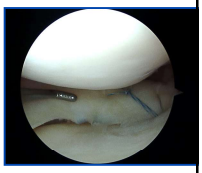
MAYO CLINIC

CHICAGO SPORTS MEDICINE SYMPOSIUM 2018
WORLD SERIES OF SURGERY

Complex Meniscus Repair: Root, Radial, Revision



Aaron J. Krych, MD

Professor
Director, Sports Medicine Fellowship
Mayo Clinic Orthopedic Surgery and Sports Medicine

AAOS

I (and/or my co-authors) have something to disclose.

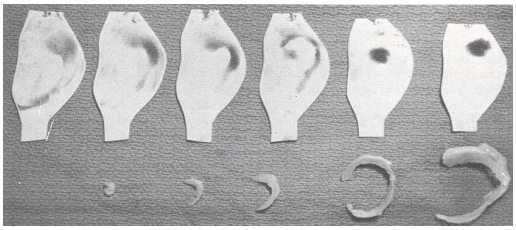
Detailed disclosure information is available via:

"My Academy" app;

Printed Final Program; or

AAOS Orthopaedic Disclosure Program on the AAOS website at http://www.aaos.org/disclosure

Post-Meniscectomy Dose Response



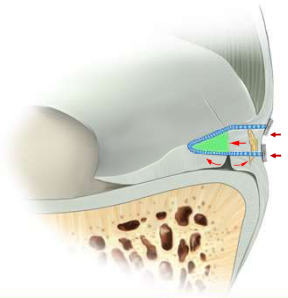
Zielinksa. Feb;128(1):115-23.

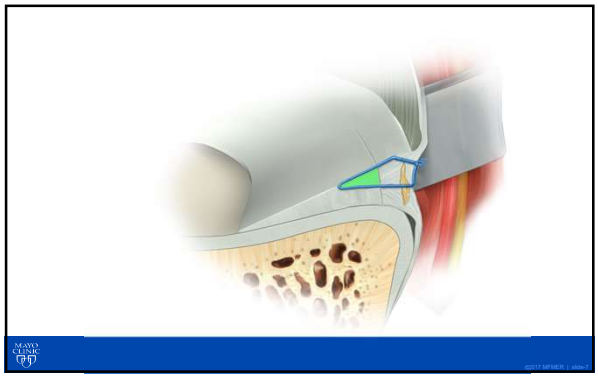
Meniscal Repair Toolbox

What are essential elements needed for a repair?

- Anatomic reduction
- Biologic preparation/augmentation
- Circumferential compression

"ABC's of Meniscus Repair" Krych JBJS 2017





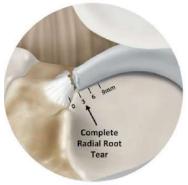
6 month follow-up MRI

Meniscal root tears: a silent epidemic

Mark E Cinque,[1] Jorge Chahla,[1] Gilbert Moatshe,[1,2,3] Scott C Faucett,[4] Aaron J Krych,[5] Robert F LaPrade[1,6]

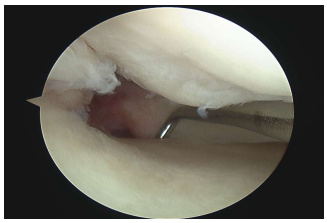
Br J Sports Med Month 2018 Vol 0 No 0

- Root tears 10-21% of presenting meniscus tears
- Significant pain and dysfunction



Type 2

Root tears—**why** are they important?



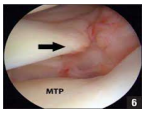
Biomechanical Consequences of a Tear of the Posterior Root of the Medial Meniscus

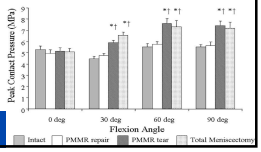
Similar to Total Meniscectomy

By Robert Allaire, MD, Muturi Muriuki, PhD, Lars Gilbertson, MD, and Christopher D. Harner, MD

