Some small AAAs (4.5-5.5mm) should be treated – how to select them?

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Disclosure

Speaker name:
Athanasios D. Giannoukas.

☑ I have the following potential conflicts of interest to report:
   ☐ Receipt of grants/research support
   ☐ Receipt of honoraria and travel support
   ☐ Participation in a company sponsored speakers’ bureau
   ☐ Employment in industry
   ☐ Shareholder in a healthcare company
   ☐ Owner of a healthcare company

☒ I do not have any potential conflict of interest
Management of Abdominal Aortic Aneurysms
Clinical Practice Guidelines of the European Society for Vascular Surgery


Men should be considered for surgery when the maximum aortic diameter reaches 5.5 cm or more. Level 1b, Recommendation A.

We recommend elective repair for the patient at low or acceptable surgical risk with a fusiform AAA that is ≥5.5 cm.

Level of recommendation 1 (Strong)
Quality of evidence A (High)
RCTS; PROPHYLACTIC OPEN SURGERY VS. SURVEILLANCE

**The UK small aneurysm trial**

**Mortality results for randomised controlled trial of early elective surgery or ultrasonographic surveillance for small abdominal aortic aneurysms**

*The UK Small Aneurysm Trial Participants*  
*Lancet 1998; 352: 1649–55*

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**Immediate repair compared with surveillance of small abdominal aortic aneurysms**

Frank A. Lincoln, M.D., Samuel E. Wilson, M.D., Gary J. Johnson, M.S., Donovan B. Fene M.D., Fred N. Littin, M.D., Charles W. Acher, M.D., David J. Ballard, M.D., Ph.D., Louis M. Mesina, M.D., Ian L. Gordon, M.D., Edmund P. Calfee, M.D., William C. Knapf, M.D., and Dennis Bandor, M.D., for the Anomaly Detection and Management Veterans Affairs Cooperative Study Group*
Comparison of Surveillance Versus Aortic Endografting for Small Aneurysm Repair (CAESAR): Results from a Randomised Trial

P. Cao, P. De Rango, F. Verzini, G. Parlani, L. Romano, E. Cieri, for the CAESAR Trial Group

Endovascular repair compared with surveillance for patients with small abdominal aortic aneurysms

Kenneth Ouriel, MD, Daniel G. Clair, MD, K. Craig Kent, MD, and Christopher K. Zorins, MD, for the Positive Impact of Endovascular Options for treating Aneurysms Early (PIVOTAL) Investigators, New York, NY; Cleveland, Ohio; Madison, Wis; and Palo Alto, Calif

J Vasc Surg 2010;51:1081-7
## Study Methods – Weak Points

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Age Range</th>
<th>Participants</th>
<th>Measurement Method</th>
<th>Diameter Range</th>
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<tbody>
<tr>
<td>ADAM</td>
<td>United States</td>
<td>50 to 79 years</td>
<td>men (n = 1126)</td>
<td>Axial computed</td>
<td>4.0 - 5.5 cm</td>
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<td>women (n = 10)</td>
<td>tomography (CT)</td>
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<td>UKSAT</td>
<td>United Kingdom</td>
<td>60 to 76 years</td>
<td>men (n = 902)</td>
<td>Antero-posterior</td>
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<td></td>
<td></td>
<td>women (n = 188)</td>
<td>maximum diameter</td>
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<td></td>
<td>in US</td>
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<tr>
<td>CAESAR</td>
<td>Italy</td>
<td>50 to 79 years</td>
<td>men (n = 345)</td>
<td>CT scan at the</td>
<td>4.1 - 5.4 cm</td>
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<td>women (n = 15)</td>
<td>maximum external</td>
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<td>cross-sectional</td>
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<td>measurement in any</td>
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<td>the vessel axis</td>
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<tr>
<td>PIVOTAL</td>
<td>United States</td>
<td>40 to 90 years</td>
<td>men (n = 631)</td>
<td>US or CT scan</td>
<td>4.0 - 5.0 cm</td>
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<td></td>
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<td>women (n = 97)</td>
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</table>
• 70% had CTA in the UKSAT

• Revealing AAA of **>5.5 cm** in patients who **had 5-5.4cm in the US**
• Elective operative mortality rate 5.8%

• 61% in the surveillance group underwent AAA repair in the follow-up period

Conclusions: Patients with small AAA under surveillance compared with early EVAR had significant impaired functional health at 6 months after assignment. After a mean of 31.8 months, SF-36 health-related quality of life in patients allocated to early EVAR and surveillance was similar.
**EVAR OUTCOMES OF SMALL VS. LARGE AAA**

