Caveat Emptor
Self-Expanding Stents in the Management of Arch Coarctation in the Adult
Eric Horlick, MDCM, FRCPC; Lee Benson, MD, FRCPC

Coarctation of the aorta, a narrowing or occlusion of the aorta, occurs generally in the region of the ligamentum arteriosum and represents 5% to 8% of all congenital heart lesions. Although most often diagnosed in infancy, a small proportion present in adolescence or adulthood during evaluation for a heart murmur, reduced peripheral pulses, or therapy-resistant hypertension. It represents one of the first congenital lesions to be successfully addressed surgically1 and has a 7-decade long history as a therapeutic treatment. However, even after successful repair, survival is reduced when compared with the general population if repair takes place later life (>5 years of age). Repair is nonetheless advocated in the older patient to reduce the cardiovascular event risk and improve survival. Several surgical approaches have evolved during the years, with percutaneous treatment options only becoming available in the 1980s, first with balloon angioplasty and balloon expandable stent implantation in the late 1990s.4,5 Although clinical acceptance of percutaneous approaches was initially slow, improved techniques, operator experience, and balloon and stent technology have resulted in an enhanced clinical acceptance with improved safety profiles and success rates, although not without controversy.6 There remains a scarcity, however, of long-term follow-up studies after endovascular repair. The diameter of the stent was 10% to 15% larger than the proximal landing zone (usually that segment of vessel near the ostium of the left subclavian artery) and stent length extended well beyond the stenotic lesion. Eight patients with a near atretic lesion required balloon dilation before stenting and all patients after stenting had the lesion dilated with a noncompliant balloon. Invasively measured coarctation gradients fell acutely from ≈55 to 3 mm Hg (P<0.001) and minimal lesion diameters increased from ≈4.6 to 18.6 mm (P<0.001). All patients were home within a few days (mean, 3.5 days). During follow-up, there was 1 noncardiovascular death and CT imaging noted the absence of stent collapse or migration and stability in the achieved lesion diameters (=18 mm). Importantly, 30 patients, just over half the cohort had discontinuation of their antihypertensive medications and in just over a quarter, drug use dropped to 1 drug per patient (P<0.001).

These results are commendable, and the demonstration of efficacy in the use of a self-expanding implant with a low entry profile (10 Fr) is encouraging. However, can we do better? Abolishing the gradient at the level of the coarctation is important, although the authors stopped progressive balloon dilations if the gradient was <10 mm Hg, possibly leaving a waist in the stent. Covered stents would be routinely fully dilated because of the added security of the covering in regards to wall trauma. Leaving a gradient is not particularly acceptable (although the residual gradients observed in this study were in the 3 mm Hg range). As such, procedural safety must always be balanced against efficacy; it is possible to do a safe procedure in the absence of efficacy; this does not necessarily help the patient. Only just over half of patients were taken off antihypertensive medications in this study. This falls mid-range when compared with other studies of coarctation stenting (56%–88%).3,5-13

As this study demonstrated, complications today are uncommon and meticulous attention to detail will continue to keep rates low. We do not support a standard dose of heparin and default to a weight-based heparin load followed by activated clotting time monitoring, and we do not use the brachial artery for a second arterial access because a randomized angioplasty trial has identified brachial access with the highest rate of complications versus radial with the lowest and femoral arterial next.14 In this regard, there is no need for an access >6 Fr and likely 5 Fr would suffice, diminishing the merits of a brachial access as a routine. However, we fully support the enhanced...
safety of the dual access for imaging in this procedure. Despite meticulous attention to detail, one patient had a ruptured aorta, which was missed in the laboratory and returned for a covered stent. This near fatal complication could have been prevented possibly with a primary covered stent procedure. This has also been reported with covered stents\(^1\) and although a covered stent is not totally protective, a well-performed procedure with a covered stent is probably superior.

A unique property of a self-expanding implant is the persistent outward force against the aortic wall and different from bare metal stents, where it must overcome the compressive forces of the vessel wall. Essentially no change in stent dimensions were noted at 24 months, although it remains unknown whether the stent edges continue to expand and push on aortic wall potentially contributing to aortic wall damage. To that end longer term follow-up is required.

A recent randomized trial showed no major difference between covered and bare metal implants\(^1\) but the numbers were small (60 in each arm) and perhaps was underpowered to detect small differences. The rate of major aortic complications is likely <5% in most series. By preventing 1 to 2 major adverse events in 100 patients, major morbidity can be avoided. Covered stents should be used appropriately and deployed uniformly to avoid movement and displacement. Most adverse events are not device related but because of human error in case selection and deployment technique, with the main factors relating to patient safety being operator experience, technique, proper stent deployment, periprocedural imaging, and angiography. The study of Kische et al\(^2\) does not answer the question what type of implant should we be using: balloon-expandable, covered or uncovered, or self-expanding. It does, however, support the continued use of endovascular repair techniques for adult arch coarctation and extend the interventionists inventory of potentially useful devices.

**Disclosures**

None.

**References**


**Key Words:** Editorials ▪ aortic coarctation ▪ stents
Caveat Emptor: Self-Expanding Stents in the Management of Arch Coarctation in the Adult

Eric Horlick and Lee Benson

_Circ Cardiovasc Interv_. 2015;8:
doi: 10.1161/CIRCINTERVENTIONS.114.002208

_Circulation: Cardiovascular Interventions_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2015 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-7640. Online ISSN: 1941-7632

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circinterventions.ahajournals.org/content/8/1/e002208

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in _Circulation: Cardiovascular Interventions_ can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to _Circulation: Cardiovascular Interventions_ is online at:
http://circinterventions.ahajournals.org//subscriptions/