5th course of advanced surgery of the knee
Val d’Isère, 02-2014

Meniscal tears in children & young athletes.

Prof. Romain Seil, MD, PhD

Orthopaedic Surgery
Centre Hospitalier de Luxembourg

Sports Medicine Research Laboratory
Centre de Recherche Public – Santé, Luxembourg
The injured knee in the young athlete
- Magnitude -

<table>
<thead>
<tr>
<th>All injuries</th>
<th>4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletes (n)</td>
<td>≈ 241</td>
</tr>
<tr>
<td>Injuries (n)</td>
<td>1458</td>
</tr>
<tr>
<td>Injuries/athl./year</td>
<td>1,5</td>
</tr>
<tr>
<td>Knee (n)</td>
<td>311</td>
</tr>
<tr>
<td>% Knee</td>
<td>21%</td>
</tr>
<tr>
<td>Major - Knee (n)</td>
<td>81</td>
</tr>
<tr>
<td>% Major - Knee</td>
<td>6%</td>
</tr>
</tbody>
</table>

Malisoux L, 2012
Frisch A, 2012
Theisen D, 2013
The injured knee in the young athlete

• Incidence of severe knee injuries: 8,2%

• Incidence of ACL injuries: 0,8 %

• Incidence of ACL injuries in general population: 0,8 %

Diagnosis - acute

- Pain & blocking > 90%
- Elastic extension deficit

Bergerault F, 2006

- 1/3 ligamentous lesions (♂>♀)
- 1/3 patellar dislocations (♀>♂)
- 1/3 meniscus lesions

Luhmann SJ, 2003

Courtesy of: P. Gicquel, Strasbourg, France
Beware of false positives!

Grades 2+3
Grades 0+1

Abnormal MRI signal

Takeda Y, JBJS-B, 1998
Crues JW, Radiology, 1987
Epidemiology

- > 50 % sports injury
- 45 % combined with ACL tear
- 55 % isolated
- some congenital

- Vertical 83 %
- Horizontal 13 %
- Radial 3 %

Bonnard C, Chotel F, RCO 2007
Clinical situations

1. Association with ACL tears
   - instabilities (lateral)
   - meniscosynovial (medial)

2. Isolated lesions on stable knees:
   - bucket handle, flap
   - radial tears lateral meniscus
   - isolated root tears
   - meniscal ossicle
   - instabilities lateral meniscus
   - horizontal tears

3. Congenital abnormalities
1. Association with ACL tears & open physes

Referred for meniscus tear

- ♂ 11 y.,
- Football injury
- Extension deficit
1. Association with ACL tears & open physes
1. Association with ACL tears & open physes

**Primary:**
36 - 100 % of acute ACL tears
Lipscomb AB 1986; Bracq H 1996; Andrews M 1994

**Secondary:**
Medial meniscus
Within 1st year after injury
Millett PJ 2002
Henry J 2009
1. Association with ACL tears

Lateral meniscus

- ♂ 15 y. football
- closed physes
- ACL & lateral meniscus repair
1. Association with ACL tears

Medial meniscus

Posterior capsule

• ♂ 14 y. football
• open physis
• ACL & medial meniscus repair
Medial meniscus

Associated to 15 % of our ACL reconstructions!
Therapeutic challenge

Should they be operated systematically?

**SURGERY**
- Growth abnormalities

**NON-OP**
- Cartilage & meniscus lesions

Courtesy of C. Bonnard, Tours, France

MFC
- Menisco-synovial lesion

Post. horn
- MM
- ♂, 12 years
No international consensus on indication for surgery, expert-opinion level discussions

- Operate if dislocated bucket handle tear
- Push indications for repair
- Never do isolated repair without stabilization

(Exception: acute bucket handle & inflammation)
Meniscus tears in stable knees

- Frequently isolated (55 %)
- Related to increased physiologic laxity?
- Always try to repair!
Radial tear of lateral meniscus

• Usually isolated
• Functional complete meniscectomy
• Repair to restore stable rim
• 50% healing rate

♂ 15 y., football, stable knee

Van Trommel MF, Arthroscopy 1998
Yoo JC, Arthroscopy 2007
2. Instabilities of the lateral meniscus

- painful locking in flexion
- can mimic patellar subluxation
- MRI normal
- can resolve spontaneously

Simonian PT, Arthroscopy 1997
George M, Arthroscopy 2003
Garofalo R, KSSTA 2005
Instabilities of the lateral meniscus

- ♂ 15 y. football

2. Meniscal root tears - Meniscal ossicle

- Traumatic (minor)
- Isolated
- Combined with ACL agenesis or traumatic ACL tear

♀ 12 y, minor trauma, recurrent swelling, blocking
♀ 12 y, minor trauma, recurrent swelling, blocking
Horizontal tears

♂ 17 y., judo

Pujol N KSSTA 2012
3. Lateral discoid meniscus

Complete (70-80%)

Incomplete (10-25%)

Wrisberg type (< 10 %)


Lateral condyle
ACL
Complete discoid meniscus

- ♀ 12 y, ballet
- blocking, extension deficit, crepitations
3. Lateral discoid meniscus

- Peripheral instabilities 28-77 %
- More frequent within complete type

- Anterior 47-53 %
- Middle 11 %
- Posterior 39 %

Lateral condyle

Anterior segment Capsule

Good CR, 2007
♀ 5 y, extension deficit

Lateral discoid meniscus
3. Lateral discoid meniscus

1. Partial meniscectomy (saucerization)
   Beware: tight knees
   (avoid sectioning into popliteal space)

2. Stability testing

3. Repair of detached or unstable fragment

Good CR, 2007
Klingele KE, 2004
3. Congenital deformities

- Cord-like structure between ACL and meniscus
  - ♀ 5 y., painful blocking
  
  Laprell H, Arthroscopy 2007

- Circular meniscus & ACL agenesis
  - ♀ 14 y., recurrent swelling
Rehab: functional classification

Axial compression

CLASSICAL 90 %
Tears of the meniscal body
Radial tears

Non-classic 10 % Periphery
Meniscosynovial tears
Meniscal root tears

Weight bearing
6 weeks
No weight bearing

Weight bearing

6 weeks
• 1986 – 2008: 14 publications
• 309 lesions
  277 repairs
  32 abstentions / debridements

Repair results (level of evidence IV):

Retrospective series:
- Scott JBJS Am 1986
- Cannon AJSM 1992
- Mintzer AJSM 1998
- Bloome Arthroscopy 2000
- Noyes AJSM 2002
- Symposium SFA 2003
- Bergerault Ann Orthop Ouest 2004

Case reports:
- Graf Arthroscopy 1992
- Mizuta JBJS Br 1995
- Aichroth JBJS Br 2002
- Fuchs Arthroscopy 2002
- Millett Arthroscopy 2002
- Anderson JBJS Am 2003
- Vaquero CORR 2005
Meniscus preservation

79% clinical success @ 5 years

Meniscus preservation

74% of re-tears within 1st year

→ 1/3: re-repairs
→ 2/3: partial meniscectomies

Recommendations

- Avoid resections
- Repair: 75% success rate
- Do not miss ACL tear
- Stabilise knee
- Immobilize after repair
- Symptomatic discoid meniscus: saucerisation + repair
Key points & future evolution

- Some rare bucket handles still have to be resected → need for early diagnosis

- Repair of radial tears
- Stabilize discoid menisci

- More evidence needed on specific tears
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