Evidence Based Management of Meniscal Tears

Kenneth G. Swan, Jr., MD
• NO DISCLOSURES
Meniscus

• Once thought to be a vestigial muscle remnant with no known purpose, now known to be:
  – Important structure for knee force distribution
  – Secondary stabilizer of the knee

  – Loss of entire meniscus (open menisectomy) leads to progressive degenerative changes decades later
    • Fairbanks, *JBJS*, 1948
Meniscus Tear

• Common
  – 35% of people over the age of 50 have a meniscus tear
  – 2/3 of these people are ASYMPTOMATIC
  – In the presence of osteoarthritis, prevalence increases to 100% if Grade IV arthritic changes

• Can be traumatic or degenerative....
A: Radial Tear (small) → Radial Tear (large) → Progresses to a Flap Tear → Progresses to Complex or Degenerative Tear

B: Flap Tear → Flap Tear → Double Flap Tear → C: Discoid Meniscus

D: Peripheral Tear → Repaired Peripheral Tear → E: Horizontal Flap Tear → Displaced Flap Tear (horizontal)

F: Longitudinal Tear (short) → Longitudinal Tear (long) → Longitudinal Tear (displaced bucket-handle)
“....its all about the blood supply...”

Arnonczky, AJSM, 1982
Meniscus Repair

Diagram showing a tear in the meniscus and the meniscus repaired with sutures.
Meniscus Injury

- Traumatic vs atraumatic/denerative
  - Traumatic: Younger, acutely painful swollen knee
  - Degenerative: Middle age-older, chronic vs acute-on-chronic vs acutely painful knee
- Catching, clicking, locking of the knee may occur
- Exam may include painful range of motion, affected joint line tenderness, and positive provocacative maneuvers (McMurray’s, Appley’s)
Meniscus Injury: Diagnosis

- History, Physical
- Plain Radiographs!
- MRI
Meniscal Injury Treatment: Young patient

- Non operative treatment NOT typically recommended
- Surgery to PRESERVE the meniscus (i.e., repair or debride, prevent tear progression)
- Definition of young?
  - <25 years old?
  - <35 years old?
  - <50 years old?
- Why?
MENISCECTOMY

- REMOVAL OF MENISCAL TISSUE DECREASES CONTACT STRESS AREA, INCREASING STRESS ON THE ARTICULAR CARTILAGE
- INCREASED STRESS IS IN PROPORTION TO THE AMOUNT OF MENISCUS REMOVED
- INCREASED STRESS INEVITABLY LEADS TO DEGENERATION OF THE JOINT
Meniscectomy and Osteoarthritis

- **Fairbanks, *JBJS*, 1948**
  - Described progressive radiographic changes after open meniscectomy, with up to 14 yrs f/u
  - *No correlation with clinical findings*

- **Jorgensen, *JBJS*, 1987**
  - 4.5 and 14.5 yr clinical and radiographic f/u of athletes after open meniscectomy
  - c/l knee radiographs for control
    - 89% radiographic changes
    - 67% symptomatic
    - 34% no sports (due to knee pain)
# Kellgren and Lawrence Radiographic Criteria for Assessment of OA*

<table>
<thead>
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<th>Radiographic grade</th>
<th>0</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
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<tbody>
<tr>
<td>Classification</td>
<td>Normal</td>
<td>Doubtful</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
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<tr>
<td>Description</td>
<td>No features of OA</td>
<td>Minute osteophyte; doubtful significance</td>
<td>Definite osteophyte; normal joint space</td>
<td>Moderate joint-space reduction</td>
<td>Joint space greatly reduced; subchondral sclerosis</td>
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*Radiography does not reliably correlate with symptoms.*
OA after arthroscopic meniscus repair vs partial meniscectomy

- Stein, AJSM, 2010
- Level 3 Cohort
- 4.5 and 9 yr blinded radiographic f/u
- Young(ish) patients: avg age ~31
- Isolated, “traumatic tears”; both groups, vertical tears/bucket handle

Results at 9 years:
- Meniscectomy: 60% OA changes (Grade I Fairbanks)
- Meniscus repair: 20% OA changes (Grade I Fairbanks)
- No Grade 2 or 3 changes seen

- Repair much higher return to prior sport (96% vs 50%)
“SAVE THE MENISCUS....”
Meniscus Tear, Young Pt.: REPAIR WHEN POSSIBLE

- Young, healthy patient
  - Non smoker
- Red Zone, Red-White Zone
- Favorable tear pattern (Vertical, Bucket handle)
- Acute?
- In conjunction with ACL reconstruction*
- Stable knee
  - Morgan, *AJSM* 1991
Meniscus Repair Healing Rate

• ~82%
• If an isolated repair: ~50% healing rate
• **If in conjunction with ACLR: ~90% healing rate

- Tenuta, *AJSM*, 1994  (West Point, A/A eval)
- Cannon, *AJSM*, 1992  (arthrogram or A/A)
- Westerman, *AJSM*, 2014  (MOON GROUP)
CLINICAL QUESTION

WHAT IS THE OPTIMAL TREATMENT OF A MIDDLE AGED PATIENT WITH A SYMPTOMATIC MENISCUS TEAR?
• PubMed Search
  – Relevant articles
  – Search terms “meniscus”, “meniscus repair”, “meniscectomy”, “meniscal healing”
  – All levels of studies considered for historical purposes
  – Level I and II studies included in outcomes review
## Levels of Evidence

