Today's Borderline EVAR Candidates

A look at the patient characteristics and anatomic variations not represented in current guidelines and the best evidence for treatment.

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The American Society for Vascular Surgery (SVS) and the European Society for Vascular Surgery (ESVS) both have clear recommendations on the size threshold for treating asymptomatic abdominal aortic aneurysms (AAAs) in men.[1,2] Their strong (grade A) recommendations are based on a high grading of the level of evidence. In practice, these guidelines simplify much of the vascular surgeon's daily practice in the decision-making process of whom and when to treat. Many clinical scenarios are unfortunately not always so clear. Indeed, both societies admit that treatment indications become more nuanced and based on less evidence when considerations such as patient sex, age, family history, comorbidities, complex anatomy, and patient preferences enter the equation.

The development of endovascular aneurysm repair (EVAR) has had a major impact on AAA treatment. The evolution from a so-called failed experiment to the predominant and preferred form of treatment in many countries is remarkable.[3,4] This is in large part due to the extremely low perioperative procedural risk involved, even though debate continues on the long-term benefits and durability. This is well illustrated using EVAR data from Vascunet, an international data registry collaboration of 11 countries (Figure 1). The sustained growth of EVAR is clear, matched by the surprising continued decrease in an already low perioperative mortality rate.[5]

The question then becomes whether or how the diminishing perioperative risk of endovascular repair changes the scope of which AAA patients should be treated. Clearly, perioperative risk differs by patient group, and ultimately, the risk must be balanced against the perceived individual risk of rupture, the durability of the repair, and the life expectancy of the patient. The evidence to guide some of these decisions is less clear, compelling us to look closer at some of these "borderline candidate" characteristics and clinical scenarios.

PATIENT SEX

The SVS and ESVS guidelines differ slightly in their interpretation of the evidence for recommending treatment of women with AAAs. The SVS states that women with aneurysms ≥ 5 cm may benefit from treatment, whereas the ESVS suggests that treatment should be "considered" once the aneurysm reaches 5.2 cm.[1,2] There appears to be little doubt that aneurysms are more aggressive (ie, aneurysms grow faster) in women than in men, and the risk of rupture during surveillance is four times greater than in men.[6-8] In the event of AAA rupture, women fare worse than men.[9] It would seem prudent to offer women treatment at a smaller AAA diameter. However, perioperative risk for women has been shown to be higher than for men.[10,11] The reasons for this are not clear but may be associated with age at presentation and dissimilar medical management, as well as issues of access and anatomic suitability. The continuing development of EVAR technology (eg, lower-profile devices) should overcome some of these issues and perhaps lower the procedural risks. More data are eagerly anticipated to help support future guidelines.

AGE

Age is an inherent risk factor for the treatment of AAAs, whether related to perioperative procedural risk for octogenarians or for the durability of the repair in younger patients. Recent data from the Vascular Quality Initiative database showed that, even for EVAR, the perioperative mortality risk was significantly greater for octogenarians than nonoctogenarians (3.8% vs 1.6%). The doubling of risk persisted even at 1 year, when mortality was reported at 8.9%.[12] These risks must be weighed against the risk of rupture and preferences of the patient.

Conversely, it comes as no surprise that younger patients have reduced perioperative mortality for EVAR. Lee et al reported a perioperative mortality of 0% for patients younger than 60 years who underwent EVAR treatment, but questions of durability have been raised due to the long-term results from the EVAR 1 trial.[13,14] The late risk of rupture after EVAR reminds us that continued aortic dilatation is an ever-present concern with EVAR. If open repair is not an option, then diligent post-EVAR follow-up and imaging is essential.

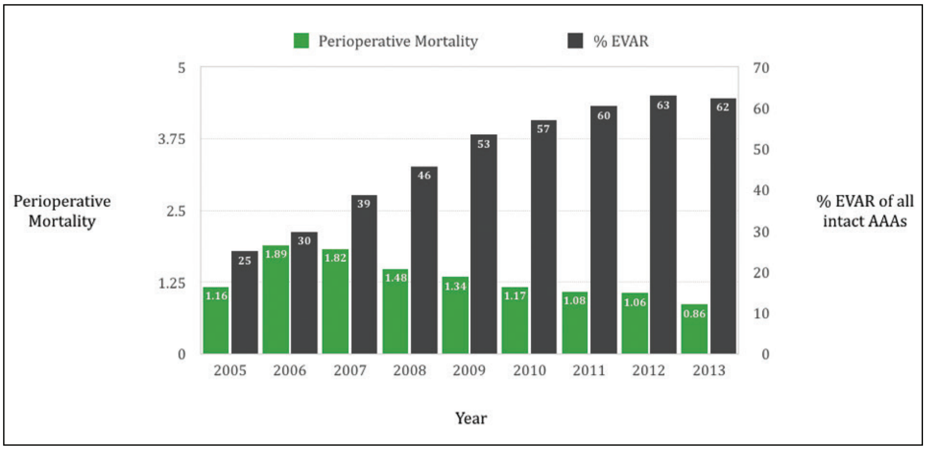

Figure 1. Yearly increase and perioperative mortality of EVAR from the Vascunet registry from 2005 to 2013.