**Diameter of abdominal aortic aneurysm and outcome of endovascular aneurysm repair: Does size matter? A report from EUROSTAR**

Noud Peppeelenbosch, MD, Jacob Burkh, MD, PhD, Peter L. Harris, MD, FRCIS, Corinne van Marrewijk, MSc, and Germaine Fransen, MSc, for the EUROSTAR Collaborators Eindhoven, The Netherlands and Liverpool, England

Conclusions: The midterm outcome of large aneurysms after EVAR was associated with increased rates of aneurysm-related death, unrelated death, and rupture. Reports of EVAR should stratify their outcomes according to the diameter of the aneurysm. Large aneurysms need a more rigorous post-EVAR surveillance schedule than do smaller aneurysms. In small aneurysms EVAR was associated with excellent outcome. This finding may justify reappraisal of currently accepted management strategies. (J Vasc Surg 2004;39:288-97.)

**Disparate outcome after endovascular treatment of small versus large abdominal aortic aneurysm**

Kenneth Ouriel, MD, Sunita D. Srivastava, MD, Timur P. Sarac, MD, Patrick J. O’Hara, MD, Sean P. Lyden, MD, Roy K. Greenberg, MD, Daniel G. Clair, MD, Ellis Sampram, MD, and Brett Butler, MD, Cleveland, Ohio

Conclusions: Outcome after endovascular repair of abdominal aortic aneurysm depends on size; results appear inferior in patients with larger aneurysms. These differences attain importance when choosing between observation and repair, balancing risk for rupture against size-dependent outcome. (J Vasc Surg 2003;37:1206-12.)

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**Endovascular Repair or Surveillance of Patients with Small AAA**


1Division of Vascular Surgery and 2Health Research and Policy, Stanford University, Stanford, CA, 3Department of Vascular Surgery, Cleveland Clinic, Cleveland, OH, and 4Division of Vascular Surgery, Harbor UCLA, Torrance, CA, USA

**EVARsmall** | **EVARmatch** | **UKsurvell**
--- | --- | ---
Total patient-years of follow-up | 1369 | 888 | 3048
Mean years of follow-up (SD, range) | 2.9 (1.2, 0-5) | 2.9 (1.2, 0-5) | 5.8 (n/a, 0-10)
Total ruptures | 1.3% | 1.6% | 5.1%
Total ruptures | 0.4% | 0.6% | 4.6%
Elective operative mortality | 1.3% | 1.9% | 5.9%
Total AAA related death | 1.7% | 2.2% | 9.5%
Total mortality | 19% | 18% | 48%

EVARmatch rate is significantly lower than UKsurvell (p=0.001).

**Conclusions.** It appears that endovascular repair of small abdominal aortic aneurysms (4.0–5.5 cm) significantly reduces the risk of fatal aneurysm rupture and aneurysm-related death and improves overall patient survival compared to an ultrasound surveillance strategy with selective open surgical repair.
Variations in Abdominal Aortic Aneurysm Care
A Report From the International Consortium of Vascular Registries


EVAR for small AAA
The Impact of Centralisation and Endovascular Aneurysm Repair on Treatment of Ruptured Abdominal Aortic Aneurysms Based on International Registries


Results: There were 9273 patients included. Mean age was 74.7 (74.5–74.9) years, and 82.7% of patients were men (81.9–83.6). Mean AAA diameter at rupture was 7.6 cm (7.5–7.6). Of these aneurysms, 10.7% (10.0–11.4) were less than 5.5 cm. EVAR was performed in 23.1% (22.3–24.0).
Are all small aneurysms the same?

Which small aneurysms may need treatment?
AAA Diameter

4.0 – 4.9 cm vs. 5.0-5.5 cm may not be the same?

Different natural history in expansion rates and risk for rupture
**Increased risk groups.**

Female gender, smoking, hypertension and chronic airway disease are associated with an increased risk of small aneurysm rupture in some studies. 

Women have a 3- to 4-fold increased risk of rupture when under surveillance and average aortic size at rupture is 5 mm smaller in women than men, although operative outcomes tend to be worse for women than men.

Patients with a higher risk of rupture should be considered for surgery when the maximum aortic diameter reaches 5.0 cm. Level 3, Recommendation C.

