Endovascular suture aneurysm repair (ESAR) using the Heli-FX™ EndoAnchor™ system (Medtronic) in combination with a standard endograft has been proposed as an off-the-shelf endovascular solution in patients with a challenging aneurysm neck, including short, angulated, and wide infrarenal aortic neck. Results from the primary arm of the ANCHOR registry proved that ESAR with prophylactic use of EndoAnchor implants was effective in preventing neck dilation and increasing aneurysm sac regression.1,2

ESAR can be particularly effective to supplement endovascular aneurysm repair (EVAR) when properly deployed with adequate aortic wall penetration in selected patients, especially in short (< 10 mm), conical necks where durability may be compromised if treated with standard EVAR. ESAR in combination with the Endurant™ II/IIs bifurcated stent graft system (Medtronic) is approved for use in patients with aortic neck lengths > 4 mm and < 10 mm when used in conjunction with the Heli-FX EndoAnchor system (bifurcated stent graft only). It is the first solution for short-neck abdominal aortic aneurysms (AAAs) that is independent of renal stenting. Although other techniques have been demonstrated to be safe and durable, certain anatomic constraints may lead to procedural complications or failure, such as upward orientation of the renal arteries, iliac/brachial access tortuosity, calcification/tortuosity, or arch thrombus load, which increases the risk of stroke.

EndoAnchor implants may become a useful tool for the endovascular approach to hostile AAA in such conditions. To that end, a subgroup analysis of the ANCHOR registry was performed, demonstrating the safety and effectiveness of ESAR for treating AAA with a short aortic neck.3

### ANCHOR Short-Neck Cohort Data Overview

**By Frank R. Arko III, MD**

Data originally presented by Dr. Arko at CX 2020 Live, the virtual Charing Cross Symposium, which took place online from May through June 2020.

The clinical experience that led to support of this technique was derived from patients with short, proximal neck lengths (≥ 4 mm, < 10 mm) implanted with an Endurant II/IIs endograft in conjunction with the Heli-FX EndoAnchor implants in ANCHOR, the Aneurysm Treatment Using the Heli-FX™ EndoAnchor™ System Global Registry.2 Proximal neck length was defined by the core lab as the length over which the aortic diameter remained within 10% of the infrarenal diameter. In this subgroup analysis, a total of 70 patients were treated with an average core lab–measured neck length of 6.9 mm. This was a challenging cohort of “real-world” patients: 93% were American Society of Anesthesiologists classification III/IV, 17% had a symptomatic presentation (including two patients with rupture), and 31% were deemed urgent or emergent by the treating physician. Primary outcomes of the analysis included technical success at the index procedure, rate of type Ia endoleak at 1 and 12 months, and secondary procedures through 12 months.

The published 12-month data were significant.4 The overall procedural success rate was 97.1% and was defined as satisfactory implantation of the required number of EndoAnchors for the endograft size, adequate penetration of all EndoAnchors, no EndoAnchor fractures, and absence of type Ia endoleak after implantation of the last EndoAnchor. An average of 5.5 ± 2.1 EndoAnchor implants...
were implanted per patient, and the total procedural time was 148 ± 80 minutes. At 30-day follow-up, four type Ia endoleaks were detected, three of which resolved spontaneously by 12-month follow-up. One type Ia endoleak persisted at 12-month follow-up but was not associated with AAA enlargement or a secondary procedure. There were four (5.7%) deaths within 30 days of the index procedure (three were cardiac-related deaths and one was due to acute hepatitis, renal failure, and pancreatitis). The Kaplan-Meier estimate for freedom from secondary endovascular procedures and all-cause mortality was 95.5% and 92.7% through 1 year, respectively. No patients in the short-neck cohort experienced main body stent migration, increase in maximum aneurysm diameter, aneurysm rupture, or conversion to open repair through 12 months.