MULTIPLE COMORBIDITIES

There are two important issues when considering treatment for a patient with comorbidities: Can the patient survive the procedure itself, and will the procedure extend the patient's life? Although the perioperative risk of EVAR is generally low, it is well documented that the presence of comorbidities such as renal failure, ischemic heart disease, and chronic obstructive pulmonary disease significantly raise this risk.[15] Despite various criticisms, the EVAR 2 trial addresses what many perceive among patients with significant comorbidities—if they are too sick to be considered for anesthesia and open surgery, then the prophylactic procedure itself should be reconsidered.[16] It should be noted that EVAR reduced the aneurysm-related mortality in this study. Acquiring an accurate prognosis of the patient's concurrent medical conditions is therefore critical.

Delaying treatment is also an option. In nonoperated high-risk patients with AAAs, Scott et al found that the risk of rupture was < 5% at 1 year for aneurysms < 7 cm, allowing time for possible optimization of medical treatment. However, for aneurysms > 7 cm, the risk of rupture rose to 35%, suggesting that elective intervention should be performed with an accepted higher perioperative risk.[17]

COMPLEX ANATOMY

Successful prophylactic AAA treatment is hardly defined by the technical success of the primary procedure, as durability is critical. The failure of EVAR (ie, endoleak, sac enlargement, or rupture) can be a result of many factors.[18,19] Schanzer et al evaluated some predictors for sac enlargement and found an alarming 5-year post-EVAR rate of 41%.[20] This was juxtaposed with the rate of only 42% compliance to instructions for use.

Depending on the clinical scenario, patients with complex anatomy may be better served by a heedful account of factors that may later lead to failure, such as aortic neck diameter, length, and morphology.[18,21] In these cases, standard EVAR may be inappropriate, and proper planning for suprarenal coverage with fenestrated or branched endovascular or open repair should be considered. Verhoeven et al have documented the good technical success of fenestrated EVAR in 100 patients with short necks or juxtarenal AAAs, reporting no type I endoleaks and only five cases of sac enlargement at a median follow-up of 2 years.[22]

Small Aneurysms

One of the important initial consequences of the documented reduced perioperative risk of EVAR has been a reevaluation of overall size thresholds for elective treatment. Data from international registries reveal that more than 25% of AAA repairs are performed for aneurysms < 5.5 cm.[4] There are clear national variations in the management of small AAAs; in Iceland, 6% of intact repairs are performed for aneurysms in men below the recommended threshold, whereas 41% are performed in Germany. Moreover, invasive treatment below the guideline threshold is more prevalent with EVAR when compared to open repair. Part of the rationale for treating a small AAA is the assumed inevitability of required repair at some point, as well as avoidance of the potential (albeit low) risk of rupture. It appears clear that growth begets growth, as data from the RESCAN study indicate an increase in growth rate by 0.59 mm for each 0.5-cm increase in diameter.[23] One clinical interpretation of this is that a 4.5-cm aneurysm would only require a mean duration of 2.3 years to reach the threshold of 5.5 cm.[24] For example, the ADAM trial reported that 27% of the patients with AAAs of 4 to 5.5 cm underwent repair within 2 years, and more than 60% needed treatment within 5 years.[25]

The goal of the PIVOTAL and CAESAR trials was to test the hypothesis that the low perioperative risk of EVAR would confer a survival benefit for patients with small AAAs.[26,27] Although no benefit was shown, it is important to recognize that certain patient groups, such as women and those with a strong family history of AAAs, were not highly represented. However, the retrospective study by Zarins et al showed significantly greater all-cause mortality in patients with small AAAs who underwent surveillance as compared with those who underwent prophylactic EVAR treatment.[28] The recent study by Karthikesalingam et al has again suggested that the size threshold for elective AAA treatment should be reconsidered. They found reduced AAA-related mortality among patients in the United States, where more than 40% of AAA repairs were performed for aneurysms < 5.5 cm, as opposed to in the United Kingdom, where the small aneurysm repair rate was < 10%.[29]

Although the guideline threshold of 5.5 cm for elective repair of an intact AAA in men is still the evidence-based standard, there is clearly a need for further individual risk evaluation, especially in patients with an increased risk of rupture and low operative risk for EVAR.

