WHEN THE MENISCUS IS GONE TO THE DOGS... WHAT OPTIONS REMAIN?

Stabilizing role of the meniscus

F ALMQVIST
P VERDONK
R VERDONK

Dept. of Orthopaedic Surgery and Traumatology, Ghent University Hospital

THE KNEE IN THE NUDE

MENISCAL REMOVAL

Tibio-femoral contact pressure maps in vitro

PAIN AFTER MECTOMY

<table>
<thead>
<tr>
<th></th>
<th>MM</th>
<th>ML</th>
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<tbody>
<tr>
<td>Repair</td>
<td>22%</td>
<td>14%</td>
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<tr>
<td>SFA 2003</td>
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</tr>
<tr>
<td>Meniscectomy</td>
<td>40%</td>
<td>52%</td>
</tr>
<tr>
<td>SFA 1996</td>
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</tbody>
</table>

Joint narrowing after menectomy

Modification: 11%

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<tr>
<th></th>
<th>MM</th>
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<tbody>
<tr>
<td>Repair</td>
<td>17%</td>
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OA (10 years)

Meniscus preservation 4 -10 %
Efficient ACL reconstruction Dejour, Lerat, Pierrard
Meniscectomy 45 %

Osteoarthritis following Meniscectomy on stable knee : 20 % MM (NEYRET), 24 % MM / 40 % ML (SPA)

Meniscus lesions

- After resection
  - decreased capacity to distribute load
  - higher peak stress on cartilage
  - cartilage degeneration

• APPROX 4% CARTILAGE VOLUME LOSS PER YEAR¹
• MORE LOSS LATERAL THAN MEDIAL²

¹ Cicuttini FM, Brennan P, 2002 May 29(NC) 1934-5

GAIT ANALYSIS

IF WE ARE MISSING IT

CAN WE EVER GET BACK THE ORIGINAL?
Men TX OR Men Implant
A DIFFERENT APPROACH?

TREATMENT POSSIBILITIES AFTER IRREPARABLE MENISCAL INJURIES

Meniscal IMPLANT

Indication
- Younger patient
- Previous partial meniscectomy
- Moderate to severe postmeniscectomy pain
- Cartilage status ideally limited degeneration
- Not old enough to be considered for TKA
- Good alignment → corrective osteotomy
- Stable joint → ligament repair

The ultimate goal is to
1. Prevent cartilage degeneration
2. Relieve pain
3. Improve function
by a meniscus substitute

Collagen Meniscus Implant: MRI results after 4 to 7 years follow-up
Joan C. Monllau MD, PhD

Meniscal substitution
- Partial defects
- Horns & rim
- CMI
- Complete defects
- No meniscus rim
- MTx
European Multicentric Trial 1997

Purpose

- To demonstrate safety and efficacy of the CMI in a wide range of population

Methods

Patients demographics

- September 97 to October 2000
- 25 patients
- ranging from 18 to 48 years of age
- met inclusion criteria
  - medial meniscectomy (acute or chronic)
  - partial defect (horns and rim intact)
  - ACL stable (or stabilized)
  - well aligned knee

Pain VAS (10 point scale)

<table>
<thead>
<tr>
<th>Mean ± SD</th>
<th>Range</th>
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<tbody>
<tr>
<td>Preop. 7.0 ± 1.8</td>
<td>1 - 9</td>
</tr>
<tr>
<td>3 Months 2.9 ± 1.8</td>
<td>1 - 8</td>
</tr>
<tr>
<td>6 Months 2.2 ± 1.3</td>
<td>1 - 5</td>
</tr>
<tr>
<td>12 Months 2.0 ± 1.4</td>
<td>1 - 7</td>
</tr>
<tr>
<td>24 Months 2.0 ± 1.6</td>
<td>1 - 6</td>
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Significant improvement (p < 0.002)

Lysholm (100 point scale)

<table>
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<th>Mean ± SD</th>
<th>Range</th>
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<tbody>
<tr>
<td>Preop. 59.9 ± 15.8</td>
<td>30-90</td>
</tr>
<tr>
<td>3 Months 83.5 ± 11.5</td>
<td>60-98</td>
</tr>
<tr>
<td>6 Months 85.1 ± 7.8</td>
<td>74-100</td>
</tr>
<tr>
<td>12 Months 87.2 ± 12.3</td>
<td>52-100</td>
</tr>
<tr>
<td>24 Months 89.6 ± 6.3</td>
<td>78-100</td>
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Significant improvement (p < 0.001)

Patient 12013

Isolated CMI reconstruction

3 years FU
Actifit Medial and Lateral

Implanted and porosity Polyurethane

R Verth, J de Groot et al

The Orteq Solution

R Warren et al 2007

The Optimum Material

+ Optimized Design

Results in:

A NEW VASCULARIZED AND FUNCTIONAL MENISCUS

R Warren et al 2007

Intact Partial Meniscectomy Orteq Scaffold Full Meniscectomy

TREATMENT POSSIBILITIES AFTER IRREPARABLE MENISCAL INJURIES

Meniscal TRANSPLANT

Indication

- Younger patient
- Previous total meniscectomy
- Moderate to severe postmeniscectomy pain
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Acellular graft Viable graft

TOTAL or SUBTOTAL meniscectomy?
Preservation techniques for meniscal allografts

- Lyophilisation
- Deep-freezing
- Cryopreservation
- cultured "VIAIBLE"

Viable meniscal allografts

- Allograft harvested < 24 h postmortem
- Culture medium: DMEM + antibiotics + L-Glut + 20 % acceptor serum
- In vitro culture for approx. 2 weeks
- Screening of donor for transmissible diseases

Meniscal replacements

- in Ghent University Hospital

TOTAL ALLOGRAFTS = 210

Surgical technique

- Open surgery
- MCL or LCL+Pop release by osteotomy of femoral side
- All inside sutures
- Fixation to meniscal rim and horns
- Additional tag for anterior horn

Meniscal allograft transplantation:
long-term clinical results with radiological and magnetic resonance imaging correlations

Patients

- Total number: 42 allografts
  - lateral meniscal transplants (LMT): 15 (LTFU: 1)
  - medial meniscal transplants (MMT): 27 (MMT-HTO: 16, MMT-HTO+HTO: 11, LTFU: 2)

Minimal FU: 10 years
Clinical outcome: KSS

Significantly improved at final follow-up

Clinical outcome: KOOS

However, substantial disability and reduced QoL

Mean values

Follow-up (years)

Cumulative Survival (%)

Survival MMT vs. LMT

Overall Survivorship

Survivorship after isolated medial allografts vs. medial allografts combined with HTO

Radiological outcome

Fairbank changes

narrowing (1) and/or osteophytes (1) and/or squaring (1); MAX 3

ICRS classification

0= no narrowing

1= <50%

2= >50%

3= obliteration of joint space

59%

Radiological outcome

OVERALL Fairbank

41% NO PROGRESSION

34% by 1 grade

22% by 2 grades

3% by 3 grades

59%

OVERALL Fairbank

28% NO PROGRESSION

32% by 1 grade

32% by 2 grades

6% by 3 grades
MRI outcome

- meniscus: Grade III stable
- articular cartilage: no progression

Discussion

- Based on KSS score
  - All groups still significantly improved 10 years down the line
  - MMT+HTO tend to do better
- Based on KOOS
  - Patients adapt their lifestyle to their knee: reduced QoL

General conclusion

- reduces pain and improves function
- satisfactory clinical outcome in 70% of patients at 10 years (survival study)
- adaptation of lifestyle to the knee
  - chondroprotective potential
  - preservation techniques
  - no significant clinical difference
  - biological difference?