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ADVANCED

IMAGING VIGNETTE: CLINICAL VIGNETTE

Atrial Back Wall Support to Facilitate Antegrade Closure of Complex Mitral Paravalvular Leaks

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ABSTRACT

Transapical puncture for transcatheter treatment of mitral-paravalvular leak (PVL) is associated with increased risks even when the apical tract is closed with vascular plugs. A novel technique that leverages back wall support from the right or left atrium can be used to facilitate transcatheter closure of mitral PVL through an antegrade approach. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2023;15:101864) © 2023 The Authors. 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/).

Treatment of a medial mitral paravalvular leak (PVL) in the presence of a mechanical aortic prosthesis typically requires transapical puncture for a retrograde rail. A transapical approach, however, is associated with a risk of hemothorax even when the apical tract is closed with vascular plugs.[1] An antegrade transseptal approach is difficult and often unfeasible given the short distance between the atrial septum and the medial mitral annulus that limits catheter support and manipulation.[2] We illustrate a novel technique that leverages back wall support from the right or left atrium to facilitate transcatheter closure of a medial mitral PVL through an antegrade approach, thereby avoiding the need for transapical access (**Figures 1A and 1B**).

CASE 1: RIGHT ATRIAL BACK WALL SUPPORT

A 36-year-old patient with Loeys-Dietz syndrome and mechanical aortic and mitral valve prosthesis was referred for closure of a large anteromedial mitral PVL and a smaller anterolateral PVL as a result of heart failure and hemolysis (Video 1). Surgery was deferred because of the patient's history of 2 previous sternotomies and chronic arterial dissections from underlying connective tissue disease. An antegrade approach without a rail was planned, with the possibility of using a transapical rail if adequate support could not be achieved. Two steerable sheaths and a telescoping guide system with an exchange-length hydrophilic wire were used to cross each defect with an anchor wire technique (Supplemental Figure 1A). The anterolateral defect was closed without difficulty using a 12-mm vascular-plug (Amplatzer Vascular Plug II, Abbott) (Supplemental Figure 1B). Advancing a guiding sheath and devices into the medial defect proved difficult. However, this objective was ultimately achieved by retracting and repositioning the steerable sheath to the back wall of the right atrium, which provided significant support to advance the guiding sheath across the leak.

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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.

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ABBREVIATIONS AND ACRONYMS

ABWS = atrial back wall support

PVL = paravalvular leak

This technique allowed smooth delivery of 2 vascular-plugs and complete amelioration of the leak (**Figure 1A**, Videos 2 and 3).

CASE 2: LEFT ATRIAL BACK WALL SUPPORT

A 59-year-old patient with rheumatic heart disease, mechanical aortic and mitral prostheses, and previous mitral PVL closure of a lateral leak presented with hemolysis and a large, crescent-shaped medial PVL. Surgery was deemed high risk because of extensive aortic calcification and the patient's history of 4 previous sternotomies. Advancing a guiding sheath by a transseptal antegrade approach proved difficult. Before creating an apical arteriovenous rail to gain support, the atrial back wall support (ABWS) technique was attempted. After crossing the leak with standard catheters and wire (as in case 1), the steerable sheath was advanced and positioned high, near the hood of the left atrium, to use ABWS, which provided sufficient support to deploy 3 vascular plugs without difficulty (**Figure 1B**, Video 4). After plug deployment, the left atrial pressure decreased by 10 mm Hg, and the PVL was reduced to mild (Supplemental Figures 2A and 2B, Video 5).

DISCUSSION AND CONCLUSIONS

Traditionally, transapical access was required for patients with double mechanical valves (aortic and mitral) or for the closure of complex medial mitral PVL. However, this access route is associated with a higher risk of complications such as coronary artery puncture, hemopericardium, and hemothorax even if the apical tract is closed.[1,2] Leveraging this novel ABWS technique facilitated antegrade transseptal closure of complex PVL in our 2 high-surgical risk patients. Potential complications of ABWS include damage to the atrial wall or enlargement of the PVL resulting from the flex of the system when delivering devices, but these complications have not been seen in our limited experience.

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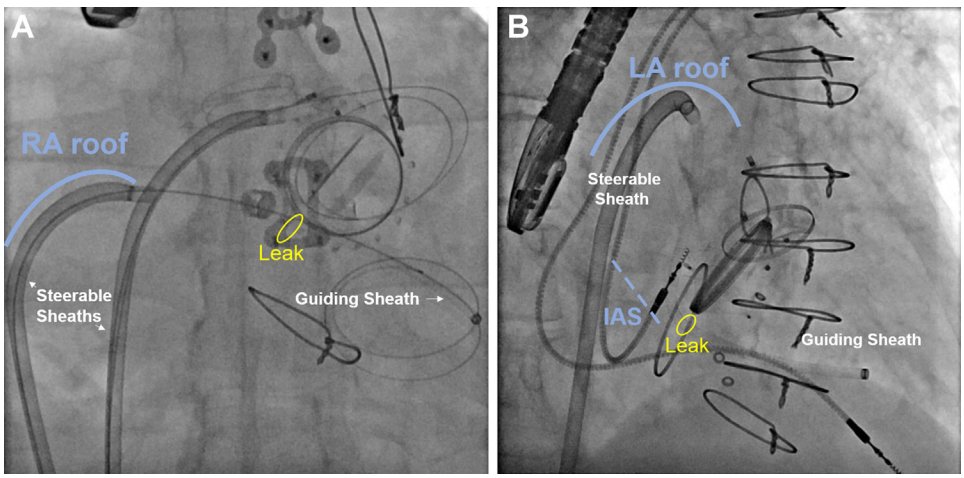
FIGURE 1 Novel Atrial Back Wall Support Technique



(A) Right atrial back wall support facilitates and supports antegrade transseptal closure of a medial mitral paravalvular leak. **(B)** Left atrial back wall support is used to avoid transapical puncture for closure of medial mitral paravalvular leak. IAS = interatrial septum; LA = left atrium; RA = right atrium.

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KEY WORDS acute heart failure, atrial septal defect, echocardiography, hemothorax, mitral valve, valve repair, 3-dimensional imaging

APPENDIX For supplemental figures and videos, please see the online version of this article.