New Concepts and Improvements in Fenestrated Aortic Endografts and Improvements in Imaging for F/BEVAR with Fusion and IVUS

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Consultant for:
- WL Gore
- Cook
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Research Support
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Aortic Angulation
Common for angulation to occur with left sided turn

Downward Orientated Renal Arteries

Completion

Brachial Access
Caudal Oriented Vessels
Preloaded Systems

Useful for:
• Stenotic vessels
• Ptotic Vessels
• Luminal constraints

Advances in Imaging

Sizing the Aortic Neck
Circa - 1999

- Angulated necks appear oval shaped
- Accurate sizing requires the measurement of the true diameter of the artery

Precise Imaging

• Detailed imaging is critical
  - Avoids complications
  - Inter-observer variation is usually <15° and <1 mm
  - Larger variations can lead to target vessel complications
  - Important to examine and modify centerline

Proximal Neck Diameter Measurement Angiogram
Circa 1999

- Body Level One
- Body Level Two
- Body Level Three
- Body Level Four
- Body Level Five

Always Evaluate in both AP and Lateral views

Lateral

24 mm

AP

28 mm
**Target Vessel Identification**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>Contrast Angiography</td>
<td>No additional manipulations of vessel</td>
<td>More contrast</td>
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<tr>
<td>Pre-cannulation</td>
<td>Reduces Contrast</td>
<td>Potential increase risk of target vessel injury</td>
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<tr>
<td>CT Angiography/Dyna CT</td>
<td>Reduces Contrast</td>
<td>Requires special equipment</td>
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<tr>
<td>IVUS</td>
<td>No contrast</td>
<td>Requires reference imaging</td>
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*Additional contrast minimization with dilute contrast (50%)*

**Image Fusion**

- Dyna CT
- Pre-Op CT

**FEVAR Implantation**

- IVUS/Fusion

IVUS evaluation performed with stent wires in place to simulate deformation that will occur.

**AP View**

- IVUS/Fusion

SMA
Lateral View
IVUS/Fusion
Right Renal Artery
SMA

Intra-Operative Guidance
Identification of Vessel Origins
3D Aortic Overlay

Completion Assessment
Dyna CT
Imported to Terarecon

Device Complications
Stent Crushing
Generally occurs on contralateral renal or SMA

Complications
AP stent compression
AP View
Stent crush in AP direction
Caudal

Inadequate Branched Stent Sealing
**Vessel Tortuosity**

- Difficult to visualize
- AP angulation in renals
- Seen most commonly with the RRA
- Transition is managed with self-expanding stent

**Conclusions**

- Advancements in device design aid tremendously in device implantations
  - Preloaded catheters and Access scallops
- Imaging modalities and techniques have advanced significantly since the initial commercial release of fenestrated devices
- Advanced imaging techies implemented pre-operatively, intra-operative can reduce the number of secondary interventions required
  - reducing radiation and contrast usage
  - improving outcomes