WHAT WOULD YOU DO?

Distal Aortic Aneurysm With a Thrombus-Lined Infrarenal Neck

MODERATOR: TARA MASTRACCI, MD, MSc, FRCSC, FACS, FRCS

PANEL: JEAN-PAUL P.M. DE VRIES, MD, PhD; BRANT W. ULLERY, MD; NUNO DIAS, MD, PhD; TIM RESCH, MD, PhD; AND BJÖRN SONESSON, MD, PhD

CASE PRESENTATION

A 65-year-old active laborer who attends an aneurysm screening clinic by invitation is found to have a 6-cm aneurysm. He is gainfully employed and is the sole breadwinner for his family. He is an active smoker but can walk up two flights of stairs without shortness of breath. He has no cardiac history or any previous surgical interventions. When discussing surgery, he explains that he needs to be back at work as soon as possible for financial reasons.

Additional imaging reveals a distal aortic aneurysm with a 360° thrombus-lined, irregular infrarenal neck (Figure 1).

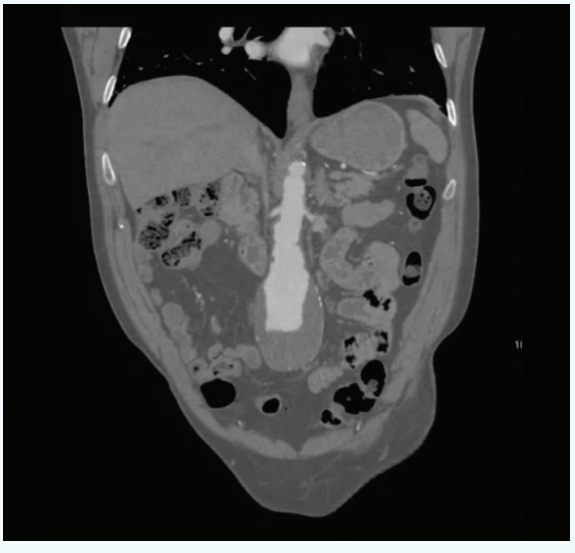

Figure 1

How does the presence of thrombus in a normal-caliber aorta affect your decision to use that segment as a landing zone? Are there exceptions?

Dr. de Vries: In a 360° thrombus-lined infrarenal neck, I don't perform standard endovascular aneurysm repair (EVAR). If possible, I perform open surgery or a juxta/suprarenal endovascular repair such as fenestrated or chimney EVAR. The only exception may be if the thrombus starts > 5 mm below the lowest renal artery. In those cases, standard EVAR will be rather safe, but I try to avoid ballooning the main body in order to minimize the risk of graft dislodgement. Oversizing the main body in a thrombus-lined neck is similar to a nonthrombotic neck (15%–20% according to the outer-to-outer neck diameter measurements), because it has been shown that thrombus in the aortic neck may dissolve at midterm follow-up.

Dr. Ullery: There continues to be a lack of consensus regarding the precise definition and perceived impact of "significant" intramural thrombus as it pertains to infrarenal aneurysm neck morphology and EVAR. Early EVAR trials classified those patients with > 25% circumferential

neck thrombus as having an increased risk of perioperative complications. Larger and more recent prospective studies have now increased that threshold to > 50% to 60% circumferential thrombus before an identifiable negative impact on clinical outcome was observed post-EVAR.

Although the quantitative, and perhaps qualitative, threshold for significant aneurysm neck thrombus burden may still be a matter of debate, the theoretical concerns regarding achieving a suitable proximal seal in such a hostile neck include type Ia endoleak, distal migration, and thromboembolization to both the renovisceral segment and lower extremities. Indeed, Aburahma and colleagues[1] previously reported that increasing the number of hostile neck features, including > 50% circumferential aneurysm neck thrombus, does result in significantly higher rates of intraoperative adjunctive procedures, acute type Ia endoleaks, and all-cause mortality.

Generally speaking, I consider the presence of thrombus to merely be one of many important variables that guide my decision to perform conventional EVAR versus complex EVAR (eg, chimney/snorkel vs fenestrated). The summation of multiple hostile neck anatomic features or patient-related variables (eg, comorbid status, acuity) is more influential in my decision making than an extreme of any one hostile neck feature alone. To that end, the irregular and thrombus-laden neck in the present case in a rather young and physically active patient is probably best treated using a fenestrated device in order to allow seal in a more proximal and healthy aortic segment. That said, if the patient presented in a nonelective setting or had inadequate iliofemoral access for larger-caliber fenestrated devices, I would have little reservation treating this patient with a conventional EVAR device.

