Non-Surgical vs. Surgical Treatment of Meniscus Tears of the Knee

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CASE 1

- 45 y/o construction worker sent to you in consultation for gradual onset right anterior knee pain for 3 months. Has tried PT without significant improvement. Pain is starting to interfere with work.

- PE: Small effusion. Patellar facet tenderness. No joint line tenderness. McMurray’s reproduces pain behind the patella.

- Imaging: Patient has an MRI that shows a medial meniscus tear.

  a) Send directly for surgical consult for meniscal tear.
  b) Cortisone injection. If no improvement, then surgical consult for meniscal tear.
  c) More physical therapy.
MENISCAL TEAR: SCOPE OF THE PROBLEM

• “...arthroscopic partial meniscectomy is the most frequent surgical procedure performed by orthopedic surgeons in the United States.”

• More than 50% of these procedures are performed in patients older than 45 years old (Englund et al., NEJM 2008)
MENISCAL TEAR: SCOPE OF THE PROBLEM

- US knee scope rate >2x England and Ontario (Canada)
- Decrease in arthroscopy for DJD, increase for knee injury
- In 2006, estimated 984,607 arthroscopies performed; nearly 500,000 for meniscus tears
“Further study is imperative to better define the symptoms, physical findings, and radiographic findings that are predictive of successful arthroscopic treatment.” (Kim et al., JBJS 2011)
MENISCAL TEAR: ANATOMY

- Pathology/Anatomy
  - tear of the meniscal cartilage
  - can be traumatic or degenerative

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MENISCAL TEAR: HISTORY

- **Traumatic**
  - joint line pain
  - hyperflexion, or “plant and twist”
  - +/- rapid swelling, hemarthrosis
  - catching, locking

- **Degenerative**
  - joint line pain
  - gradual onset
  - +/- swelling
  - catching, locking
MENISCAL TEAR: PHYSICAL EXAM

- Physical Exam
  - often + effusion
  - + joint line tenderness
  - + McMurray’s

Physical Exam

- often + effusion
- + joint line tenderness
- + McMurray’s reproduces pain at the joint line
MENISCAL TEAR: EPIDEMIOLOGY

- Undiagnosed meniscal tears are common in the community, with an incidence that increases with age (Englund et al, NEJM 2008):
  - Incidence of undiagnosed meniscus tears was:
    - 32% and 19% of men and women 50-59 y/o
    - 56% and 51% in men and women 70-90 y/o
    - 61% of these tears were in patients who were asymptomatic in the last month
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- Imaging: Patient has an MRI that shows a medial meniscus tear.
  
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CASE 1

Key points:
• Meniscus tears cause pain that is well localized to the joint line.
• Many meniscal tears are asymptomatic.
CASE 2

• “Right knee meniscus tear, f/u ER”

• Per ER notes, “60 y/o male accountant with right medial knee pain after twisting injury yesterday on a wet floor at work. Difficulty walking after the injury. Swollen today.”
CASE 2

• PE: Limping. Right knee with small effusion. Tenderness along the medial joint line. McMurray’s test reproduces medial pain.

• X-rays: 2 non-weightbearing views of the knees “normal.”

• “Assessment and Plan: Acute medial meniscus tear. Ice, ibuprofen, knee immobilizer, F/U with primary care doctor in 1 week.”
CASE 2

a) Refer to physical therapy.
b) Order a 4 view weight bearing series of knee x-rays.
c) Order MRI to evaluate for a meniscal tear.
d) Send directly for surgical consult.
MENISCAL TEAR: IMAGING

X-ray

- To rule out fracture: 2 view non-weight bearing
- To rule out significant osteoarthritis: 4 view weight bearing

MRI

OSTEOARTHRITIS: XRAYS

4 weight bearing views of the knee
OSTEOARTHRITIS: XRAYS

Tunnel (Notch) view of the knee
MENISCAL TEAR: IMAGING

- Imaging
  - Xray
  - MRI – meniscal tear
MENISCAL TEAR: IMAGING

- Imaging
  - Xray
  - MRI – meniscal tear
As the severity of osteoarthritis increases, so does the frequency of meniscal tears: among those with severe osteoarthritis, 95% had a meniscal tear.

Among patients with osteoarthritis:
- of patients with symptoms, 63% had a meniscus tear
- of patients without symptoms, 60% also had a meniscus tear
76% of asymptomatic patients had a meniscus tear
91% of patients with symptomatic osteoarthritis had a meniscus tear
Patients with severe osteoarthritis had a 100% prevalence of medial meniscal tears (Bhattacharyya et al., JBJS 2003)
In patients with osteoarthritis, ratings of pain, stiffness, and function were no different between subgroups of patients with vs. without a coexisting meniscal tear (Bhattacharyya et al., JBJS 2003)

**TABLE II** WOMAC* and Visual Analog Scale Pain Scores of Patients with and without a Medial Meniscal Tear in the Subgroup of Patients with Symptomatic Osteoarthritis and a Low Radiographic Grade†

