The Vertebral Artery - a Forgotten Vessel?

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Disclosure

Nothing to disclose
Why is VA disease more complicated than ICA disease?

- Clinical symptoms less characteristic
- Localization of stenosis more variable
- Condition of contra-lateral VA important
- Compensatory collaterals from the anterior circulation and neck arteries
- Hemodynamic or embolic problem?
- Compression by bone spurs
- No standardized surgical procedure
Why Is VA Disease More Complicated Than ICA Disease?

Rarer Causes of Ischemia

- extrinsic compression
- bow-hunter’s syndrome
- trauma
- fibromuscular dysplasia
- aneurysm
- dissection
Are vertebral artery plaques different?

**Plaques**
- smooth and concentric
- mostly not ulcerated
- rarely bleeding in the arterial wall
- lower embolic risk

Where is the lesion located?

<table>
<thead>
<tr>
<th>VA segments</th>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>prevertebral</td>
<td>70%*</td>
</tr>
<tr>
<td>V2</td>
<td>intertransverse</td>
<td>5%</td>
</tr>
<tr>
<td>V3</td>
<td>atlanto-axial</td>
<td>4%</td>
</tr>
<tr>
<td>V4</td>
<td>intracranial</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Own figures 1990-2005

~ 5% aortic origin of VA
What Are Good Indications for Tx?

- only symptomatic pts
- contra-lateral VA compromised
  - hypoplasia
  - stenosis/occlusion
  - ending in PICA
- V1 stenosis = ostial stenosis
- V4 stenosis = intracranial stenosis
- multi-vessel disease
What Are The Tx Options

- vascular surgery
- orthopedic / neuro-surgery
- endovascular intervention
Hemodynamic & Embolic Disease

P.P. m-55
brain stem symptoms
Left VA

P.P. m-55
brain stem symptoms

HercuLink 5.0 mm

stent protrusion often unavoidable
P.P. m-61
Brain stem symptoms
Steep angle between VA & SA

HercuLink 5.0 mm

Left VA
Buddy Wire Technique
B.F. f-56 y
smoker
hyperlipidemia
vertigo
TIA right hemisphere
right VA occluded?
Strategy in Multiple Vessel Disease

- Treating more than one lesion at a time?
- Where to begin with?

- No rule
- Individual decision
- First symptomatic artery
More Than One Artery Affected

B.F. f-56 y

HercuLink 8x5 mm
More Than One Artery Affected

B.F. f-56 y
Bilateral ICA stenosis

AccuLink 6-8x40 mm
And again …

W.H. m-69
Small cerebellar & brainstem infarction

- Distal occlusion of right VA
- ICA stenosis
And again ...

W.H. m-69

- Right VA occluded
- Left VA stenosis
- V4 segment
And again ...
VA 4 lesion

W.K. m-71y
brain stem TIA

left VA occluded
cervical artery collaterals
VA 4 lesion

W.K. m-71
brain stem TIA

problem: stenosis at the origin of the PICA
What is that?
VA Transposition to CCA

balloon angioplasty
4.5 mm

I.S. f-45
A Trauma Patient ...

What is that?

S.B. f-39
A Trauma Patient ...

False aneurysm
Transsection of VA

S.B. f-39
A Trauma Patient ...

False aneurysm
Transsection of VA

S.B. f-39
A Surgical Complication …

Nucleotomy C6/7
Bleeding !!!

G.L. f-52
A Surgical Complication …

Self-expanding covered stent

G.L. f-52
Are there limitations?

- type III aortic arch
- syphon at ostium
- spiral VA

Probing more difficult:
- risk of spasm and dissection
- use brachial access
What is the Outcome?

- technical success: 97-100%
- complications: < 5%
  - spasm
  - dissection
  - occlusion
  - rupture
  - stroke
- recurrence rate with BMS: ~20%/y
- DE-stents preferred
- DE-balloons under investigation

Better long term results with DES
What is the Outcome?

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Follow-Up</th>
<th>Risk of Death</th>
<th>Risk of Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>12 months</td>
<td>0.3%</td>
<td>0.7%</td>
</tr>
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<thead>
<tr>
<th>Procedures</th>
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<tr>
<td>993</td>
<td>21 months</td>
<td>1.3%</td>
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</table>

** Stayman et al. Stroke 2001
DES Data

FU 140 pts.
Restenosis rates
0 - 12%

What is still missing

good registries
prospective
randomized trials
Good Repair! Thank you for your interest.