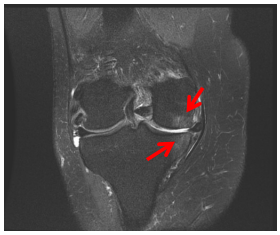
J Bone Joint Surg Am. 2008;90:1922-31

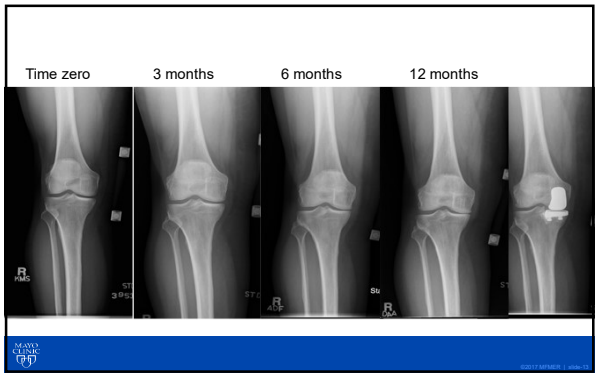
- Loss of hoop stress
- Meniscus extrusion
- Increased contact pressures in root tear and total meniscectomy similar
- Repair of root tear established normal contact pressures and kinematics



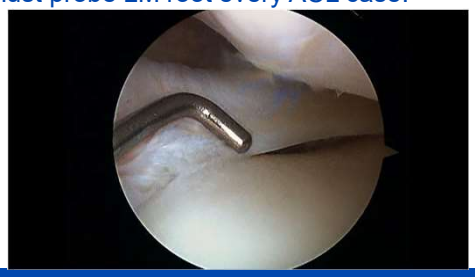


59F acute knee injury with pop and pain





Must probe LM root every ACL case!



Must probe LM root every ACL case!

Root repair transtibial pull-through technique

Treatment Options

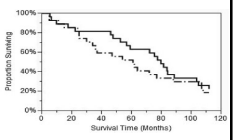
- Why not just perform a partial meniscectomy?

Partial meniscectomy provides no benefit for symptomatic degenerative medial meniscus posterior root tears

Aaron J. Krych[1] · Nick R. Johnson[1] · Rohith Mohan[1] · Diane L. Dahm[1] · Bruce A. Levy[1] · Michael J. Stuart[1]

Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-017-4454-5

- 52 patients
- PMM vs non-op
- Similar clinical outcome scores and TKA rate
- 54% rate of arthroplasty
- Risk factors: Females, increased BMI, meniscus extrusion

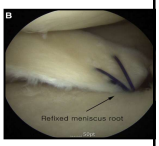


Comparison of Clinical and Radiologic Results Between Partial Meniscectomy and Refixation of Medial Meniscus Posterior Root Tears: A Minimum 5-Year Follow-up

Kyu Sung Chung, M.D., Jeong Ku Ha, M.D., Cheol Hyun Yeom, M.D., Ho Jong Ra, M.D., Ho Su Jang, M.D., Seung Hyuk Choi, M.D., and Jin Goo Kim, M.D., Ph.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 31, No 10 (October), 2015: pp 1941-1950

- 20 partial meniscectomies vs 37 root repairs minimum 5 year follow-up
- Repair group had superior IKDC and Lysholm scores
- Repair group had 0% vs 35% conversion to knee replacement in debridement group
- Conclusion: Repair more effective than debridement



Meniscus Root Repair vs Meniscectomy or Nonoperative Management to Prevent Knee Osteoarthritis After Medial Meniscus Root Tears

Clinical and Economic Effectiveness

Scott C. Faucett,*† MD, MS, Benjamin Peter Geisler,‡ MD, MPH, Jorge Chahla,§ MD, PhD, Aaron J. Krych,‖ MD, Peter R. Kurzweil,¶ MD, Abigail M. Garner,‡ MS, Shan Liu,‡ PhD, Robert F. LaPrade,§ MD, PhD, and Jan B. Pietzsch,‡ PhD

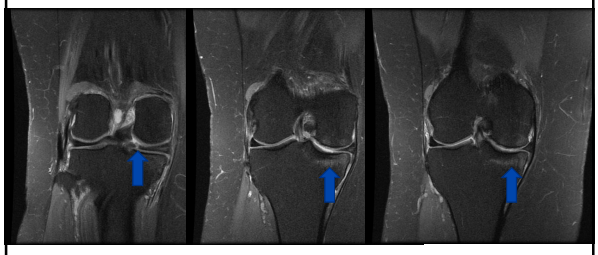
The American Journal of Sports Medicine
1–8
DOI: 10.1177/0363546518755754

