Anatomical Analysis For Transforaminal Approach of Percutaneous Endoscopic Lumbar Discectomy

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COI Disclosure Information

Fumitake Tezuka, M.D.

• I have no financial relationships to disclose.
Introduction

Percutaneous endoscopic lumbar discectomy (PELD) is a minimally invasive procedure for the surgical treatment of lumbar disc herniation (LDH).

Local anesthesia & Small skin incision (about 8 mm)

Anatomical consideration to perform the PELD safely, particularly to approach an affected disc, is still lacking.
Purpose of this study

To assess

- Operability of TF-PELD
- Vascular structures for TF-PELD

TF-PELD: Percutaneous Endoscopic Lumbar Discectomy thorough Transforaminal Approach
Patients and Methods

100 adult (60 men and 40 women), bilateral sides: 200 subjects
mean age: 64.9 years old (range 36-89)

Abdominal contrast-enhanced multi-planner 3D-CT scans
preoperative screening for colon cancer surgeries
Study 1: *Operability of TF-PELD*

- **Case #1**
  - High iliac crest

- **Case #2**

**Relationship between iliac crest and trajectory**

<table>
<thead>
<tr>
<th>Disc level</th>
<th>Interference with iliac crest</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4-5</td>
<td>91 / 200 (45.5%)</td>
</tr>
<tr>
<td>L5-S</td>
<td>199 / 200 (99.5%)</td>
</tr>
</tbody>
</table>
Study 2: *Operability of TF-PELD*

We assessed the trajectory of TF-PELD at **L4-5** and **L5-S** disc level.

- **Maximum inclination angle** ($\alpha^\circ$)
  
  $\alpha^\circ$: max angle $\leq$ 90

<table>
<thead>
<tr>
<th>Disc level</th>
<th>Mean $\alpha$ ($^\circ$)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4-5</td>
<td><strong>84.5</strong></td>
<td>(56 - 90)</td>
</tr>
<tr>
<td>L5-S</td>
<td><strong>56.0</strong></td>
<td>(33 - 90)</td>
</tr>
</tbody>
</table>

- **Distance on the middle line between the posterior edge of disc and the trajectory (D mm)**

<table>
<thead>
<tr>
<th>Disc level</th>
<th>Mean D (mm)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4-5</td>
<td><strong>2.2</strong></td>
<td>(0 - 23.8)</td>
</tr>
<tr>
<td>L5-S</td>
<td><strong>15.0</strong></td>
<td>(0 - 44.6)</td>
</tr>
</tbody>
</table>
Study 3: *Vascular structures for TF-PELD*

We assessed the vascular structures on the trajectory of TF-PELD at L4-5 and L5-S disc level.

<table>
<thead>
<tr>
<th>Disc level</th>
<th>Vascular structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4-5</td>
<td>173 / 200 (86.5%)</td>
</tr>
<tr>
<td>L5-S</td>
<td>114 / 200 (57.0%)</td>
</tr>
</tbody>
</table>

Postoperative Retroperitoneal Hematoma

Symtomatic RPH

4 / 412 (0.97%)


One of the variation of the vascular pattern around L5

24% of all subjects (323 patients)

Very dangerous in targeting L4-5 disc

( Tezuka F, et al. ISSLS, 2014 )
Summary of the results

Approximately, 50% of the trajectories for **L4-5 disc levels (45.5%)**, and 100% of those for **L5-S disc levels (99.5%)** were interfered with the iliac crest.

The results of $\alpha^\circ$ and D mm in this study suggested that **PELD for the central-type LDH at L5-S was more difficult** than that at L4-5 due to the surrounding bony structures.

Vascular structures were highly detected on the trajectories of the TF-PELD (**L4-5: 86.5%, L5-S: 57.0%)**
Conclusion

We have to recognize that the trajectory of TF-PELD is limited by the surrounding anatomical structures such as bone and vessels.

Particularly, to avoid critical complications as vascular injuries, we must pay attention to the dorsal branches of the lumbar or iliolumbar artery on the trajectory line.