No-Repair and Open Surgical Treatment should be considered more often in the Rx of some patients with complex-anatomy large aneurysms.

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**DISCLOSURE:**

Medtronic: consulting, sales training
79y M

“end-stage PAD”: failed previous fem-fem and fem-pop bypasses.
Heavily calcified nearly occluded bilateral iliac and femoral arteries, and more...

Severe COPD; stable CAD

Deemed medically inoperable for major OR

Juxta-renal juxta-visceral AAA, gradually enlarging over the last 5 years, now up to 6.9cm

Became increasingly concerned about “time bomb” in his belly and the risk of rupture...
Kept asking about possible options... advised to go for second opinion
Once in the hands of a specialist:
Once in the hands of a specialist:

It is (almost) always all about *how*…?

BUT seldom if ever on *whether to repair* an aneurysm in the face of a patient of a certain age and life expectancy (among other variables)
DEFINE "COMPLEX"
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Cannot treat optimally with either

- Standard EVAR
DEFINE “COMPLEX”
Cannot treat optimally with either

- **Standard** EVAR


or

- **Standard** Open Repair
Ch-EVAR:
- Advanta V12 bilateral chimney stents
- Proximal extension Endurant cuff to SMA
DEFINE "COMPLEX":

ALSO:

The aneurysm must be large enough to represent an immediate and significant threat to life
AAA = 4.9cm max
70y M
Morbid obesity
Serious CV risks
“You say here you’re eager to ‘push the envelope.’
Great! We’ll place you in the mail room.”
Guidelines for the treatment of abdominal aortic aneurysms


David C. Brewster, MD, Jack L. Cronenwett, MD, John W. Hallett, Jr, MD, K. Wayne Johnston, MD, William C. Krupski, MD, and Jon S. Matsumura, MD, Boston, Mass; Lebanon, NH; Bangor, ME; Toronto, Canada; Denver, Colo; and Chicago, Ill

Table I. Estimated annual rupture risk

<table>
<thead>
<tr>
<th>AAA diameter (cm)</th>
<th>Rupture risk (%/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4</td>
<td>0</td>
</tr>
<tr>
<td>4-5</td>
<td>0.5-5</td>
</tr>
<tr>
<td>5-6</td>
<td>3-15</td>
</tr>
<tr>
<td>6-7</td>
<td>10-20</td>
</tr>
<tr>
<td>7-8</td>
<td>20-40</td>
</tr>
<tr>
<td>&gt;8</td>
<td>30-50</td>
</tr>
</tbody>
</table>
### Table II. Rupture risk

<table>
<thead>
<tr>
<th></th>
<th>Low risk</th>
<th>Average risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>&lt;5 cm</td>
<td>5-6 cm</td>
<td>&gt;6 cm</td>
</tr>
<tr>
<td>Expansion</td>
<td>&lt;0.3 cm/y</td>
<td>0.3-0.6 cm/y</td>
<td>&gt;0.6 cm/y</td>
</tr>
<tr>
<td>Smoking/COPD</td>
<td>None, mild</td>
<td>Moderate</td>
<td>Severe/steroids</td>
</tr>
<tr>
<td>Family history</td>
<td>No relatives</td>
<td>One relative</td>
<td>Numerous relatives</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Normal blood pressure</td>
<td>Controlled</td>
<td>Poorly controlled</td>
</tr>
<tr>
<td>Shape</td>
<td>Fusiform</td>
<td>Saccular</td>
<td>Very eccentric</td>
</tr>
<tr>
<td>Wall stress</td>
<td>Low (35 N/cm²)</td>
<td>Mdm. (40 N/cm²)</td>
<td>High (45 N/cm²)</td>
</tr>
<tr>
<td>Gender</td>
<td>-</td>
<td>Male</td>
<td>Female</td>
</tr>
</tbody>
</table>

Average rupture risk per year:

- 1.0% in male pts with AAA 5.0-5.9cm
- 3.9% in females with AAA of same size (4x)
- 14.1% in males with AAA 6.0cm or larger
- 22.3% in females with AAA of that size

The risk of rupture in untreated aneurysms: The impact of size, gender, and expansion rate

Peter M. Brown, MD, David T. Zelt, MD, and Boris Sobolev, PhD, Kingston, Ontario, Canada

**Objective:** The purpose of this study was to establish the risk of rupture as related to size of abdominal aortic aneurysm (AAA), gender, and expansion of the aneurysm.

**Methods:** Between 1976 and 2001, 476 patients with conditions considered unfit for surgery with AAA 5.0 cm or more were followed with computed tomographic scans every 6 months until rupture, surgery, death, or deletion from follow-up. Surgery was performed for rupture (n = 22), improved medical condition (n = 37), increase in size (n = 95), symptoms (n = 17), and other reasons (n = 24).

**Results:** Fifty ruptures occurred during the follow-up period. The average risk of rupture (and standard error) in male patients with 5.0-cm to 5.9-cm AAA was 1.0% (0.01%) per year, in female patients with 5.0-cm to 5.9-cm AAA was 3.9% (0.15%) per year, in male patients with 6.0-cm or greater AAA was 14.1% (0.18%) per year, and in female patients with 6.0-cm or greater AAA was 22.3% (0.95%) per year.

