Dual anterior and posterior mitral valve clefts evaluated by 3-dimensional echocardiography with robot-assisted surgical correction

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Video clip is available online.

We report a case of dual mitral valve clefts in both the anterior and posterior leaflets of the mitral valve. Three-dimensional transesophageal echocardiography (TEE) facilitates visualization of the mitral leaflet pathology and assists with accurate surgical planning. This rare mitral valve anomaly is confirmed surgically and corrected with minimally invasive robotic technique.

CLINICAL SUMMARY

A 16-year-old female patient with a history of ostium primum septal defect and cleft anterior mitral valve repair at 14 months of age was being followed with echocardiog-

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FIGURE 1. Two-dimensional (left) and color Doppler (right) TEE of the mitral valve at 90 degrees before mitral valve repair demonstrating a centrally directed regurgitant jet (Video 1).

FIGURE 2. A, Real-time 3-dimensional zoom image of both A2 scallop and P2 scallop mitral valve clefts (arrows) before surgical repair and (B) after repair of anterior and posterior leaflets and commissuroplasty via minimally invasive lateral endoscopic robotic-assisted surgery. AML, Anterior mitral valve; PML, posterior mitral valve.

raphy for residual postoperative mitral regurgitation. Over the past year, cough and decreased exercise tolerance developed in the patient. Auscultation revealed a high-frequency, holosystolic murmur with II/VI intensity harshest at the apex. Electrocardiography demonstrated normal sinus rhythm, left axis deviation, and right ventricular hypertrophy with qR in V1. A 2-dimensional transthoracic echocardiogram revealed severe mitral valve regurgitation. Intraoperative TEE confirmed the centrally directed severe mitral regurgitation jet (Figure 1 and Video 1). Real-time 3-dimensional TEE clearly demonstrated a large cleft in the A2 scallop of the anterior leaflet and another cleft in the P2 scallop of the posterior leaflet (Figure 2, A).

FIGURE 3. Radical mitral valve reconstruction with repair of anterior and posterior leaflets and commissuroplasty with minimally invasive lateral endoscopic robotic-assisted surgery before (A) and after (B) repair of the anterior mitral valve leaflet.

The patient underwent radical mitral valve reconstruction with repair of anterior and posterior leaflets and commissuroplasty via a minimally invasive lateral endoscopic robotic-assisted surgery (Figures 2, B, and 3; Video 2). The mitral valve regurgitation decreased from severe to trace postoperatively (regurgitant volume by proximal isovelocity surface area 34 to 8 mL) (Figure 4; Video 3). Four months after repair, the patient shows no residual mitral regurgitation and reports significant improvement in symptoms.

DISCUSSION

Dual mitral valve clefts in both the anterior and posterior leaflets are rare anomalies and have only been described in 3 prior case reports.¹⁻³ Standard transthoracic 2-dimensional echocardiography is a sensitive tool for identification of mitral regurgitation, but it does not easily delineate the

FIGURE 4. Two-dimensional (left) and color Doppler (right) TEE demonstrating postoperative images after successful repair of the anterior and posterior mitral valve clefts and absence of mitral valve regurgitation (Video 3).

anatomy of the valve when complex structural abnormalities exist.⁴ This case highlights the utility of 3-dimensional TEE, which facilitates viewing of the mitral valve from the left atrial (surgeon's) perspective and allows accurate depiction of mitral valve leaflet pathology and effective surgical planning. When this patient underwent an operation at the age of 14 months (1995), it is likely that intraoperative 3-dimensional TEE was not available and the cleft posterior leaflet was not identified.

CONCLUSIONS

To our knowledge, this is the first report to demonstrate dual mitral valve clefts with 3-dimensional TEE with confirmatory surgical findings and correction via a minimally invasive robotic technique.

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