Cervical Vertebral Artery Course Anomalies: A Retrospective Analysis of Anatomical Variance, Prevalence, and Clinical Implications in 1002 patients
Fara Dayani, Harminder Singh
Department of Neurosurgery, Stanford Medical Center, Stanford, CA, 94305.

Introduction
- Vertebral artery injury (VAI) is a serious iatrogenic complication in anterior or posterior cervical spine surgery.
- This is in part due to the anomalous course of vertebral artery at the V2 segment.
- While this complication is rare, it can lead to rapid blood loss intraoperatively and potentially catastrophic neurologic deficits postoperatively.
- This study will investigate the prevalence and anatomical features of anomalous vertebral artery (VA) course.

Methods
- Subjects with CT angiography (CTA) of the neck from 2011-2015 were identified to evaluate the course of the VA V2 segment bilaterally.
- We excluded cases in which the course and lumen of VA was poorly visualized due to dissection, poor bolus contrast, and artifact.
- An anomalous VA course was defined as V2 segment entrance into the transverse foramen at any level other than C6.
- Dominance of VA on the left vs. right was defined as the lumen size difference of > 0.2mm.

Results
- 1002 subjects were included in the study, contributing to 2004 vertebral artery courses.
- 182 anomalous vertebral artery (AVA) courses were identified with the incidence of 9.1%.

Table 1. Unilateral vs. Bilateral Distribution of AVA course

<table>
<thead>
<tr>
<th></th>
<th>Number of AVA course</th>
<th>Number of individuals with AVA Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral</td>
<td>46</td>
<td>23</td>
</tr>
<tr>
<td>Unilateral</td>
<td>136</td>
<td>136</td>
</tr>
<tr>
<td>P-value</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
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</tbody>
</table>

Conclusions
- Our study found the prevalence of anomalous vertebral artery course to be 9.1%, which are significantly higher compared to prior studies [1].
- There is higher prevalence of anomalies in male compared to females.
- Entry of VA at C5 neuro-foramina is the most common anatomic variance followed by entry at the C4 and C7 neuro-foramen.
- The left VA is unilaterally dominant 62% of the time.
- Knowledge of these anatomic variations is key to vascular complication avoidance in anterior and posterior cervical surgeries.

Future Directions
- Future studies should aim to investigate anatomic variances in VA course as a multicenter study to identify patient specific characteristics that are associated with this anatomic variation.

References