Awareness of Managing Aortic Disease Progression

An introduction by Phil Nowell and interview with Stephan Haulon, MD, PhD.

The understanding of the progressive nature of aortic disease is evolving; therefore, the approach to endovascular aneurysm repair (EVAR) must also evolve. As a chronic condition that requires long-term management, the ability to achieve a durable repair becomes the central consideration and objective. This is true as much for EVAR as it is has been for open surgical repair. The questions to be asked and answered, however, focus on the factors that need to be considered and the decisions that need to be made to provide the best possible durable repair for the patient at any age and with aortic disease at any stage of progression.

In pursuit of the answers, we have asked a group of experienced physicians to present papers in an attempt to further our understanding of the progressive nature of aortic disease. In "Aortic Aneurysm Sac Enlargement After EVAR," Andres Schanzer, MD, presents evidence that aneurysmal sac enlargement results from the progression of aortic disease post-EVAR. Nikolaos Tsilimparis, MD, and Tilo Kölbel, MD, PhD, explain how it is possible to achieve an acceptable seal zone from the aortic arch to the iliac bifurcation in "What Signs Indicate a Compromised Seal Zone?" Next, Martyn Knowles, MD; M. Shadman Baig, MD; and Carlos H. Timaran, MD, suggest an approach to device selection that can assist physicians in managing progressive aortic disease in "Beyond Standard EVAR."

To begin, we wanted to hear the perspectives of Professor Stephan Haulon, who has extensive experience with advanced aortic disease. In the following discussion, Professor Haulon shares his perspective on the principles he adopts to achieve a long-term durable repair.

Stephan Haulon, MD

What can you tell us about your practice?

I work at the University Hospital of Lille in Lille, France, which is a tertiary referral center offering medical services to more than 5 million people. I run an "aortic center" together with my colleagues—cardiothoracic and vascular surgeons, interventional radiologists, and cardiologists. We believe that this multidisciplinary approach is mandatory to provide the best medical treatment and the best surgical options (open and/or endovascular) to our patients. My practice specifically focuses on the endovascular treatment of complex aortic diseases such as thoracoabdominal aneurysms, aortic arch aneurysms, and aortic dissections. We perform approximately 250 aortic endovascular repairs per year.

What types of aortic cases do you see at your referral center?

Our intensive care unit and emergency departments accept all aortic emergencies. Acute type A dissections are treated by open surgery by our cardiothoracic surgeons, but early complications often require CT angiography (CTA) to plan for complementary endografting, stenting, or fenestration in the setting of persistent malperfusion. Endografting is usually the preferred treatment for complicated acute type B dissections with malperfusion or rupture and for ruptured abdominal aortic aneurysms (AAAs) with favorable anatomies. Thus, we have a CT scan and a hybrid room running 24/7.

There is a bias among the patients sent to my clinic because most of them have already been turned down for open surgery by a cardiothoracic or vascular surgeon colleague. These patients typically have complex aortic diseases. All cases are discussed during our weekly multidisciplinary meeting. In thoracic AAAs (TAAAs) or arch aneurysms with a compromised proximal sealing zone, we often offer a combined approach: proximal open ascending and arch repair with an elephant trunk and distal endovascular repair with branched or fenestrated endografts.

Whenever possible, we try to stage these procedures to decrease the surgical impact on patients. In patients

who are contraindicated for a (redo) sternotomy, we are currently evaluating a double-inner-branch (a-branch) endograft for arch repair. The a-branch device requires a proper landing zone in the ascending aorta (native or graft). We currently perform about 60 thoracic and 130 abdominal endograft procedures every year, including approximately 60 fenestrated and branched cases.

From the podium, you've spoken about the concept of aortic disease being progressive. Why is this an important factor?

We have learned from our early experience, including failures, that a "no compromise" strategy is integral when performing aortic endografting if favorable long-term results are to be expected. This strategy requires a thorough analysis of the preoperative CTA on a three-dimensional workstation to locate proper sealing zones, which are long segments of nondiseased aorta located above and below the aneurysm. A short sealing zone is usually diseased sealing zone that will enlarge during follow-up, potentially leading to a type I endoleak and/or endograft migration.