<table>
<thead>
<tr>
<th></th>
<th>No Tear† (N = 15)</th>
<th>Tear† (N = 76)†</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC score (points)</td>
<td>29 ± 4.1</td>
<td>29 ± 3.0</td>
<td>0.91</td>
</tr>
<tr>
<td>Visual analog scale pain score (0-100 mm)</td>
<td>31 ± 8.3</td>
<td>34 ± 3.1</td>
<td>0.67</td>
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</table>

*WOMAC = Western Ontario and McMaster University Osteoarthritis Index. †The values are given as the mean and standard error. †The power was 80% to detect a difference in the WOMAC scores of 15 points and a difference in the scores on the visual analog scale of 16 mm.
CASE 2

• “60 y/o male, right knee meniscus tear, f/u ER”
• X-rays: 2 non-weightbearing views of the knees “normal.”
• “Assessment and Plan: Acute medial meniscus tear. Ice, ibuprofen, knee immobilizer, F/U with primary care doctor in 1 week.”

  a) Refer to physical therapy.
  b) Order a 4 view weight bearing series of knee x-rays.
  c) Order MRI to evaluate for a meniscal tear.
  d) Send directly for surgical consult.
CASE 2

Key points:
• Meniscus tears are increasingly common in knees with osteoarthritis.
• As a group, osteoarthritic patients with a meniscus tear are no more symptomatic than osteoarthritic patients without a meniscus tear.
• Consequently, review x-rays (4 views, weight bearing) to assess for osteoarthritis prior to obtaining MRI.
CASE 3

• 60 y/o male with gradual onset right medial knee pain for 3 weeks. Worsened yesterday when twisted it in the workplace parking lot.
• PE: Small effusion. + medial joint line tenderness. McMurray’s reproduces medial joint line pain.
• X-rays show trace osteoarthritic changes.
• MRI confirms minimal medial articular cartilage changes without associated bone marrow edema, as well as a medial meniscus tear.

a) Trial of conservative therapy including some combination of rest, ice, NSAIDS, cortisone injections, viscosupplementation, and/or physical therapy.

b) Send directly for surgical consult.
Arthroscopic partial meniscectomy combined with PT was no better for relief of symptoms than PT alone in patients with a meniscal tear and DJD (Katz et al., NEJM 2013)

- Moseley et al., NEJM 2002; and Kirkley et al., NEJM 2008: lack of efficacy of arthroscopy in DJD
Patients with degenerative meniscus tears and no osteoarthritis (Sihvonen et al., NEJM 2013)

All patients underwent diagnostic arthroscopy
  • During diagnostic arthroscopy, patients randomized to partial meniscectomy vs. sham surgery
MENISCAL TEAR: TREATMENT OF DEGENERATIVE TEARS WITHOUT DJD

- Both groups had “significant” improvement from baseline to 12 months after surgery.
- However, no significant difference between groups in the amount of change from baseline for pain (Lysholm score), quality of life (WOMET), or knee pain after exercise.
- “…These results argue against the current practice of performing arthroscopic partial meniscectomy in patients with a degenerative meniscal tear.” (Sihvonen et al., NEJM 2013)
Limitations and critiques of the study

- Factors such as subchondral edema or chondromalacia on MRI were not used to exclude or stratify patients.
- Patients with mechanical symptoms were excluded, “yet this is probably the group that would benefit most from arthroscopic partial meniscectomy.” (Krych et al., NEJM 2014)
- “Mechanical symptoms are an important primary problem that arthroscopic meniscectomy can alleviate. Such symptoms were reported by less than half the patients in this study, and a locked knee was an exclusion criterion….” (Jevsevar et al., NEJM 2014)
Objective: To assess whether APM improves mechanical symptoms better than sham surgery.

(Sihvonen et al., Ann Intern Med 2016)
MENISCAL TEAR: TREATMENT OF DEGENERATIVE TEARS WITH MECHANICAL SYMPTOMS

- 69 patients with mechanical symptoms:
  - 32 patients underwent arthroscopic partial meniscectomy
  - 37 patients underwent sham surgery
- Presence of mechanical symptoms assessed at 2, 6, and 12 months
- Reported symptoms at least once during 12 month follow up:
  - 23 of 32 APM patients (72%)
  - 22 of 37 sham surgery patients (59%)
- Did not report mechanical symptoms at any of the 3 follow up points:
  - 9 of 32 APM patients (28%)
  - 15 of 37 sham surgery patients (41%)
“Conclusion: Resection of a torn meniscus has no added benefit over sham surgery to relieve knee catching or occasional locking. These findings question whether mechanical symptoms are caused by a degenerative meniscus tear and prompt caution in using patients’ self-report of these symptoms as an indication for arthroscopic partial meniscectomy.” (Sihvonen et al., Ann Intern Med 2016)
MENISCAL TEAR: SURGICAL DECISION MAKING

• Arthroscopy for any meniscal tear with significant osteoarthritis: no benefit

• Arthroscopy for degenerative meniscal tear without osteoarthritis: no benefit

• Arthroscopy for degenerative meniscal tear with “mechanical” symptoms: no benefit
MENISCAL TEAR: ROLE OF SURGERY FOR DEGENERATIVE MENSICAL TEARS

Is there any role for arthroscopy in the treatment of degenerative meniscal tears?

