Management of Degenerative Meniscal Tears

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APAC Clinical & Education Manager – OA & IS

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OVERVIEW

• Anatomy
• Function of the meniscus
• Meniscal injuries
• Risk factors, symptoms, treatment
• Changing trends in management/treatment
• Clinical Evidence
• Brace options
KNEE ANATOMY

• Key structures of the knee
  - Cartilage
    • Menisci (fibrocartilage)
    • Articular (hyaline cartilage)

MENISCAL INJURY

• Injury of the menisci is one of the most prevalent injuries in the human body (medial>lateral)
• Its investigation and treatment includes surgical techniques that are among the most commonly performed orthopaedic procedures worldwide.  
• Menisci are c-shaped fibro-cartilage discs
• Often meniscal injuries are described as “torn cartilage”

• Acute/Traumatic meniscal tears – younger population
• Degenerative/non-traumatic meniscal tears – middle age/older population

• Degenerative meniscal tears are the most common aetiology for knee pain, swelling and loss of function
The menisci have several functions:

- Shock absorber within the knee
- Provide nutrition for articular cartilage
- Reduce friction during movement
- Increase stability & joint congruency – wedge analogy
- Limit extreme flexion and extension
- Proprioceptive function
The menisci have several functions:

- Disperse load and reduce peak pressure
- Convert axial load into circumferential stress
- Menisci bear 40 to 50% of the total load transmitted across joint in extension
- 85% of the compressive load is transmitted through the menisci at 90 deg of flexion
ANATOMY
**ZONES OF THE MENISCUS**

- Tears at the outer edge (red-red zone) tend to heal well because there is a good blood supply.
- The inner area (white-white zone) lacks a good blood supply and therefore does not heal well.
- The red-white zone is the transition zone from vascular to avascular zones.
CLINICAL TESTS

McMurray's Test
Palpable click and joint line pain indicate meniscal tear
Knee extended
External rotation

The Apley Test
Axial compression applied
Tibia rotated on femur
Click or pain indicates meniscal tear
Tibia rotated internally and externally
Tension relieved by pulling up on knee

Thessaly Test
Examiner supports the patient by holding their outstretched hands.
With the knee flexed 30°, patient pivots on knee, internally and externally rotating 3 times.
CLINICAL SYMPTOMS OF A MENISCAL TEAR

Symptoms of Meniscal tears include:

• Pain – can be severe (especially when twisting or rotating)
• Joint line tenderness (77-86% of patients with a meniscal tear)
• Effusion (~50% of patients presenting with a meniscal tear)
• Joint instability (loss of wedge effect)
• Difficulty in straightening knee fully
• Difficulty on deep knee bending
• Locking of the knee in partial flexion
• Popping sensation
MENISCAL TEARS / LESIONS CLASSIFICATION

Acute/Traumatic

- Longitudinal
- Bucket-handle
- Horizontal
- Radial
- Oblique
- Complex

Degenerative
ACUTE MENISCAL TEARS

• Risk Factors:
  - Sports
  - ACL Injury
    - Acute
    - Time between ACL injury and reconstruction >12 month
  - Systemic joint laxity
  - Peak age 20-29 years

• Incidence:
  - 6:1000
  - 50% of knee injuries that require surgery

ACUTE MENISCAL TEAR - TREATMENT

- Treatment will depend on location/zone and type of tear = vascularity and healing potential
- Repair preferred if type, location and vascularity allow
  - “Save the Meniscus”
- Repairs usually require reduced WB (+/- ROM control)
  - Axial load is converted into circumferential stress
  - Weight bearing control is vital as the structural continuity of the fibres has been compromised

Partial Meniscectomy

Meniscal Repair

Meniscal Transplantation
# REHABILITATION AFTER MENISCAL REPAIR (EXAMPLE)

