCL Injuries: Usually Non-Operative

The Most Common Knee Ligament Injury

- MCL is the most frequently injured knee ligament
- Usually from a valgus (outside-to-inside) force
- Work injuries: falls, being struck from the side
- Most MCL injuries heal without surgery
- Grade I-II: bracing + PT, return to work 2-6 weeks
- Grade III (complete): may need surgery if combined with other injuries

Grade I: 1-2 weeks | **Grade II:** 3-6 weeks | **Grade III:** 6-12 weeks (or surgery)

When Surgery is Needed

- Complete MCL tear with persistent instability
- MCL + ACL combined injury (multiligament)
- MCL + PCL combined injury
- Chronic MCL laxity affecting function
- Tibial-sided avulsion injuries
- Failed non-operative treatment (rare)

Surgical Options: Primary repair, reconstruction with allograft or autograft, augmented repair with internal brace

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Multiligament Knee Injuries: The Severe End

Knee dislocations (2+ ligaments torn) are limb-threatening emergencies. Vascular injury must be ruled out immediately.

- Definition: injury to 2 or more of the 4 major knee ligaments
- Often from high-energy trauma: falls from height, motor vehicle accidents, industrial accidents
- Popliteal artery injury in ~30-40% of knee dislocations
- Peroneal nerve injury in ~25-35%
- Staged surgical approach often needed
- Complex reconstruction, longer recovery

Workers' Comp Implications

- Return to work: 9-12+ months typically
- May require multiple surgeries (staged approach)
- Physical therapy: 9-12 months or longer
- Some patients cannot return to heavy labor
- Permanent impairment rating often applies
- Early referral to a specialist is critical
- Better outcomes with experienced surgeon

SECTION 05

Recovery & Return to Work

Rehabilitation, Timelines & MMI

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Rehabilitation Timeline After Knee Surgery

Weeks 0-2
Protect & Activate
ROM exercises, quad activation, cryotherapy, crutches/brace

Weeks 2-6
Restore Motion
Progress weight bearing, stationary bike, patellar mobility, early strengthening

Weeks 6-12
Strengthen
Progressive resistance training, balance/proprioception, pool therapy

Months 3-6
Functional Training
Job-specific activities, agility, endurance, work simulation

Months 6-9+
Return to Full Duty
Full activity, sport/job-specific testing, criteria-based return

Timeline varies by procedure, patient factors, and job demands. Meniscus repair may require protected weight bearing for 6 weeks.

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Return to Work Guidelines by Procedure

Procedure	Modified Duty	Full Duty	Notes
Arthroscopic Meniscectomy	1-2 weeks	4-6 weeks	Fastest recovery
Meniscus Repair	6-8 weeks	3-6 months	Protect the repair
ACL Reconstruction	6-8 weeks	6-9 months	Criteria-based return
ACL + Meniscus Repair	8-10 weeks	7-10 months	Longer due to repair
MCL Repair/Recon	6-8 weeks	4-6 months	Depends on grade

Key Considerations

- Modified duty may include seated work, limited walking, no climbing/squatting
- Full duty return is criteria-based: strength, function, and confidence
- Physical job demands analysis helps set realistic expectations

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Maximum Medical Improvement (MMI)

MMI Definition: The point at which a patient's condition has stabilized and is unlikely to improve substantially with further medical treatment, even though the patient may not have returned to pre-injury status.

Typical MMI Timelines

Meniscectomy	**3-6 months**
Meniscus Repair	**6-9 months**
ACL Reconstruction	**9-12 months**
ACL + Meniscus Repair	**10-14 months**
Multiligament Reconstruction	**12-18+ months**

Important MMI Considerations

- MMI does NOT mean full recovery or no symptoms
- Patient may have permanent impairment at MMI
- Further treatment may be maintenance, not curative
- Impairment rating is assessed at MMI
- May need functional capacity evaluation (FCE)
- Communication between surgeon, PT, and case manager is key

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Patient Outcomes: Real Results

92-95%
Patient Satisfaction
After ACLR

85-90%
Return to
Pre-Injury Activity

3-5%
Re-tear Rate
(with modern techniques)

80-90%
Meniscus Repair
Healing Rate

What Drives Good Outcomes

- Patient compliance with rehab protocol
- Adequate pre-operative optimization
- Appropriate surgical technique and graft choice
- Adherence to return-to-work criteria (not just time)
- Communication between all stakeholders
- Psychological readiness and confidence
- Modified duty bridge to full duty

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What the Work Comp Team Should Know

1. Early, Accurate Diagnosis Saves Money

Delays in diagnosis lead to worse outcomes, longer recovery, and higher costs. Push for timely evaluation and imaging.

2. Not All Knee Injuries Need Surgery

Many MCL injuries and some ACL tears can be managed conservatively. Trust the clinical decision-making process.

3. Repair > Remove (When Possible)

Meniscus repair costs more initially but prevents arthritis and future surgeries. Think long-term cost, not just short-term.

4. Pre-hab and Rehab Are Critical Investments

Authorizing pre-operative PT and comprehensive post-op rehab improves outcomes and shortens total recovery.

5. Modified Duty Bridges the Gap

Getting workers back in a modified capacity benefits everyone - the worker, the employer, and the claim.

6. Communication Is Everything

Regular updates between surgeon, PT, case manager, and employer lead to the best outcomes and fewest surprises.

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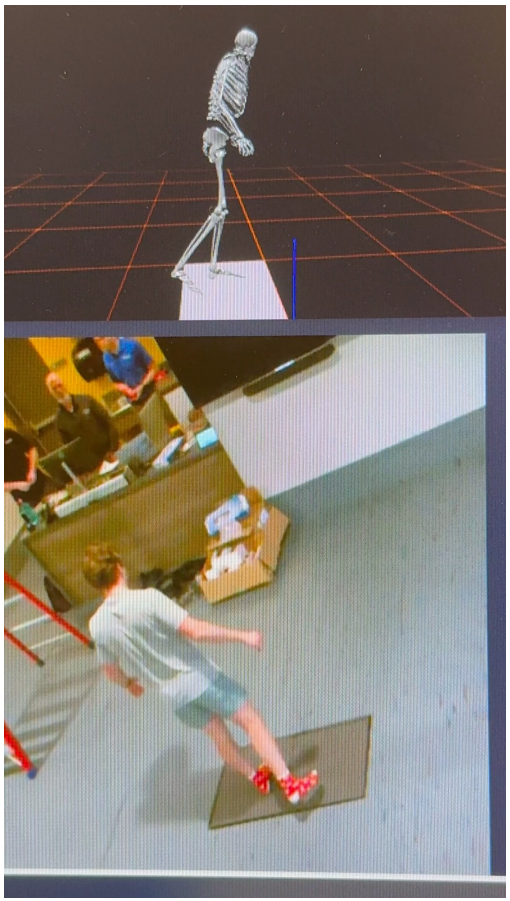
Evidence Based Recommendations



- Individualized treatment approach
- Consider for isolated, single ligament injuries without displaced meniscus or locked knee
- Risk-stratification
  - Coper/non-coper
  - Delaware-Oslo equations to estimate outcome *(Grindem et al. 2018 OJSM)*
  - Higher IKDC score, older age, female sex associated with improved odds
- Shared decision making with patient
- Prioritize functional & dynamic stability over static measures of laxity
- Implement structured neuromuscular training and phased return to activity program

Thank You

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SCAN ME