Meniscal Tears

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Meniscus

Meniscal Anatomy
- Increases conformity between femur and tibia
- Force = Pressure / Area
- Analogy is high heel shoe leaving dent on hardwood floor
Knee Pain, Now what?

- MRI results difficult to interpret

Meniscal Tears

- Meniscal tears are one of the most common knee injuries
- Prevalence increases with age, higher body mass index and the presence of arthritis
- Classified as acute (caused by physical trauma) or degenerative

Types of Meniscal Tears
Meniscus Tear

- Unstable cartilage flap causes pain or mechanical symptoms such as catching or locking

Degenerative Meniscal Tears

Degenerative tears tend to occur over the age of 40
- result of changes within the menisci, decreased elasticity and becomes dry and brittle
- frequently associated with osteoarthritis
- Sometimes a history of minor or repeated trauma, however 50% of these tears occur spontaneously, often not aware of any injury
  - Horizontal, flap and complex tears are more common

Acute Meniscal Tear

- more commonly occur in people under 40
- often sports-related
- Three types of tears:
  - Longitudinal
  - bucket handle
  - radial tears
Management Meniscus Tear

- Examination reveals joint line tenderness, effusion, positive McMurray’s
- MRI reveals meniscus tear
- Trial conservative measures such as NSAIDs, activity modification and Physical Therapy
- Remain symptomatic then arthroscopic meniscectomy is an option

Thank you for inviting me

More To The Story

- More to the story
- How many patients are unhappy or unable to return to work or require another surgery?
More Questions than Answers

What is value and who decides?
• Era of big data, are we examining who does well with regard to complications but what about outcomes?
• Review recent literature on meniscal tears
• Rogue thoughts from a former Econ major

Value

• Value = Outcome/Cost
• Can we stratify patients to maximize their outcome
  – Factors that predict who will do well?
• How do we judge outcome
  – Surgeon reported?
  – Patient reported?
  – Short term or long term?

Complications

• We have great deal of data that discusses risk of surgery such as infection, blood clots or anesthetic risk
• Stratified who is at higher risk for infection:
  – Diabetics
  – Patients on immunosuppressive agents
  – Smokers
  Patients at higher risk of DVT
    Factor V Leiden
    Protein C and Protein S Deficiency
What do we do with this data?
  Same treatment regardless or risks?
**Risk of Poor Outcome**

- Apart from risk of procedure, what about outcome
- We have some data to say certain patients won’t do as well
  - Pre operative opiate use
  - Worker’s compensation
  - How do we use this data?

**Data**

- Review some articles and meta-analysis regarding:
  - MRI’s
  - History of Meniscectomy
  - Complete Meniscectomy versus Partial
  - Degenerative tears
  - Meniscal tears in general
  - What to do for Cartilage flap
  - Arthroscopy for degenerative changes
  - Long term outcomes regarding arthritis

**MRI**

- MRI often does not clarify issue with meniscal tear
- Finds pathology but unclear if this is the source of the pain or is the result of the injury in question
- Once pathology identified, hard not to focus on information
MRI Results, Now What?

- New England Journal Medicine, Framingham Massachusetts age 50 – 90 randomly called and obtained MRI
- Patients who were asymptomatic had MRI evidence of meniscal tear 19% in women in their 50’s to 56% in men age 70-90
- Patients with arthritis, 60% had meniscal tear
- 61% patients with meniscal tear had no pain, aching or stiffness

More Questions Than Answers

- Study from Texas obtained MRI’s on opposite side as injured knee or shoulder in patients over age 40
- 294 claims reviewed, (Level 4 evidence)
- 57% of MRI showed worse pathology on non injured side

Early Literature

- 1948: Fairbank wrote early article
  - Historically meniscus thought to be vestigial
  - Series of patients who shortly after surgery developed joint-space narrowing, spurs and subchondral sclerosis
  - he concluded that “meniscectomy is not wholly innocuous” and “it seems likely that narrowing of the joint space will predispose to early degenerative changes.
  - Known now as Fairbank’s changes
Results of Open Meniscectomy

• 53 patients who underwent open total meniscectomy as adolescents
  – no other intra-articular pathology of the knee at surgery
  – mean follow-up of 40 years (33 to 50)
  – 13.2% had already undergone total knee replacement at the time of follow-up.
  – greater 4X relative risk of osteoarthritis at 40 years
  – concluded that meniscectomy leads to symptomatic arthritis
  – found a 132X increase in the rate of total knee replacement compared to age-matched peers.