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase I (Week 0-6)</th>
<th>Phase II (Week 7-14)</th>
<th>Phase III Week 15-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>Protect and allow maximal healing</td>
<td>Improve muscle strength to level of daily activities</td>
<td>Optimizing functional capability- prepare to go back to sports</td>
</tr>
<tr>
<td>WB</td>
<td>NWB → PWB → FWB * Except radial and complex tears</td>
<td>FWB</td>
<td>FWB</td>
</tr>
<tr>
<td>ROM</td>
<td>0-0, 0-60 or 0-90 - physio</td>
<td>free</td>
<td>free</td>
</tr>
<tr>
<td>Brace</td>
<td>Protection &amp; ROM Limitation (d&amp;n)</td>
<td>Protection while exercise levels are increasing (day)</td>
<td>Protection while training</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>RICE, regain quadriceps control,</td>
<td>Restore full ROM and normal gait</td>
<td>Sports-specific exercises, neuromuscular control</td>
</tr>
</tbody>
</table>

Adapted from Cavanaugh et al. (2012)
ACUTE TEARS - BRACING OPTIONS

• Meniscal Repair:
  - Protect repaired meniscus from axial load
  - +/-ROM
  - Protected weight bearing
  - Protect during activities

• Rebound Cartilage (ROM control and load reduction)

• Meniscectomy:
  - Maintain joint ROM and strength - physio
  - Modify load activities (protect/preserve joint)
  - Removal of meniscus increases load on articular cartilage

• Unloader One/Unloader Fit
DEGENERATIVE MENISCAL TEARS
MENISCAL TEARS / LESIONS
CLASSIFICATION

Acute/Traumatic

Degenerative

LONGITUDINAL
BUCKET-HANDLE
HORIZONTAL
RADIAL
OBLIQUE
COMPLEX
DEGENERATIVE MENISCAL TEARS

Definition:

- Complex tear pattern mainly in the posterior horn / mid-body following prolonged 'wear and tear'
- Degenerative tears are typically seen in middle aged or older people and often accompany knee osteoarthritis

- In isolation, degenerative meniscus is currently thought of as pre or early OA
- Pain occurs spontaneously or following trivial event
- Poor healing due to type and location of tear = white zone (avascular)
DEGENERATIVE MENISCAL TEARS

Prevalence:
- 35% prevalence of degenerative meniscal tears in people over 50 years
- 60% in people of 65 years

<table>
<thead>
<tr>
<th>FOCUS MARKETS</th>
<th>POPULATION</th>
<th>Degenerative Meniscal Tears*</th>
<th>Mild OA</th>
<th>Moderate OA</th>
<th>Severe OA</th>
<th>TKR</th>
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</thead>
<tbody>
<tr>
<td>EUROPE</td>
<td>180,810,746</td>
<td>9,453,243</td>
<td>2,477,107</td>
<td>2,242,053</td>
<td>1,790,026</td>
<td>295,181</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>24,420,661</td>
<td>1,014,807</td>
<td>334,563</td>
<td>302,816</td>
<td>241,765</td>
<td>43,957</td>
</tr>
<tr>
<td>TOTAL</td>
<td>560,522,872</td>
<td></td>
<td>9,971,680</td>
<td>9,025,463</td>
<td>7,205,813</td>
<td>1,120,257</td>
</tr>
</tbody>
</table>

= 637,379

- Note: these are total numbers rather than symptomatic numbers
# Degenerative Meniscal Tears

