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Commentary: Highly selected: Endovascular arch repair after surgery for type A dissection

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The spectrum of treatment options for disease of the aortic arch continues to expand with new innovations in endovascular devices. While open total arch replacement has long been a gold standard for many acute and chronic arch pathologies, less-invasive approaches are finding a role in the treatment armamentarium. Several branched endovascular grafts have been designed to allow for proximal landing in zone 0 (the ascending aorta). These include 3 commercially produced devices: (1) the Nexus stent graft (Endospan, Herzliya, Israel), a 2-piece off-the-shelf device with a side branch for the innominate artery; (2) the RelayBranch stent graft (Terumo Aortic, Glasgow, United Kingdom), a custom-designed device with 2 inner tunnels for connection to supra-aortic extensions in the innominate and left common carotid arteries; and (3) the Cook branched arch endograft (Cook Medical, Bloomington, Ind), a custom device with 2 inner side branches for the innominate trunk and left common carotid artery. These devices have been used to treat chronic pathologies of the arch in patients deemed high risk for surgery in ongoing or previous small feasibility studies.¹⁻⁵ In most cases, the underlying aortic pathology has been aneurysmal disease. A smaller subset of patients has been treated for aneurysmal dilation of chronic aortic arch dissections, most often after previous proximal repair of acute type A dissection.

In this issue of the *Journal*, D'Onofrio and colleagues⁶ describe their experience at the University of Padova with

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CENTRAL MESSAGE

A new study highlights key selection criteria and technical considerations in the treatment of aortic arch pathology with branched endografts after previous surgical repair for type A dissection.

branched endovascular stent graft repair for arch disease in 4 patients who previously underwent repair of type A dissections with bio-Bentall procedures. Both the Nexus and RelayBranch devices were used for treatment of aneurysmal arch dissection (3 patients) and distal anastomotic pseudoaneurysm (1 patient). The authors describe 100% technical success, no major adverse events, no endoleaks, and 100% survival at mean follow-up of 28 months. These initial results are very encouraging, but are we ready to replace our gold standard open repair with this new technique?

It is important to understand that patient selection for treatment with these devices is quite nuanced. Specifically, there are anatomic criteria that must be met. These include an adequate length and curvature in the proximal landing zone. Often this is not available in patients with previous proximal open aortic repair due to (1) short graft length between the sinotubular junction and the innominate trunk or (2) kinking of the interposition graft due to excess length. For patients without previous proximal aortic surgery, the presence of proximal aortic dilatation often precludes safe landing in zone 0, as the risk of retrograde dissection is increased in the presence of proximal aortic disease. The standard delivery system for these devices traverses the aortic valve, so a pre-existing mechanical aortic valve is also a contraindication to its use. A modified tip-free delivery system has

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been described in a single case with the Cook branched arch endograft.⁷

Other anatomic characteristics that are unfavorable for endovascular repair are significant atheroma, thrombus, or calcification in the aortic arch and target branch vessels due to risk of embolism, aneurysmal disease of the supra-aortic vessels that prevents a good seal on the side branches, and underlying connective tissue disorder. In the limited series that have been reported, investigators have generally described significant learning curves, with better outcomes in the later experience for both the Cook and RelayBranch devices.^{2,5} There is significant planning for these procedures, including customization for the Cook and RelayBranch devices, which currently limits the applicability to chronic pathologies in nonemergency settings. Open surgery still remains more versatile, but for select patients, including those described in the report by D'Onofrio and colleagues, branched endografts have a burgeoning role.

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