

Repair of pseudoaneurysm in extra-anatomic aortic arch bypass graft



Lamees Ibrahim El Nihum, BS,^{a,b} M. Mujeeb Zubair, MD,^c Ponraj Chinnadurai, MBBS, MMST,^d and Thomas E. MacGillivray, MD,^a Houston and Bryan, Tex; Los Angeles, Calif; and Malvern, Pa

From the ^aDeBakey Heart & Vascular Center, Department of Cardiovascular Surgery, Houston Methodist Hospital, Houston, Tex; ^bTexas A&M College of Medicine, Bryan, Tex; ^cDivision of Cardiothoracic Surgery, Cedars-Sinai Medical Center, Los Angeles, Calif; and ^dSiemens Medical Solutions USA, Inc, Malvern, Pa.

Disclosures: Ponraj Chinnadurai is a Senior Key Expert at Advanced Therapies Division, Siemens Medical Solutions USA. All other authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

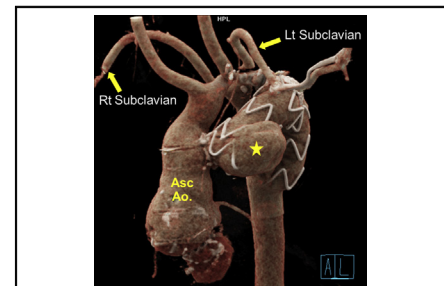
Received for publication Jan 26, 2022; revisions received March 14, 2022; accepted for publication March 30, 2022; available ahead of print April 19, 2022.

Address for reprints: Thomas E. MacGillivray, MD, DeBakey Heart and Vascular Center, Department of Cardiovascular Surgery, Houston Methodist Hospital, 6550 Fannin St, Smith Tower, Suite 1401, Houston, TX 77030 (E-mail: tmacgillivray@houstonmethodist.org).

JTCVS Techniques 2022;13:11-3

2666-2507

Copyright © 2022 Published by Elsevier Inc. on behalf of The American Association for Thoracic Surgery. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). <https://doi.org/10.1016/j.jtc.2022.03.017>



Pseudoaneurysm (star) of proximal aortic bypass in an interrupted aortic arch patient.

CENTRAL MESSAGE

Extra-anatomic procedures in infancy and childhood lead to late sequelae in adulthood, necessitating lifelong surveillance and interval imaging in patients with complex congenital heart disease.

We describe a 31-year-old man born with a type B interrupted aortic arch with an aberrant origin of the right subclavian artery from a common subclavian trunk, malalignment ventricular septal defect, patent ductus arteriosus, and bicuspid aortic valve. The institutional review board or equivalent ethics committee of the authors' institution did not approve this study because it deemed our study exempt. The patient provided informed written consent for the publication of the study data.

He had a neonatal left thoracotomy at 4 days of age to construct an ascending-to-descending aortic bypass using 2 separate 6-mm polytetrafluoroethylene (PTFE) grafts, pulmonary artery banding, and patent ductus arteriosus ligation. Through a sternotomy at 10 days of age, he had a transatrial ventricular septal defect repair and pulmonary artery band takedown. At 7 months of age, he had an open aortic valvuloplasty and pericardial patch aortoplasty through a second sternotomy. At 2 years of age, his 2 PTFE grafts were taken down and replaced with a 16-mm Dacron ascending-to-descending bypass graft through a second left thoracotomy. Several months later, a stent was deployed in the Dacron graft to treat graft kinking. At 8 years of age, he had a Konno procedure, aortic valve replacement with a 27-mm porcine bioprosthesis, and right coronary artery reimplantation. He developed mediastinitis requiring sternal debridement, excision of a PTFE patch, and vacuum-assisted closure dressings.

When the patient was 28 years of age, the Dacron graft was noted to have a pseudoaneurysm at the anastomosis. An endovascular covered stent graft was placed in the Dacron graft and a second stent graft was placed in the proximal descending aorta to the common subclavian arterial trunk. He further underwent transcatheter aortic valve replacement with a 23-mm balloon-expandable valve, which was complicated by a wound infection. Because of Bernard-Soulier syndrome, all of his operations have been complicated by severe bleeding requiring multiple platelet and red cell transfusions. He now presented with an expanding pseudoaneurysm of his ascending-to-descending bypass graft (Figure 1).

