EVAR should be the first choice treatment in a young patients with good anatomy

Frans Moll

Joost van Herwaarden
Disclosure

Speaker name: FRANS MOLL

I have the following potential conflicts of interest to report:

- Consulting Philips, Medtronic and Best Doctors
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest
Research question

• Does EVAR or open repair result in the best outcomes in young and healthy patients with AAA?
Research question

• Does EVAR or open repair result in the best outcomes in young and healthy patients with AAA?

• Best treatment:
  – Safe procedure
  – Durable result
Methods

• **Systematic literature Search following MOOSE guidelines**
  – Medline, Embase and Cochrane

• **Keywords**
Methods

• **Inclusion criteria**
  A: To look for perioperative benefit
  – AAA treatment (EVAR or open repair)
  – Patients < 70 years or at low risk

B: To investigate durability
  – Long term (>5yrs) durability of stentgrafts

• **Exclusion criteria**
  – Complicated or emergency procedures
Methods

• Data extraction
  – Patient characteristics

  – Outcomes
    • **Short term**: complications, mortality
    • **Long term**: reinterventions, ruptures, mortality
Results

• **Systematic search:**
  - 957 possibly relevant articles

• **Used articles**
  - Young or low risk patient articles: 3
  - Durability of EVAR articles: 12
Patient fitness and survival after abdominal aortic aneurysm repair in patients from the UK EVAR trials

The EVAR Trial Participants

British Journal of Surgery 2007; 94: 709–716

- N = 1656
- Fitness classified: good, moderate or poor by Customized Probability Index
- 30-day mortality for pts with good fitness:
  
  EVAR 1.0% vs OR 4.1% (OR 0.24, P = 0.030)
Patient fitness and survival after abdominal aortic aneurysm repair in patients from the UK EVAR trials

The EVAR Trial Participants

![British Journal of Surgery 2007; 94: 709–716](image)

- \( N = 1656 \)
- Fitness classified: good, moderate or poor by Customized Probability Index
- 30 day mortality for pts with good fitness:
  
  **EVAR 1.0% vs OR 4.1%** (OR 0.24, \( P = 0.030 \))

**Conclusion:** The benefit of endovascular repair was most convincing in the fittest patients. There was no evidence that the fittest patients benefited more from open surgery.
• 61,598 treated AAA patients (2001-2004)
  – 2 matched cohorts of 22,300

• Outcomes
  – Higher mortality in younger patients after open repair
    • RR compared to EVAR 6.21, p<0.001
  – 4 yrs minor reinterventions
    • 1.3% OR vs 7.8% EVAR
  – 4 yrs laparotomy-related reinterventions
    • 9.7% OR vs 4.1% EVAR
  – Rupture uncommon in both EVAR and OR
• Retrospective data: 260 EVAR vs 417 OR
  – 1996-2005
  – Follow up 3-5 yrs

• Outcomes
  – 30 day mortality patients ≤69:
    2.5% OR vs. 0% EVAR

Blood loss, length of hospital stay and patients discharged home → in favour of EVAR
Durability stent-grafts

- 12 relevant studies
- Follow up 5-9 yrs
- Patiënt numbers: 68-6,787

Durability stent-grafts

• **Low AAA-related mortality rates**
  – 9/11 included studies <1%
  – Annual aortic rupture ~1%

• **Annual conversion to OR <1% – 2%**

• **Annual reinterventions 2.3% – 6%**
  – Latest generation devices: lower reintervention rates
  – Majority small interventions
Conclusion

• EVAR better than OR in young and low risk patients

  – Short Term
    • Lower 30 day morbidity and mortality

  – Long Term
    • Good, improving durability results
    • More minor reinterventions but less laparotomy related reinterventions
What about sexuality?

IMPOTENCE...

NATURE'S WAY OF SAYING "NO HARD FEELINGS".
Methods

• 1999 – 2002
• EVAR or OR
• 293 male pts
• Questionnaire regarding sexual functioning before and 3 months after Repair
Results

• 90 questionnaires returned
• No differences before procedure
Results

• Erectile function worsened after OR \( (p=0.002) \)
• Orgasmic function deteriorated after OR \( (p=0.001) \)
• EVAR not accompanied by decreased erectile or orgasmic function
• Impairment of erectile function not associated with number of patent hypogastric arteries
Who can still advocate OR over EVAR for young & fit patients?
Comparative Safety of Endovascular Aortic Aneurysm Repair Over Open Repair Using Patient Safety Indicators During Adoption

John Rose, MD, MPH; Christopher Evans, BS; Andrew Barleben, MD, MPH; Dennis Bandyk, MD; S. Eric Wilson, MD; David C. Chang, PhD, MBA, MPH; John Lane, MD

**IMPORTANCE** In 2003, the Agency for Healthcare Research and Quality established Patient Safety Indicators (PSIs) to monitor preventable adverse events during hospitalizations.

**OBJECTIVE** To evaluate the comparative safety of endovascular aneurysm repair (EVAR) vs open aneurysm repair (OAR) of abdominal aortic aneurysm by measuring PSIs associated with each procedure over time.

**DESIGN, SETTING, AND PARTICIPANTS** Cases of abdominal aortic aneurysm repair were extracted from the Nationwide Inpatient Sample (2003-2010). Patient Safety Indicators were calculated using Agency for Healthcare Research and Quality software (WinQi, version 4.4). Unadjusted analysis included year, age, sex, race/ethnicity, comorbidities, rupture status, hospital teaching status, and emergency status. Multivariable analysis was stratified by year for any PSI in EVAR vs OAR. Postoperative mortality was analyzed to control for the overall safety.