## Risk Factors:

<table>
<thead>
<tr>
<th>Condition/Risk Factor</th>
<th>OR (95% CI)</th>
</tr>
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<tbody>
<tr>
<td>Degenerative meniscal tears</td>
<td></td>
</tr>
<tr>
<td>Age (&gt;60 y compared to &lt;60 y)</td>
<td>2.32 (1.80, 3.01)</td>
</tr>
<tr>
<td>Gender (male compared to female)</td>
<td>2.98 (2.30, 3.85)</td>
</tr>
<tr>
<td>Work-related kneeling and squatting (&gt;1 h compared to &lt;1 h per d)</td>
<td>2.69 (1.64, 4.40)</td>
</tr>
<tr>
<td>Sitting (&gt;2 h compared to &lt;2 h per d)</td>
<td>0.68 (0.50, 0.92)</td>
</tr>
<tr>
<td>Driving (&gt;4 h compared to &lt;4 h per d)</td>
<td>1.37 (0.94, 1.98)</td>
</tr>
<tr>
<td>Standing or walking (&gt;2 h compared to &lt;2 h per d)</td>
<td></td>
</tr>
<tr>
<td>Walking (&gt;2 mi compared to &lt;2 mi per d)</td>
<td>1.65 (1.22, 2.24)</td>
</tr>
<tr>
<td>Stair climbing (&gt;30 flights compared to &lt;30 flights per d)</td>
<td>2.28 (1.56, 3.31)</td>
</tr>
<tr>
<td>Lifting or carrying &gt;10 kg (more than 10 times per wk)</td>
<td>1.89 (1.41, 2.55)</td>
</tr>
<tr>
<td>Lifting or carrying &gt;25 kg (more than 10 times per wk)</td>
<td>1.58 (1.15, 2.16)</td>
</tr>
</tbody>
</table>
DEGENERATIVE MENISCAL TEARS
SYMPTOMS

Non specific symptoms

• Initially:
  - Pain
  - Locking/pseudo locking (acute block to knee extension)
  - Catching sensation

• Ongoing
  - Pain
  - Swelling
  - Clicking
  - Popping
  - Instability

Severity of pain: VAS 4-6


Meniscus tears shown to result in decreased walking endurance and balance performance¹
DEGENERATIVE MENISCAL TEARS
TREATMENT

Conservative Treatment

- Pain relief
  - NSAID
  - Limit activities
  - Keep mobility- prevent stiffness
- Physio+ Exercise
  - Keep ROM
  - Strengthen muscles
  - Improve proprioception

Surgical Treatment

- Surgery:
  - Debridement of unstable meniscal tear
  - Removal of loose bodies
  - ~700,000 procedures/year in US
- Rehabilitation:
  - bicycling, resisted quadriceps exercises, and squats

Reduce Pain – Improve Function

3 - 6 MONTHS
DEGENERATIVE MENISCAL TEARS
CONSERVATIVE TREATMENT

• Treatment overview

1. Pain relief

2. Preserve / improve ROM
   • Back to ADL

3. Strengthening of muscles
   • Prevent OA onset / progression

• NSAIDs / Analgesics
• Cold Therapy
• Crutches

• NSAIDs / Analgesics
• Cold Therapy
• Physiotherapy / Exercise

• Physiotherapy
• Exercise
DEGENERATIVE MENISCAL TEARS
SURGICAL TREATMENT

1. Pain relief
   - NSAIDs / Analgesics
   - Cold Therapy
   - Crutches

2. Surgery
   - Removal of loose bodies
   - Partial meniscectomy
   - Meniscal repair (if possible)

3. Rehabilitation
   - Physiotherapy
   - Exercise

Partial Meniscectomy

Meniscal Repair
DEGENERATIVE MENISCAL TEARS - TREATMENT

Conservative

Osteoarthritis and Cartilage

Increased risk for knee replacement surgery after arthroscopic surgery for degenerative meniscal tears: a multi-center longitudinal observational study using data from the osteoarthritis initiative

Arthroscopy

The role for arthroscopic partial meniscectomy in knees with degenerative changes
A SYSTEMATIC REVIEW

J. D. Lempert, R. H. Brophy

Patients with osteoarthritis of the knee commonly have degenerative meniscal tears. Arthroscopic meniscectomy is frequently performed, although the benefits are debatable.
MENISCECTOMY – 1949 FINDING

