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Successful Obliteration of a Lateral Residual Commissural Jet After MitraClip Implantation Using a Cardioform Septal Occluder

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The MitraClip (Abbott, Santa Clara, California) transcatheter edge-to-edge repair (TEER) has become an approved therapeutic option for surgical high-risk patients with favorable anatomy and severe mitral regurgitation (MR). In patients with challenging anatomy, such as those with commissural MR, the procedure, while feasible, often demands increased technical dexterity and may be associated with higher procedural risk with less favorable outcomes. Herein, we illustrate the combined use of a TEER and Cardioform Septal Occluder (CSO) (Gore Medical Inc, Flagstaff, Arizona) to treat a large lateral commissural gap following initial Mitraclip implantation.

An 80-year-old woman with severe symptomatic degenerative MR was referred for TEER. Transesophageal echocardiography (TEE) revealed prominent lateral commissural MR secondary to P1 prolapse (Figure 1a and b; Supplemental Video 1) with corresponding systolic pulmonary vein flow reversal. The patient was considered high surgical risk by the heart team and a suitable candidate for TEER. Baseline intraprocedural TEE confirmed our preprocedural findings (Figure 1c and d; Supplemental Video 1). Baseline hemodynamics following transseptal puncture were consistent with MR severity. Device selection favored the use of MitraClip NTR. The MitraClip steerable guide and clip were advanced uneventfully into the left atrium (LA) (Figure 2a). Advanced intraoperative 2-dimensional biplane and 3-dimensional TEE imaging allowed for procedural visualization and guidance. Multiple attempts were made by our high volume and experienced operator and team (>500 TEER cases) to maneuver the NTR clip deep into the lateral commissure. Suboptimal results were obtained to effectively plicate the involved prolapsed segments. The inability to corner the clip deep within the commissure made the alternate use of a septal occluder in tandem with the MitraClip most viable. Figure 2b and c, and Supplemental Video 2 depict the MitraClip NTR positioned laterally with a large residual commissural jet. The implantation of a second MitraClip to eliminate the residual gap was felt to be nonviable and of risk for subvalvular entanglement and/or iatrogenic leaflet detachment of the first clip (Figure 2d). The use of a 25 mm Gore CSO was pursued in exchange.

The 22Fr steerable MitraClip delivery guide catheter was maintained in the LA. Through it, the commissural gap was carefully traversed antegrade under TEE and fluoroscopic guidance using a 5FR multipurpose (MP) catheter and standard 0.035" J-wire. Once positioned in the left ventricle (LV), the MP catheter was exchanged for a Super Stiff Amplatzer wire (Figure 3d). Both the MP catheter and 22Fr steerable guide were carefully withdrawn through the right femoral vein while maintaining wire access in the LV. A 22Fr Gore DrySeal sheath was then inserted into the right femoral vein to secure vascular access. A 25 mm nonfenestrated Gore CSO was flushed, loaded, and deaired using conventional technique. The CSO was advanced over the wire, across the interatrial septum, and into the lateral commissure. The distal and proximal discs were deployed in the LV and LA, respectively. Real-time TEE assessment revealed trivial MR with corresponding drop in mean LA pressure from 30 mmHg to 10 mmHg, further substantiating successful closure of residual regurgitant jet (Figure 3, Supplemental Video 3).

Abbreviations: CSO, cardioform septal occluder; LA, left atrium; MR, mitral regurgitation; NYHA, New York Heart Association functional class; TEE, transesophageal echocardiography; TTE, transthoracic echocardiography.

