Tips And Tricks To Facilitate Upper Extremity Access For F/BEVAR And Parallel Graft Insertion And How To Avoid Complications
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F/BEVAR Complexity

- Patient related factors
  - Caudally oriented visceral vessels
  - Vessel stenosis
  - Angulated aorta
  - Presence of a previous endograft in place
  - Difficult cannulation of the contralateral gate
  - Need for hypogastric artery embolization
  - Mandatory with downward branches

Upper Extremity Access

- Utilized for a multitude of endovascular procedures
  - Coronary angiography and stenting
  - Lower extremity interventions
  - Mesenteric ischemia
  - Chimney/snorkel procedures
  - *Stroke risk 3.2-9.5%*
  - Endovascular arch procedures

Technique

- Preferential initial left arm access
- Careful review of CT angiogram
- Ultrasound evaluation of the brachial access
- Decision for upper extremity access solely based on surgeon preference

Disclosures

- Timaran, CH
  - Cook Medical Inc. Consultant / Research / International Proctorship / IDE for P-branch and custom-made devices

Bruem KJ et al. JVS, 2011
Coscas R-K et al. JVS, 2011
Lee J et al. JVS, 2012
Brachial artery exposed, avoiding the median nerve

Access with micropuncture kit and 5F sheath placement

Diaphragm of the 12F sheath is punctured for "buddy-wire" access

Allows placement of four 0.035 inch wires simultaneously

12F sheath allows three 0.035 inch wires and 7F sheath for stent placement
Custom Made Devices with Pre-cannulated Renal Fenestrations for Access from Above
11/19/2015

UE for F/BEVAR Outcomes

- 148 patients underwent F/BEVAR over 5 years
- 98 (66.2%) had upper extremity access
  - 12 (12.2%) percutaneous
  - 86 (87.8%) open
- Any sheath size >7 Fr
  - Open brachial access

Operative Details

<table>
<thead>
<tr>
<th></th>
<th>Femoral</th>
<th>Upper Extremity</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenestrations</td>
<td>2.72 ± 0.09</td>
<td>3.25 ± 0.08</td>
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<tr>
<td>Operative Time</td>
<td>258.8 ± 14.1</td>
<td>327.1 ± 10.6</td>
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<td>EBL</td>
<td>490.5 ± 44.1</td>
<td>754.8 ± 65.7</td>
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<td>Transfusion</td>
<td>1.23 ± 0.31</td>
<td>2.17 ± 0.43</td>
<td>0.1</td>
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<td>ICU LOS</td>
<td>3.42 ± 0.65</td>
<td>4.20 ± 0.38</td>
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<tr>
<td>Total LOS</td>
<td>7.34 ± 1.28</td>
<td>7.03 ± 0.47</td>
<td>0.78</td>
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Results – Upper Extremity Sheath Size

- Distribution of Sheath Sizes

Results – Local Complications

- Four (4.1%) patients developed local complications
  - Percutaneous (2 complications)
    - Hematoma with manual pressure, required intraoperative cut-down and primary repair (7 Fr)
    - Hematoma, conservatively managed (6 Fr)
  - Open (2 complications)
    - Hematoma with neurologic symptoms, surgical repair (12 Fr)
    - Hematoma, conservatively managed (12 Fr)

Results - CVA

- Two (1.4%) patients developed a stroke post-procedure
  - Femoral access (1 CVA)
    - 66-year-old male with 6.4 cm pararenal AAA
    - Normal post-operative neurologic exam
    - After 3 days, new onset atrial fibrillation and left arm weakness
    - MRI - right frontal and parietal lobe CVA
    - Discharge to rehab after 5 days, regained 5/5 strength
  - Brachial access (1 CVA)
    - 75-year-old female with 5.7 cm type V TAAA
    - 12F open brachial access, normal postoperative exam
    - Developed severe hypertension after 5 days, unresponsive
    - MRI - large temporal hemorrhagic stroke
    - Family withdrew care

Results – Open vs Percutaneous

<table>
<thead>
<tr>
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<th>Access side</th>
<th>Femoral</th>
<th>Upper Extremity</th>
<th>P-Value</th>
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<tbody>
<tr>
<td>Number</td>
<td>12 (12.2%)</td>
<td>96 (87.8%)</td>
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<tr>
<td>Complications</td>
<td>2/12 (16.7%)</td>
<td>2/86 (2.3%)</td>
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<td>Stroke</td>
<td>0/12 (0%)</td>
<td>3/86 (3.5%)</td>
<td>0.7</td>
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</table>

Conclusions

- Upper extremity access appears to be a safe and feasible approach for patients undergoing FEVAR
- Open exposure in the upper extremity appears to be safer than percutaneous access
- Upper extremity access during FEVAR is not associated with an increased risk of stroke
  - Multiple visceral vessel stenting
  - Large sheath size
  - Despite increased complexity in the upper extremity group