MENISCUS TEARS, SYNOVECTOMY, LOOSE BODIES & SYNOVIAL PLICA

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### SCORECARD

<table>
<thead>
<tr>
<th>ENDOSCOPIC</th>
<th>OPEN</th>
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<tbody>
<tr>
<td><strong>Small incision</strong></td>
<td>✓</td>
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<tr>
<td><strong>Less pain</strong></td>
<td>✓</td>
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<tr>
<td><strong>Less morbidity</strong></td>
<td>✓</td>
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<tr>
<td><strong>Accuracy</strong></td>
<td>✓</td>
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<tr>
<td><strong>Early function</strong></td>
<td>✓</td>
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<tr>
<td><strong>Cosmesis</strong></td>
<td>✓</td>
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ARTHROSCOPY KNEE

- Commonest surgery performed in UK
- Treatment – Ligamentous and soft tissue injury of knee
- > precise and accurate than open method
- Less morbidity and early rehab
Meniscus Anatomy

- Fibrocartilagenous structure
- Medial meniscus covers greater than half of the weight bearing articular surface of the medial tibial plateau
- Lateral meniscus covers greater than three fourths
- Both firmly anchored to the tibial surface both anteriorly and posteriorly
Blood Supply

- 30% medial meniscus vascularized
- 10-25% lateral meniscus vascularized
- Commonly referred to as zones:
  - Red zone
  - Red/white zone
  - White zone
Physiology

Secondary restraint for knee stability

Share load bearing

? Proprioceptive function

Increases the articular contact area

– Lowers the load/unit area

– Circumferential fiber orientation increases ability to support hoop stresses

– Menisci transmit 30-55% of the load across the joint in the standing position

– After menisectomy contact stress may increase by 235%
Diagnosis

- History of twisting injury
- +/- ligamentous injury
- Effusion
- Mechanical Sx’s
- Joint line tenderness
- Provocative tests
Clinical tests

- McMurray’s test
- Appley’s test
MRI Advantages

• Noninvasive
• Low risk
• Diagnostic potential
  – Subchondral bone lesions
  – Osteonecrosis
  – Articular cartilage injury
  – Nondisplaced fractures
  – Tumors
  – Extra-articular lesions
Meniscus

Normal anatomy

• The normal meniscus shows uniform, low signal intensity (Black)
• Peripherally the meniscus have a bow-tie configuration
• Centrally, the normal meniscus is composed of 2 separate triangular structures, the anterior horn and the posterior horn. The apices (free edges or inner margins) appear as sharp points of the triangle facing each other.
MRI criteria for meniscal tears

- Two MRI criteria have been established for diagnosing meniscal tears.

Criteria 1
- Criteria 1 is increased internal signal intensity in the meniscus
- The abnormal signal intensity must be in contact with one articular surface, either the superior or interior surface or at the tip (free edge) of the meniscus

Criteria 2
- Criterion 2 is an abnormal meniscal shape
Types of Meniscal Tear

Three basic meniscal tear

• Longitudinal
• Radial
• Horizontal
Longitudinal Tears

- Longitudinal tears separate the meniscus into inner and outer fragments and occur parallel to the outer margin of the meniscus. They are perpendicular to the tibial plateau and propagate parallel to the circumferential axis of the meniscus.
Radial tears (Transverse Tears)

- These are vertical tear and propagate perpendicular to the main axis of the meniscus.
Horizontal tear

• These tears are also called cleavage or fish-mouth tears
• They divide the meniscal tear into a top (superior) portion and a bottom (inferior) portion
• Most are degenerative, occurring in older patients with...
Bucket-Handle Tears

- These tears are displaced vertical longitudinal tears and usually involve the MM.
- The separated central (inner) fragment, when viewed axially, resembles the handle of a bucket. The remaining larger peripheral portion of the meniscus resembles the bucket.
- Typical locations of the displaced fragment include the intercondylar notch anterior and parallel to the PCL (double PCL sign).
Management

Conservative

Surgical (Arthroscopic)