**Conclusion:** The risk of rupture in male patients with AAA 5.0 to 5.9 cm is low. The four-time higher risk of rupture in female patients with AAA 5.0 to 5.9 cm suggests a lower threshold for surgery be considered in fit women. The data regarding risk of rupture in patients with AAA 6.0 cm or more may allow more appropriate decision analysis for surgery in patients with unfit conditions with large AAA. (J Vasc Surg 2003;37:280-4.)
Through the looking glass: The first 20 years of thoracic aortic stent-grafting

D. Craig Miller

*J Thorac Cardiovasc Surg* 2013;145:142-148
DOI: 10.1016/j.jtcvs.2012.11.076

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Durability and survival are similar after elective endovascular and open repair of abdominal aortic aneurysms in younger patients

Kevin Lee, MD, Elaine Tang, Luc Dubois, MD, MSc, Adam H. Power, MPhil (Cantab), Guy DeRose, MD, and Thomas L. Forbes, MD, London, Ontario, Canada

Results: The study cohort comprised 169 patients 60 years of age or younger (mean age, 56.7 ± 2.8 years) who underwent elective repair (119 open repair, 50 EVAR). Patients treated with open repair and EVAR had similar comorbidities, except that EVAR patients were more likely to have hypertension (P = .03) and poor left ventricular function (P = .04). The open repair group had significantly larger suprarenal (P = .004) and infrarenal (P = .005) neck angles, shorter neck lengths (P < .001), and larger maximum aneurysm diameter (P = .02) compared with the EVAR group. Only five patients (13%) in the EVAR group did not meet all IFU criteria. The overall in-hospital mortality rate was 1.8% (0% EVAR, 2.5% open repair; P = .56). Overall mean life expectancy was 11.5 years (9.8 years EVAR, 11.9 years open repair; P = .09). The 1-year (98% EVAR, 96% open repair), 5-year (86% EVAR, 88% open repair), and 10-year (54% EVAR, 75% open repair) survival did not differ between EVAR and open repair (P = .16). Long-term survival (78% EVAR, 85% open repair; P = .09) and reintervention rates (12% EVAR, 16% open repair; P = .80) did not differ. No late aneurysm rupture or aneurysm-related deaths were observed. The most common causes of long-term mortality were malignant disease and cardiovascular events. Reinterventions in the open repair group were exclusively laparotomy related (incisional hernia repairs), whereas all reinterventions in the EVAR group were aortic related, including one conversion to open repair.

Conclusions: After elective aneurysm repair, younger patients have a moderate life expectancy related to malignant disease and cardiovascular health. EVAR offers durability and long-term survival similar to those with open repair in these younger patients as long as aneurysm anatomy and IFU are adhered to. (J Vasc Surg 2015;61:636-41.)
Fifteen-year follow-up data from the landmark randomized controlled United Kingdom endovascular aneurysm repair trial 1 (EVAR 1) were published by Rajesh Patel, MD, et al online ahead of print in The Lancet. EVAR 1 was led by Chief Investigator Prof. Roger Greenhalgh, MD, and colleagues, with the Vascular Surgery Research Group at Imperial College London in London, United Kingdom. The 15-year data were first presented at the Charing Cross International Symposium in April 2016.

As detailed in The Lancet, over a mean of 12.7 years (standard deviation, 1.5 years; maximum, 15.8 years) of follow-up, the investigators recorded 9.3 deaths per 100 person-years in the EVAR group and 8.9 deaths per 100 person-years in the open repair group. Through 6 months after randomization, patients in the EVAR group had a lower mortality rate. However, beyond 8 years of follow-up, open repair had a significantly lower mortality rate (total mortality, $P = .048$; aneurysm-related mortality, $P = .0064$). The increased aneurysm-related mortality in the EVAR group after 8 years was mainly attributable to secondary aneurysm sac rupture (13 deaths [7%] in EVAR vs 2 deaths [1%] in open repair), with increased cancer mortality also observed in the EVAR group. Twenty-five patients had been lost to follow-up by June 30, 2015 (four for mortality outcome).
“Today’s EVAR results are clearly better and more durable thanks to better technologies...”
GUIDING PRINCIPLES TO TAKE HOME:

- Always weigh risks of procedure versus natural history of the untreated AAA

- Elective repair of complex-anatomy AAA requiring complex EVAR or difficult OR reserved for aneurysms measuring 6cm+
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- Always weigh risks of procedure versus natural history of the untreated AAA

- Elective repair of complex-anatomy AAA requiring complex EVAR or difficult OR reserved for aneurysms measuring 6cm+

- OR still has much to offer when done with skills and expertise on patients who are good-risk candidates

- Most truly inoperable patients should probably be observed and not subjected to elective aneurysm repair of any kind
No-Repair and Open Surgical Treatment should be considered more often in the Rx of some patients with complex-anatomy large aneurysms.

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