After open exposure of his diminutive left common femoral artery and vein, he was explored through a redo left thoracotomy. Through extensive adhesiolysis while avoiding the pseudoaneurysm, the descending aorta distal to the Dacron graft was mobilized and controlled. The

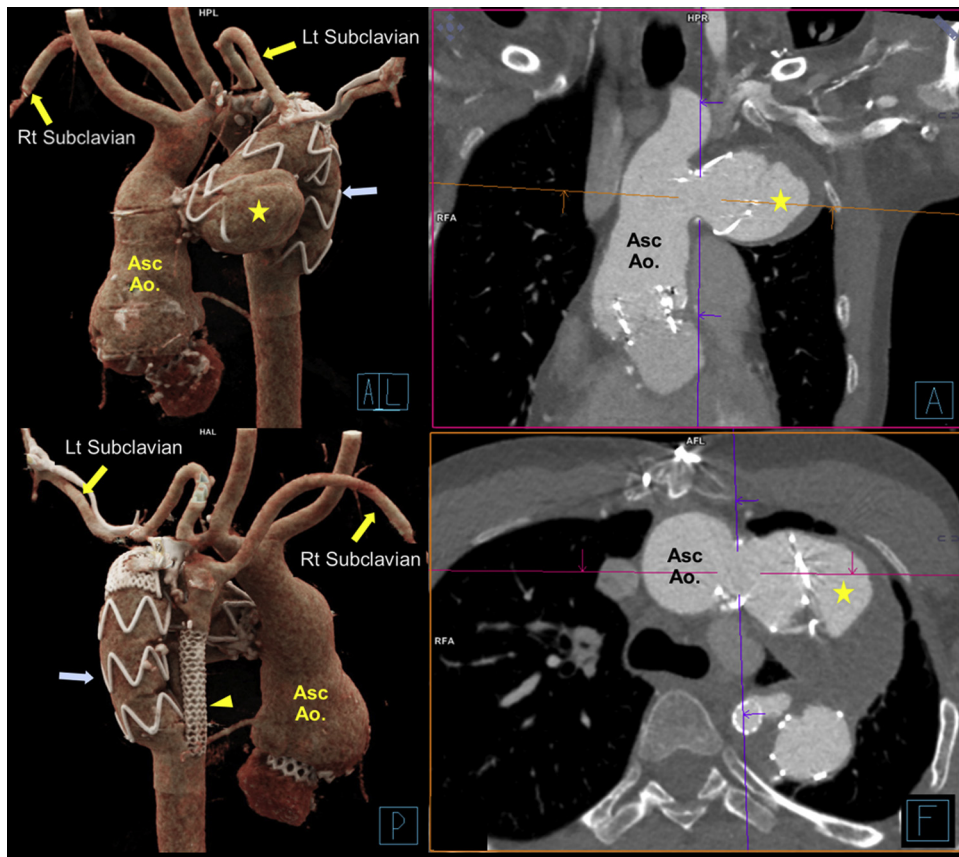


FIGURE 1. Three-dimensional reconstruction of computed tomography angiography in a patient with type B interrupted aortic arch. The patient presented with pseudoaneurysm (*yellow star*) at the proximal anastomotic site of his previous 16-mm Dacron ascending-to-descending aortic bypass graft reinforced by a 28-mm × 155-mm covered stent graft (*blue arrow*). He had aberrant origin of the right subclavian artery (*yellow arrow*) and left subclavian artery (*yellow arrowhead*).

descending aorta and left femoral vein were cannulated for cardiopulmonary bypass with hypothermia to 18 °C. During circulatory arrest, the Dacron graft and the stent graft were excised. Using a 22-mm Dacron graft with an 8-mm side arm graft, the proximal end-to-side anastomosis was constructed to the ascending aorta. Cardiopulmonary bypass was resumed through the 8-mm side arm graft to the

ascending aorta and to the body through the descending aortic cannula. While warming, an end-to-end anastomosis of the Dacron graft was constructed to the descending aorta. The 8-mm side arm graft was then used to reconstruct the origin of the common subclavian trunk (*Figure 2*). The patient tolerated the procedure, and at 11-month follow-up he was doing well.

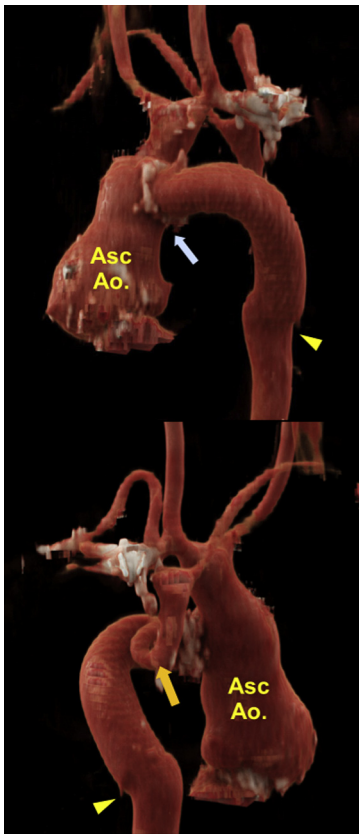


FIGURE 2. Aortic arch reconstruction. The aorta was reconstructed with a 22-mm Dacron graft from the ascending (*blue arrow*) to descending (*yellow arrowhead*) thoracic aorta, with an 8-mm side arm graft (*yellow arrow*) to the origin of the common subclavian arterial trunk.