Is It Possible To Create an Anatomical Femoral Tunnel using Transportal Technique and Modified Transtibial Technique in Anterior Cruciate Ligament Reconstruction?

- Comparison of Femoral Tunnel Placement in Transportal and Modified Transtibial Technique.

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
Jai-Hyun Chung, MD

I and my co-authors have no financial conflicts to disclose.
Introduction

Non-Anatomical reconstruction of ACL

Transtibial technique
- Classic ACL reconstruction technique
- Non anatomical femoral and tibial tunnel
- Rotational instability d/t vertical slope

Michele et al, Joints, 2017
Introduction

Anatomical reconstruction of ACL

Modified transtibial technique

- Development to avoid vertical slope of graft
- Modification of tibial tunnel orientation, guide angle
  \( \rightarrow \) Makes more anatomical tunnel entry
  without concern about tunnel length and blowout

Transportal technique

- Can make more anatomical footprints
- Influenced by knee flexion angle, transverse drill angle

Hussin et al., J of Sports Med, 2018
Ahn et al, CiOS, 2012
Michele et al, Joints, 2017
Purpose

Transportal technique in ACL reconstruction provides more anatomical reconstruction. But there is no objective guiding system in femoral tunnel drilling on transportal technique, variabilities are inevitable.

Compare femoral tunnel entry between modified transtibial technique and transportal technique, and figure out the variabilities between two techniques.
Materials and methods

Criteria

- Age: 22 – 39 yrs
- Pure ACL reconstruction without combined ligament injury
- Retrospective review (total 86Pts.)
  - 43 Pts.: Modified transtibial technique
  - 43 Pts.: Transportal technique
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
Surgical procedure

Modified transtibial technique

Transportal technique

## Results

### Patient demographics: No significant difference

<table>
<thead>
<tr>
<th></th>
<th>Modified transtibial technique</th>
<th>Transportal technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (Male/Female)</td>
<td>28 / 15</td>
<td>24 / 19</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>29 (ranges, 22 – 37)</td>
<td>31 (ranges, 24 – 39)</td>
</tr>
<tr>
<td>Side (Right/Left)</td>
<td>25 / 18</td>
<td>20 / 23</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>
Results

Comparison of femoral tunnel depth and height
Between two surgeon

Surgeon A: Modified transtibial technique
Surgeon B: Transportal technique
## Results

### Comparison of mean femoral tunnel depth and height

<table>
<thead>
<tr>
<th></th>
<th>Transportal</th>
<th>Modified transtibial</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of femoral Tunnel (%)</td>
<td>27.12 ± 3.92</td>
<td>33.58 ± 3.54</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Height of femoral Tunnel (%)</td>
<td>26.09 ± 5.82</td>
<td>17.14 ± 3.85</td>
<td>&lt;0.001</td>
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</tbody>
</table>

### 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>6.46%</td>
<td>8.95%</td>
<td>&lt;0.05</td>
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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

There is no significant difference of femoral entry between two techniques. Anatomical femoral entry is made at the nearest position using transportal technique, nevertheless modified transtibial technique showed less variability than transportal technique. It is necessary to build an object system for accurate femoral entry position as well as to reduce variability.


