Can We Always Reproduce the Same Anatomical Femoral Tunnel using Transportal Technique in Anterior Cruciate Ligament Reconstruction?

- Variation of Femoral Tunnel Placement by Surgeon

Jai-Hyun Chung, MD, Chong-Hyuk Choi, MD, PhD, Jin-Young Jang, MD, Sang-Woo Jeon, MD, Kyung-Han Lim, MD

Department of Orthopedic Surgery, Severance Hospital
Yonsei University, College of Medicine, Seoul, Korea
I and my co-authors have no financial conflicts to disclose.
Introduction

Anatomical tunnel placement in ACL reconstruction

- Restore normal knee kinematics
- Improve rotatory stability and long term outcome

ACL reconstruction using transportal technique

- Can make more anatomical footprints
- Influenced by knee flexion angle, transverse drill angle
- Consider in tunnel length, blowout, graft bending angle

Kim et al. Hindawi, 2018
Michele et al, Joints, 2017
There is no precise guideline for knee flexion angle to make a femoral tunnel as well as objective system for tunnel entry avoiding the destruction of posterior cortex. Are there any variations on femoral tunnel placement between surgeons?
Materials and methods

Inclusion Criteria

Age: 21 – 41 yrs
ACL rupture diagnosed by P/Ex & MRI
ACL reconstruction using transportal technique
Materials and methods

Exclusion Criteria

Combined ligament injury
Need to repair meniscus
Revisional ACL reconstruction
Osseous deformity

Retrospective review

→ Total 100 patients met the inclusion & exclusion criteria
  Two surgeons performed 50 patients each.
Materials and methods

Measurement on Three-Dimensional Images
Reconstructed using Mimic program

Location of Femoral tunnel
Figure out the centers of the femoral tunnel apertures based on Bernard’s quadrant method

Location of femoral tunnels are presented as the mean ± SD
### Results

**Patient demographics: No significant difference**

<table>
<thead>
<tr>
<th></th>
<th>Surgeon A</th>
<th>Surgeon B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (Male/Female)</td>
<td>28 / 22</td>
<td>31 / 19</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>27 (ranges, 21 – 38)</td>
<td>30 (ranges, 22 – 41)</td>
</tr>
<tr>
<td>Side (Right/Left)</td>
<td>29 / 21</td>
<td>23 / 27</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
Results

Comparison of femoral tunnel depth and height
Between two surgeon

Surgeon A

Surgeon B
# Results

## Comparison of mean femoral tunnel depth and height

<table>
<thead>
<tr>
<th></th>
<th>Surgeon A</th>
<th>Surgeon B</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of femoral Tunnel (%)</td>
<td>28.52 ± 5.11</td>
<td>27.12 ± 3.92</td>
<td>0.330</td>
</tr>
<tr>
<td>Height of femoral Tunnel (%)</td>
<td>24.51 ± 7.29</td>
<td>26.09 ± 5.82</td>
<td>0.449</td>
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## Difference of femoral depth and height

<table>
<thead>
<tr>
<th></th>
<th>Depth of femoral tunnel (%)</th>
<th>Height of femoral tunnel (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference</td>
<td>1.3%</td>
<td>1.5%</td>
<td>0.04</td>
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</table>

The values are given as the mean and SD. Variability in one surgeon and the mean value between the two surgeons were compared using an independent two-sample t-test.
Conclusion

Although each surgeon and inter-surgeon variabilities are inevitable, it is necessary to build an object system for accurate femoral entry position as well as to reduce inter-surgeon variability.
Reference


