

A Rare Case of Improved Mitral Regurgitation after the Inter-Atrial Septal Defect Created during an Unsuccessful Percutaneous Mitra-Clip Placement Attempt

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Abstract

Percutaneous mitral valve repair has shown to be a less-invasive treatment option for patients with symptomatic severe mitral regurgitation (MR) with multiple comorbidities. We describe a case of improved mitral regurgitation due to improved atrial fibrillation secondary to left atrial pressure relief after the inter-atrial defect created during an unsuccessful mitral clip placement attempt. Transthoracic Echocardiogram that was performed on admission showed severe mitral valve regurgitation. She was not a surgical candidate due to multiple co-morbidities. Patient was then medically optimized and a percutaneous MitraClip placement (PMCP) was attempted but was unsuccessful due to excessive trans-mitral gradient and the procedure was aborted. However, left atrial pressure decreased, likely secondary to inter-atrial septal defect created by the procedure. Transesophageal echocardiogram performed post-op showed moderate and improved mitral regurgitation and sinus rhythm. Attempts to convert atrial fibrillation to sinus rhythm to improve mitral regurgitation had to be made before continuing with a mitral clip placement procedure in our case. In our case, the procedure itself did not help patient's symptoms, but the resulting acute atrial pressure relief improved mitral regurgitation overall due to left to right shunt from iASD, which also helped the rhythm.

Keywords

Mitral Clip Placement, Mitral Regurgitation, Inter-Atrial Septal Defect

1. Introduction

Percutaneous mitral valve repair has shown to be a less-invasive treatment op-

tion for patients with symptomatic severe mitral regurgitation (MR) with multiple comorbidities [1] [2] [3] [4]. After the promising results of EVEREST I trial in 2005, multiple studies have supported the low complication rates associated with mitral clip placement procedure [1] [2]. Technical developments and growing experience with this procedure decreased the major adverse event rate from 15% in 2005 to <3.5% in 2020, even though more complex lesions have been addressed lately [2]. The MitraClip guiding catheter is inserted via the right femoral vein and requires a trans-septal puncture to access the left atrium, which creates an iatrogenic atrial septal defect (iASD) that is larger in diameter than most other percutaneous procedures do [1] [5]. Some studies have associated iASD post percutaneous MitraClip placement with improved hemodynamics [6]. We describe a case of improved mitral regurgitation due to improved atrial fibrillation secondary to left atrial pressure relief after the inter-atrial defect created during an unsuccessful mitral clip placement attempt.

2. Case Presentation

A 72 year old female with a past medical history of COPD on home oxygen, lung cancer status post right lower lobectomy and atrial fibrillation, presented with severe dyspnea and was managed for severe MR with diastolic heart failure. Patient was diagnosed with severe mitral regurgitation as per American Society of Echocardiography (ASE) criteria due to pre-procedural transesophageal echocardiogram showing severely dilated left atrium, thickened and degenerative mitral valve leaflets and colour doppler showing severe eccentric jet > 50% of left atrial area (Figure 1) as well as vena contract width of 0.8cm which is >0.7 cm (Figure 2). There was also severe pulmonary venous systolic flow reversal (Figure 3). Electrocardiogram on admission (Figure 4) showed atrial fibrillation with rapid ventricular response. Atrial fibrillation is also a very well-known precipitant of diastolic heart failure, therefore attempts were made to convert to sinus rhythm. Patient was first started on Amiodarone in addition to Diltiazem and anticoagulation, but atrial fibrillation persisted. Therefore, Cardio-version was also attempted on two separate occasions without success. All laboratory work including cardiac markers was grossly normal. She was not a surgical candidate due to multiple co-morbidities. Patient was then medically optimized and a percutaneous MitraClip placement (PMCP) was attempted but was unsuccessful due to excessive trans-mitral gradients (15 mmHg initially and 13 mmHg after attempting repositioning) that were observed when the mitral clip was deployed and the procedure was aborted. However, left atrial pressure decreased, likely secondary to inter-atrial defect created by the procedure. Transesophageal echocardiogram performed post-op (Figure 5 and Figure 6) showed moderate and improved mitral regurgitation with a vena contract width of 0.42 cm and the rhythm strip showed sinus rhythm. Electrocardiogram post procedure also showed sinus rhythm with normal heart rate (Figure 7). Patient was transferred for transcatheter mitral valve replacement (TMVR) at another hospital,

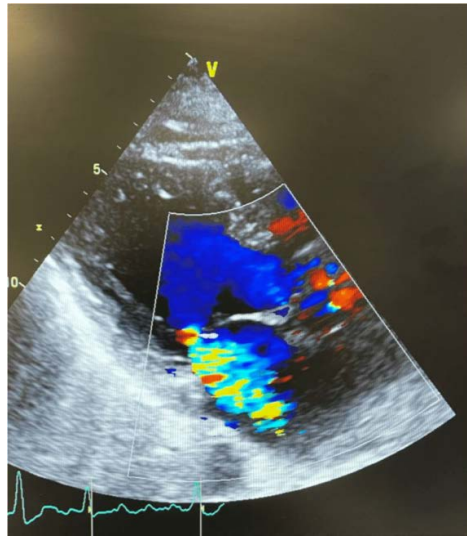


Figure 1. Echocardiogram in parasternal long axis view, with colour doppler jet (pre-percutaneous MitraClip placement procedure), showing severe mitral regurgitation.

