Results With Complex EVARs (FEVAR) Performed With C-Arm Mobile Imaging Fluoroscopy Units Are As Good As Those Done With Fixed Equipment In A Hybrid Suite

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Disclosures

• Proctor for COOK Medical

Introduction

Hybrid operating room

- Combines advantages of several imaging techniques (Fusion technique; CBCT)
- Less image distortion
- Lower contrast dose and fluoroscopy time
- Operator-controlled imaging

Mobile C-arm vs Hybrid Room

Pro /Con

• Con Mobile C-Arm:
  - the limited power of the tube impacts image quality.
  - the field of view is smaller for image-intensifier systems than for flat-panel detector systems
  - the cooling system of mobile C-Arms can lead to overheating after just a few hours.
• Con Hybrid Room:
  - Compared to a mobile C-Arm, fixed C-Arms work on a much higher energy level, which induces higher dose.

Financial Issues

• Mobile C-arm Machines
  – $50,000 – $140,000

• Imaging System in Hybrid Room
  – $1,000,000

Preparation of the Hybrid Room

• Space: >70 square meters including a control room & technical room

- 2-3mm lead shielding
- potentially enforcement of the floor or ceiling to hold the additional weight of the imaging system (approximately 650–1800 kg)
Material and Methods

- Retrospective analysis of prospectively collected data
- January 2006 and November 2014
- Inclusion of FEVAR for infra-, juxta-, suprarenal AAA
- Primary endpoints
  - Radiation exposure
  - Intraoperative complications
  - 30-day mortality
  - Deterioration of renal function
  - Target vessel patency
Demography

- 74 patients, (89.2% male, 75.5±6.1 age)
- 50 (68%) in the mobile C-arm vs. 24 (32%) in the Hybrid Room group
- No significant differences in co-morbidity
- Mean aneurysm size: 65 mm (47-89 mm) vs 66 mm (54-92)

Intraoperative results

- No intra-operative deaths
- Radiation exposure (DAP): 116074 Gy.cm² vs 147161Gy.cm² (p=0.43)
- Contrast volume: 163 ml vs 135 ml (p=0.06)
- Intraoperative complications: 20% vs 21% (p=0.58)

Intraoperative complications

<table>
<thead>
<tr>
<th>Endoleaks type I-II, n(%)</th>
<th>C-ARM</th>
<th>HYBRID ROOM</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 (11%)</td>
<td>3 (12.5%)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Graft or vessel occlusion, n(%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Peripheral embolization, n(%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Intravenous dissection, n(%)</td>
<td>1 (2%)</td>
<td>1 (4.2%)</td>
<td>0.52</td>
</tr>
<tr>
<td>Intravenous rupture, n(%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Unintentional renal occlusion, n(%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Conversion to open surgery, n(%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Location renal stent, n(%)</td>
<td>2 (4%)</td>
<td>0 (0%)</td>
<td>0.55</td>
</tr>
<tr>
<td>Incorrect placement stent-graft, n(%)</td>
<td>1 (2%)</td>
<td>1 (4.2%)</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Postoperative results

- Hospital stay: 7 vs. 5 days (p=0.06)
- Postoperative renal insufficiency: 7% vs 4% (p=0.07)
- 30-days mortality: 6% vs. 0% (p=0.08)
- Target vessel patency:
  - @1 month: 97% in both group (p=1.00)
  - @ 2 years: 94% vs 97% (p=0.23)

Conclusion

- FEVAR can be done successfully using mobile C-arm
- Mobile C-arm works for low volume centers with not-too-complicated procedures (EVAR/FEVAR)
- More complex procedures (BEVAR/Arch repair) need hybrid room, because of:
  - For using image fusion / CBCT
  - Contrast reduction
  - Radiation reduction (for medical staff)