Preoperative medial meniscus extrusion rate is inversely correlated with postoperative quality of life in high tibial osteotomy patients

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Several factors that affect the results of high tibial osteotomy (HTO), such as obesity, smoking and severity of osteoarthritis (OA), are reported in the past. However, those are mainly about the patient factors and x-ray findings. We sometimes encounter poor results cases without those factors.
Medial Meniscus Injuries

- Medial Meniscus Extrusion (MME; Fig.1) is recognized as a risk factor in the progression of knee osteoarthritis (OA), and is related to the pain in knee OA.

- Medial Meniscus Posterior Root Tear (MMPRT) is said to be related to the progression of MME.

Correlation between these meniscal findings and the result of HTO is unclear.
Objective

- We focused on the meniscal findings including MME and MMPRT, and investigated the factors influencing postoperative results of HTO.
Methods

Inclusion criteria

- Patients who underwent HTO between 2013 and 2017.
- Cases who were followed for more than 1 year postoperatively.
- Cases who were able to analyze clinical score.

The total subjects were 15 patients involving 16 knees.

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Follow up period (month)</td>
<td>20.8</td>
</tr>
<tr>
<td>Male : Female</td>
<td>3 : 12</td>
</tr>
<tr>
<td>Age (years old)</td>
<td>65 ± 9</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.6 ± 3.5</td>
</tr>
<tr>
<td>OWHTO : CWHTO</td>
<td>9 : 7</td>
</tr>
<tr>
<td>Kellgren-Lawrence grade</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>5</td>
</tr>
<tr>
<td>III</td>
<td>11</td>
</tr>
</tbody>
</table>
Evaluations

In preoperative MRI

- **MME distance** (MME\textsubscript{d} ; b in Fig.2)
- **MME ratio** (MME\textsubscript{r} ; b/a in Fig.2)
- **MMPRT** (The presence of White meniscus sign\textsuperscript{6}; Fig.3)

Clinical score

- The Knee Injury and Osteoarthritis Outcome Score (KOOS) at the time of final follow up.

We analyzed factors affecting postoperative KOOS subscales using multiple regression analysis.
Results

<table>
<thead>
<tr>
<th>Meniscus</th>
<th>KOOS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMPRT</td>
<td>Symptoms</td>
</tr>
<tr>
<td></td>
<td>40%</td>
</tr>
<tr>
<td>MMEd (mm)</td>
<td>Pain</td>
</tr>
<tr>
<td>5.4 ± 1.4</td>
<td>84.2 ± 24.6</td>
</tr>
<tr>
<td>MMEr (%)</td>
<td>Function</td>
</tr>
<tr>
<td>51.7 ± 13.4</td>
<td>86.6 ± 16.9</td>
</tr>
<tr>
<td></td>
<td>Sports/Rec</td>
</tr>
<tr>
<td></td>
<td>63.1 ± 38.0</td>
</tr>
<tr>
<td></td>
<td>QOL</td>
</tr>
<tr>
<td></td>
<td>68.8 ± 31.1</td>
</tr>
</tbody>
</table>

There was significant inverse correlation between MMEr and KOOS QOL. ($p = 0.0448$, Fig.4)
Discussion

In this study, MMEr showed an inverse correlation between postoperative KOOS QOL.

Treating MMEr could be a useful option to improve the results of HTO and patients' postoperative QOL.

But how to treat MMEr?
How to treat large MMEr

- Direct treatment for MMEr is Arthroscopic centralization.

- Another treatment option for MMEr may be MMPRT repair.

Although MMPRT itself was not significantly correlated with post operative results in this study, but our sub-analysis showed that large MMEr significantly correlated with MMPRT (correlation coefficient 0.622, \( p =0.03 \)).
Recent study showed that large MME ratio is a poor prognostic factor of conservative treatment for MMPRT\textsuperscript{8}).

⇒ Although this is about conservative treatment, treating MMPRT may have beneficial effect when patient have large MMEr.
Another study showed that healing status of MMPRT was not associated with clinical outcome of HTO\(^9\).

However, this study didn’t evaluated patient reported outcome like KOOS.

So, we think that treating MMPRT may reduce MMEr indirectly and improve results of HTO.
**Conclusion**

- MMER showed a inverse correlation between postoperative KOOS QOL.
- Treating MMER could be the useful option to improve the results of HTO and patients postoperative QOL.

**References**