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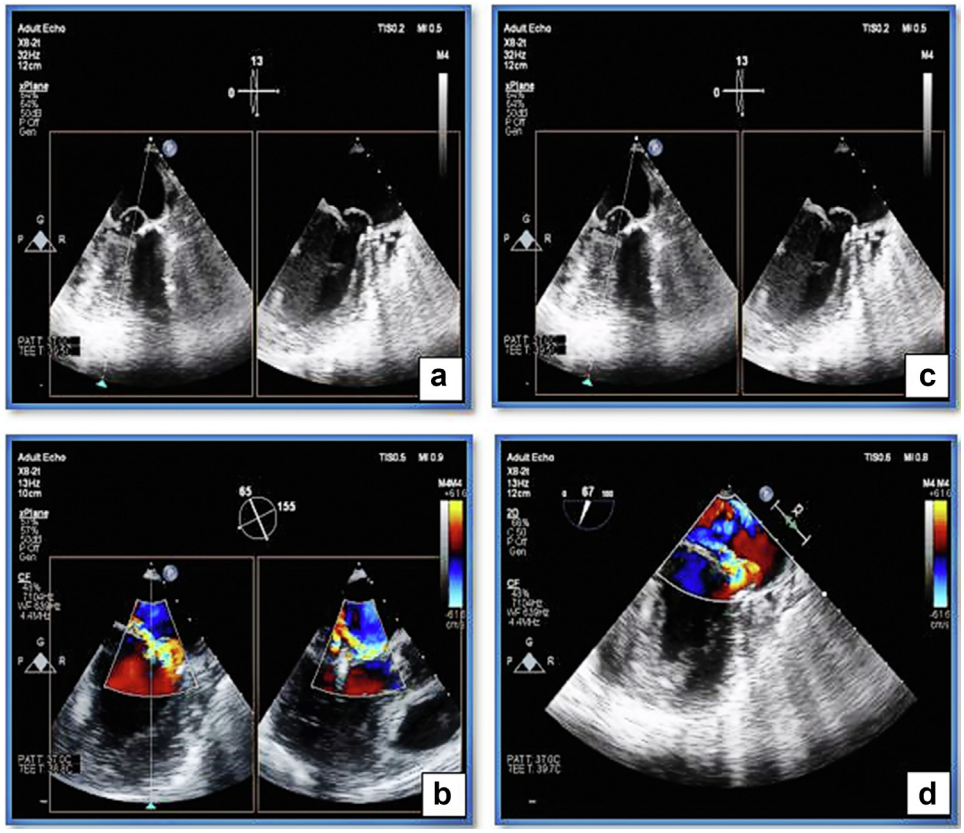

Figure 1. Significant posterior leaflet prolapse visualized with subsequent anteriorly directed 4+ mitral regurgitation jet seen in preoperative (a and b) and intra-operative (c and d) transthoracic echocardiography. See Video 1.

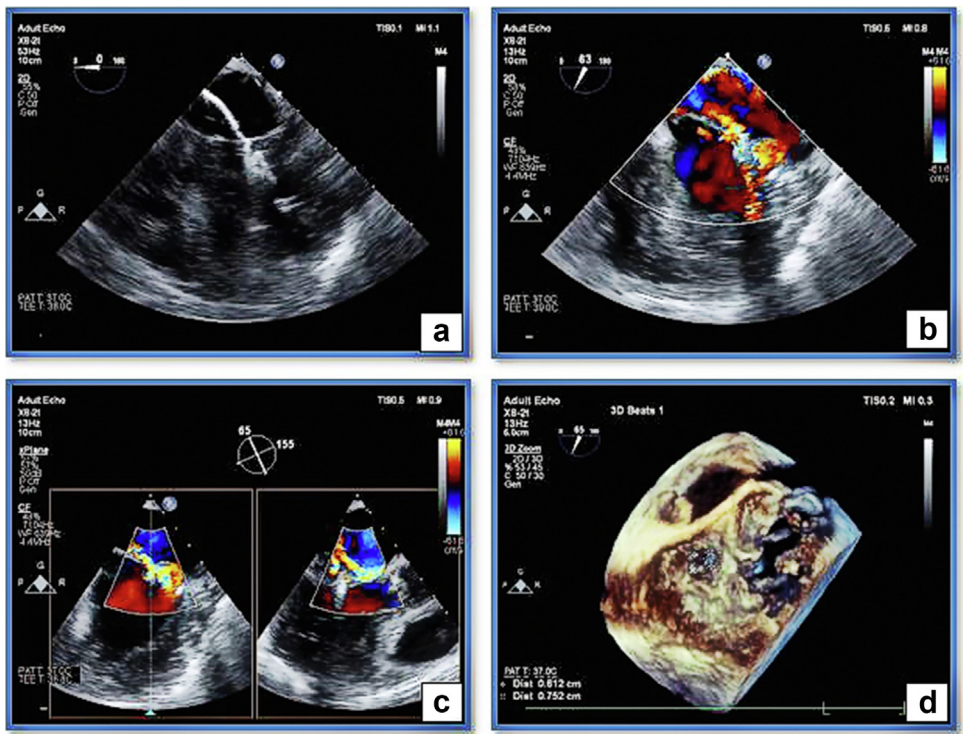

Figure 2. Introduction of MitraClip NTR device into the left atrium (a); residual 2+ moderate mitral regurgitation visualized (b and c) after deployment of the device. 3D view of lateral commissural orifice yielding high risk for entanglement if the second clip implemented (d). See Video 2.

