JACC: CASE REPORTS VOL. 4, NO. 14, 2022

IMAGING VIGNETTE

ADVANCED

CLINICAL VIGNETTE: RHYTHM DISORDERS

Coronary Artery Bypass Salvage With Branched Aortic Endograft in a Patient With Aortic Arch Ulcer

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ABSTRACT

Treatment of multiple penetrating aortic ulcers becomes troublesome if they involve the aortic arch. We report a percutaneous aortic repair using a unibody design endoprosthesis with a precannulated side component for the left subclavian artery to manage a large aortic arch ulcer and preserve the patency of previous coronary artery bypass graft. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:851-853) © 2022 Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

A 75-year-old man was diagnosed with multiple penetrating aortic ulcers (PAUs) during chest computed tomography. The largest PAU was just beneath the left subclavian artery (LSA) origin (**Figure 1A**). He experienced myocardial infarction, treated with coronary artery bypass graft (CABG) (left internal mammary artery on the left anterior descending artery and saphenous vein graft on the right coronary artery) (Supplemental Figures 1 and 2).

MANAGEMENT

Considering the aortic anatomy and high risk of rupture, the heart team excluded a conservative management. The patient's EuroSCORE II was 20.62%, so he was considered ineligible for redo surgery, but a standard endovascular repair strategy was challenging for the scarce landing zone. Because a carotid-left subclavian artery bypass graft would not safely warrant a good myocardial perfusion, a unibody design endograft with a side component for LSA was implanted.

A 6-F sheath was inserted through the right radial artery, and a pigtail catheter was advanced in the ascending aorta. Then, a 14-F sheath was inserted in the left common femoral artery with preimplantation of 2-closure system. Afterward, an 8-F sheath was inserted through the left brachial artery, and a 0.035-inch guidewire was advanced in the aortic arch; the guidewire was caught by a goose neck snare and externalized, forming a brachiofemoral loop wire. An extra-stiff 0.035-inch guidewire was advanced through femoral access to the ascending aorta. The endograft main body was advanced over the extra-stiff wire and the side branch over the brachiofemoral loop wire simultaneously. A 40 × 34 × 200-mm single-branched endoprosthesis was advanced and deployed accordingly (**Figures 1B and 1C,** Supplemental Figure 3). Another 38 × 34 × 200-mm endoprosthesis was positioned just distally to the first one with partial

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

Manuscript received April 25, 2022; accepted April 29, 2022.

ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2022.04.023

ABBREVIATIONS AND ACRONYMS

CABG = coronary artery bypass graft

LSA = left subclavian artery

PAU = penetrating aortic ulcer

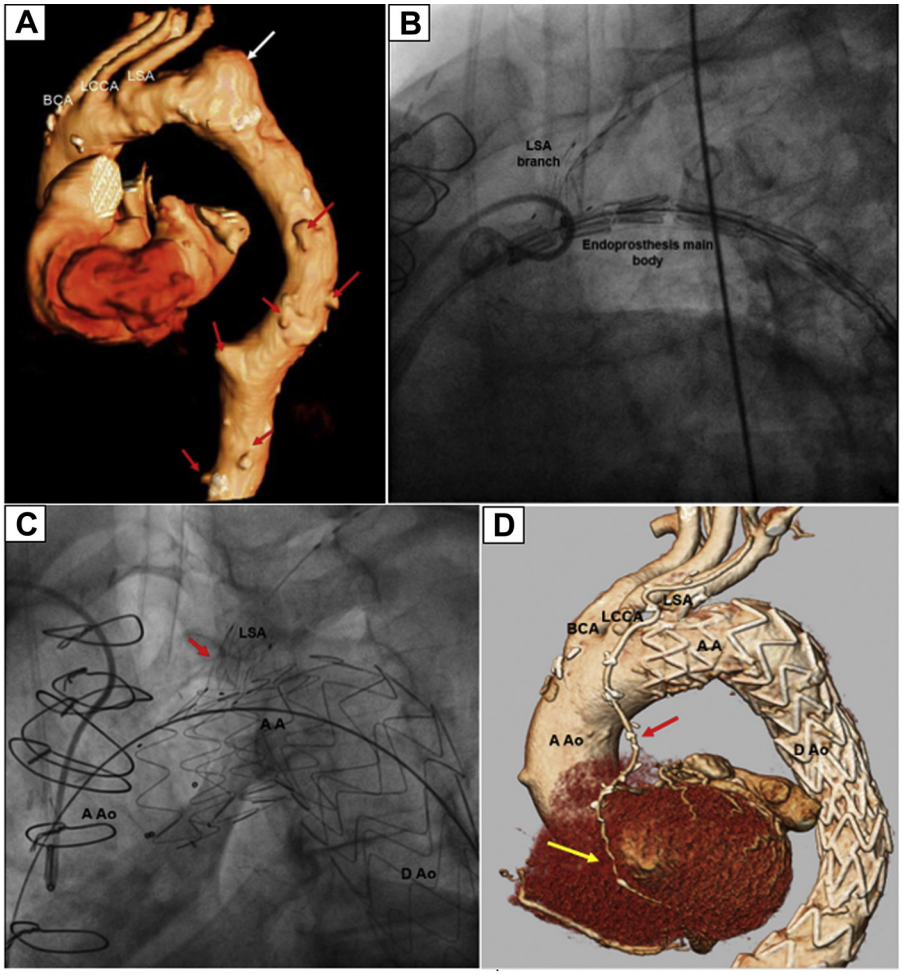
imbrication (Supplemental Figure 4). No endoleaks were observed during aortographies. Finally, vascular accesses hemostasis was performed.

The computed tomography angiography performed later showed correct aortic endograft positions, complete PAU exclusion, patency of the LSA, and CABG (**Figure 1D,** Supplemental Figure 5). The patient was discharge on 6th postoperative day; The 3-month follow-up was uneventful.

DISCUSSION

PAU is an aortic syndrome characterized by atherosclerosis-related tunica intima erosion with deeper extension to the tunica media and consequent outpouching of the vascular lumen beyond the aortic wall.[1] In 91% of cases, PAUs are located in the descending aorta, but a significant number may also be found in the aortic arch.[2] No clear recommendations exist on their management.

FIGURE 1 Preoperative, Intraoperative, and Postoperative Aorta Imaging



(A) Preoperative 3D volume rendering computed tomography angiography reconstruction of the thoracic aorta showing multiple small penetrating aortic ulcers **(red arrows)** and the largest penetrating aortic ulcer at the level of the dorsal aortic isthmus **(white arrow)**. **(B)** Stent graft positioning. **(C)** A stent graft deployed with the LSA branch expanded **(red arrow)**. **(D)** Postoperative 3D volume rendering electrocardiogram-gated computed tomography angiography, with the sagittal view showing left internal mammary artery **(red arrow)** to left anterior descending coronary artery **(yellow arrow)** coronary artery bypass graft. A A = aortic arch; A Ao = ascending aorta; BCA = brachiocephalic artery; D Ao = descending aorta; LCCA = left common carotid artery; LSA = left subclavian artery.

In this case, the patient had 3 different treatment options: 1) open surgery; 2) standard endovascular aortic repair; or 3) a hybrid procedure. The first and second options were excluded for prohibitive surgical risk and short proximal landing zone. The third treatment would have consisted of a carotid-subclavian bypass graft, followed by LSA origin embolization and aortic graft implantation; this type of procedure has already been performed for CABG preservation.[3] We provided a fourth treatment option to the patient with a totally percutaneous implantation of a unibody-design stent graft with a precannulated side component for LSA, preserving the myocardial blood supply.

CONCLUSIONS

Currently, PAU treatment strategies are not well established, and lesions involving the aortic arch may be very challenging. To our knowledge, this is the first-in-human case of single-branched aortic graft implantation for multiple PAUs with CABG sparing.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS aortic arch, aortic syndromes, endovascular aortic repair, left subclavian artery, penetrating aortic ulcer

APPENDIX For supplemental figures, please see the online version of this paper.