Contemporary Approaches for Aneurysm Repair

Written by **Mary Mosley**

Aortic aneurysms are the 12th leading cause of death in Western societies—a silent but deadly disease, often with no symptoms until they rupture. Ali Shahriari, MD, Florida Aortic Disease Institute, Fort Lauderdale, Florida, USA, reviewed the natural history, indications, and approaches for endovascular and open aortic aneurysm repair in both the abdomen and the thorax.

The risk factors for abodminal aortic aneurysms (AAA) and often thoracic aneursysms are similar to those for coronary heart disease. There is a higher prevalence in the elderly, men, smokers, those with a family history of AAA, or evidence of peripheral artery disease [Hiratzka LF et al. *Circulation* 2010].

The prognosis of aortic aneurysms depends on the size. The feared complication is rupture. and the risk of rupture increases with aneurysm size. Of patients with an untreated AAA >5.5 cm, 50% will die of rupture within 5 years. The risk of rupture is significant in thoracic descending aneurysms (TDA) as well [Davies RR et al. *Ann Thorac Surg* 2006].

The indications for AAA repair include a size of ≥5.5 cm, a growth rate >0.5 cm per 6 months when the size is < 5.5 cm, or a symptomatic aneurysm. The indication for TDA repair include a size ≥5.5 cm, a rapid rate of growth (>0.5 cm per 6 months), symptoms, or a family history of rupture and/or dissection at a smaller size. In patients without a known genetic etiology, repair of an ascending aortic aneurysm may be considered at a smaller size (4.0 to 5.0 cm, based on body size index). In addition, repair at a smaller size (4.5 cm) may be considered if aortic valve surgery is planned.

Many patients with an indication to undergo AAA repair may face a significant complication risks with an open procedure and may be candidates for an endovascular aortic repair (EVAR). Other than requiring at least a 1.0-cm landing zone, the anatomic requirements for EVAR are few.

In appropriately selected patients at experienced centers, EVAR is associated with a shorter hospital stay and lower 30-day mortality with 5-year outcomes similar to those of open repair.

Open repair remains a good option for appropriate candidates with pararenal or suprarenal aneurysms, but Dr. Shahriari contends that EVAR is possible in these situations if there are patients with high surgical risk due to comorbidities. This procedure lines the abdominal aorta to the superior mesenteric artery, isolating the aneurysm, but has fenestrations and after placement is followed by stents to the major arterial branches (eg, renal arteries) to ensure adequate perfusion. Patient selection is critical. Occasionally, more complicated anatomical considerations such as a renal artery aneurysm associated with an aortic aneurysm involving the origins of the renal arteries may requires staging of the aneurysm repairs.

Most TDAs are treated with EVAR, even if the arch vessel is involved. The results achieved with thoracic endovascular aortic repair (TEVAR) using the TX2 Endovascular Graft, compared with open repair, are shown in Table 1 [Matsumura JS et al. *J Vasc Surg* 2008]. In this international study of 230 patients (160 TEVAR, 70 open) the endovascular approach was found to be safe and effective, with lower rates of stroke and paralysis. Migration >10 mm occurred in 2.8% (3/107) of patients overall. Reintervention rates appeared similar, but this requires further clarification, especially since TEVAR reinterventions tend to be less complex than for those after open procedures.

Table 1. TEVAR and AAA for Descending Aortic Aneurysms

Event	TEVAR	Open	p Value
Stroke	2.5% (4/160)	8.6% (6/70)	0.07
Paraplegia	1.3% (2/160)	5.7% (4/70)	0.07
Paraparesis	4.4% (7/160)	0% (0/70)	0.10
Reintervention	4.4% (7/158)	5.7% (4/70)	0.74

Open repair remains the gold standard for ascending aortic aneurysm. This requires left heart bypass and deep hypothermic circulatory arrest. The procedure is associated with a 5% to 10% risk of mortality and 5% to 10% risk of paralysis and stroke.

Although there are several approaches for resecting this type of aneurysm, Dr. Shahriari stated a preference for the David or Yacoub procedure, especially if there is aortic insufficiency. These approaches allow sparing of the native aortic valve (in contrast to the modified Bentall procedure), which avoids the need for anticoagulation.

Dr. Shahriari mentioned that patients with Marfan syndrome may present a particular challenge. Individuals with this condition often have widening of the aortic root that must be treated. However, the aortic root can be difficult to measure. He recommended 3D imaging for these patients. In addition, patients with genetically mediated syndromes (eg, Marfan, vascular EDS) may benefit from multidisciplinary assessment at referral centers and planning the timing and type of repair can be complex.

Overall it is important to remember that the patient with aortic disease should be treated broadly to reduce their cardiovascular risk. Careful management of hypertension is essential with use of indicated medications depending on the risk factors of the patient. Lipid lowering with statins should be considered. Importantly, lifestyle counseling with intensive intervention for patients who continue to smoke is essential.

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