Fairbank T.J. JBJS 1949

KNEE JOINT CHANGES AFTER MENISCECTOMY

SUMMARY AND CONCLUSION

Changes in the knee joint after meniscectomy include ridge formation, narrowing of the joint space, and flattening of the femoral condyle. Investigations suggest that these changes are due to loss of the weight-bearing function of the meniscus. Meniscectomy is not wholly innocuous; it interferes, at least temporarily, with the mechanics of the joint. It seems likely that narrowing of the joint space will predispose to early degenerative changes, but a connection between these appearances and later osteoarthritis is not yet established and is too indefinite to justify clinical deductions.
In conclusion, the results of this randomized, sham-controlled trial show that arthroscopic partial medial meniscectomy provides no significant benefit over sham surgery in patients with a degenerative meniscal tear and no knee osteoarthritis. These results argue against the current practice of performing arthroscopic partial meniscectomy in patients with a degenerative meniscal tear.
The American Journal of Sports Medicine

The Urgent Need for Evidence in Arthroscopic Meniscal Surgery: A Systematic Review of the Evidence for Operative Management of Meniscal Tears
Paul Monk, Patrick Garfjeld Roberts, Antony J.R. Palmer, Lee Bayliss, Reza Mafi, David Beard, Sally Hopewell and Andrew Price
Am J Sports Med published online July 18, 2016

Results: ... No difference was found between arthroscopic meniscal debridement compared with nonoperative management as a first-line treatment strategy for patients with knee pain and a degenerative meniscal tear. Some evidence was found to indicate that patients with resistant mechanical symptoms who initially fail non-operative management may benefit from meniscal debridement
PARTIAL MENISCECTOMY - TREATMENT OUTCOMES

• What else does the evidence suggest?
  - A randomized trial showed that arthroscopic partial meniscectomy combined with physical therapy provides no better relief of symptoms than physical therapy alone in patients with a meniscal tear and knee osteoarthritis\(^1\)
  - Partial meniscectomy is associated with increased risk of incidental radiographic osteoarthritis and worsening cartilage damage in the following year\(^2\)
  - In patients with knee osteoarthritis, arthroscopic knee surgery with meniscectomy is associated with a three fold increase in the risk for future knee replacement surgery\(^3\)
  - Partial meniscectomy patients had a significant loss of knee joint position sense/proprioception at knee flexion angles of 60 and 75°. \(^4\)
  - Patients with symptomatic meniscal tears and degenerative changes in the knee can benefit from arthroscopic meniscectomy, particularly if the osteoarthritis is mild\(^5\)

\(^2\) Roemer FW, Kwoh CK, Hannon MJ, Hunter DJ, Eckstein F, Grago J, Boudreau RM, Englund M, Guermazi A. Partial meniscectomy is associated with increased risk of incident radiographic osteoarthritis and worsening cartilage damage in the following yearEur Radiol. 2016 Apr 27. [Epub ahead of print]
\(^5\) Lamplot JD and Bropy RH The role for arthroscopic partial meniscectomy in knees with degenerative changes — a systematic review THE BONE & JOINT JOURNAL VOL. 98-B, No. 7, JULY 2016
Conservative treatment preferred with degenerative meniscal tears
Knee Arthroscopy statement from the Britsh Orthopaedic Association

BOA/BASK response to media reports regarding knee arthroscopy

- A knee with no arthritis and an acute meniscus tear causing pain for more than six weeks (often without locking or giving way) will not settle with watchful waiting, pain killers, exercise or physiotherapy. It would be correct to offer knee arthroscopy to this group of patients regardless of their age.

- Patients with advanced bone on bone arthritis should not generally be treated with arthroscopy. They need conservative treatment and when that is no longer efficacious, joint replacement is often appropriately advised.

- The grey area is the patient with some degree of arthritis but with acute on chronic pain and evidence of mechanical symptoms due to a meniscus tear. The decision on whether to operate in that circumstance is a finely balanced clinical decision. Some patients benefit and some do not.

