A comparison of arthroscopic diagnosis of ramp lesion and pre-operative MRI evaluation


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There is no financial disclosure to report for this study.
Ramp lesion

Longitudinal tear of the posterior horn of the medial meniscus (PHMM) adjoining the menisco-capsular (MC) junction associated with ACL ruptures.


Menisco-capsular (MC) junction or Red-Red zone

PC: posterior capsule


Ramp lesion

- Increase of knee instability
  - Ahn JH, et al. AJSM, 2011
  - Nicholas N, et al. AJSM, 2018

- Difficulty of spontaneous healing ➞ necessity of meniscal repair
  - Ahn JH, et al. AJSM, 2010

- Difficulty of diagnosis
  - MRI: Low sensitivity (0~61%)
    - Bollen SR, et al. JBJS Br, 2010
    - Nicholas N, et al. AJSM, 2017
  - Arthroscopy
    - Anterior visualization ➞ Impossible to diagnose

- Necessity of systematic arthroscopic exploration
  - Sonnery-Cottet, et al, AJSM, 2014
Purpose

- To evaluate the **prevalence of ramp lesion** by systematic arthroscopic exploration.
- To compare the **arthroscopic diagnosis** of ramp lesion and **pre-operative MRI** evaluation.
Materials and Methods

✓ 149 ACL-injured patients
✓ Systematic arthroscopic exploration of ramp lesion
  • Step 1: Anterior visualization via an anterolateral portal
  • Step 2: Inter-condylar visualization with the arthroscope introduced deeply into the posteromedial compartment
  • Step 3: Probing and debridement through the posteromedial (PM) portal with Inter-condylar visualization

*Sonnery-Cottet, et al, AJSM, 2014*

MFC: Medial femoral condyle

Ramp lesion

MFC

Step 1

Step 2

Step 3

PC

PHMM
Materials and Methods

<Evaluation>
✓ Prevalence of ramp lesion
✓ Number of cases for each step when ramp lesion was identified
✓ Location of ramp lesion (MC junction or Red-Red zone)

✓ Pre-operative MRI (138 of the 149 cases)
  • Sagittal proton density fat saturation
  • High signal intensity at the posterior margin of the PHMM

<Evaluation>
Diagnostic rate for ramp lesion by pre-operative MRI
• Sensitivity
• Specificity
Results ①: Arthroscopic evaluation

- Prevalence of ramp lesion: 17.4% (26 of the 149 cases)
- Number of cases for each step when ramp lesion was identified:
  - Step 1: 10 cases, Step 2: 11 cases, Step 3: 5 cases
  - Inter-condylar visualization
  - Procedures through PM portal: Effective in identifying ramp lesion
- Location of ramp lesion:
  - MC junction: 13 cases, Red-Red zone: 12 cases, Both: 1 case

![Images showing MC junction and Red-Red zone with arrows indicating ramp lesion](image-url)
Results ②: MRI evaluation

<table>
<thead>
<tr>
<th></th>
<th>Ramp (+)</th>
<th>Ramp (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI (+)</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>MRI (-)</td>
<td>8</td>
<td>107</td>
</tr>
</tbody>
</table>

**Total**
- Sensitivity: 66.7%
- Specificity: 93.9%

Ramp (+): Arthroscopic diagnosis of ramp lesion
Ramp (-): Arthroscopic diagnosis of no ramp lesion

**Ramp lesion**

<table>
<thead>
<tr>
<th></th>
<th>Ramp (+)</th>
<th>Red-Red zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC junction</td>
<td>6</td>
<td>10</td>
</tr>
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</tr>
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</tbody>
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**Sensitivity**
- MC junction: 42.9%
- Red-Red zone: 90.9%

**Low sensitivity** of MRI in detecting ramp lesion at **MC junction**
Discussion ①: Arthroscopic diagnosis of ramp lesion

✓ **Prevalence** of ramp lesion

- 17 of 183 cases (9.3%)  
  *Bollen SR, et al. JBJS Br, 2010*
- 144 of 868 cases (16.6%)  
  *Xin Liu, et al. AJSM, 2011*
- 769 of 3214 cases (23.9%)  
  *Sonnery-Cottet, et al. AJSM, 2018*

Our study: 26 of 149 cases (17.4%)

✓ **Diagnostic rate** of ramp lesion

Step 1 (Anterior view): 0%,  
Step 2 (Inter-condylar view): 58%  
Step 3 (Procedures through PM portal): 100%

*Sonnery-Cottet, et al, AJSM, 2014*

Our study

- Step 1: 38.5% (10/26)
- Step 2: 80.8% (21/26)
- Step 3: 100% (26/26)

**Necessity of inter-condylar view and PM portal for diagnosis of ramp lesion**
Discussion ②: Diagnostic rate for ramp lesion by MRI

✓ Sensitivity of pre-operative MRI

- 0% (0 of 11 cases)  
  *Bollen SR, et al. JBJS Br, 2010*
- 48% (24 of 50 cases)  
  *Nicholas N, et al. AJSM, 2017*
- 61% (80 of 132 cases)  
- Our study
  - **MC junction**: 42.9% (6/13), Red-Red zone: 90.9% (10/11)

Difficult to diagnose ramp lesion at **MC junction** by MRI

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PC  PH  MM

Ramp lesion  MC junction
Conclusion

✓ The prevalence of ramp lesion was 17.4%.

✓ Inter-condylar visualization and the creation of a posteromedial portal was effective in identifying ramp lesion.

✓ Low sensitivity in detecting ramp lesion was seen especially at the menisco-capsular junction on pre-operative MRI.

✓ Careful arthroscopic exploration should be required so as not to overlook ramp lesion, even when it is not indicated on pre-operative MRI.
References