F/b EVAR are they cost-effective at two years compared to OSR for patients with complex aortic aneurysms

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Disclosures

- I have the following potential conflicts of interest to report:
  - A grant obtained from the French Ministry of Health covered the cost of the study (STIC 2009 – P090209; IDRCB 2009-A00743-54). Neither the sponsor nor the manufacturer had a role in the design of the study.
Context & objective

f/b EVAR offer encouraging results for in complex aortic aneurysms but limits as well
• No RCT vs. OSR
• Frequent re interventions
• High cost
• No economic evaluation

Objective: to assess the cost-effectiveness of f/b EVAR compared to OSR in thoraco-abdominal or complex abdominal aortic aneurysms at two years
Method

Two cohorts

• OSR patients: French national hospital discharge database
  – Records all acute-care hospital admissions with diagnoses, surgical procedures, length of stay, etc. for payment purposes

• f/b EVAR patients: WINDOW registry
  – Multicenter, prospective single-arm registry
  – CRF data and hospital discharge data

→ Comparison based on data from the discharge database for the two groups
Population

WINDOW registry

• Patients at high risk for open surgery, with an AAA > 50 mm in men/45 in women, with or without thoracic aortic aneurysm greater than 55 for men/50 mm for women, and with an infrarenal neck < 10 mm in length or extent of the aneurysm to the suprarenal aorta

• Emergent and ruptured aneurysms and aortic dissections were excluded

OSR patients

• Same exclusion criteria as in the registry whenever possible
Outcomes

At two years

- In-hospital all-cause mortality
- Readmissions for cardiovascular events and for any cause
- Total hospital costs
- Incremental cost-effectiveness ratio (ICER): additional cost per death averted

\[
\frac{(\text{cost}_{f/b \text{ EVAR}} - \text{cost}_{\text{OSR}})}{(\text{effectiveness}_{f/b \text{ EVAR}} - \text{effectiveness}_{\text{OSR}})}
\]
Analysis

Multivariate Cox model
Propensity score matching between f/b EVAR and OSR patients (1 for 2) based on age, sex, type of aneurysm and Charlson index
Bootstrap analysis
1,678 patients treated with OSR

268 patients treated with f/b EVAR

- Significantly older (71.6 vs. 69.2 years, p<0.001)
- No difference in Charlson index but dyslipidemia, hypertension, chronic pulmonary disease and congestive heart failure more frequent / peripheral arterial occlusive disease less frequent
Mortality - all

14.9% with f/b EVAR vs. 11.8% with OSR (p=0.15)

- Para/juxtarenal AAA: 11.2% vs. 11.4%, p=0.96
- Infradiaphragmatic TAAA: 17.1% vs. 8.4%, p=0.09
- Supradiaphragmatic TAAA: 28.6% vs. 31.0%, p=0.79

Multivariate regression: no association

- HR=0.85, CI95%=[0.59 ; 1.22]
After propensity score matching (n=720)

<table>
<thead>
<tr>
<th></th>
<th>HR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment (f/b EVAR)</td>
<td>0.91</td>
<td>[0.60 – 1.40]</td>
<td>0.67</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
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<tr>
<td>Mechanical ventilation ≥ 7 days</td>
<td>1.98</td>
<td>[1.13 – 3.46]</td>
<td>0.017</td>
</tr>
<tr>
<td>Severe ischemic colitis or bowel infarction</td>
<td>3.12</td>
<td>[1.67 – 5.82]</td>
<td>0.0003</td>
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<tr>
<td>Reintervention</td>
<td>2.05</td>
<td>[1.22 – 3.47]</td>
<td>0.048</td>
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</tbody>
</table>
Patients with at least one readmission

- For a CV event: 34.4% with f/b EVAR vs. 23.3% with OSR, p=0.0002
- Any readmission: 69.7% vs. 64.2%, p=0.0955

Mean number of readmissions per patient
- For a CV event: 0.6 vs. 0.4, p<0.0001
- Any readmission: 2.2 vs. 1.7, p=0.0013
## Costs

Total hospital costs significantly higher with f/b EVAR

- Initial admission: 95% of the difference at two years

<table>
<thead>
<tr>
<th></th>
<th>f/b EVAR</th>
<th></th>
<th>OSR</th>
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<th>p (f/b EVAR vs. OSR)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>p</td>
<td>Mean (SD)</td>
<td>p</td>
<td></td>
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<tr>
<td>All patients</td>
<td>46,039 (27,371)</td>
<td>22,779 (24,228)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Para/juxtarenal AAA</td>
<td>41,786 (26,290)</td>
<td>21,142 (20,358)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Infradiaphragmatic TAAA</td>
<td>44,575 (16,956)</td>
<td>22,551 (18,725)</td>
<td>&lt;0.0001</td>
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<td></td>
<td>&lt;0.0001</td>
<td>&lt;0.001</td>
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<tr>
<td>Supradiaphragmatic TAAA</td>
<td>65,491 (31,909)</td>
<td>55,364 (60,281)</td>
<td>0.3160</td>
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</tbody>
</table>
Cost-effectiveness analysis

f/b EVAR is more costly and less effective than OSR at two years
→ Not cost-effective

In the population matched with propensity score (n=720), ICER = €405,960,000 per death averted
→ Unlikely to be cost-effective
Cost-effectiveness analysis

Legend:
- Para/juxtarenal abdominal aortic aneurysm
- Infradiaphragmatic thoraco-abdominal aortic aneurysm
- Supradiaphragmatic thoraco-abdominal aortic aneurysm

Threshold: willingness to pay for one extra unit of effectiveness

- Less effective and more costly → Rejected
- More effective and more costly → ?
- Less effective and less costly → Rejected?
- More effective and less costly → Adopted
f/b EVAR has no survival advantage at two years compared to OSR and is more expensive

- Results robust to sensitivity analyses

→ f/b EVAR does not appear justified in patients eligible to OSR, particularly patients with para/juxtarenal AAA and infradiaphragmatic TAAA
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