Lessons learned from 257 patients treated by surgical correction of dialysis steal syndrome

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Disclosure

Speaker name: Samuel N. Steerman

I have the following potential conflicts of interest to report:

- Consulting – Medtronic, Bard/BD, Abbott, Penumbra
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest
Background

- Dialysis access steal syndrome
  - Incidence rate can be as high as 8%, but can vary depending on access configuration and population

Steal Classification

1: No/Low-grade steal - retrograde flow in distal artery without complaints
2: Mild - Pain on exertion and/or with hemodialysis
3: Moderate - Rest pain
4: Severe - Ischemic changes (ex. Ulceration, necrosis, gangrene)
Surgical Management of Steal

- Distal Revascularization with Interval Ligation (DRIL)
- Proximalization of arterial Inflow (PAI)
- Banding
- Revision Using Distal Inflow (RUDI)
- Access Ligation
Methods

- Retrospective review of dialysis patients who underwent surgical correction for steal syndrome within a single high-volume Vascular Surgery practice (January 2009 – May 2017)

- Steal syndrome diagnosis based on symptom presentation and Digit-Brachial Index < 0.45
### Results: Demographics

257 patients underwent surgical management for steal

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years)</td>
<td>63 (range: 23-90)</td>
</tr>
<tr>
<td>BMI</td>
<td>30.4 (range: 14.6-56.1)</td>
</tr>
<tr>
<td>Gender</td>
<td>65.7% (Female)</td>
</tr>
<tr>
<td>Race/Ethnicity: African-American</td>
<td>53.8%</td>
</tr>
<tr>
<td>Positive Smoking History</td>
<td>51%</td>
</tr>
<tr>
<td>History of Diabetes Mellitus</td>
<td>74.7%</td>
</tr>
<tr>
<td>History of Peripheral Arterial Disease</td>
<td>17.5%</td>
</tr>
<tr>
<td>Access Location: Left upper extremity</td>
<td>68.1%</td>
</tr>
<tr>
<td>Access on non-dominant hand</td>
<td>76.3%</td>
</tr>
<tr>
<td>Prior failed access procedures</td>
<td>35.4%</td>
</tr>
<tr>
<td>Prior access procedures on extremity that</td>
<td>19.5%</td>
</tr>
<tr>
<td>developed steal</td>
<td></td>
</tr>
<tr>
<td>Number of prior access procedures on the</td>
<td></td>
</tr>
<tr>
<td>extremity that developed steal</td>
<td></td>
</tr>
<tr>
<td>0: 80.2%</td>
<td></td>
</tr>
<tr>
<td>1: 16.2%</td>
<td></td>
</tr>
<tr>
<td>2: 2.8%</td>
<td></td>
</tr>
<tr>
<td>3: 0.8%</td>
<td></td>
</tr>
</tbody>
</table>
## Access Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>AVF (162)</th>
<th>AVG (95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary a.-Axillary v.</td>
<td></td>
<td>9.5%</td>
</tr>
<tr>
<td>Brachial a.-Axillary v.</td>
<td></td>
<td>75.8%</td>
</tr>
<tr>
<td>Brachial a.-Brachial v.</td>
<td></td>
<td>11.6%</td>
</tr>
<tr>
<td>Brachial a.-Basilic v.</td>
<td></td>
<td>1%</td>
</tr>
<tr>
<td>Brachial a.-Cephalic v.</td>
<td></td>
<td>61.4%</td>
</tr>
<tr>
<td>Radial a.-Cephalic v.</td>
<td></td>
<td>13.6%</td>
</tr>
<tr>
<td>Radial a.-Basilic v.</td>
<td></td>
<td>0.6%</td>
</tr>
<tr>
<td>Basilic Vein Transposition (BVT)</td>
<td></td>
<td>24.7%</td>
</tr>
</tbody>
</table>
Surgical Interventions for Steal (n = 257)

- DRIL: 35.4%
- RUDI: 0.4%
- PAI: 12.8%
- Banding: 18.7%
- Access Ligation: 22.6%
- Distal Ligation: 5.1%
- PTA: 4.7%
- Other: 0.4%
All patients (257)

- DRIL (91)
  - Complete Symptom Resolution: 68.1%

- RUDI (1)
  - Complete Symptom Resolution: 0%

- PAI (33)
  - Complete Symptom Resolution: 75.8%

- Banding (48)
  - Complete Symptom Resolution: 54.2%

- Access Ligation (58)
  - Complete Symptom Resolution: 87.9%

- Distal Ligation (13)
  - Complete Symptom Resolution: 53.8%

- PTA (12)
  - Complete Symptom Resolution: 91.7%

- Other (1)
  - Complete Symptom Resolution: 100%
Results: AVF Symptom Resolution

Complete Resolution for AVF ($x^2=0.001$)

- DRIL: 64.60%
- PAI: 66.70%
- Banding: 26.30%
- Access Ligation: 100%

Partial Symptom Resolution for AVF ($x^2=0.286$)

- DRIL: 88.20%
- PAI: 100%
- Banding: 57.10%
Results: AVG Symptom Resolution

**Complete Resolution for AVG**

- DRIL: 75%
- PAI: 69.20%
- Banding: 66.70%
- Access Ligation: 66.70%

**Partial Symptom Resolution for AVG**

- DRIL: 100%
- PAI: 75%
- Banding: 100%
- Access Ligation: 100%
Conclusions

- AVG with steal had a higher rate of symptom resolution after surgical intervention compared to AVF with steal.
  - Symptom resolution for steal in AVGs was shown to have equivalent results irrespective of the surgical modality chosen.
- For steal in AVFs, DRIL and PAI were superior to banding with statistical significance and allowed maintenance of patent access, as compared to access ligation.
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