Penetrating abdominal aortic ulcer endovascular treatment: Could ultra-low profile endograft be considered the first choice?

A single center experience
Disclosure

Speaker name:

...............PAOLA SCRIVERE.................................................................

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☒ I do not have any potential conflict of interest
INTRODUCTION

- Abdominal Penetrating aortic ulcers (**PAU**): aneurysmal degeneration of focal atherosclerotic lesions

- Higher incidence in elderly population associated to a mild-severe panvascular disease

- PAU overall incidence is 1%: abdominal infrarenal PAU represent 15%, despite Thoracic PAU (76% circa).

- PAU natural history, therapeutic indications, and outcomes are less well-defined
INTRODUCTION

Complicated PAU: indication to treat

Radiological peculiar characteristics:

- Depth > 20 mm
- Intimal disruption > 10mm
- Increasing maximal aortic diameter/sudden growth
- PAU Evolution into IMH, pseudoaneurysm, saccular aneurysm
- Symptomatic PAU


<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Class</th>
<th>Level</th>
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<tbody>
<tr>
<td>115</td>
<td>I</td>
<td>C</td>
<td>[499,579]</td>
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<tr>
<td>In patients with complicated penetrating aortic ulcer, dissection, or intramural haematoma, and in pseudoaneurysm in the abdominal aorta, repair is recommended.</td>
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<tr>
<td>116</td>
<td>IIb</td>
<td>C</td>
<td>[361,623]</td>
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<td>Early treatment may be considered for saccular abdominal aortic aneurysms, with a lower threshold for elective repair than for standard fusiform abdominal aortic aneurysms.</td>
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<td>In patients with complicated penetrating aortic ulcer, dissection, intramural haematoma, or pseudoaneurysm of the abdominal aorta, endovascular repair should be considered as a first option.</td>
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PREOPERATIVE PLANNING:

- Calcified / coral reef proximal neck
- Length of proximal neck and distal neck
- Length between lowest renal artery and the aortic carrefour
- Narrow and calcified aortic carrefour
- Hypertrofic IMA and lumbar arteries
- Mild vs severe stenosis of iliac arteries
- Groin access inadequate foe percutaneous approach

CHALLENGING PAU CHARACTERISTICS

**TYPE A**
Proximal PAU with adequate distal landing zone and narrow carrefour

**TYPE B**
Distal PAU with adequate proximal neck and carrefour diameter: EVAR

In case of narrow proximal/distal neck: Double Barrell Technique
ULTRA-LOW Profile Endograft Characteristics

Reengineering the EVAR you know

From catheter to crown, the ultra-low profile INCRAFT™ System has been designed to enhance EVAR success—including your most complex cases.

Highly flexible, hydrophilically coated catheter helps minimize delivery-related complications by advancing smoothly through even the most tortuous, diseased, and heavily calcified vessels.

Designed for PEVAR access
Perform minimally invasive PEVAR with the ultra-low-profile 13F inner and 14F outer diameter delivery system featuring an integrated sheath introducer and state-of-the-art device compression technology.

Treatment for a broader range of patients
Demonstrated in simple and complex anatomies, including patients who would have been previously excluded from EVAR, even those with small (47 mm), diseased, and challenging vessels.

Engineered for ease of use
Use conventional delivery techniques.

Constructed to help reduce procedure complexity
Innovative INCRAFT™ System technology, including "cap-free" trans-renal design and per-procedure customisation, enhances the capabilities of EVAR without adding complexity.

InCraft
• RETROSPECTIVE STUDY: to investigates mid-term outcomes of endovascular treatment with ultra-low profile endograft vs standard EVAR and aortic cuff.

• PRIMARY OUTCOME: Technical success rate, limb patency, no crushing stents, no EL, reintervention rate at mid-term FU

• Mean FU: 24 months

Incidence of PAU in relation to EVAR procedures between 2017-2023: 12%
By 2018, in 44% of cases PAU, in case of favourable anatomies for EVAR, 44% were treated with Ultra-Low Profile endograft
## Demographic and Anatomical Characteristics

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>N° Patients (35)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTN</td>
<td>30</td>
<td>83%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>20</td>
<td>56%</td>
</tr>
<tr>
<td>COPD</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Cardiac failure</td>
<td>18</td>
<td>51%</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>6</td>
<td>16%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>PAD</td>
<td>14</td>
<td>40%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>8</td>
<td>23%</td>
</tr>
</tbody>
</table>

- High risk patients unfit for open surgery
- Panvascular Disease
## PAU ANATOMICAL CHARACTERISTICS

### EVAR procedures in PAU

<table>
<thead>
<tr>
<th>ANATOMICAL FEATURES</th>
<th>EVAR</th>
<th>AORTIC CUFF</th>
<th>EVAR Ultra low profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sac Diameter AP (mm)</td>
<td>46+-13</td>
<td>41+-17</td>
<td>46 +- 9</td>
</tr>
<tr>
<td>Sac Diameter LL (mm)</td>
<td>49+-14</td>
<td>35+-15</td>
<td>44 +-10</td>
</tr>
<tr>
<td>Proximal Neck Length (mm)</td>
<td>31+-8</td>
<td>24+-9</td>
<td>32+-11</td>
</tr>
<tr>
<td>Proximal Neck Diameter at a 5 mm</td>
<td>21+-3</td>
<td>19+-2</td>
<td>21+-5</td>
</tr>
<tr>
<td>Proximal Neck Diameter at 20mm</td>
<td>23+-4</td>
<td>20+-3</td>
<td>22+-5</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>25+-7</td>
<td>23+-5</td>
<td>24+-7</td>
</tr>
<tr>
<td>Carrefour Diameter (mm)</td>
<td>23+-6</td>
<td>16+-3</td>
<td>21+-8</td>
</tr>
<tr>
<td>Distal Neck Length to aortic carrefour (mm)</td>
<td>10+-10</td>
<td>18+-5</td>
<td>16+-12</td>
</tr>
<tr>
<td>Diametri iliache comuni (mm)</td>
<td>11+-4</td>
<td>12+-3</td>
<td>9+-3</td>
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MID-TERM FU:
SURVIVAL RATE

### Overall Survival

- Incraft
- Bifurcated
- Tubes

### Aortic survival

- Incraft
- Bifurcated
- Tubes

Survival rates are depicted over 60 months with milestones at 1, 3, 6, 9, 12, 18, 24, 36, and 48 months.
MID-TERM FU:
PRIMARY OUTCOME

Iliac branch patency: 100%

Freedom from reintervention: 97%
**Type 2 EL:**
- 3 early type 2 EL (Standard EVAR)
- 1 late type 2 EL (Ultra-low profile)

**Freedom from type 1A EL**
- At 1 months FU: 96% (Aortic CUFF). AT 2 ys FU: resolution
- At 56 months: 86% (Ultra-low Profile)
CONCLUSIONS

• In case of infrarenal aortic lesions, EVAR represents the first line treatment in comparison to surgical repair, especially in case of calcified aorta.

• Technical success and favourable long-term primary outcomes are strictly related to a preoperative accurate planning.

• Considering the wide variability of anatomical PAU characteristics, endovascular treatment need a adequate and accurate planning and potential bail-out solutions.

• Ultra low-profile stent grafts could become a valid alternative, ensuring a high trackability and pushability in calcified iliac arteries and reducing kinking or fractures of the iliac endografts.

• Ultra-low profile endograft should be considered in case of narrow aortic carrefour (up to 15 mm) and calcified iliaca arteries.
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A single center experience

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