Case Report

Percutaneous Transvenous Mitral Commissurotomy in a Postoperative Patient With the Pericardial Patch Repair of an Atrial Septal Defect

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ABSTRACT

Coexistence of an atrial septal defect (ASD) and acquired rheumatic mitral valve disease is uncommon. Transseptal puncture during percutaneous transvenous mitral commissurotomy (PTMC) can be technically difficult and challenging in patients with the pericardial or synthetic patch at the interatrial septum following ASD repair. We describe a middle-aged woman who had pericardial patch repair of ASD during childhood and now presented with severe, symptomatic rheumatic mitral stenosis. She had successful PTMC through a transseptal approach, following the puncture of the pericardial patch. The technical details about the transseptal approach following the surgical patch repair of the ASD are discussed in the article.
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KEYWORDS: Atrial septal defect, Iatrogenic atrial septal defect, Mitral stenosis, Percutaneous transvenous mitral commissurotomy, Pericardial patch

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Chronic rheumatic heart disease (RHD) continues to be an important public health problem in many developing and underdeveloped countries.[1] The mitral valve is the commonly affected valve in RHD.[2] A combination of rheumatic mitral valve disease in association with a congenital atrial septal defect (ASD) is termed "Lutembacher syndrome".[3] Percutaneous transvenous mitral commissurotomy (PTMC) has become the procedure of choice for patients with symptomatic, severe mitral stenosis.[4] Following the surgical repair of an ASD, the transseptal puncture of the surgical patch can be challenging.[5,6] We hereby describe a middle-aged woman with severe, symptomatic mitral stenosis, who had successful PTMC through the surgically repaired ASD patch.

Case Report

A 47-year-old woman presented to the emergency department with worsening shortness of breath (New York Heart Association [NYHA] functional class III) of 6 months' duration. The patient was on regular medical follow-up during the last 10 years for chronic RHD. She had an open surgical, pericardial patch repair of a sinus venosus ASD at the age of 10 years. At the time, she had no associated rheumatic

valvular disease. Clinical examination revealed an irregular pulse and a long mid-diastolic murmur at the cardiac apex, suggestive of severe mitral stenosis. The rest of the clinical examination was unremarkable. An electrocardiogram showed atrial fibrillation with a ventricular rate of 70 per minute. Two-dimensional transthoracic (Fig. 1A) and 3D transesophageal (Fig. 1B) echocardiographic examinations showed critical mitral stenosis with an area of 0.43 cm^2 by planimetry. The transmitral peak/mean diastolic gradient was 15/10 mm Hg. The mitral valve was pliable, with the Wilkins score of 8. There was severe tricuspid regurgitation, with an estimated pulmonary artery systolic pressure of 50 mm Hg. The interatrial septum was hyperechoic, 4.5 mm thick, and without a residual ASD (Fig. 1C & 1D).

After providing written informed consent, the patient was considered for PTMC. The usual dip at the site of the foramen ovale was absent during the pullback of the Brockenbrough needle to perform transseptal puncture. The appropriate puncture site was selected in anteroposterior and lateral views (Supplementary Video 1) under fluoroscopic guidance. The thickened interatrial septum could be punctured by applying some extra-manual force, compared with the usual transseptal puncture. The PTMC procedure was completed as per the standard Inoue technique. Post-PTMC trans-mitral end-diastolic gradient decreased from 20 mm Hg to 1 mm Hg. There was no mitral regurgitation or other procedure-related complications. The repeat echocardiogram after 24 hours showed a dilated mitral valve (Fig. 1E & 1F) with an area of 1.44 cm^2 by planimetry. The estimated pulmonary artery systolic pressure dropped to 23 mm Hg with mild tricuspid regurgitation. A residual 2.7 mm iatrogenic ASD could be visualized across the pericardial patch (Fig. 1G & 1H). She remained asymptomatic for the next 6-months of follow-up. A repeat transthoracic echocardiographic examination at 6 months showed the disappearance of the iatrogenic ASD.

