Conversion to open procedure:
Decision making, treatment, tips & tricks

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Conflict of interest

Nothing to disclose
EVAR vs Open

EVAR has no advantage on survival!

Salata K. et al. JAMA Net Open – Surgery - 2019
EVAR vs Open

.. but higher need of secondary procedures!

Salata K. et al. JAMA Net Open –Surgery - 2019
EVAR unsolved issues

Endoleak

Durability

Migration
ENDO vs OR: long-term

Meta-analysis (52,220 pts)

- ACE (299 pts)
- DREAM (351 pts)
- EVAR1 (1,252 pts)
- MEDICARE (45,560 pts)
- OVER (881 pts)
- SwedVasc (3,777 pts)

↑ reinterventions (OR = 2)

↑ AAA rupture (OR = 6)

Meta-analysis (52,220 pts)

Reinterventions @ 4 yrs

AAA rupture @ 4 yrs

Stather et al, Br J Surg 2013
Late ruptured AAA after EVAR

3 years after EVAR

Proximal type I EL with retroperitoneal hematoma

Trend of open conversion 2010-2015

Growing rate of EVAR

Secondary procedures

Late open conversions

1.9%
4%

Moulakakis et al J Endovasc Ther 2010
OSR personal experience
2005-2019

1487 EVAR procedures
23 Open conversion *

*1.5%
OSR global experience 2005-2019

Tot. 84 pts

Open conversion after EVAR

23 pts OSR 27%

61 pts other centers 73%
### Causes of open conversion

<table>
<thead>
<tr>
<th>Cause</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endoleak I - III</td>
<td>45</td>
</tr>
<tr>
<td>Endoleak II</td>
<td>21</td>
</tr>
<tr>
<td>Occlusion</td>
<td>7</td>
</tr>
<tr>
<td>Graft failure</td>
<td>5</td>
</tr>
<tr>
<td>Infection</td>
<td>4</td>
</tr>
<tr>
<td>Migration</td>
<td>2</td>
</tr>
</tbody>
</table>
When EVAR fails ...

..it’s time for surgical conversion!
Surgical approach after EVAR

Saccotomy

Laparoscopic ligation

Partial endograft removal

Complete endograft removal

Lumbar artery
Surgical approach after EVAR

Saccotomoy

Laparoscopic ligation

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Complete endograft removal
Technique: surgical accesses

- Median laparotomy: 44%
- Bilateral subcostal laparotomy: 48%
- Thoraco-phreno-laparotomy: 8%
Technique: clamping site

Infrarenal: 47%  Suprarenal: 42%  Supraceliac: 11%
Case #1
Main body complete removal

62 y.o. male

2012: EVAR (Gore Excluder)
Type II endoleak (IMA and lumbar)

2013-14: Previous embolizations

2015: Rapid sac enlargement
Case #1
Main body complete removal
But... endograft configuration

- No free-flow: 43%
- Free-flow: 27%
- Free-flow + barbs: 30%
- Total: 57%
Main body complete removal may cause...

Aortic dissection
Aortic endoarterectomy
Renal dissection
Renal ischemia
Renal embolization
Complete removal (stent+barbs)

Bilateral renal artery bypass

Bilateral renal artery occlusion after conversion
Case #2
Main body partial removal

71 y.o. female

2013: EVAR (Trivascular Ovation)
Type II endoleak

2015: Embolization

2016: Rapid sac enlargement
Case #2
Main body partial removal
Focus on the technique:

Proximal anastomosis

(when stent-graft is partially removed)

“Triple-layer technique”
Focus on the technique: Distal anastomosis (with iliac limbs preservation)

Pruitt catheters limb occlusion
Case#3
Nellix (EVAS) open conversion

78 y.o. male

2016: EVAS (Nellix)

2018: Graft migration with sac reperfusion and abdominal pain
Case #3
Nellix (EVAS) open conversion

Aortotomy
Case#3
Nellix (EVAS) open conversion

Polymer disruption
## Open conversion: results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>5</td>
<td>5.9%</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>8</td>
<td>9.5%</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>2</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
Open conversion: results

<table>
<thead>
<tr>
<th></th>
<th>Complete removal</th>
<th>Partial removal</th>
<th>Saccotony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>38 (45%)</td>
<td>43 (51%)</td>
<td>3 (3.6%)</td>
</tr>
<tr>
<td>Renal Insufficiency</td>
<td>4 (10%)</td>
<td>1 (2.3%)</td>
<td>0</td>
</tr>
<tr>
<td>In-hospital Mortality</td>
<td>1 (2.6%)</td>
<td>1 (2.3%)</td>
<td>0</td>
</tr>
</tbody>
</table>
Conclusions
Open conversion after EVAR

- Technical challenging
- Mortality and morbidity rates acceptable in high volume centres for open repair
- Partial removal of the stent-graft offers reduced renal morbidity
- Careful patient selection and follow-up after EVAR
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