Mid-term clinical outcome after medial opening wedge high tibial osteotomy and relationship between patient-based knee functional score and progression of patellofemoral osteoarthritis

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I have no financial conflicts to disclose
Opening Wedge High Tibial Osteotomy (OWHTO)

- Lower limb realignment surgery for medial compartment knee OA
- Progression of patellofemoral (PF) OA after OWHTO has been stimulated interest recently

Bito H: KSSTA 2010
Kim KI: Arthroscopy 2017
Tanaka T: KSSTA 2018
Purpose and Subjects

- Purpose
  - To investigate the mid-term clinical outcome and the influence of OWHTO on PF joint
- Subjects: 40 knees (33 patients)
- Inclusion criteria:
  - F/U periods > 3 years
Investigation items

- Age, Gender, BMI
- F/U periods
- Japanese Orthopaedic Association (JOA) score
- Radiographic evaluation
  - Kellgren-Lawrence (KL) grade
  - Femorotibial angle (FTA)
  - Insall-Sarvati ratio (ISR)
- Progression of radiographic PF-OA
  Joint space narrowing or osteophyte formation
### Patient’s demographics

- **F/U periods:** 66±24 months

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male : female)</td>
<td>15 : 18</td>
</tr>
<tr>
<td>Disorder (OA : ON)</td>
<td>37 : 3</td>
</tr>
<tr>
<td>Age [years]</td>
<td>52.4 ± 8.4 (33 - 64)</td>
</tr>
<tr>
<td>BMI [kg/m²]</td>
<td>26.7 ± 3.9 (30.2 – 37.3)</td>
</tr>
<tr>
<td>KL grade (I : II : III : IV)</td>
<td>1 : 10 : 25 : 4</td>
</tr>
</tbody>
</table>
HTO survival and JOA score

- 2 conversion TKA at 39 and 98 months
- JOA score was significantly improved and maintained at final f/u

One-way ANOVA, Tukey’s post hoc analysis
Radiographic evaluation

Femorotibial angle [degrees]

<table>
<thead>
<tr>
<th></th>
<th>pre op.</th>
<th>1Y</th>
<th>3Y</th>
<th>Final</th>
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<tbody>
<tr>
<td>Value</td>
<td>0.0</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
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Insall-Salvati ratio

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One-way ANOVA, Tukey’s post hoc analysis
Predictive factor for progression of radiographic PF-OA

Progression of PF-OA: n = 28 (70%)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.198</td>
<td>0.029</td>
<td>1.02 - 1.46</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.080</td>
<td>0.947</td>
<td>0.09 - 9.63</td>
</tr>
<tr>
<td>BMI</td>
<td>0.391</td>
<td>0.061</td>
<td>0.98 - 2.23</td>
</tr>
<tr>
<td>JOA score</td>
<td>-0.003</td>
<td>0.967</td>
<td>0.87 - 1.14</td>
</tr>
<tr>
<td>KL grade</td>
<td>2.486</td>
<td>0.047</td>
<td>1.03 - 140.45</td>
</tr>
<tr>
<td>FTA</td>
<td>-0.295</td>
<td>0.287</td>
<td>0.43 - 1.28</td>
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</table>

Logistic regression analysis
Dependent variable: progression of radiographic PF-OA
Correlation between opening gap and clinical outcome

- Opening gap: 9.1 ± 2.0 mm
  (6.0 – 12.5)

<table>
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<tr>
<th>Variable</th>
<th>$\rho$</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Progression of PF-OA</td>
<td>0.257</td>
<td>0.109</td>
</tr>
<tr>
<td>ROM (ext.)</td>
<td>-0.078</td>
<td>0.660</td>
</tr>
<tr>
<td>ROM (flex.)</td>
<td>0.144</td>
<td>0.418</td>
</tr>
<tr>
<td>JOA score</td>
<td>0.325</td>
<td>0.053</td>
</tr>
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</table>

Spearman’s rank correlation coefficient
Progression of PF-OA after OWHTO

- Incidence
  - 35.7% (min. 5 y.)

Oh KJ: KSSTA 2017

- Patella: 23%, Trochlea: 30.8% (ave. 14 mo.)

Tanaka T: KSSTA 2018

In this study...

Progression of radiographic PF-OA: 70% (ave. 5.5 y.)

- Predictive factors for PF-OA
  - Opening gap ≥ 13mm
  - Change in medial tibial angle ≥ 9°

Tanaka T: KSSTA 2018

In this study...

There was no correlation between opening gap and progression of PF-OA, because opening gap was smaller than 13mm in all cases.
Conclusions

- Knee functional score was improved at average 5.5 years after OWHTO
- Progression of radiographic PF-OA was shown in 70% patients
- Predictive factors for progression of PF-OA were age and severity of preoperative KL grade
Reference

- Bito H: KSSTA 2010
- Kim KI: Arthroscopy 2017
- Tanaka T: KSSTA 2018
- Oh KJ: KSSTA 2017