

Introduction

- Open total arch repair (TAR) in patients with aortic disease involving the distal arch has been associated with severe morbidity and mortality
- TAR of extensive distal pathology requires long periods of cardiopulmonary bypass (CPB) and hypothermic circulatory arrest (HCA) which exposes patients to a high risk of neurologic complications
- Endovascular surgical advancements and the advent of hybrid arch repair (HAR) now offers previously poor surgical candidates a viable treatment option

Methods

- We performed a retrospective review of a prospectively maintained aortic database to find patients who underwent hybrid arch repair via mini or full sternotomy with trifurcated and stent graft placement between 2011 and 2023 by a single surgeon
- HAR was considered in patients with a suitable proximal landing zone just beyond the proximal anastomoses of the trifurcated graft to the ascending aorta in zone 0
- Indications for surgery included arch aneurysm, chronic Type B dissection, pseudoaneurysm, intramural hematoma, and penetrating atherosclerotic ulcer
- HAR methodology detailed in Figure 1.

Table 1. Patient Demographics, Preoperative Comorbidities, and Outcomes (n=15)	
Average Age (years)	72.7 ± 10.2
Male %	11 (73.3%)
CHF	2 (13.3%)
Average LVEF (%)	65.5 ± 7.46
Diabetes	4 (26.7%)
Hypertension	15 (100%)
Hypercholesterolemia	10 (66.7%)
COPD	3 (20.0%)
Preoperative TIA	1 (6.67%)
Preoperative Stroke	1 (6.67%)
Renal Insufficiency	1 (6.67%)
Type of Disease	
Aneurysm	8 (53.3%)
Chronic Type B dissection	4 (26.7%)
Pseudoaneurysm	1 (6.67%)
Intramural hematoma	1 (6.67%)
Penetrating atherosclerotic ulcer	1 (6.67%)
Average length of ICU stay (days)	6.6 ± 5.69
Average length of hospital stay (days)	14.3 ± 11.4
Stroke	1 (7.69%)
TIA	0
Spinal cord injury	0
Retrograde type A aortic dissection (RAD)	2 (13.3%)
Atrial fibrillation	4 (26.6%)
Re-intubation	2 (13.3%)
Prolonged ventilatory support (>48 hours)	6 (40.0%)
Vocal cord paralysis	2 (13.3%)
Re-op for bleeding	0
Post-operative in hospital death	3 (20%)
Average follow-up duration (days)	1380
Endoleak	3 (20.0%)
Long Term Mortality	8 (53.3%)

Table 2. Operative Variables (n=15)	
Elective Operations	12 (80.0%)
Urgent Operation	3 (20.0%)
Full Sternotomy	10 (66.6%)
Partial Sternotomy	5 (33.3%)
CPB	8 (53.3%)
Average CPB Time (minutes)	180.6
Cross Clamp Time (minutes)	88.7