Marfan Syndrome and Postdissection Aneurysms

Although a review of proper treatment of patients with Marfan syndrome is beyond the scope of this article, they should be considered borderline candidates for EVAR. Despite a low operative risk, the high midterm mortality (13%) and surgical conversion (16%–18%) rates at 2.5 years reported by Pacini et al led to the conclusion that stent grafting for dissections in patients with Marfan syndrome should be considered with great caution.[30] These patients often undergo multiple operations, and endovascular repair might prove valuable for graft-to-graft bridging.[31] EVAR as a bridge to open surgery or as an option in acute repair is also possible, but close follow-up is mandatory.[32]

Mycotic and Saccular Aneurysms

Evidence of an infected aneurysm is a dire sign, and patients with mycotic aneurysms are by no means borderline candidates. Mycotic aneurysms grow rapidly and have a high risk of rupture, and patients often have severe comorbidities, particularly immunodeficiency and coexisting septic conditions. Treatment should be prompt, yet an important question is whether EVAR is warranted. Although antibiotic therapy is important, studies have shown that conservative treatment of mycotic AAAs is dismal, and surveillance is not an option.[33] Surgical repair with either excision and extra-anatomic bypass or in situ reconstruction with, for example, a neo-aorto-iliac system has been the standard treatment for many years.[34,35] However, surgical repair carries high mortality and morbidity rates, with a risk of serious late complications, and the anatomic location of the aneurysm may make surgical repair very technically demanding or even impossible. A recent large comparative study by Sörelius et al shows good evidence for treating mycotic aneurysms with EVAR.[36] In a propensity score–weighted, risk-adjusted analysis of 132 patients who underwent treatment for a mycotic AAA, EVAR was associated with improved survival (up to 4 years) compared with open surgery, without a higher associated incidence of serious infection-related complications or reoperations (Figure 2).

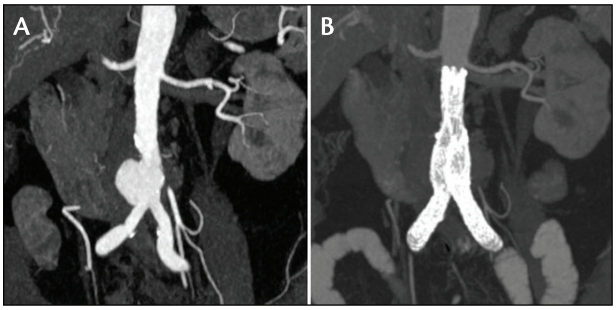

Figure 2. Endovascular treatment of mycotic aneurysms is a borderline indication, but excellent results have been achieved. This patient was treated with EVAR for a mycotic aneurysm (A) with *Salmonella* bacteremia. Four months postoperatively (B), the aneurysm was sealed, and the inflammatory parameters normalized with antibiotic treatment.

Although little is known on the natural history of saccular aneurysms, the general perception is that they are more prone to rupture.[37] The SVS guidelines recommend treatment; however, there is limited evidence and no mention of particular diameter thresholds.[1]

SURVEILLANCE AND PATIENT PREFERENCE

Not intervening on an aneurysm should not confer no treatment. Deferment of surgical intervention should be used for proper medical management and possible risk factor correction. AAA patients are often burdened with a grim cardiovascular risk profile.[38] Smoking cessation, antihypertension therapy, and statin and antiplatelet therapy should be accounted for. These may attenuate aneurysm growth and rupture risk but, more importantly, should increase overall survival, regardless of whether surgery is eventually performed.[39,40] Patients deemed unfit for repair should be considered for continuous surveillance during optimization of their fitness status for later reassessment.

The frequency and methods of surveillance vary, and regular patient contact and compliance are critical. Add to this the importance of allowance and credence to the patient's expressed interests. Reise et al described the benefits of patient education and preference when deciding between EVAR and open surgery, but it is difficult to quantify the angst or willingness of a patient to accept various strategies for any of the previously discussed scenarios.[41]

This may be straightforward if a patient adamantly chooses to pursue a course of active surveillance for a small aneurysm. Alternatively, for an otherwise healthy woman with a 4.8-cm AAA, a strong personal request for EVAR may be enough impetus to proceed with treatment.

CONCLUSION

In many cases, rupture of a previously identified AAA is a failure of care. By the same token, perioperative death in an asymptomatic patient is equally as lamentable. Screening programs, active medical management, improving technology, and a better understanding of the natural history of aneurysms have helped to reduce some of these failures. Although the guidelines have taken advantage of multiple informative studies, considerations of some of the previously mentioned issues reveal that decisions to treat borderline candidates are not always clear. The debate between open surgical repair and EVAR has been interesting and important, but perhaps the more relevant question is when and whom to treat. Future studies will hopefully clarify many of these unanswered questions. ■

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