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Grading Criteria</th>
<th>Grade of Recommendation</th>
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<tbody>
<tr>
<td>1a</td>
<td>Systematic review of RCTs including meta-analysis</td>
<td>A</td>
</tr>
<tr>
<td>1b</td>
<td>Individual RCT with narrow confidence interval</td>
<td>A</td>
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<td>1c</td>
<td>All and none studies</td>
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<tr>
<td>2a</td>
<td>Systematic review of cohort studies</td>
<td>B</td>
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<tr>
<td>2b</td>
<td>Individual cohort study and low quality RCT</td>
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<td>Outcome research study</td>
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<tr>
<td>3a</td>
<td>Systematic review of case-control studies</td>
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<tr>
<td>3b</td>
<td>Individual case-control study</td>
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<tr>
<td>4</td>
<td>Case-series, poor quality cohort and case-control studies</td>
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<tr>
<td>5</td>
<td>Expert opinion</td>
<td>D</td>
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*Source: Ann Surg © 2004 Lippincott Williams & Wilkins*
Knee Arthroscopy

• ~700,000 arthroscopic partial medial meniscectomies/year in the U.S. in 2006

• But should we be doing this?
Knee MRI Magnetic Field!
Electromagnetic forces may cause doctor to lose common sense!
Meniscus Tear

• Common
  – 35% of people over the age of 50 have a meniscus tear
  – 2/3 of these people are ASYMPTOMATIC
  – In the presence of osteoarthritis, prevalence increases to 100% if Grade IV arthritic changes

• Can be traumatic or degenerative....
Arthroscopy for Osteoarthritis?

- RCT, Level I
- Arthroscopy with debridement and menisectomy vs. lavage surgery vs. sham surgery
- Conclusions: NO DIFFERENCE AMONG GROUPS!

Should we ‘scope this patient’s knee for their meniscus tear?
Arthroscopy and Osteoarthritis

- **In General:** Doing an arthroscopy for a patient with advanced arthritis no longer appropriate!

- What about knee arthroscopy for meniscus tear in a patient with mild arthritic changes?

- No arthritis?
Arthroscopy vs Sham Surgery for Degenerative Meniscus Tears

- Multicenter RCT, Level 2 Evidence
- Arthroscopic partial meniscectomy vs. sham surgery in patients without OA
- Findings: NO DIFFERENCE b/t GROUPS @ 12mos
  - Importantly, statistical difference in severity of non-radiographic appearance of arthritis seen in surgical vs. sham group.
Knee arthroscopy vs PT for meniscus tears

- Herrlin, *KSSTA*, 2013
- RCT, Level 1
- No or minimal OA (< grade 1)
- Middle aged patients
- Findings:
  - PT group did as well as Arthroscopy/PT group at 5 years
Arthritis Surgery In Ailing Knees Is Cited as Sham
By GINA KOLATA
Published: July 11, 2002

Common Knee Surgery Does Very Little for Some, Study Suggests
By Pam Belluck
Published: December 25, 2013

The Placebo Effect Doesn’t Apply Just to Pills
OCT. 6, 2014
Knee arthroscopy vs PT for meniscus tears

- Herrlin, KSSTA, 2013
- RCT, Level 1
- No or minimal OA (< grade 1)
- Middle aged patients
- Findings:
  - PT group did as well as Arthroscopy/PT group at 5 years
  - HOWEVER: 33% of patients had crossed over into the surgical group, and improved after arthroscopy!!
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- No or minimal OA (< grade 1)
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Findings:
- PT group did as well as Arthroscopy/PT group at 5 years
- **HOWEVER**: 33% of patients had crossed over into the surgical group, and improved after arthroscopy!!
- No progression of OA in surgical group
Arthrosocopy vs PT for Meniscus Tear and [mild-moderate] Osteoarthritis

- RCT, multicentered, Level I Evidence
- Arthroscopy and PT vs PT alone
- 12 mos f/u, pt. age >45 yrs

Results: NO DIFFERENCE!
Arthrosocopy vs PT for Meniscus Tear and [mild-moderate] Osteoarthritis

• RCT, multicentered, Level I Evidence
• Arthroscopy and PT vs PT alone
• 12 mos f/u, pt. age >45 yrs
• Results: NO DIFFERENCE!

  — But:
  • 35% crossover, with improved results
  • Treatment failure: PT alone (49%), Arthroscopy (25%)
    — (WOMAC)
Arthroscopy vs Conservative Tx for Meniscus Tears

- “Not all meniscus tears need surgery..”

- “This does not mean all meniscus tears do not need surgery”

- Robert Brophy, MD
- Washington University, St. Louis, MO
- *JBJS*, 2014
Non-Op Treatment, Meniscus
Does knee arthroscopy and meniscectomy lead to osteoarthritis?

- Paxton, *Arthroscopy*, 2011
- Systematic Review, Level IV

- 10 years s/p meniscectomy, 36% of patients had Fairbanks I/II changes (none had III/IV)
- Meniscus repair, 21% had I/II changes

- Reoperation rate: Meniscectomy(3.9%), Repair (21%)

- But: DIFFERENT PT POPULATIONS/AVG AGE....
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• Non-operative management is an appropriate first step, with physical therapy, activity modifications, +/- medications, +/- bracing

• Arthroscopy and partial meniscectomy may be considered in those who fail non-operative measures

• Arthroscopy unpredictable in those with more advanced arthritis, and should not be the first line of treatment in these patients
SUMMARY

• Non-operative management is an appropriate first step, with physical therapy, activity modifications, +/- medications, +/- bracing

• Many patients will do well without surgery

• Arthroscopy and partial meniscectomy may be considered in those who fail non-operative measures

• Literature not conclusive on partial meniscectomy and osteoarthritis: cause or effect?

• Arthroscopy unpredictable in those with more advanced arthritis, and should not be the first line of treatment in these patients
Meniscus References

THANK YOU!
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