At CX 2020 Live, midterm data were presented on the short-neck cohort. Of note, there were two (2/31) type Ia endoleaks and no migrations as reported by the sites at 3 years. Also at 3 years, two of 32 patients had an AAA sac increase, whereas 15 had a stable AAA aneurysm sac and 15 had a decreasing aneurysm sac. The Kaplan-Meier estimate for freedom from secondary endovascular procedures and aneurysm-related mortality was 91.5% and 92.4% through 3 years, respectively.

Whereas longer-term follow-up is still needed to assess the durability of this treatment strategy, the ANCHOR short-neck cohort results showed that ESAR with Endurant II/IIs endograft and complementary Heli-FX EndoAnchor implants is a safe and effective off-the-shelf therapy for treating a short aortic neck, providing high technical success rate and low incidence of type Ia endoleak through 3 years.

DISCUSSION

This patient’s clinical presentation is not uncommon in our daily routine practice. Although open aortic surgery remains the gold standard treatment option in terms of durability of repair, this patient may be unfit for open surgery, making EVAR preferred due to its lower rates of perioperative mortality and morbidity. This patient also presented with some nonspecific pain symptoms. The diagnosis of a “symptomatic” aneurysm must be entertained if a clear alternate cause cannot be confirmed. The need for more urgent intervention as well as the smaller access vessels precluded certain endovascular treatment options. In this and other clinical situations, ESAR presents an attractive endovascular solution that can offer the perioperative benefits of EVAR with the desired clinical durability for AAA repairs.

The ESAR technique essentially incorporates an endovascular “suture line” to mimic an open surgical aortic anastomosis (Figure 1). For successful EndoAnchor implantation, the neck must be free from significant thrombus, calcification, or plaque to ensure adventitial penetration of the EndoAnchors (Figure 2). The addition of “endosutures” provides the radial fixation needed to increase proximal seal and potentially mitigate future aortic neck dilatation.1 ESAR uses EndoAnchors to provide radial fixation and increase the proximal seal. This offers a readily available off-the-shelf solution with broader patient applicability. The procedure can be performed with short procedure times, minimal radiation use, and no need for renal artery instrumentation. The available clinical data demonstrate that ESAR provides the perioperative benefits of a less invasive treatment while maintaining durable midterm outcomes.

Case Example: ESAR for Hostile Necks

By Jeffrey Jim, MD, MPHS, FACS

This case, “The Challenging Aortic Neck,” was originally presented as part of a VEITHsymposium webinar in August 2020 and published in the VEITH Bulletin in September 2020. Republished with permission from the VEITH organization (February 2021).

A patient in their late 70s presented with a 6-cm AAA, and imaging demonstrated the presence of an 8-mm-long infrarenal “neck.” In treating a patient with a short aortic neck, a physician has a variety of potential treatment options, ranging from traditional open repair to various EVAR techniques. However, additional patient information must be considered. This patient had multiple medical comorbidities, including a requirement for home oxygen and overall frailty. In addition, the patient reported nonspecific abdominal discomfort with some radiation to the back for the previous 2 days. On more thorough review, the patient was noted to have relatively small-sized iliac arteries.

Figure 1. The endosuture line is created by placing EndoAnchors at the proximal aortic neck to mimic the surgical anastomoses created during open aortic surgery.

Figure 2. Intraoperative (A) and CT (B) images show adventitial penetration of EndoAnchors into the aortic wall.
ESAR is a solution with reduced complexity, which may decrease cost and resource use. Further, its short learning curve means it can be readily adopted by more vascular specialists. Physicians should carefully consider aortic anatomy, overall health, and the clinical situation when using the best treatment modality for AAA repair, and ESAR is certainly a procedure that should be considered for treating aneurysms with hostile neck characteristics.

CONCLUSION

ESAR with the Heli-FX EndoAnchor system is an off-the-shelf solution that, when combined with the Endurant II/Is stent graft, adds treatment options for patients with short-neck AAAs. ESAR may provide a fixation and sealing mechanism for hostile EVAR necks.