Why do we keep performing arthroscopy in patients with degenerative meniscal tears?

My personal opinion: “In my experience, many patients with degenerative meniscal tears will improve over time without surgery. However, some remain symptomatic. Some of these patients may still benefit from arthroscopic partial meniscectomy.”
Meniscal tears and osteoarthritis frequently coexist, but to our knowledge, no data exist to identify who will benefit from arthroscopic partial meniscectomy versus non-operative management. Our objective was to evaluate the capability of preoperative information to predict arthroscopic partial meniscectomy outcomes in osteoarthritis.” (Suter et al., Arth Rheum 2009)
MENISCAL TEAR: SURGICAL DECISION MAKING

• Developed a mathematical model based on published data. Combined 2 clinical indicators (mechanical symptoms and pain pattern) and 2 MRI indicators (tear type and bone marrow lesions) into 36 possible combinations, then ranked each combination according to the likelihood of having primarily tear- vs OA-related pain in individuals ages 45-65 years with knee pain, OA, and meniscal tears.

• Found that having the clinical combination of locking and increasing pain, with the MRI combination of a displaced tear and no bone marrow lesions, represented the highest likelihood of arthroscopic partial meniscectomy benefit.
MENISCAL TEAR: SURGICAL DECISION MAKING

History and Physical Exam
- **Younger** patients vs. more **elderly** patients
- **Traumatic** vs. **degenerative** meniscal tears
- Increasing pain
- “Locked” meniscus tear vs. “mechanical” symptoms

Radiographic Criteria
- Displaced or “bucket handle” tears
- **Bone marrow edema**
- Large horizontal cleavage tears
In the published study by Sihvonen et al., participants had >3 months of knee pain “that was unresponsive to conventional conservative treatment and had clinical findings consistent with a tear of the medial meniscus.”
In the 2013 NEJM study published by Sihvonen et al., participants had >3 months of knee pain that was unresponsive to conventional conservative treatment and had clinical findings consistent with a tear of the medial meniscus.

Table S1. Inclusion and exclusion criteria of the study.

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<tbody>
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<td>1. Age: 35 to 65 years</td>
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<tr>
<td>2. Persistent (&gt; 3 months) pain on the medial joint line of the knee</td>
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<td>3. Pain provoked by palpation or compression (forced flexion) of the medial tibiofemoral joint line or a positive McMurray sign</td>
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<td>4. MRI showing signals characteristic of medial meniscus injury</td>
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<td>5. Arthroscopically-verified degenerative medial meniscus tear</td>
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</tbody>
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<td>1. Obvious trauma-induced onset of symptoms</td>
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<tr>
<td>2. Locked knee (that cannot be straightened normally)</td>
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<td>3. Previous surgical procedure on the affected knee</td>
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<tr>
<td>4. Clinical knee OA (ACR Criteria)</td>
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<tr>
<td>5. Radiographic knee OA (Kellgren-Lawrence grade &gt; 1)*</td>
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<tr>
<td>6. Acute (within the previous year) fracture of the affected extremity</td>
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<tr>
<td>7. Decreased range of motion of the knee</td>
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<td>8. Instability of the knee</td>
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<tr>
<td>9. MRI assessment shows pathology other than degenerative knee disease requiring treatment other than APM</td>
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<tr>
<td>10. Arthroscopic examination reveals pathology other than a degenerative injury to the medial meniscus requiring intervention other than APM</td>
</tr>
</tbody>
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“In both the partial meniscectomy group and the sham-surgery group, postoperative care was delivered according to a standardized protocol specifying that all patients receive the same walking aids and instructions for the same graduated exercise program. Patients were instructed to take over-the-counter analgesic agents as required.” (Sihvonen et al., NEJM 2013)
MENISCAL TEAR: ROLE OF SURGERY FOR DEGENERATIVE MENSICAL TEARS

Possible approach to the patient with symptoms suggestive of a degenerative meniscal tear

- If “locked,” then early MRI. If MRI confirms displaced tear plausible for patient’s disability, then early surgical referral.
- Otherwise, optimize a period of relative rest, oral NSAIDS, cortisone injections, and physical therapy. May also consider viscosupplementation for patients with mild osteoarthritis.
- If still not improved, then MRI for consideration of arthroscopy.
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Possible approach to the patient with symptoms suggestive of a degenerative meniscal tear

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• Otherwise, optimize a period of relative rest, oral NSAIDS, cortisone injections, and physical therapy. May also consider viscosupplementation for patients with mild osteoarthritis.

• If still not improved, then MRI for consideration of arthroscopy

• If MRI shows a meniscal tear and no alternative explanation for patient’s symptoms (such as bone marrow edema), then surgical referral is reasonable
CASE 3

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THE END