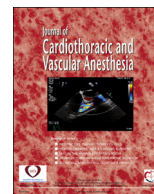




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Case Conference

Unexpected Mitral Regurgitation During Coronary Artery Bypass Graft Surgery: The Multidisciplinary Management of a Mitral Valve Cleft

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AN ISOLATED CLEFT of a mitral valve leaflet is a rare finding in adult cardiovascular practice, with an estimated incidence of 0.1%.^{1,2} Although rare, a mitral cleft may be an important etiology for significant mitral regurgitation (MR).¹⁻³ These clefts can pose a challenging diagnosis to the perioperative echocardiographer because they can be difficult to visualize despite comprehensive systematic mitral valve imaging with multiple views, especially in the setting of concomitant valvular lesions.³⁻⁵ This case conference presents and discusses the management of a clinical scenario in which a mitral valve cleft was diagnosed intraoperatively in an adult

patient who presented for coronary artery bypass grafting (CABG).

Case Report^{*}

A 64-year-old man with history of hypertension, hyperlipidemia, and diabetes mellitus presented to his primary care physician with chest pain consistent with exertional angina. Given his risk factors, he was referred promptly for further cardiac evaluation. His electrocardiogram at rest demonstrated sinus bradycardia without any signs of an acute coronary syndrome. After a positive exercise stress test, he underwent cardiac catheterization that revealed severe multivessel

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coronary artery disease, including the left anterior descending artery, the circumflex artery, and the right coronary artery. Left ventriculography revealed a normal ejection fraction with no evidence of mitral or aortic regurgitation. Based on these coronary findings, he was scheduled for CABG. Additional laboratory testing was within normal limits. He did not undergo a preoperative transthoracic echocardiogram.

In the operating room, the patient underwent an uneventful induction of general anesthesia after placement of a right radial arterial line. After endotracheal intubation, a pulmonary arterial catheter was inserted via the right internal jugular vein. A transesophageal echocardiography (TEE) probe also was placed without difficulty.

The TEE examination revealed normal biventricular function with no regional wall motion abnormalities. Additional mitral evaluation demonstrated significant eccentric MR that was posteriorly directed into the left atrium (Fig 1). Further quantification including the vena contracta suggested that this eccentric MR was severe in grade. Given that the left atrium was dilated, it was likely that this severe MR was chronic. Because the patient did not have a preoperative echocardiographic examination, this represented a new and important finding.

The mechanism for the MR subsequently was investigated further. There was no obvious prolapse or restriction of the mitral valve leaflets. The MR remained severe despite normotensive conditions under general anesthesia. There was no evidence for acute ischemia either on electrocardiographic or echocardiographic monitoring. Additional mitral examination with 3-dimensional (3D) TEE imaging, however, suggested an isolated cleft between the second and third scallops of the posterior mitral valve leaflet as the mechanism for the severe eccentric MR (Fig 2). These echocardiographic findings were reviewed in detail with the surgical team who decided to proceed with CABG and mitral valve repair with cardiopulmonary bypass (CPB).

After CPB was established with aortobicaval cannulation, the mitral valve was inspected after cardioplegic arrest. The cleft of the posterior mitral valve leaflet was confirmed and

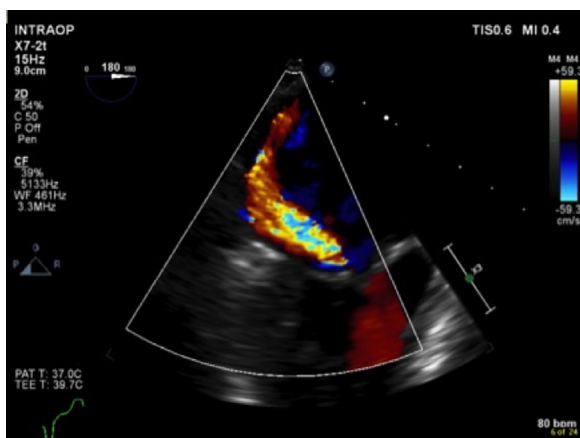


Fig 1. Mitral regurgitation. In this modified midesophageal aortic long-axis view, significant eccentric mitral regurgitation is demonstrated. The mitral regurgitation is posteriorly directed.

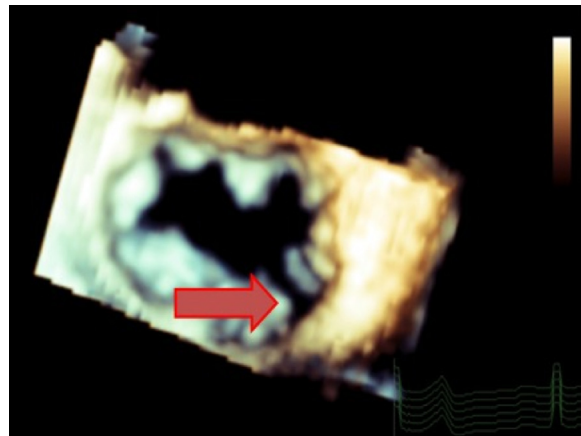


Fig 2. An isolated cleft of the posterior mitral valve leaflet. In this edited 3-dimensional image of the mitral valve, the red arrow demonstrates an isolated cleft between the second and third scallops of the posterior mitral leaflet.

subsequently closed. This repair was reinforced with flexible annuloplasty band (Simplici-T Annuloplasty System; Medtronic, Minneapolis, MN). The patient also received 3 bypass grafts. After an uneventful separation from CPB, comprehensive TEE demonstrated normal biventricular function with a trace of MR, a repaired posterior mitral valve cleft, an annuloplasty band, and a normal transmitral diastolic pressure gradient. There also was no left ventricular outflow tract obstruction. The patient subsequently was admitted to the cardiothoracic intensive care unit. The postoperative course was uncomplicated. The patient required cardioversion for atrial flutter in the first week after surgery and ultimately was discharged home on the 9th hospital day.

Case Discussion

An isolated mitral valve cleft is an uncommon cause of MR.²⁻⁴ A cleft is a defect of the mitral leaflet and may be considered a partial manifestation of an endocardial cushion defect.⁴ This congenital form of MR can be differentiated from normal leaflet defects such as a scallop in that the tissue defect of a cleft typically extends completely to the annulus (see Fig 2).⁵ Mitral valve clefts affect the anterior mitral leaflet more commonly than the posterior leaflet and may be associated with additional congenital abnormalities such as atrial septal defects (Fig 3) and aberrant chordal attachments of the mitral valve.⁴⁻⁸ These aberrant chordal attachments may be associated with a parachute mitral valve when they attach predominantly to a single papillary muscle and left ventricular tract obstruction when they attach to the ventricular septum.⁴⁻⁸

Mitral valve clefts are classified as isolated when they are not associated with other congenital abnormalities. Although isolated mitral valve clefts typically involve the anterior leaflet, they may affect the posterior leaflet, as illustrated in this case conference.⁶⁻⁹ In a large echocardiographic analysis (n = 19,320), the incidence of an isolated cleft of the posterior mitral leaflet was 0.11%.⁶ In this analysis, posterior mitral clefts were more common in men and commonly localized to

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