

IMAGING VIGNETTE

CLINICAL VIGNETTE

Successful Transcatheter Closure of Iatrogenic Mitral Regurgitation After Aortic Valve Surgery



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ABSTRACT

We present 2 cases of significant mitral regurgitation secondary to pericardial patch avulsion from the anterior mitral valve leaflet after aortic valve replacement with aortic annulus enlargement. Both cases were successfully managed by transcatheter repair with off-label implantation of occluder devices. (J Am Coll Cardiol Case Rep 2023;28:102126)
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Aortic valve surgery, especially in the context of concomitant aortic root enlargement, bears the low but potential risk of mitral valve injury with consequent iatrogenic mitral regurgitation (MR). Aortic root enlargement by expanded aortotomy to the mitral valve may be performed in the presence of small aortic annuli, for the facilitation of future valve-in-valve interventions, or for the prevention of potential patient-prosthesis mismatches. Significant iatrogenic MR is usually managed by repeat heart surgery.^{1,2} In this case vignette, for the first time, we present transcatheter occlusion of iatrogenic mitral leaflet defects as an alternative to surgery.

The first case was in a 53-year-old female patient undergoing aortic valve surgery for symptomatic stenosis of a heavily degenerated bicuspid aortic valve. Intraoperatively, a small aortic annulus <19 mm was enlarged by the Nicks technique. Finally, a 23-mm mechanical aortic heart valve was implanted. The second case was in a 48-year-old female patient with symptomatic combined stenosis and regurgitation of a bicuspid valve. Because long-term anticoagulation was refused, aortic valve replacement by bioprosthesis was performed. A small aortic root was enlarged by the Nicks technique to allow for implantation of a 26-mm prosthesis and facilitation of future valve-in-valve-interventions.

In both cases, the initial results were good; however, during the first 3 months after the initial surgery, symptoms reappeared. Echocardiography demonstrated a new onset of significant MR by localized avulsion of a pericardial patch from the anterior mitral leaflet (AML) (case 1: **Figure 1A**; case 2: **Supplemental Figure 1A**). Patient 1 refused repeat open heart surgery, whereas the clinical status of patient 2 was deteriorating because of renal failure, respiratory congestion, and thrombocytopenia leading to high operative risk. Given the localized defect, an interventional approach with off-label implantation of occluder devices was considered.

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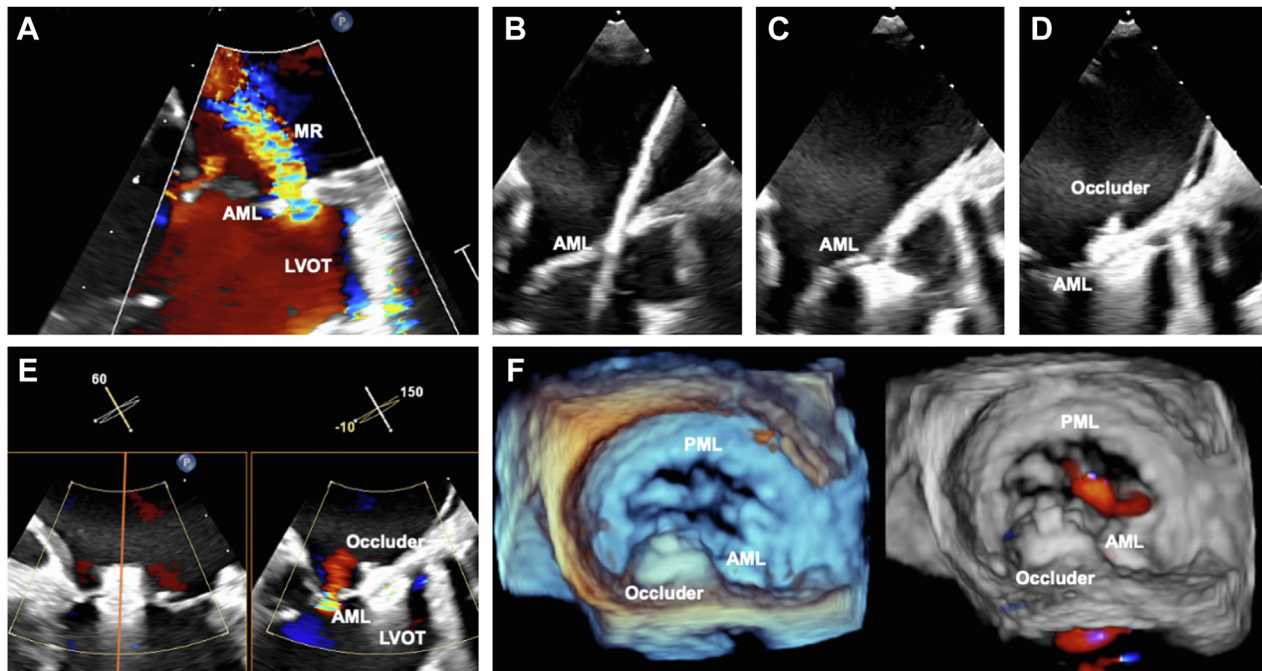
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**ABBREVIATIONS
AND ACRONYMS****AML** = anterior mitral leaflet**MR** = mitral regurgitation