**MAIN OUTCOMES AND MEASURES** Patient Safety Indicators and mortality.

**RESULTS** In total, 43,385 EVARs and 27,561 OARs were documented, with 1289 (3.0%) and 3094 (11.2%) associated PSIs, respectively. Compared with those receiving OAR, patients receiving EVAR were more likely to be male, older, and of white race/ethnicity; have a lower Charlson Comorbidity Index; and seek care at teaching hospitals (P < .001 for all). Patients were less likely to have a PSI after EVAR than after OAR. Overall, multivariable analysis showed that EVAR was associated with a 42.1% decrease in the risk-adjusted odds of any PSI compared with OAR (odds ratio, 0.58; 95% CI, 0.51-0.65). Stratified by year, the risk-adjusted odds of any PSI after EVAR were comparatively less likely than after OAR every year except for 2007, and the odds of death were comparatively less every year. The annual percentage of PSIs among all aortic repairs decreased from 7.4% in 2003 to 4.4% in 2010, while the proportion of total repairs that were EVARs increased from 41.1% in 2003 to 75.3% in 2010.

**CONCLUSIONS AND RELEVANCE** Patient Safety Indicators can be used to monitor the comparative safety of emerging surgical technologies. Herein, EVAR was safer than OAR. The adoption of minimally invasive technology can improve safety among surgical admissions.
EVAR Results in higher Patient-Level Safety Benefit than Surgery for AAA

<table>
<thead>
<tr>
<th>Death, Patient Safety Indicators</th>
<th>EVAR (n= 43,385)</th>
<th>Open Repair (n = 27,561)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>1.8%</td>
<td>10.6%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Any Patient Safety Indicator</td>
<td>3.0%</td>
<td>11.2%</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>
Comparative safety of endovascular and open surgical repair of abdominal aortic aneurysms in low-risk male patients

Jeffrey J. Siracuse, MD, Heather L. Gill, MD, Ashley R. Graham, MD, Darren B. Schneider, MD, Peter H. Connolly, MD, Art Sedrakyan, MD, PhD, and Andrew J. Meltzer, MD, New York, NY

Objective: The prevalence of significant comorbidities among patients with abdominal aortic aneurysms (AAAs) has contributed to widespread enthusiasm for endovascular AAA repair (EVAR). However, the advantages of EVAR in patients at low risk for open surgical repair (OSR) remain unclear. The objective of this study was to assess perioperative outcomes of EVAR and OSR in low-risk patients.

Methods: Patients undergoing EVAR and OSR for infrarenal AAAs were identified in the 2007 to 2010 National Surgical Quality Improvement Program data sets. AAA-specific risk stratification, by the Medicare aneurysm scoring system, was used to create matched low-risk (score <3) cohorts. Perioperative morbidity and mortality were assessed by crude comparisons of matched groups and regression models.

Results: Of 11,753 elective patients undergoing EVAR, 4,339 (37%) were deemed low risk (score <3). A matched cohort of 1,576 low-risk patients was developed from a total of 3,804 (41%) undergoing OSR. The low-risk cohorts included only male patients and those <75 years of age, without significant cardiac, pulmonary, or vascular comorbidities. Mean age in both low-risk groups was 67 ± 6 years (P = NS). EVAR patients had higher rates of obesity (40% vs 33%; P < .001), diabetes (16% vs 13%; P = .005), history of cardiac intervention (24% vs 19%; P < .001), cardiac surgery (23% vs 20%; P = .02), steroid use (4% vs 2%; P = .002), and bleeding disorders/anti-coagulation (9% vs 6%; P = .001) compared with OSR patients. There were no other differences between the matched cohorts. EVAR was associated with reduced 30-day mortality (0.5% vs 1.5%; P < .01) and reduced rates of major complications, including the following: sepsis (0.7% vs 3.2%; P < .01), unplanned intubation (1.0 vs 5.4%; P < .001), pneumonia (0.8% vs 6.1%; P < .001), acute renal failure (0.4% vs 2.7%; P < .001), and early reoperation (3.7% vs 6.0%; P < .001). Furthermore, EVAR was associated with reduced perioperative morbidity across organ systems, including venous thromboembolism (0.1% vs 0.3%; P = .001), transfusion requirement of more than 4 units (2.0% vs 13.0%; P < .001), cardiac arrest (0.2 vs 0.8; P = .001), neurologic deficits (0.2% vs 0.5%; P = .032), and urinary tract infections (1.2% vs 2%; P = .02).

Conclusions: Our results demonstrate that even among those male patients at low risk for OSR on the basis of comorbidities, EVAR is associated with reduced perioperative mortality and major complications. Whereas clinical decisions must account for safety and long-term effectiveness, the short-term benefit of EVAR is evident even among male patients at the lowest risk for OSR. (J Vasc Surg 2014;□:1-5.)
EVAR Safer than Surgery Even in Low-Risk Men

<table>
<thead>
<tr>
<th>Complications and Perioperative Morbidity: EVAR vs. Open Surgery</th>
<th>EVAR (n = 4,068)</th>
<th>Open Surgery (n = 1,459)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Day Mortality</td>
<td>0.5%</td>
<td>1.5%</td>
<td>.001</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0.7%</td>
<td>3.2%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Unplanned Reintubation</td>
<td>0.1%</td>
<td>5.4%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.8%</td>
<td>6.1%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td>0.4%</td>
<td>2.7%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Venous Thromboembolism</td>
<td>0.3%</td>
<td>1.1%</td>
<td>.001</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>0.2%</td>
<td>0.8%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Neurologic Deficits</td>
<td>0.2%</td>
<td>0.5%</td>
<td>.032</td>
</tr>
<tr>
<td>Urinary Tract Infections</td>
<td>1.2%</td>
<td>2.0%</td>
<td>.02</td>
</tr>
</tbody>
</table>
EVAR should be the first choice treatment in a young patients with good anatomy

Frans Moll

Joost van Herwaarden