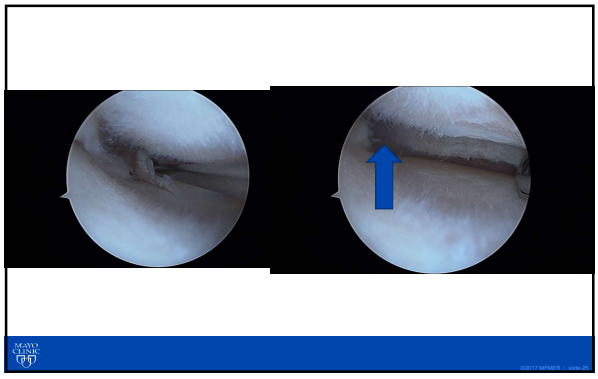
- Meta-analysis with cost-effectiveness modeling
- Meniscus root repair leads to *less OA* and is *cost-saving*
- Evidence supports meniscus repair as the first treatment in good candidates

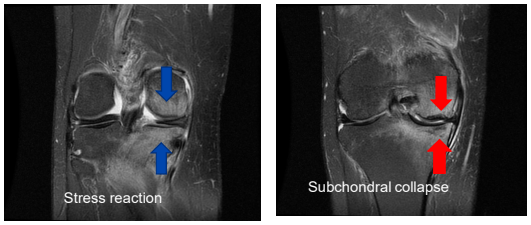
3 most common root tear patients in my clinic

How do I manage them?

Case 1: Unhappy knee scope







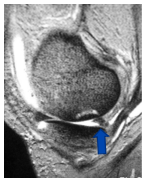
Subchondral Fracture Following Arthroscopic Knee Surgery

A Series of Eight Cases

By Samuel J. MacDessi, FRACS, Robert H. Brophy, MD, Peter G. Bullough, MB, ChB, Russell E. Windsor, MD, and Thomas P. Sculco, MD

Investigation performed at the Hospital for Special Surgery, New York, NY

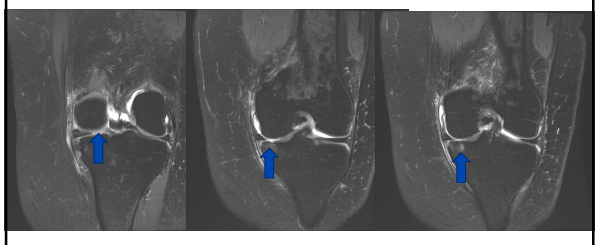
- Post-meniscectomy "osteonecrosis" is a subchondral fracture
- All 8 patients had medial meniscus debridement



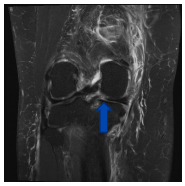
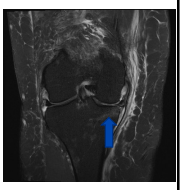
Case 2: 3 strikes, you're out

55F sedentary BMI 40 acute knee injury with pop and pain

3 strikes
-BMI
-Varus
-Grade 3 changes

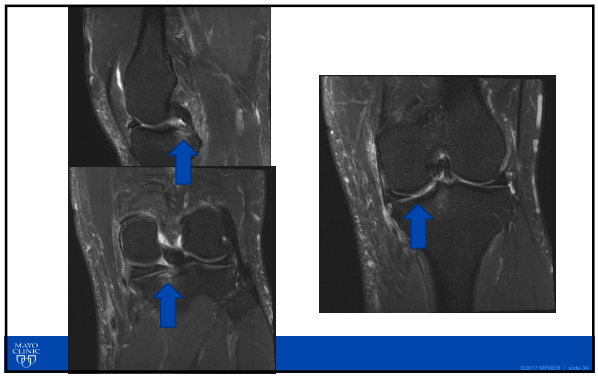


2 years later…now contralateral pain

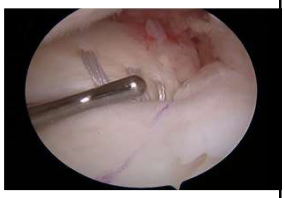
Case 3: Better do something

53M acute pain

Meniscus root repair

- Transtibial pull-through technique
- 2-3 simple cinch sutures
- Rehab critical
- NWB x 4-6 weeks following surgery