The patient may well not be in severe enough pain for a joint replacement so apart from a steroid injection, weight loss, analgesics and modification of lifestyle (again primary care interventions), a knee arthroscopy would be the next step.

Any operation, including arthroscopy, is not without a degree of risk and it should not be recommended lightly. Informed consent, discussing risks and benefits, always need to be discussed with the patient and the decision to do a knee arthroscopy is a joint process.
• **Position Statement from the Australian Knee Society on Arthroscopic Surgery of the Knee, including reference to the presence of Osteoarthritis or Degenerative Joint Disease** – October 2016

• Arthroscopic debridement, and / or lavage, has been shown to have no beneficial effect on the natural history of osteoarthritis, nor is it indicated as a primary treatment in the management of osteoarthritis. However, this does not preclude the judicious use of arthroscopic surgery, when indicated, to manage symptomatic coexisting pathology, in the presence of osteoarthritis or degeneration. *Partial medial menisectomy is not indicated as an initial treatment for atraumatic tears of degenerative menisci*, excluding bucket handle tears and surgeon assessed locked or locking knees.

**PDF Document**

DEGENERATIVE MENISCAL TEARS
CONSERVATIVE TREATMENT

• Treatment overview

1. Pain relief
   - NSAIDs / Analgesics
   - Cold Therapy
   - Crutches

2. Preserve / improve ROM
   - NSAIDs / Analgesics
   - Cold Therapy
   - Physiotherapy / Exercise
   - Back to ADL

3. Strengthening of muscles
   - Physiotherapy
   - Exercise
   - Prevent OA onset / progression
Össur's Unloader Braces

3-points of Leverage
DFS Straps & Thigh/Calf shells
Active unloading and even distribution of forces resulting in reduced pain
Objective:
- Evaluating the effects of an unloading brace on patients with degenerative meniscal tears with regards to function and pain

Method:
- Uncontrolled prospective trial with 14 subjects presenting with degenerative meniscus tear, confirmed by MRI
- Assessment at baseline prior to brace fitting and after 1 month, and 2 months of brace use via electronically administered questionnaires consisting of WOMET (Western Ontario Meniscal Evaluation Tool) questionnaire, and VAS pain scales
- VAS pain was measured at rest and before and after performing set activities (walking, stair climbing, and one-legged sitting) with and without the brace.

Inclusion criteria:
- Age: 35 – 65 years
- Medial joint line pain, pain that can be provoked by palpation or compression of the joint line or positive McMurray, and a degenerative tear of medial meniscus identified on a clinically indicated MRI within 3 months prior to enrolment

Exclusion criteria:
- Radiological K&L grade II osteoarthritis or greater
- Symptoms of knee OA as clinically defined by the American College of Rheumatology (ACR)
- Trauma induced onset of symptoms, previous or concomitant ligament injuries to the knee, locking or painful snapping of knee, MRI signs of pathology requiring surgery, the decision to have surgery for the tear within 6 months of enrolment, and other health conditions, body size or diseases that preclude the patient from applying the brace or moving around with it.
DEGENERATIVE MENISCUS – IMPROVED QOL - WOMET

From inhouse study: Individuals with radiographically diagnosed degenerative meniscus

- WOMET (Western Ontario Meniscal Evaluation Tool) is a meniscus injury specific questionnaire measuring Health related Quality of Life.

- The total WOMET improved with a mean of 22 percentage point (MCID 15)

  = confirmed improvement of Quality of Life

*The total WOMET score has been converted to a percentage where 100% represents a healthy joint with no problems and 0 worst imaginable symptoms.
• The VAS pain score measurement at rest reached statistically significant change from baseline to 2 months (p<0.001) with a mean reduction of 14.56.