• Partial Menisectomy
• Meniscal Repair
• Meniscal Tansplantation
Menisectomy

- Unstable part removed
- Meniscal Balancing

Problem

- Early Arthritis
Menisectomy

- En-bloc excision
- Piecemeal resection
Menisectomy
Indications for Repair

• Recommended for longitudinal tears in the peripheral 10-30%
• Tears which displace more than 3 mm
• Tears which may be left to heal:
  – Peripheral tears < 10mm
  – Small radial tears < 3 mm
  – (fenestration, rasping, or debridement of free edges may expedite healing)
Meniscal Repair Technique

• 3 basic techniques for repair
  – Inside out
  – Outside in
  – All inside
  (Saphenous and peroneal nerves always a concern)
Inside Out Technique

- Suture passed through cannulas
- Needle accepted outside via a posteromedial or posterolateral incision
Inside-Out Repair
Outside in Technique

- Suture passed from outside through straight or curved needle
- Knot is created once suture passed across the tear
All Inside Suture Repair

Anatomical location

- Posterolateral- Common Per. N
- Posteromedial- Sapheous N. & V
Meniscal Repair
Meniscal Repair
Meniscal repair
Meniscal Repair
Allograft Transplantation

- Ideal candidate
  - Young
  - Active
  - Pain over previously menisectomized compartment
  - Normal knee alignment
  - Minimal to no damage to articular cartilage
In Summary

• Meniscal Tissue essential to joint preservation
• Meniscus serves secondary roles in knee joint function
• Repairable tears are rare but indications should expand in younger patients
• Meniscal replacement strategies still highly experimental
Loose bodies

- Free loose bodies - single or multiple
- Fixed loose bodies
- Presentation -
  - Intermittent catching & Pain
  - Recurrent effusion
  - Limitation of motion
  - Feeling of instability
Loose Bodies

Causes-
- Degenerative chondral/osteophytes
- Osteochondral fragment-traumatic
- Meniscal fragment
- Fibrosed synovial villi
- Broken implants/instruments
- Bone cement residue

Diagnosis
- Clinical
- X-rays if calcified or metal
- MRI
Loose bodies

Management

• Diagnostic arthroscopy
• commonly located in supra-patellar pouch, ant. Intercondylar area, posteromedial & posterolateral recess, Gutters, beneath meniscus
• Reduce inflow to decrease turbulence
• Percutaneously fix with needles
• Make appropriate portal
• Remove under vision
Loose Bodies
Loose Body
Loose Body
Foreign body removal

- 28 yr old
- TBW patella -3 yrs back
- C/O locking & instability episodes
Foreign body removal
Foreign Body Removal
Foreign Body Removal
Foreign Body Removal
Post-op
Synovium

- Synovium is a sensitive indicator of joint

- **Causes of Synovitis**
  - Primary synovitis - RA, Gout, PVNS
  - Reactive synovitis - Chondral or Meniscal lesion
  - Traumatic synovial lesions
  - Infection
Synovitis

Management

- Reducing irritation: NSAIDs, I/A cortisone
- Treating cause:
  - Meniscal lesions
  - Cartilage lesions
  - Instability
  - Loose bodies
  - I/A foreign bodies
Synovitis

Arthroscopic procedures-
  - Synovial biopsy
  - Partial synovectomy
  - Complete synovectomy

- Accessory Portals for Synovectomy
- Be careful with aggressive Shavers
- Hemarthrosis after surgery
Synovium
Synovium
Synovium (PVNS)
Synovial Plica

Three large synovial plica in the knee

- medial patellar plica
- supra-patellar plica
- infra-patellar plica

Medial patellar plica has greatest significance
Synovial Plica

Presenting features

- Chronic pain
- Occasional snapping
- Tenderness on anteromedial capsule
- D/D- Meniscus tear

Treatment – Plica resection
Synovial Plica
Synovial Plica
To summarise

Arthroscopy is a valuable tool for management of intra-articular problems of knee

• Minimal post-op scar
• Decreased post-op morbidity
• Short stay & early return to activity
• Minimal complication
• Reduced cost
THANK YOU
Thank you
Conclusions