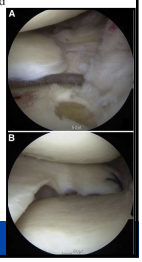


Survivorship Analysis and Clinical Outcomes of Transtibial Pullout Repair for Medial Meniscus Posterior Root Tears: A 5- to 10- Year Follow-up Study

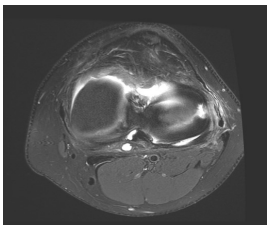
Kyu Sung Chung, M.D., Ph.D., June Mo Noh, M.D., Jeong Ku Ha, M.D., Ho Jong Ra, M.D., Ph.D., Sung Bae Park, M.D., Hyung Kook Kim, M.D., and Jin Goo Kim, M.D., Ph.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol ■, No ■ (Month), 2017: pp 1-6

- 91 patients age 58.7
- Avg 7 year f/u (min 5 year)
- Lysholm increased from 51.8 to 83.0
- 4 failures (1 TKA, 3 low scores)
- Overall: 92% survival at 8 years

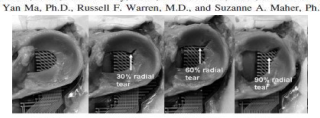


Radial tears



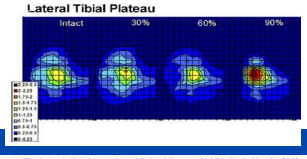
Dynamic Contact Mechanics of Radial Tears of the Lateral Meniscus: Implications for Treatment

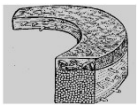
Asheesh Bedi, M.D., Natalie Kelly, B.Sc., Michael Baad, B.Sc., Alice J. S. Fox, M.Sc., Yan Ma, Ph.D., Russell F. Warren, M.D., and Suzanne A. Maher, Ph.D.



Intact 30% RT 60% RT 90% RT

Lateral Tibial Plateau

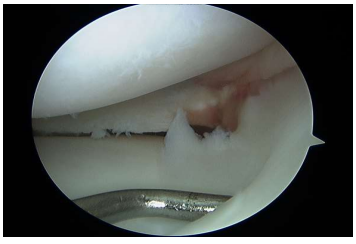




Loss of hoop stress

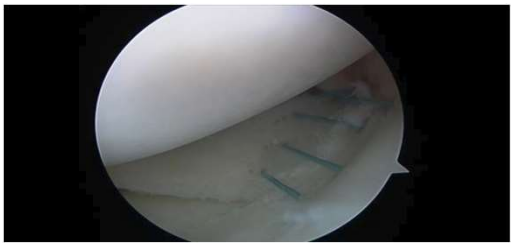
Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 28, No 3 (March), 2012: pp 372-381

15M football player



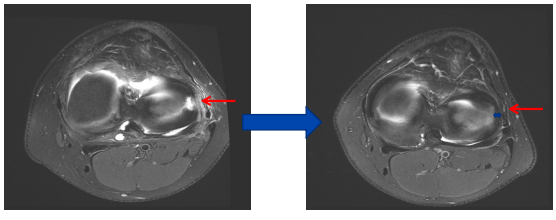
Full thickness radial tear body

Inside Out Repair Video



Follow up Imaging….

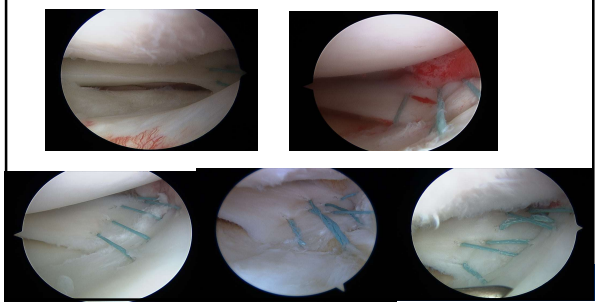
MRI comparison



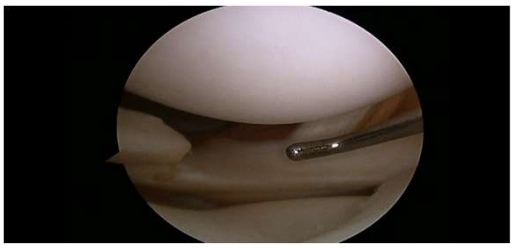
Before

After

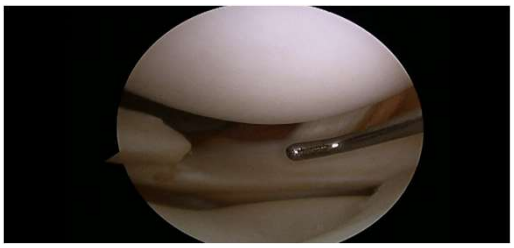
Not uncommon!