= confirmed pain reduction

**A VAS Pain score of 100 is “the worst imaginable pain” and 0 is “no pain”.

From inhouse study: Individuals with radiographically diagnosed degenerative meniscus

VAS score was measured on a scale ranging from 0 to 100. 0 indicates no pain and 100 worst imaginable pain.
UNLOADER FIT
EFFECTIVE SOLUTION FOR DEGENERATIVE MENISCAL TEARS

• Source: Össur HF – data on file

= confirmed improvement of Quality of Life

= confirmed pain reduction

• The Unloader Fit is an effective treatment option for patients with degenerative meniscus tears without locking/blocking.
MENISCAL INJURY

• Loss of meniscus (following degeneration or meniscectomy) results in:
  - Loss of shock absorbency
  - Increased coefficient of joint friction
  - Reduced joint stability
  - Disrupted joint homeostasis

• Above are all contributing factors to degenerative joint disease/OA
Össur's Unloader braces (Unloader One/Unloader Fit) are indicated for:

- Degenerative Meniscus
  - And/Or

- Mild to Severe unicompartmental knee OA
  - Unloader Fit (Mild-Moderate)
  - Unloader One (Mild to Severe)
RADIOGRAPHIC GRADING OF OA  
(Kellgren & Lawrence 1957)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Narrowing of Joint Space</th>
<th>Osteophytes</th>
<th>Sclerosisis</th>
<th>Deformation of Joint Contour</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Doubtful</td>
<td>Possible</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Possible</td>
<td>Definite</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Definite</td>
<td>Moderate/Multiple</td>
<td>Present</td>
<td>Possible</td>
</tr>
<tr>
<td>4</td>
<td>Marked</td>
<td>Large</td>
<td>Severe</td>
<td>Definite</td>
</tr>
</tbody>
</table>
Meta analysis; Pollo FE et al; J of AAOS, 14:5-11, 2006.
Validates the Unloader brace design & reveals that knee bracing for OA effectively relieves pain and improves function.

Adjustable valgus bracing (Unloader) reduced pain and improved function in patients with medial OA.

Valgus bracing with Unloader and neutral position foot orthoses, significantly reduces pain and improves lower extremity biomechanics in patients with varus knee OA.
Patients with varus OA experience a decrease in pain and improvement in disease specific quality of life with the use of an Unloader brace.

Valgus bracing (Unloader) reduces pain and improves function in patients with medial OA.
Can be a useful treatment modality to delay surgery

CLINICAL EVIDENCE – OA

• Briggs 2012

Improvement in Quality of Life with Use of an Unloader Knee Brace in Active Patients with OA: A Prospective Cohort Study

Karen K. Briggs, M.P.H., M.B.A.² Lauren M. Matheny, B.A.² J. Richard Steadman, M.D.¹

1 The Steadman Clinic, Steadman Philippon Research Institute, Vail, Colorado
2 Clinical Research Department, Steadman Philippon Research Institute, Vail, Colorado

J Knee Surg

• Patients had significant improvement in quality of life (SF-12) (p < 0.05).
• Patients saw improvement in SF-12 physical component
• There was significant improvement in pain, stiffness, and function (WOMAC) (p < 0.05).
• Patients demonstrated a significant decrease in pain and disability.
MENISCAL TEARS - TREATMENT SUMMARY

• Treatment of degenerative meniscal tears can be approached conservatively or surgically
  - Current data suggest that the majority of the patients can be successfully treated without surgery
  - Patients who show mechanical symptoms (blocking/locking) of the knee shall be considered for surgical treatment (mensicectomy)

• Using Ossur’s Unloader braces to support rehabilitation of degenerative meniscal tears:
  - Reduces pain and improves QoL (conservative - 2016 Ossur study)
  - Prevent/slow OA onset/progression (conservative or surgical) by offsetting associated increases in peak pressures (i.e. Unloading affected compartment)

• Ossur’s Unloader One and Unloader Fit are also clinically proven for the conservative management of uni-compartmental knee OA (for which meniscal injuries are a pre-cursor)
CONTACT DETAILS

• Contact your local Ossur staff member to find out more and arrange a product demonstration
• If you have any additional questions:
• Chris Wallis - cwallis@ossur.com
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