• Lateral meniscus does move more than medial
• Anterior horns move more to accommodate the cam shaped femoral condyles during flexion preventing anterior tibial translation
• Act as “wheel blocks” against the posterior femoral condyles.
Role as a Stabilizer

• Medial meniscus stabilizes against anterior translation of the tibia (particularly in ACL Deficient knee)

• Medial meniscus thus subject to greater shear forces in ACL deficient knee

• Lateral meniscus more mobile and less likely to experience shear forces
Apley Test

- Patient prone
- Knee flexed 90 degrees
- Compression / distraction/rotation
- Pain with compression suggestive of meniscal pathology
- Pain with distraction suggestive of ligamentous injury
Mc Murray Test

- 58% true positives
- 5% false positives
- Forced tibial rotation with flexion and varus/valgus stress

**Results**
- Negative
- Joint line pain
- Both pain and clunk (Painless clunk not truly “positive”)
MRI grading system for Meniscal Degeneration

Grade I
- Grade I is a nonarticular, focal or diffuse region of increased signal intensity within the substance of the meniscus.

Grade 2
- Grade 2 is a horizontal, linear area of increased signal intensity within the substance of the meniscus that extends to but does not involve the articular surface.

Patients are usually asymptomatic.
Meniscal Degeneration

Grade 3

- Is a region of abnormal signal intensity within the meniscus extending to and communicating with at least 1 articular surface of the meniscus

Clinically Significant
Tears

- Complete longitudinal
- Bucal bundle
- Displaced bucal bundle
- Partial tear
- Flap
- Transposed flap
- Hood
- Double flap
- Incomplete longitudinal
Locked Bucket Handle Tear
Meniscal Repair
Vertocal Suture Superior to Horizontal Biomechanically
Fast- Fix Versus Inside- Out Suture Meniscal Repair in the Goat Model

Steven J. Hospodar, MD1, Matthew R. Schritiz, MD1, S. raymond Golish, MD, PhD2, Craig R. Ruder, MD1, Mark D. Milter, MD2 (AJSM, October 2008)

- **Conclusion:** The Fast- Fix meniscal repair had inferior meniscal healing results in this animal model. Previous studies using this animal model have paralleled clinical outcomes. Implantation of the Fast- Fix device does not damage adjacent femoral or tibial cartilage. The deployment of the Fast- fix implant was simple and reproducible. There was no inflammatory reaction to the Fast- Fix implant.
Effect on Tissue Differentiation and Articular Cartilage Degradation of a Polymer Meniscus Implant A 2-year Follow–up study in Dogs

Roy T.CMD (AJSM, October 2008)

- **Conclusion**: A final remodeling of tissue into neomeniscus tissue could not take place since the original structure of the polymer was still present after 24 months. The implant did not prevent cartilage degradation. Several factors are discussed that may be responsible for this.
Arthroscopic Repair of Isolated Meniscal Tear in Patients 18 years and Younger

- 44 Patients
  - 80% simple tears healed
  - 88% displaced bucket handle
  - 13% complex tears

- Predominantly inside out technique
- Rim width > 3 mm associated with failure
Meniscal Rasing Arthroscopy 1999

- Induced lonitudinal tears in the avascular zone of rabbit menisci
- Treated with meniscal rasping
- 2-4 weeks later hypertrophic synovum invaded tear
- 8-16 weeks tear completely healed with a significant increase in tensile strength and stiffness over a control meniscus
Arrow Repair

• Biodegradable arrows used
• Tensile strength approximately $\frac{1}{2}$ that of vertical suture
• Number of complications reported
  – Loose body
  – Cystic hematoma formation
  – Osteochondral lesion
  – Incomplete healing
Fibrin Clot

- Posterolateral tears of the lateral meniscus (anterior to popliteus fossa)
- 1-2 ml of exogenous fibrin clot used to fill tear after repaired with suture (outside in)
- 5 cases reported in Arthroscopy 1998 all five healed (follow up with MRI, average of 71 months)
MIS IS HOT

GEN SURGERY - Lap chole, Lap Hernia