All-inside knot-tying technique



All-inside knot-tying technique



- What is defined as success?

Amount of Meniscal Resection After Failed Meniscal Repair

Nicolas Pujol,*† MD, Olivier Barbier,‡ MD, Philippe Boisrenoult,‡ MD, and Philippe Beaufils,‡ MD
Investigation performed at the Orthopedic Department, Centre Hospitalier de Versailles, Versailles-Saint Quentin University, Le Chesnay, France

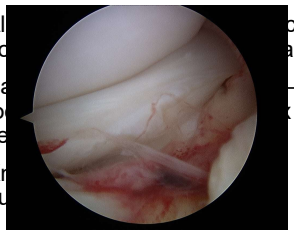
The American Journal of Sports Medicine, Vol. 39, No. 6
DOI: 10.1177/0363546511402661

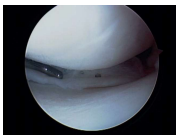
- 295 meniscus repairs
- 19 failed repairs
  - 75% cases had partial healing, ultimately removing *less* meniscus tissue

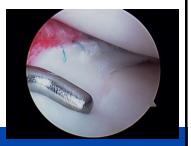
What about ***revision*** meniscus repair?

15 year old ACL injury + MM tear

- Al cus
  po ar
- Ba –
  fo x 3
  ye
- Kn
  bu







Clinical Outcomes After Revision Meniscus Repair

Aaron J. Krych, M.D., Pat Reardon, B.S., Paul Sousa, M.D., M.B.A., Bruce A. Levy, M.D., Diane L. Dahm, M.D., and Michael J. Stuart, M.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 32, No 9 (September), 2016: pp 1831-1837

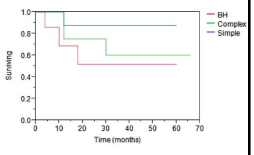
- 34 patients (24M/10F) avg age 22
- 12 lateral and 22 medial menisci
- Avg 6 year follow-up from revision repair

Clinical Outcomes After Revision Meniscus Repair

Aaron J. Krych, M.D., Pat Reardon, B.S., Paul Sousa, M.D., M.B.A., Bruce A. Levy, M.D., Diane L. Dahm, M.D., and Michael J. Stuart, M.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 32, No 9 (September), 2016: pp 1831-1837

- At 6 years:
- 7/34 (21%) underwent partial meniscectomy
- IKDC score 85
- *Joint space stable at 4 mm*
- Younger age risk factor for failure

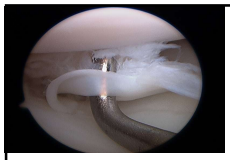
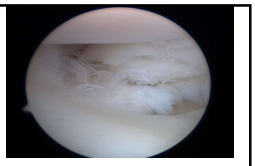
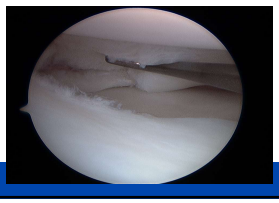


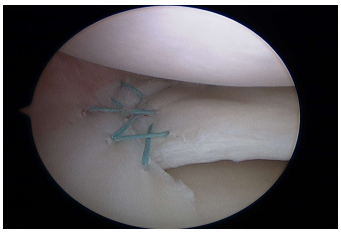
Conclusions: Complex meniscus repair

- Save as much native meniscus as possible
- Remember ABC's of meniscus repair
  - Anatomic reduction
  - Biologic preparation
  - Circumferential compression
- Need to have entire meniscus repair toolbox

Multi-planar complex tears

16 year old football player bilateral knee pain



Complex inside-out repair

Anatomic root guide

Anatomic root guide

Suture passage

Suture passage

Inside Out Repair

- Advantages:
  - *Smaller* perforations in meniscus
  - Can often reduce tear better with angle of needle (better for complex)
  - Cheaper
  - Can address more anterior tears

2-0 FiberWire Needles