Results of Open Meniscectomy

• 123 patients 21 years following open meniscectomy
• Found 14X risk arthritis at 21 years
• Concluded meniscectomy following knee injury represents a significant risk factor for radiographic tibiofemoral OA

Arthroscopic Partial versus Complete Meniscectomy

• Function of the knee directly related to the amount of meniscal tissue remaining
• 200 patients randomized to partial or total meniscectomy
• 7.8 years follow up
• After partial meniscectomy, posterior horn tears had the worst outcome if more than two-thirds of the meniscus had been removed
• Preservation of the peripheral rim of the meniscus following partial meniscectomy produces the best functional results.
Arthroscopic Meniscectomy

- Even partial meniscectomy increases peak local contact pressure within the knee by 65% and reduce contact area by 10%
- Higher rate of arthritic changes with loss of periphery, more tissue resected, root tears and lateral meniscal tears

Arthroscopy for Degenerative Meniscal Tears

- Seven randomized studies evaluating patient reported outcome at short and long term
- Patients had no or minimal arthritis
- Evaluated pain as well as function
- No short or long term significant improvement with arthroscopy with respect to pain or function

Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomized trial

- 99 patients randomized arthroscopy vs 8 weeks of exercise program
- both groups scored similarly on functional outcome scores and visual analog scale pain scores over the 6 months.
Degenerative Horizontal Tears Medial Meniscus

• 108 patients randomized to arthroscopy or PT with strength training
• After 2 years of evaluation, the treatments did not differ in terms of pain relief, knee function, or satisfaction.

Mechanical Symptoms

• 146 patients with degenerative meniscal tear randomized to sham surgery versus arthroscopic partial meniscectomy
• evaluated mechanical symptoms at 1 year
• 49% of patients in the meniscectomy group versus 43% of patients in the sham surgery group had mechanical symptoms at least once during the 12-month follow-up period
• severity and frequency of mechanical symptom occurrences were similar between groups at all follow-up points.

Degenerative Meniscal Tear Sham Surgery

• New England Journal of Medicine
• Rare to have surgery control
• 146 patients randomized
• No difference in outcome at 1 year
NEJM Study

- Pain improved in both groups (VAS)
  - Baseline: Meniscectomy - 5.8, Sham - 6.1
  - 2 months: Meniscectomy - 3.1, Sham - 4.1
  - 6 months: Meniscectomy - 2.5, Sham - 3.1
  - 12 months: Meniscectomy - 2.7, Sham - 2.9
- The difference between groups was not significant at any time point

Exercise therapy compared to meniscectomy in meniscal tear treatment

- Meta-analysis involving 12 studies
- Exercise therapy demonstrated significantly greater strength in extension at 3 months, and no significant differences in short- and long-term pain and function

Long Term Outcome after Meniscectomy

- 205 patients followed 14 years after meniscectomy for acute and degenerative meniscal tear
- Degenerative tear scored significantly worse than individuals with a traumatic tear
Risk of Developing Arthritis after Meniscectomy

- Compartment involved: Greater risk with lateral meniscectomy
- Volume of resection: Greater risk with larger resection volume
- Orientation of tear: Greater risk with radial tear — destroys hoops stress function
- Associated conditions: Greater risk with pre-existing chondral damage
- Greater risk with ACL insufficiency
- Knee alignment: Varus malalignment → greater medial compartment load
- Valgus malalignment → greater lateral compartment load
- Body habitus: Greater risk for larger BMI
- Patient age: Greater risk over 40-year-old
- Activity level: Greater risk with lower preoperative activity level