On top of that, especially in younger patients, we need to keep in mind that additional aortic endovascular repairs will probably be required in the future. The current repair needs to be compatible with a future repair; for example, when designing a four-fenestration endograft in the setting of a type IV TAAA, I would recommend positioning two sealing stents above the celiac trunk fenestration. If required during follow-up, placement of an additional proximal extension endograft will then be a straightforward procedure, with no risk of compromising flow to the celiac trunk and allows for a perfect seal between the endografts with a two-stent overlap.

What is your treatment philosophy in approaching AAA patients who present with aortic necks that are short, angled, thrombus-laden, or nonparallel?

My philosophy is crystal clear: if analysis of the preoperative CT on the workstation has not depicted a long, relatively straight and parallel, and nondiseased neck, I will not implant a commercially available endograft. Schanzer et al[1] have clearly demonstrated that noncompliance with a device's instructions for use is associated with poor outcomes during follow-up. I don't understand why one would push the envelope in such circumstances.

The goal of endovascular treatment should not be restricted to a favorable completion angiogram or discharge CT angiogram; we should aim to achieve a durable exclusion of the aortic disease in the long-term. Therefore, I recommend the use of fenestrated and branched endografts if a proper sealing zone is not depicted in order to relocate the sealing zone more proximally. This is especially true now that systematic reviews and meta-analysis[2,3] have confirmed favorable outcomes with these endografts and the long-term follow-up is available.[4]

Is there a difference in considering a good seal zone for treating abdominal versus thoracic disease?

I believe so. I consider a 15-mm-long, healthy neck to be a good sealing zone in the abdominal aorta, but I usually look for a 25- to 30-mm-long neck in the thoracic aorta, especially when the sealing area is located in the arch. In this latter setting, it is mandatory to consider the landing zone in the horizontal portion of the arch, otherwise the endograft will not conform to the arch anatomy. The risk for type I endoleak arising from the lesser curvature is very high. Treatment for thoracic diseases frequently requires covering the origin of the left subclavian artery, which in my opinion, requires transposition or bypass of the left subclavian artery to the left common carotid artery.

After you've treated a patient for a challenging AAA or TAAA (with a short, angled, thrombus-laden, or nonparallel neck), what are your expectations for follow-up and the durability of the repair?

Because I would treat such a patient with a fenestrated or branched endograft to achieve stable sealing zones, I expect that durability will match that in patients treated with standard endovascular repair for AAAs with suitable anatomy.[5]

Thank you very much, Professor Haulon, for sharing insights on the way you and your colleagues approach aortic disease.

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1. Schanzer A, Greenberg RK, Hevelone N, et al. Predictors of abdominal aortic aneurysm sac enlargement after endovascular repair. Circulation. 2011;123:2848-2855.
2. Cross J, Gurusamy K, Gadhvi V, et al. Fenestrated endovascular aneurysm repair. Br J Surg. 2012;99:152-159.
3. Linsen MA, Jongkind V, Nio D, et al. Pararenal aortic aneurysm repair using fenestrated endografts. J Vasc Surg. 2012;56:238-246.
4. Mastracci TM, Greenberg RK, Eagleton MJ, Hernandez AV. Durability of branches in branched and fenestrated endografts. J Vasc Surg. 2013;57:926-933; discussion 933.
5. Perot C, Sobocinski J, Maurel B, et al. Comparison of short- and mid-term follow-up between standard and fenestrated endografts. Ann Vasc Surg. 2013;27:562-570.

In the articles that follow, I think you will find some commonalities with Professor Haulon's responses. In moving EVAR forward, we must challenge ourselves to uncover the critical issues that will allow us to achieve the best possible patient outcomes. As Professor Haulon states, in the face of aortic disease progression, this should include providing a multidisciplinary approach, looking beyond a favorable completion angiogram or discharge CTA, and offering no compromise in finding healthy aortic tissue for the seal zone.

The intent of this Endovascular Today *supplement is to engage and inform our physician readers and raise the EVAR conversation to a new level. We acknowledge the progressive nature of aortic disease and are working hard to find solutions that create long-term durable repairs. Cook Medical will always strive to ensure that we show the necessary rigor and discipline to be the responsible partner that physicians expect. We hope this supplement provides a new perspective and even some take-home points that physicians can use in the fight against aortic disease.*

Thank you,
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