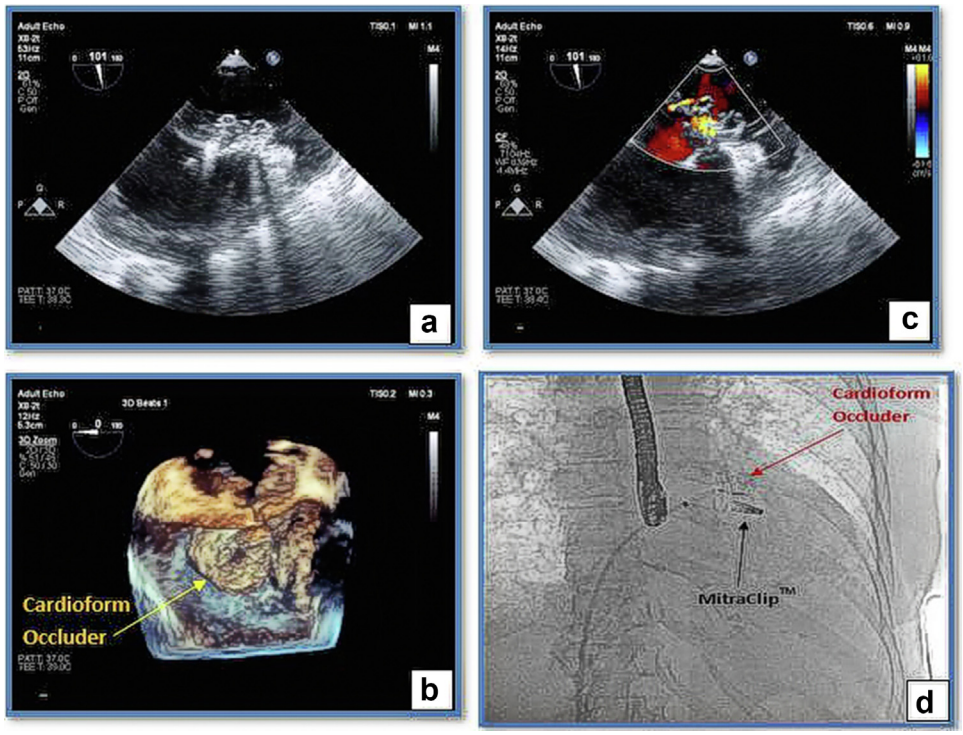

Figure 3. Placement of nonfenestrated Cardioform Septal Occluder in the lateral commissure with adequate resolution of residual lateral mitral regurgitation jet as seen on echo (a-c) and fluoroscopy (d). See Video 3.

The patient improved from NYHA 3 to NYHA 1 and no longer required supplemental home oxygen. 1-month follow-up echocardiogram revealed MitraClip and CSO in adequate position with mild (1+) MR (Supplemental Video 4). The mean gradient across the valve remained at 3 mmHg. No evidence of intravascular hemolysis was appreciated during short- or long-term follow-up. The patient was maintained on dual-antiplatelet therapy during the extended period of her follow-up.

The case highlights a) the technical challenges of TEER in patients with commissural MR, and b) the feasibility of a "clip and plug" approach to treat commissural MR in these circumstances. While one could consider the alternate use of a second MitraClip to seal the residual commissural gap, this approach is often limited by poor visualization and the risks of device interaction resulting in leaflet detachment and device entanglement. The feasibility and anecdotal experience of other types of septal occluders have been previously reported.[1] While the Amplatzer family of occluders has been most commonly employed in these circumstances, their fenestrated design limits their use as it may result in refractory hemolysis.[1,2] As previously shown in similar patients with perivalvular leak, the CSO as a nonfenestrated device minimizes the risk of residual leak and device-mediated hemolysis.[3] We presented the utility of a nonfenestrated CSO in obliterating a residual lateral commissural jet where the anatomy was not amenable to placement of an additional MitraClip with remarkable hemodynamic and symptomatic improvement.

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Supplementary Material

Supplemental data for this article can be accessed on the publisher's website.

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