The one caveat to conventional EVAR in such cases with heavy thrombus burden is that I generally prefer devices with sealing mechanisms that are more conducive to irregular proximal landing zones, specifically the Ovation and AFX2 platforms (Endologix, Inc.). These devices are far less likely to require balloon molding in the proximal seal zone in these cases and therefore offer additional reduction in the risk of thromboembolic phenomenon (eg, "toothpasting" thrombus into the renal arteries). In cases with large-volume juxtarenal or pararenal thrombus, I generally prefer either fenestrated repair or, based on the previously mentioned factors, will often perform conventional EVAR but use a transbrachial approach and place balloons in the renal(s) to protect them during device placement and/or balloon molding. This also allows flexibility for proximal extension with one or more chimney stents, if necessary, to achieve a suitable proximal seal if a type Ia endoleak is identified.

Drs. Dias, Resch, and Sonesson: In the presence of thrombus in the landing zone, we are likely to attempt to achieve longer landing zones. This oftentimes requires incorporating the visceral vessels in the repair with fenestrated stent grafts when the supravisceral segment is free of disease. The exception is the presence of significant thrombus at the visceral level, especially circumferential, because it markedly increases the risk of embolization during catheterization of the target vessels. Another difference is the use of more intensive follow-up protocols, such as the use of CTA instead of ultrasound for infrarenal grafts, when there is thrombus in the landing zone and even if the landing zone is long.

How does age and robustness (physical health) affect your decision to proceed with an endovascular procedure versus open surgery? Outside of connective tissue disease, are there young patients in whom an endovascular approach is contraindicated?

Dr. Ullery: Young age and operative fitness have traditionally favored an open approach to abdominal aortic aneurysm (AAA) repair given the perceived enhanced durability, less intensive postoperative surveillance imaging requirements, and lower risk for secondary procedures. Moreover, a host of studies, including a review of the 2007–2009 perioperative outcomes in AAA repairs from the National Surgical Quality Improvement Program, have shown the excess risk related to open surgery, as suggested by previous trials, was fully lost when the analysis was confined to younger patients aged 60 years or younger (30-day mortality of 0.4% after open repair vs 1.1% after EVAR).[2]

With longer-term EVAR data becoming available and more young vascular surgeons becoming trained in advanced endovascular therapies (and, accordingly, less trained in traditional open AAA repair), I think the age and physical health of the patient are becoming less of a barrier to an endovascular-first approach for the majority of patients with AAAs. I continue to favor an endovascular approach for virtually all patients, regardless of age, if the anatomy permits the use of currently available devices in an on-label fashion. Although I do think it is important to recognize that younger patients with AAAs may arguably signify more aggressive underlying vascular disease or other associ-

ated comorbidities, I believe it is harder to justify an elective, complex, off-label repair in these patients until newer devices are approved in the United States and additional clinical data are available. Outside of connective tissue disease, I continue to favor open AAA repair in young patients with a history of noncompliance and/or those who are unwilling or unable to undergo the regular postoperative radiographic surveillance studies required following conventional EVAR.

Dr. de Vries: Endovascular repair in young patients is not contraindicated, but it may not be the best option for long-term clinical success. In my practice, young patients who are good surgical candidates are offered both endovascular and open repair, and normally, these patients will have two to three visits at the outpatient clinic before we decide on the treatment path (shared decision making). Over the last 2 years, 45% of these patients have been treated by open surgery at my institution. This percentage is not likely to decline over the next few years, as the results of elective open AAA surgery are good at our department.

Drs. Dias, Resch, and Sonesson: Age and robustness only affect the choice of treatment modality when the patient's physical health is very good, there is no hostile abdomen, and the required endovascular alternative is highly complex versus a more straightforward open repair. An example is when a patient has poor iliac access combined with severely angled aortic anatomy at the infrarenal and visceral levels in which there is no aortic segment with parallel walls that would provide an adequate sealing zone. In this case, the endovascular alternative becomes extremely difficult given the visceral and iliac anatomies, whereas open repair may be performed with an infrarenal graft.

