Prevertebral Vascular and Esophageal Consideration during Percutaneous Cervical Disc Procedures

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Introduction

• Humans commonly experience neck pain at some point in their life, and neck pain can arise from various sources.

• Among neck pain etiologies, cervical disc disease is common source of neck pain.

• Minimally invasive surgery has gained greater popularity for treating cervical disease, along with new novel treatment strategies developed over the last few decades, such as endoscopic discectomy or nucleoplasty.
Purpose

- The postoperative hematoma could be considered from the small vascular structures around the trajectory of the minimally invasive procedure.

- Precise knowledge of anatomical characteristics is important to minimize the injury of vital structures.

- In this study, we attempted to identify anatomical characteristics of the cervical spine in an effort to promote awareness of structures at risk of vascular and esophageal injury during a percutaneous anterior approach.
Materials & Methods

511 MRI Images

- Patients with reported neck pain
- December 2012 and April 2013
- From the Teun Teun Hospital database
- Cervical disc level from C3/4 to C6/7

Finally, a total of 2044 images were analyzed to define small vessel structures or esophageal deviations at risk of injury.
The presence of small vascular structures was evaluated in the anterior portion of each vertebral body from C3/4 to C6/7.

Measurement of esophageal deviations was made at level C7. Deviations were calculated from the midpoint of the cervical disc, and the degree of esophageal deviation was measured as the length to each side.
## Results

<table>
<thead>
<tr>
<th>Disc Level</th>
<th>Left/Right</th>
<th>Presence of small vessel</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3/4</td>
<td>Left</td>
<td>50.5%</td>
<td>0.661</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>49.1%</td>
<td></td>
</tr>
<tr>
<td>C4/5</td>
<td>Left</td>
<td>30.3%</td>
<td>0.583</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>28.8%</td>
<td></td>
</tr>
<tr>
<td>C5/6</td>
<td>Left</td>
<td>24.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>7.6%</td>
<td></td>
</tr>
<tr>
<td>C6/7</td>
<td>Left</td>
<td>55.2%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>43.1%</td>
<td></td>
</tr>
</tbody>
</table>
The presence of small vascular structures along the anterior portion of each vertebral body:

A statistical difference in the number of small vessels between the left and right sides was not observed at the levels of C3/4 and C4/5.

Significantly fewer small vascular structures were noted on the right side at levels C5/6 and C6/7.

A minimal cervical approach on the right side at levels C5/6 and C6/7 is safer than on the left as it involves less potential for small vessel iatrogenic injury.
The esophagus deviated 0.63 mm to right and 1.18 mm to left at level C7 ($P<0.001$). ➔ It may be safer to undertake a minimal cervical approach on the right side than the left by preserving the esophagus.
The vessels were assumed that superior thyroid artery at C3–C4 level, superior thyroid artery or ascending cervical artery at C4–C5 level, and inferior thyroid artery or ascending cervical artery at C5–C6 and C6–C7 levels with anatomical consideration of cervical level.
Conclusion

• In this study, significantly fewer vascular structures in the prevertebral areas of C5–C6 and C6–C7 were found on the right side, whereas esophageal deviation was predominant to the left side.

• Anatomical consideration of the prevertebral area may prevent vascular and esophageal injury.