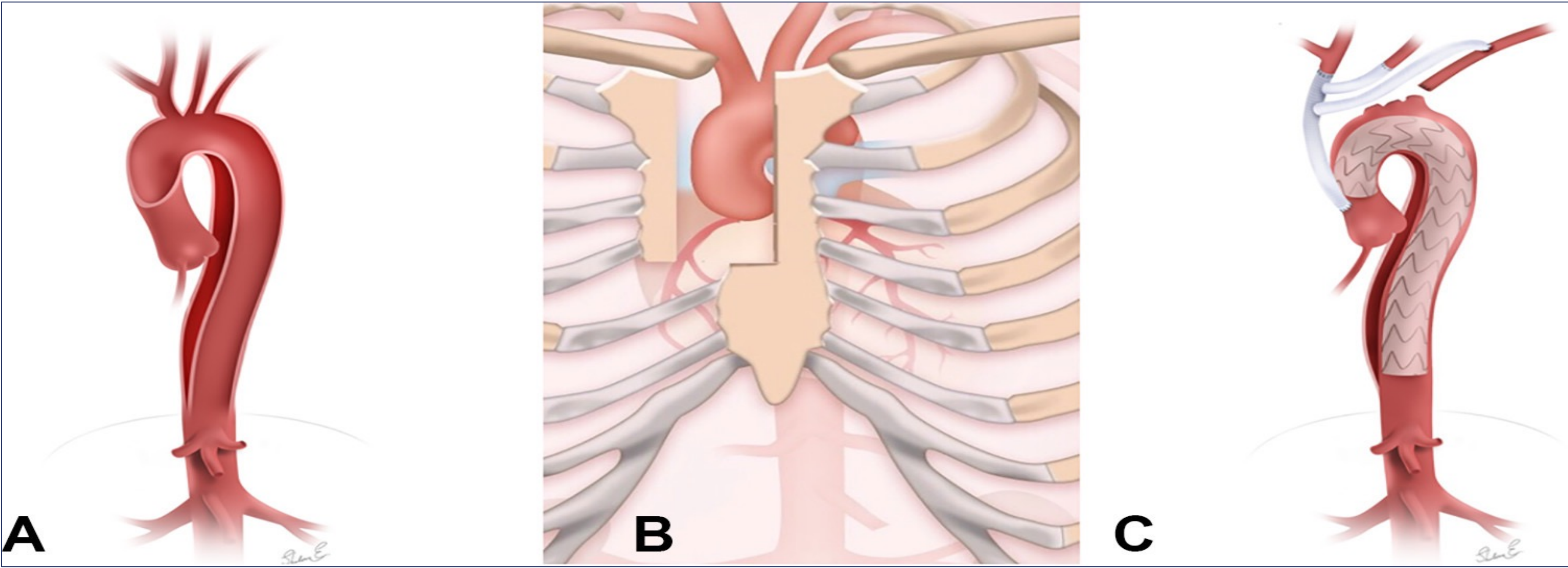


Figure 1. A, A schematic representation of aortic pathology. B, Upper J-type ministernotomy. C, A schematic representation depicting final repair.

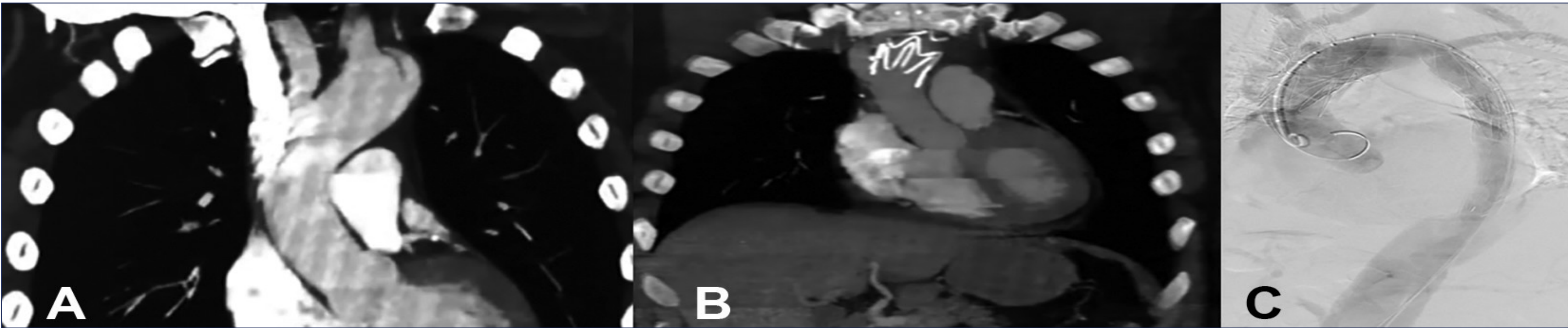


Figure 2. A, Computed tomography (CT) angiogram depicting dissection extending to distal aortic arch. B, CT depicting final repair. C, Completion aortogram after hybrid repair.

Results

- From 2011 to 2023, 15 patients (72.7±10.2 years) underwent total HAR repair
- All patients underwent single-stage total arch debranching with zone 0 reimplantation with 100% technical success
- 2 (13.3%) patients developing retrograde type A dissection while in the hospital
- In hospital mortality was 20% with all patients being aged 80 or older
- The average length of hospital stay was 14.3 ± 11.4 days with patients spending 6.6 ± 5.69 of those days in the ICU
- Mid-term follow-up demonstrated no reintervention, endoleak in 3 (20%) patients, and 8 (53.3%) patient deaths

Conclusions

- Preliminary results demonstrate HAR is not only feasible, but a successful endeavor in patients with comorbid conditions that put them at risk for complications with TAR
- Careful pre-operative selection is necessary to minimize mortality
- Further studies looking at long-term outcomes and additional indications are still needed

Citations

1. Tshomba Y, Melissano G, Logaldo D, et al. Clinical outcomes of hybrid repair for thoracoabdominal aortic aneurysms. *Annals of cardiothoracic surgery.* 2012;1(3):293-303. <https://search.proquest.com/docview/1428270835>. doi: 10.3978/j.issn.2225-319X.2012.07.15.

2. Papakonstantinou NA, Antonopoulos CN, Baikoussis NG, Kakisis I, Geroulakos G. Aortic arch reconstruction: Are hybrid debranching procedures a good choice? *Heart, Lung and Circulation.* 2018;27(11):1335-1349. <https://www.sciencedirect.com/science/article/pii/S144395061830132X>. doi: 10.1016/j.hlc.2018.03.016.

3. Zanothi G, Reese TB, Afab M. Aortic arch pathology. *Cardiology Clinics.* 2017;35(3):367-385. <https://www.clinicalkey.es/playcontent/1-s2.0-S0733866317300255>. doi: 10.1016/j.ccl.2017.03.006.