The Vertebral Artery in the Vascular Lab: What Does It Mean?

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Disclosures

• None
Subclavian Steal

Occlusion of proximal Subclavian Art
Vertebral artery supplies retrograde flow
Posterior brain receives decreased flow

55 years +
Men > Women more than 2:1
LSA affected 3x more than RSA
Subclavian Steal

Causes:
- Arteriosclerosis of subclavian artery (>95% cases)
- Embolism
- Takayasu’s Arteritis
- Dissecting Aneurysm

Risk Factors: (similar to CAD)
- Smoking
- Hypertension
- Hyperlipidemia
- Hypertension
Symptoms of Subclavian Steal

Vertebrobasilar Insufficiency (posterior circulation symptoms)

- Light headedness or dizziness
- Ataxia or Vertigo
- Visual Disturbance
- Headache
- Syncope
- Confusion
Symptoms of Subclavian Steal

Subclavian Insufficiency

Arm weakness, coldness
Numbness or “tingling”
Arm Claudication with exercise

Symptoms can be exacerbated with:

Vigorous exercise
Sudden turning of head to affected side
Signs of Subclavian Steal

Diminished pulses (radial/ulnar)

Discrepant blood pressures in upper extremities (>20mmHg) (Pitfall with bilateral disease)

Subclavian Bruit
Subclavian steal on Duplex Exam

Incomplete steal
• Striking deceleration of velocity in mid or late systole
• High grade stenosis of subclavian rather than occlusion

Complete Steal
• Complete reversal of flow within the vertebral artery
Vertebral Retrograde Flow

- Reversal of flow in the vertebral artery is a common finding identified on cerebrovascular duplex ultrasound.
- The clinical significance and natural history of patients presenting with this finding, however, is poorly understood.
Vertebral Retrograde Flow
Methods

- Objective: to better characterize the symptomatology and outcomes of patients presenting with reversal of flow in the vertebral artery

- A retrospective review was performed of all cerebrovascular duplex studies performed at our institution between January 2010 and January 2016.

- Individuals with reversal of flow in one or both vertebral arteries were included in the analysis.
Methods

- A retrospective review was performed of all cerebrovascular duplex studies performed at our institution between January 2010 and January 2016.
- Individuals with reversal of flow in one or both vertebral arteries were included in the analysis.
- A total of 74 patients were included in the study.
- Mean duration of follow-up was 28 ± 22 months.
## Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistic (N=74)</th>
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</thead>
<tbody>
<tr>
<td>Mean age at diagnosis (years)</td>
<td>71 (range 27-92)</td>
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<tr>
<td>Male gender, no. (%)</td>
<td>37 (50)</td>
</tr>
<tr>
<td>Hypertension, no. (%)</td>
<td>58 (83)</td>
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<tr>
<td>Hyperlipidemia, no. (%)</td>
<td>40 (57)</td>
</tr>
<tr>
<td>Diabetes mellitus, no. (%)</td>
<td>21 (30)</td>
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<tr>
<td>Tobacco use, no. (%)</td>
<td></td>
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<tr>
<td>Current</td>
<td>8 (11)</td>
</tr>
<tr>
<td>Former</td>
<td>41 (59)</td>
</tr>
<tr>
<td>Never</td>
<td>25 (30)</td>
</tr>
<tr>
<td>History of CAD, no. (%)</td>
<td>35 (50)</td>
</tr>
<tr>
<td>History of PAD, no. (%)</td>
<td>28 (40)</td>
</tr>
<tr>
<td>History of TIA/CVA, no. (%)</td>
<td>15 (21)</td>
</tr>
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Anterior Circulation

- 21 patients (28%) had evidence of a prior unilateral or bilateral carotid intervention (carotid endarterectomy (CEA) or carotid stent placement (CAS))
- 21 patients had evidence of moderate carotid stenosis (50-79%) in at least one carotid artery
- 12 patients (16%) had evidence of severe carotid stenosis (>80%) in at least one carotid artery.
<table>
<thead>
<tr>
<th>Indication</th>
<th>Percentage</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic/Screening</td>
<td>44%</td>
<td>(32)</td>
</tr>
<tr>
<td>Anterior circulation symptoms</td>
<td>7%</td>
<td>(6)</td>
</tr>
<tr>
<td>Posterior circulation symptoms</td>
<td>21%</td>
<td>(13)</td>
</tr>
<tr>
<td>Follow-up after cerebrovascular intervention</td>
<td>29%</td>
<td>(21)</td>
</tr>
<tr>
<td>Isolated upper extremity symptoms</td>
<td>6%</td>
<td>(4)</td>
</tr>
</tbody>
</table>
Interventions performed on patients presenting with vertebral artery flow reversal and posterior circulation symptoms

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Number of patients (N=15)</th>
</tr>
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<tbody>
<tr>
<td>Subclavian artery stenting</td>
<td>3</td>
</tr>
<tr>
<td>Subclavian artery balloon angioplasty</td>
<td>1</td>
</tr>
<tr>
<td>Axillary-axillary arterial bypass</td>
<td>1</td>
</tr>
<tr>
<td>Awaiting intervention</td>
<td>5</td>
</tr>
<tr>
<td>Too high risk for surgical intervention</td>
<td>1</td>
</tr>
<tr>
<td>No intervention needed, patient diagnosed with Meniere’s disease</td>
<td>1</td>
</tr>
</tbody>
</table>
59 patients without Symptoms related to Posterior Circulation

- Remained asymptomatic
- One patient progressed to vertebral artery occlusion
- Six patients had progression of their carotid disease during this interval.
The majority of patients with this finding are asymptomatic at the time of presentation.

Symptomatic reversal of flow in the vertebral artery responds well to intervention, including SCA stenting and carotid intervention (CEA or carotid stenting) in patients with anterior circulation symptoms.

Although progression of vertebral artery disease is rare, these patients should be monitored for worsening of vertebral and carotid artery atherosclerotic disease with surveillance ultrasonography.

Conclusions