Arthroscopic Assessment of meniscal injuries using an anatomical zone classification system

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CONFLICT OF INTEREST

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INTRODUCTION

- The ideal suture technique for the meniscus depends on the location of the lesion, as well as anatomical and vascular characteristics.

- Accurate classification of the tear pattern, which is often done according to location based on blood supply (red-red zone, red-white zone and white-white zone), direction and type of meniscal injury (flap, radial tear, horizontal, longitudinal oblique or complex and degenerative) can guide the clinician in surgical planning.
INTRODUCTION

The anatomical classification proposed by Smigielski et al. distinguishes the medial and lateral menisci in anatomical zones according to their adjacent structures. Implementation of this classification system is also thought to increase understanding of meniscal injuries and can assist surgeons in selecting the most appropriate treatment.
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PURPOSE

✓ Evaluate the inter- and intra-observer reproducibility of the arthroscopic meniscus tear classification system (proposed by Smigielski) in patients treated with meniscal suture.

✓ To correlate these anatomical zones, according to the injury characteristics and the suture technique employed.
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MATERIAL AND METHODS

- 66 meniscal sutures (34 medial meniscus; 32 lateral meniscus).
- Inside-out, all-inside, outside-in suture techniques evaluated.
- Patient charts and arthroscopic recordings were analyzed and evaluated by three board-certified orthopedic surgeons with more than ten years of experience.
- Each surgeon completed the analysis twice, with a 3-month interval between evaluations.
- Data on demographics, time period from injury to surgery, and presence or absence of anterior cruciate ligament (ACL) with meniscus injury were recorded.
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MATERIAL AND METHODS

Smigielski classification - Medial Meniscus

- Zone 1 (the anterior root),
- Zones 2a and b (anterolateral zone - before and after transverse ligament)
- Zone 3 (the tibial collateral ligament-medial zone),
- Zone 4 (the posterior zone)
- Zone 5 (the posterior root)
MATERIAL AND METHODS

Smigielski classification - Lateral Meniscus

- Zone 1 (of the anterior root)
- Zones 2a and b (anteromedial zone)
- Zone 3 (popliteal hiatus zone)
- Zones 4 and 5 (the posterior zone)
- Zone 6 (of the posterior root)
RESULTS

**Meniscal zone**

Schematic image showing the medial meniscus (MM) and lateral meniscus (ML) zones. In regards to the MM, zone 3 attaches to the tibial collateral ligament (TCL). In regards to the LM, the transverse ligament (TL) delineates zone 2 into two sub-zones: 2a and 2b; zone 3 attaches to the popliteal tendon (PoT);. The percentages represent the meniscal injuries described in the present study.
### RESULTS

**Intra and Inter-observer correlation**

<table>
<thead>
<tr>
<th>EXAMINERS</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td><strong>Intra-observer Kappa</strong></td>
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<td><strong>Inter-observer Kappa</strong></td>
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<tr>
<td>LM</td>
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</table>

Kappa values for inter- and intra-observer agreement in the assessment of MM and LM ranged from substantial to almost perfect agreement.
**RESULTS**

*Type of injury by meniscal zone*

**MM injuries**
- Longitudinal (82%) and occurred primarily in zones 3 (42%) and 4 (42%).
- Radial tears were predominant in zone 4 (40%).
- Horizontal tears were predominant in zones 3 (50%) and 4 (50%).
- Disinsertion of the meniscal root was the most common injury in zone 5 (90%).

**LM injuries:**
- Longitudinal (61%) and occurred primarily in zone 4 (39%).
- Radial tears were predominant in zones 4, 5 and 6 (25%).
- Horizontal tears occurred predominantly in zone 2b (42%).
- All disinsertions of the meniscal root occurred in zone 6.
RESULTS

*Suture technique by meniscal zones*

MM injuries
- Inside-out suture technique was used to repair the MM in 61% of the cases.
- All-inside suture technique was commonly utilized to treat lesions in zone 4 (57%).
- Inside-out suture technique used for lesions in zone 3 (41%).
- Outside-in suture technique was performed predominantly in zones 2b and 3 (31%).

LM injuries
- All-inside suture technique was performed in 66% of the cases predominantly in zone 4 (34%).
- Inside-out (41%) and the outside-in (33%) techniques were used in 3-zone meniscal injuries.
References