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In patients with a small aneurysm (4.0-5.4 cm) who will require chemotherapy, radiation therapy, or solid organ transplantation, we suggest a shared decision-making approach to decide about treatment options.

<table>
<thead>
<tr>
<th>Level of recommendation</th>
<th>2 (Weak)</th>
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<tbody>
<tr>
<td>Quality of evidence</td>
<td>C (Low)</td>
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</table>

We suggest repair in women with AAA between 5.0 cm and 5.4 cm in maximum diameter.

<table>
<thead>
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<th>Level of recommendation</th>
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<tbody>
<tr>
<td>Quality of evidence</td>
<td>B (Moderate)</td>
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</table>
Figure 7: Proposed management of an asymptomatic abdominal aortic aneurysm

Female patients
Younger patients at low surgical risk
Patients with known family history
Rapidly growing AAA
Saccular AAA
Follow-up on Small Abdominal Aortic Aneurysms Using Three Dimensional Ultrasound: Volume Versus Diameter

Q.M. Ghulam a,c,*, K.K. Bredahl a, L. Lönn b,c, L. Rouet d, H.H. Sillese n a,c, J.P. Eiberg a,c,e

Conclusion: In this cohort of small AAAs, 40% of patients with a stable diameter had an increasing volume at 12 month follow-up. From this perspective, 3D-US could have a future supplemental role in AAA surveillance programmes.

On the influence of wall calcification and intraluminal thrombus on prediction of abdominal aortic aneurysm rupture.
Barrett HE1, Cunnane EM1, Hidayat H2, O'Brien JM3, Moloney MA2, Kavanagh EG2, Walsh MT4.

‘No significant correlation was found between the AAA diameter and the wall mechanical properties...... additional biomechanical measures, detailing the biomechanical-structural characteristics of AAA tissue, that may be a helpful adjunct to improve the accuracy of rupture prediction.’
Anatomic characteristics of ruptured abdominal aortic aneurysm on conventional CT scans: Implications for rupture risk

Mark F. Fillinger, MD, Jessica Racusin, MD, Robert K. Baker, MD, Jack L. Cronenwett, MD, Arno Teulelink, MD, Marc L. Schermerhorn, MD, Robert M. Zvolak, MD, PhD, Richard J. Powell, MD, Daniel B. Walsh, MD, and Eva M. Rzucidlo, MD Lebanon, NH


18F-FDG Uptake Assessed by PET/CT in Abdominal Aortic Aneurysms Is Associated with Cellular and Molecular Alterations Prefacing Wall Deterioration and Rupture

Audrey Courtois¹, Betty V. Nusgens¹, Roland Hustinx², Gauthier Namur², Pierre Gomez³, Joan Somja⁴, Jean-Olivier Defraine⁵, Philippe Delvenne⁶, Jean-Baptiste Michel⁷, Alain C. Colige⁸, and Nutzi Sakalihasan⁹

DOI: 10.2967/jnumed.112.115873
18 F–Sodium Fluoride Uptake in Abdominal Aortic Aneurysms: The SoFIA³ Study

Rachael O. Forsythe MD a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, David E. Newby MD a, b, c

**Outcome**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>All Patients</th>
<th>Tertile 1 (n = 24)</th>
<th>Tertile 2 (n = 24)</th>
<th>Tertile 3 (n = 24)</th>
<th>p Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA With AAA (N = 72)</td>
<td>2.20 (0.96–3.73)</td>
<td>1.24</td>
<td>1.55</td>
<td>3.10</td>
<td>0.008</td>
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<tr>
<td>expansion rate, mm/yr</td>
<td>(0.52–)</td>
<td>(0.81–)</td>
<td>(2.34–)</td>
<td>(2.92)</td>
<td>(3.12)</td>
</tr>
<tr>
<td>AAA events</td>
<td>22 (30.6)</td>
<td>4 (16.7)</td>
<td>7 (29.2)</td>
<td>11 (45.8)</td>
<td>0.043</td>
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<tr>
<td>Composite events</td>
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Conclusions

- Diameter is not the only absolute criterion for risk assessment
- Small AAAs do rupture (~10% of all ruptured AAAs)
- Certain factors beyond diameter appear to increase the risk of rupture among the so-called “small AAAs”
- RCT on OR and EVAR vs. surveillance in small AAAs have serious methodological problems
- AAAs 4.0-4.9 cm vs. 5.0-5.4 cm in diameter may not have the same natural history
- Further research is needed to identify which one of small (5.0-5.4cm) AAAs need treatment
Thanks for the attention