Chondral Lesions

- 190 patients undergoing arthroscopic meniscectomy randomized to debridement of chondral flap versus observation
- No difference in outcome in any parameters at one year but, initially, less pain and better function if left alone
- Recommendation was to leave cartilage lesions alone

Arthroscopic Debridement if Arthritis

- Pain improved with arthroscopy at 3 and 6 months but no difference at 12, 18 or 24 months
- No significant differences in patient-reported function at 3, 6, 12, 18, or 24 months after treatment.
- Complications with arthroscopy
  - .4% DVT
  - .2% infection
  - .015% pulmonary embolism
Results of Meniscectomy In Arthritic Knee

- Determining who will do well
- Retrospective study, 65 patients over 40
- Divided based upon amount cartilage degeneration
- Patients without articular damage 87% excellent clinical result
- Patients with articular damage, 7% excellent clinical result

Long Terms Results after meniscectomy

- 155 patients evaluated 16 years after meniscectomy
- 43% of patients had X-rays showing arthritis with 59% symptomatic
- Results far worse with degenerative meniscal tears but also seen with acute tear (Relative Risk 7.0)

Outcomes of Meniscectomy

- Review article, looked at 29 studies
- Predictors of poor clinical or radiographic outcomes included:
  - total meniscectomy or removal of the peripheral meniscal rim
  - lateral meniscectomy
  - degenerative meniscal tears
  - presence of chondral damage
  - presence of hand osteoarthritis suggestive of genetic predisposition
  - increased body mass index.
Results

- 147 athletes, prospective longitudinal study
- Isolated meniscectomy
- Follow up at 4.5 years and 14.5 years
- Complaints related to the operation increased from 53% at 4.5 years to 67% at 14.5 years
- Arthritic changes rose from 40% at 4.5 years to 89% at 14 years
- Half had given up or reduced their sporting activity, and 6.5% had changed their occupation
- Radiographic deterioration started after the 4.5-year review in 49% of the patients and was more frequent after lateral than medial meniscectomy.

Medial vs Lateral Meniscectomy

- 362 medial and 109 lateral isolated arthroscopic
- 10 years follow up
- 95% of the patients were very satisfied or satisfied with the results of the medial meniscectomy, and 95.5% with results of the lateral meniscectomy
- Radiologic changes after medial and lateral meniscectomy were found in 21.5% and 37.5%, respectively
- Subjective and clinical results after medial or lateral meniscectomy are quite similar, but radiologic results are significantly worse after lateral meniscectomy.

Results Meniscectomy

- 136 patients isolated meniscectomy
- 8.5 years average follow up
- Reoperation rate was as high as 22.8%, but was the lowest in the bucket handle tear group (13%)
- 53% of patients had at least one of the Fairbanks change in the operated knee and only 22% in the control knee
Positive Results Meniscectomy

- meta-analysis of 6 randomized controlled trials comparing the outcome partial meniscectomy with conservative treatment in adults with non obstructive meniscal tear
- 773 patients randomized to the surgery versus non operative treatment.
- small significant differences in favor of the meniscectomy group for physical function at 2 to 3 months and at 6 months and pain at 6 months
- no differences at longer follow-up.

Outcomes

- Study evaluating benefit of meniscal repair compared to meniscectomy
- 81 patients repair vs meniscectomy
- Evaluated function and progression of arthritis
- 8.8 year follow up:
  - no arthritis in 80.8% after repair compared with 40.0% after meniscectomy
  - preinjury activity level was obtained in 96.2% after repair compared with 50% after meniscectomy

Can We Predict Who Will Do Well?

- 105 patients with meniscectomy
- Outcome of meniscectomy was generally favorable but much worse outcomes in:
  - Worker’s compensation
  - Low baseline physical functional status
  - Underlying arthritis in knee
Summary

• Data convincing that degenerative meniscal tears should be left alone
• Early data suggest chondroplasty not beneficial and associated with more pain and worse function in the first year after surgery
• Many meniscal tears will improve without surgery

Where are we now?