How do you provide informed consent about the durability of the repair that you would plan for this patient?

Drs. Dias, Resch, and Sonesson: The patient is given information on the procedural details of both endovascular and open repair, as well as the expected technical success rate and the course of the hospital stay for both techniques. Moreover, we discuss the long-term results of both techniques and how well these results have been studied, including the need for a lifelong follow-up with endovascular repair, with a particular focus on controlling for any upcoming target vessel instability if a complex repair is an alternative. Finally, information is given on the overall long-term survival of AAA patients and the importance of cardiovascular prevention measures, including cessation of smoking.

Dr. Ullery: I ensure that every patient fully understands what open and endovascular options, including off-label approaches, exist for his or her specific anatomy. In the current case, I would highlight the added intraprocedural and periprocedural risks associated with a thrombus-laden neck, including the inability to achieve a suitable proximal seal (acute or delayed type Ia endoleak), need for intraprocedural adjuncts or late secondary interventions, and thromboembolic complications. I would clearly state that this patient's aneurysm neck has at least one feature that has been demonstrated to potentially compromise the long-term durability of an endovascular repair, either conventional or fenestrated, and underscore the critical importance of maintaining close radiologic follow-up.

Dr. de Vries: Patients and their relatives will visit the outpatient clinic multiple times. After diagnosis of the AAA, they are informed about the open and endovascular options, and the respective patient brochures are provided. The next visit will be at the preoperative outpatient clinic of the anesthetists. The third visit is again with the vascular surgeon to jointly decide on the treatment approach. Perioperative complications are discussed, as well as long-term follow-up and possible reintervention rates. The patient's informed consent is noted in the electronic medical file, including the possible complications.

SUMMARY

The presence of thrombus in the proximal sealing zone of a man whom most vascular surgeons would consider "young" is highly controversial. Although the anatomy in this case appears quite straightforward at first, an understanding of the long-term outcomes of endovascular repair make refining the indications for infrarenal EVAR slightly more complex. Procedural complications (eg, embolization or failure of proximal seal) as well as longer-term complications (eg, aneurysmal degeneration of the neck) are both considerations that should be discussed with the patient and factor into the decision making. In many respects, having the clinical capability to perform either open or complex endovascular repairs is important for vascular centers treating a high volume of aortic aneurysms. ■

1. Aburahma AF, Campbell JE, Mousa AY, et al. Clinical outcomes for hostile versus favorable aortic neck anatomy in endovascular aortic aneurysm repair using modular devices. J Vasc Surg. 2011;54:13-21.
2. Gupta PK, Ramanan B, Lynch TG, et al. Endovascular repair of abdominal aortic aneurysm does not improve early survival versus open repair in patients younger than 60 years. Eur J Vasc Endovasc Surg. 2012;43:506-512.

Tara Mastracci, MD, MSc, FRCSC, FACS, FRCS
The Royal Free London NHS Foundation Trust
The Royal Free Hospital
Hampstead, London, United Kingdom
tara.mastracci@nhs.net
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Jean-Paul P.M. de Vries, MD, PhD
Head, Department of Vascular Surgery
St. Antonius Hospital
Nieuwegein, The Netherlands
j.vries@antoniusziekenhuis.nl
Disclosures: Consultant to Medtronic and Endologix, Inc.; advisory board member of Endologix, Inc.

Brant W. Ullery, MD
Providence Heart and Vascular Institute
Portland, Oregon
brant.ullery@providence.org
Disclosures: Consultant to Cook Medical, Medtronic, and Endologix, Inc.

Nuno Dias, MD, PhD
Vascular Center Malmö
Department of Thoracic and Vascular Surgery
Skane University Hospital
Malmö, Sweden
nuno.dias@med.lu.se
Disclosures: Consultant to and intellectual property holder in Cook Medical.

Tim Resch, MD, PhD
Vascular Center Malmö
Department of Thoracic and Vascular Surgery
Skane University Hospital
Malmö, Sweden
timothyresch@gmail.com
Disclosures: Consultant to and intellectual property holder in Cook Medical.

Björn Sonesson, MD, PhD
Vascular Center Malmö
Department of Thoracic and Vascular Surgery
Skane University Hospital
Malmö, Sweden
b.sonesson@gmail.com
Disclosures: None.