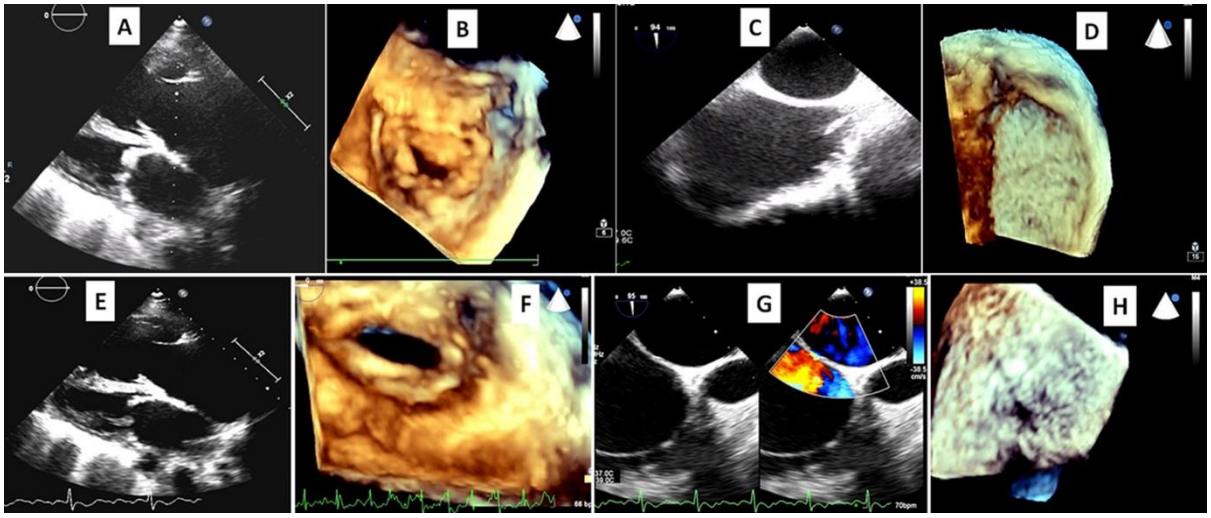

Figure 1: Transthoracic echocardiography in the modified, parasternal long-axis view (A) and 3D transesophageal echocardiography (TEE) (B) show a thick and domed mitral valve. Two-dimensional TEE in the bicaval view (C) shows a 4.4 mm thick, hyperechoic pericardial patch at the interatrial septum. Three-dimensional TEE shows an intact pericardial patch at the atrial septal position (D). Following successful percutaneous transluminal mitral commissurotomy (PTMC), the image shows a well-opened mitral valve in transthoracic echocardiography in the modified parasternal long-axis view (E) and 3D TEE (F). Two-dimensional (G) and 3D (H) TEE examinations show an iatrogenic atrial septal defect, 2.7 mm in size, across the pericardial patch.

Supplementary Video 1: Percutaneous transluminal mitral commissurotomy (PTMC) through the pericardial patch at the atrial septum is demonstrated herein. The Brockenbrough needle is tracked down below the aortic bulge in the anteroposterior view. The septal puncture is performed in the lateral view, followed by the Inoue wire placement within the left atrium. The next step sees the successful balloon dilatation of the mitral valve.

DISCUSSION

Open surgery for the ASD constitutes a pericardial or synthetic patch or septal stitches to repair the defect. These post-surgical patients may require left atrial access for a left heart catheterization, atrial fibrillation ablation, percutaneous mitral valve repair, or PTMC.[5,6] Transseptal access can be challenging in the presence of the surgical patch and distorted anatomy.[5,6] Direct transseptal puncture through a synthetic PTFE Gore-Tex patch can be difficult, while pericardial and Dacron patches can be punctured without much difficulty.[5,6] Pericardial or synthetic patches tend to calcify over time and can make the puncture difficult, along with the risk of systemic calcium embolization.[7] Transesophageal or intracardiac echocardiography-guided radiofrequency transseptal ablation is an alternative method in calcified pericardial or Gore-Tex patches when conventional methods fail.[7,8] The index case had a thickened non-calcified pericardial patch, which did not hamper the transseptal puncture. The usual fluoroscopic landmark of the fossa ovalis is absent in such cases, hence intracardiac/transesophageal echocardiography can help select the appropriate site of the transseptal puncture.[5,7,8] We succeeded in performing the transseptal puncture in the anteroposterior and lateral fluoroscopic projections of the cardiac silhouette. Though left heart catheterization and radiofrequency ablation of atrial fibrillation through the transseptal surgical patch are frequently reported,[7-9] we managed to find only a single published case report of PTMC through the Dacron patch in such patients.[10]

A retrograde transaortic PTMC approach can be an alternative option in such cases when the transseptal puncture is not successful or contraindicated.[11] The iatrogenic ASD has spontaneous closure in most transseptal access patients with a native[12] or patched atrial septum.[9] A persistent iatrogenic ASD can rarely cause right heart failure and pulmonary hypertension, requiring closure.[13] The index case had spontaneous resolution of a small iatrogenic ASD during 6 months of follow-up. In conclusion, we performed a successful PTMC through a transseptal approach in a patient with a post-surgical pericardial patch in situ and had favorable short-term outcomes.

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Ethical Approval: Ethical approval was obtained from the institutional board, and the study was compliant with the declaration of Helsinki.

Informed written consent was obtained from the patient for the publication of case details and clinical images in this case report.

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