After transseptal puncture, the mitral valve defect was wired using an Agilis steerable sheath (Abbott) and a Judkins right guiding catheter (Figure 1B). An Occlutech paravalvular leak occluder device (case 1) or an Occlutech atrial septal defect occluder device (case 2: Supplemental Figure 1C) was introduced through the mitral valve defect (Figure 1C). Withdrawal of the device allowed contact of the distal disk to the ventricular side of the AML. Consequently, the proximal disk was released to the atrial side (Figure 1D, Video 1). Echocardiography demonstrated complete occlusion of the defect without a residual regurgitant jet (Figure 1E, Supplemental Figure 1E, Video 2). This was confirmed by 3-dimensional echocardiography (Figure 1F, Supplemental Figure 1F).

The clinical and echocardiographic results 6 months after intervention were excellent. The clinical status improved from NYHA functional class III to class I in both patients. Echocardiography demonstrated good functioning of the mitral valve without relevant regurgitation (MR grade <1+).

In conclusion, aortic annulus enlargement during surgical aortic valve replacement should be performed with caution because iatrogenic defects of the mitral valve can be serious complications. Transcatheter management by occluder implantation in the mitral valve defect may be considered as an alternative to surgery in specific situations. Depending on the size and configuration of the individual defect, different types (atrial septal defect or paravalvular leak) or sizes of occluders may be used and can be implanted with low procedural risk. However, the long-term result of this interventional strategy warrants further investigation.

FIGURE 1 Case 1: Transcatheter Closure of Iatrogenic Mitral Regurgitation Using an Occlutech PLD Occluder

(A) An iatrogenic circumferential defect in the anterior mitral leaflet (AML) after aortic valve surgery led to mitral regurgitation (MR). (B to D) Transcatheter management with implantation of a paravalvular leak device occluder (Occlutech PLD Occluder) successfully closed the perforation: (B) wiring of the mitral valve, (C) release of the distal disk in the left ventricle, and (D) opening of the proximal disk after pulling back the device toward the valvular defect. (E) After release, the occluder successfully sealed the defect, as demonstrated by x-plane echocardiography with color Doppler. (F) A 3-dimensional echocardiogram confirmed positioning of the occluder in the mitral valve without relevant mitral regurgitation. LVOT = left ventricular outflow tract; PML = posterior mitral leaflet.

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KEY WORDS avulsion of pericardial patch, mitral regurgitation, mitral valve defect after

surgery, paravalvular leak occluder, transcatheter mitral valve repair

 **APPENDIX** For a supplemental figure and videos, please see the online version of this paper.