• Some studies show transient benefit up to 6 months pain relief and function but long term results unpredictable
• Lots of data shows loss of meniscus leads to arthritic changes, especially if already has arthritis

Treatment Recommendations

• Pending review article from France
• All but 1 of the 8 recent randomized studies reported non-superiority of arthroscopy over nonoperative treatment
• Non operative treatment should be the first-line choice, with arthroscopic meniscectomy reserved for cases of failure, or earlier in case of “considerable” mechanical symptoms
Predictive Data

- Repeated studies in the total joint literature show patients do less well if they are:
  - On opiate medications preoperatively
  - Active legal claim
If we know that you are at high risk for not doing well, do we still operate?

Outcomes

- 105 patients with meniscectomy
- SF-36 scores improved from a mean of 53.7 to a mean of 18.2
- Satisfactory Lysholm scores increased from 5% preoperatively to 73% after surgery
- The outcome of APM is generally favorable
- Worker’s Compensation (p = 0.003), worse baseline physical functional status (p = 0.007), and Grade III-IV cartilage damage (p = 0.05) were associated with worse post-operative function

Where Now?

- Need data looking at results
  - PROM’s
  - Long term radiographic studies
Surgeon is the method
  - Outcomes vary between providers
  - Show your results
  - Stratify patients who will not do well
Role for payment for injury rather than surgery?
What would you Rather Have?

- Partridge in Pear Tree $209.99
- Two turtle doves $375
- Three French Hens $181.50
- Seven Swans $13,125
- Ten Lords-A-Leaping $5,508.70

Investor Place 2016

Future

- Patient reported outcomes crucial to know if we are delivering value
- Data should help us determine which surgeons have good outcomes and which patients will do well with surgery
- Data convincing that absence of meniscus leads to arthritis, arthroscopy not without downsides
- Do we limit surgery when we know it doesn’t help?
  - Degenerative meniscal tears
  - Chondral debridement
  - Are we better off compensating for the injury and not necessarily driving treatment?

Take Home

- Meniscectomy is very common but long-term results are not entirely satisfactory
- Many studies show the meniscectomy rate remains too high
- Longitudinal vertical tears are a proper indication for repair, especially in the red-white or red-red zones
- Degenerative meniscal lesions are very common findings which can be considered as an early stage of osteoarthritis in middle-aged patients.
- Recent randomised studies found that arthroscopic partial meniscectomy has no superiority over non-operative treatment
- Non-operative treatment should be the first-line choice and meniscectomy should be considered in case of failure; three months has been accepted as a threshold in the ESSKA Meniscus Consensus Project presented in 2016.
- Earlier indications may be proposed in cases with considerable mechanical symptoms
Thank You

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Traumatic vs Degenerative Meniscal Tears

- Traumatic Versus Degenerative Tears
- Traumatic tears: result of supraphysiologic forces applied to the knee, often resulting in ligamentous disruption
  - Commonly radial or vertical longitudinal tears
- degenerative tears result from repetitive physiologic forces leading to gradual wear of the meniscus
  - commonly horizontal cleavage or complex tears accompanied by osteoarthritic changes
  - Nonoperative treatment recommended for pain relief and improves mechanical
Where To Go From Here
• Need data to determine outcomes
  – Patient reported outcomes
  – Outcomes of each surgeon
  – Long term outcome with regard to arthritis

Summary
• Studies are conflicted
• Meniscectomy for acute tear often subjective improvement initially
• Certain types of tears (lateral or root tears) have worse prognosis
• Long term arthritis relates to amount of meniscus removed and location

Outcomes
• Patients did better with partial meniscectomy if
  – Age less than 40
  – Symptoms present less than 1 year
  – No patellofemoral symptoms
  – No X-ray evidence of arthritis
  – Stable knee
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<tr>
<th>Patient Reported Outcomes</th>
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<td>• Multiple studies in total joints shows pre-operative factors identify patients not satisfied with procedure</td>
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<tr>
<td>— Mental health</td>
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<td>— Secondary gain</td>
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<td>— Pre-operative opiates</td>
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