Current Management for Small Abdominal Aortic Aneurysms

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Medtronic
Cordis J&J
Landscape of the Problem:

- In most cases, the mere presence of a disease mandates treatment
  - Colon cancer - resection
  - Hypercholesterolemia – statins

- But many exceptions exist – (no tx is indicated)
  - Asymptomatic coronary disease
  - Asymptomatic carotid artery stenosis
  - Prostate cancer in an elderly male

- What do these exceptions have in common?
  - “Aegrescit medendo”
  - “The cure is worse than the disease”
    - Virgil, 1st century BCE
Small Aortic Aneurysms: Aegrescit medendo

- Small aortic aneurysms fit into the category of diseases where the cure may be worse than the disease.
- If we had a “pill” for aneurysms, every 3cm “aneurysm” of the infrarenal aorta would be treated.
- Present treatment for aneurysms, be it open or endovascular, can be fraught with complications.
- Unless the aneurysm can be predicted to have a high risk of rupture, the treatment can be worse than the disease.
We treat AAAs to prevent rupture

But do smaller AAAs rupture?

4.2 cm Asymptomatic AAA  
May

2 hours of Back Pain - Rupture  
October
Trade-Off From Treating Small AAA

- The mortality of the operation is significant.
- The risk of rupture is small.
- Unless a procedure can be devised such that the \textit{perioperative mortality is low} and \textit{protection from risk of rupture is high}, small AAA will be better treated with surveillance and not repair.
- But, does the advent of endovascular therapy change the risk-benefit equation?
What Does the Data Show?
If Open Repair is the treatment option, leave them alone!

• **UK Small Aneurysm Trial:**
  – Observation vs. Open Repair
  – *Survival similar* in two groups.
  – Some benefit noted at a single time point, in favor of early repair, but attributed by the authors to better lifestyle management (less smoking)in the surgical group

• **ADAM Trial:**
  – Observation vs. Open Repair
  – *Survival similar* in the two groups
Small Aneurysms

Cleveland Clinic Series: Endo Repair of Small AAA

- 7 years, 456 repairs, f/u just over 1-yr
- Endovascular treatment of smaller aneurysms was associated with:
  - Lower mortality compared with endo treatment of larger (>5.5 cm) AAA
  - Lower risk of subsequent rupture
  - Lower need for open surgical conversion
  - But, this begs the question. **What would have happened if we left these small AAA alone?**
The two randomized small aneurysm trials (UK and ADAM) demonstrated similarity between early open repair and surveillance.

But, perioperative mortality rate* was 5.4% in UK-SAT and 2.7% in ADAM.

If a procedure could be performed with a lower perioperative morbidity than open repair, that procedure might demonstrate better outcomes compared with surveillance.

*30 day, immediate repair group
What Has To Happen For A Randomized Small AAA Trial To Demonstrate Benefit?

• The mortality rate from endovascular repair must be very low (essentially zero!).

• The rupture risk after endovascular repair should be very low (again, essentially zero).

• The rupture rate should be significant in the Surveillance arm
The PIVOTAL Study

• Objective - To compare EVAR to surveillance in patients with 4 to 5 cm abdominal aneurysms, with respect to patient survival, AAA rupture, and AAA related death

• Enrollment – Planned randomization of 1050 patients (525 test; 525 surveillance)

• All test patients to receive either Medtronic FDA-approved device (AneuRx or Talent)

• Follow-up - every 6 months for a minimum of 3 years and up to 5 years depending on date of enrollment.
### Demographics

<table>
<thead>
<tr>
<th></th>
<th>Early Repair (N=366)</th>
<th>Surveillance (N=362)</th>
<th>P-Value</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
<td>70.46 ± 7.80</td>
<td>70.47 ± 7.67</td>
<td>0.99</td>
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<tr>
<td><strong>Male</strong></td>
<td>88.8%</td>
<td>84.5%</td>
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<tr>
<td><strong>White Ethnicity</strong></td>
<td>92.9%</td>
<td>94.8%</td>
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<tr>
<td><strong>Maximum Aneurysm Diameter (cm)</strong></td>
<td>4.45 ± 0.27</td>
<td>4.45 ± 0.27</td>
<td>0.80</td>
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<tr>
<td><strong>Creatinine</strong></td>
<td>1.14 ± 0.29</td>
<td>1.10 ± 0.27</td>
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<td><strong>Current/Former Smoker</strong></td>
<td>90.1</td>
<td>91.9</td>
<td>0.41</td>
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Baseline Risk Factors

- Medication use:
  - Anti-coagulant Use
    - Warfarin (Coumadin)
  - Antiplatelet Therapy
  - Ace Inhibitor Use
  - Beta Blocker Use
  - Lipid Lowering Use
- Family Hx of Aneurysmal Disease
- Cardiovascular History
  - MI
  - CHF
  - CAD
  - Cardiac Arrhythmia
  - Thrombolysis
  - PVD
  - HTN

- Other conditions
  - Abdominal Surgery
  - Pulmonary Disease
  - Renal Disease
  - Endocrine Disease
  - Infectious Disease
  - Gastrointestinal
  - Liver Disease
  - Cancer
  - **Neurological Disease**
    - Higher incidence in Early EVAR group, P=0.031
Cumulative Rate of Aneurysm Repair

![Graph showing cumulative rate of aneurysm repair with data points and months since randomization.](image)

<table>
<thead>
<tr>
<th>Surveillance</th>
<th>Number of Repairs</th>
<th>Number at Risk</th>
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<tr>
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<th>Early EVAR</th>
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Efficacy: Repaired Patients

- Migration:
  - 1 event in each group
- Thrombosis:
  - 5 (5.8%) Surveillance
  - 13 (4.8%) Early EVAR
- Aneurysm Enlargement:
  - 35(14.2%) Surveillance
  - 15 (5.7%) Early EVAR
Primary Endpoint
Composite: Aneurysm Related Mortality or Rupture

![Graph showing proportion of patients free from event over time](image-url)
Survival

**PIVOTAL Study**

![Survival Graph]

<table>
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<th>Months Since Randomization</th>
<th>Surveillance</th>
<th>Early EVAR</th>
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<tr>
<td></td>
<td>Number of Deaths</td>
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**Cumulative Rate of Secondary Interventions**

![Graph showing cumulative rate of secondary interventions over time.](image)

**Surveillance**
- Interventions: 1, 4, 5, 5, 5, 5, 5, 5
- Number at Risk: 109, 67, 71, 39, 22, 8, 1

**Early EVAR**
- Interventions: 0, 7, 8, 9, 10, 12, 12
- Number at Risk: 322, 269, 230, 180, 131, 70, 25

*PIVOTAL Study*
Conclusion

The risk of rupture is low in patients with small aneurysms.

With the early data that is available, there does not appear to be an advantage of early repair over surveillance for patients with small AAA. With carefully follow-up and selective intervention, small aneurysms can be safely observed.