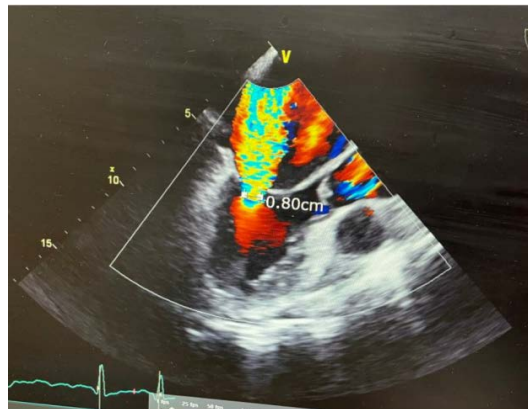


Figure 2. Echocardiogram in apical four chamber view with colour doppler showing severe eccentric jet $> 50\%$ of left atrial area as well as vena contract width of >0.7 cm.

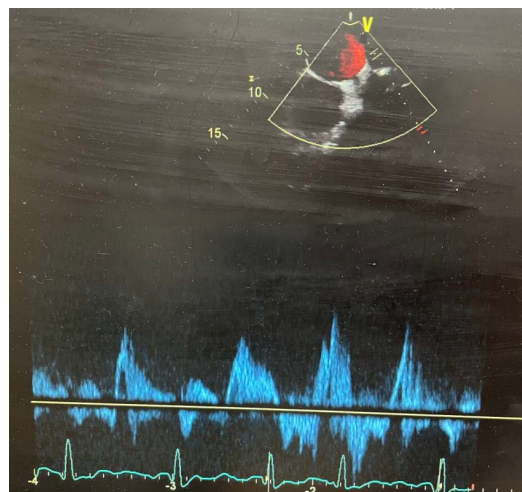


Figure 3. Transesophageal echocardiogram pre-procedure, severe pulmonary venous systolic flow reversal, indicative of severe mitral regurgitation.

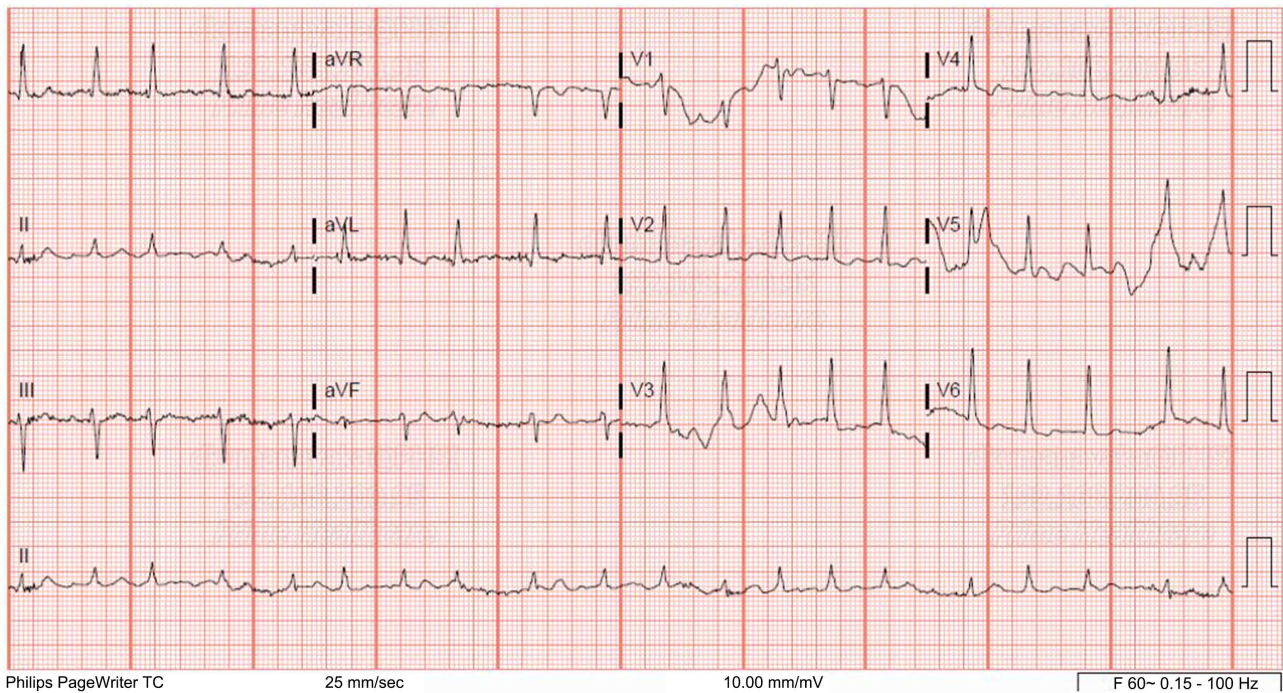


Figure 4. Electrocardiogram on admission showed atrial fibrillation with rapid ventricular response.

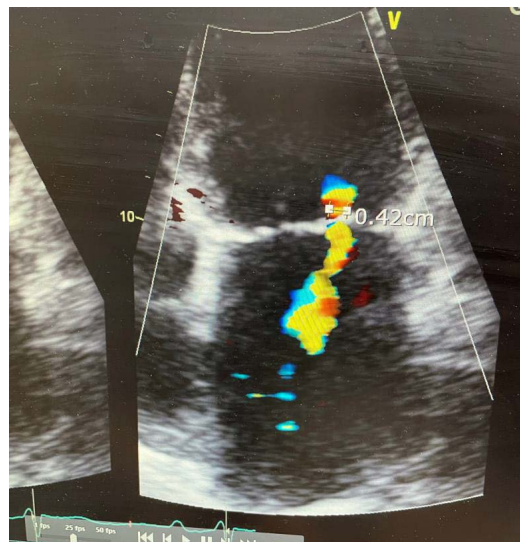


Figure 5. Transesophageal echocardiogram performed post-op (Figure 5) showed moderate and improved mitral regurgitation with a vena contract width of 0.42 cm and the rhythm strip showed sinus rhythm.

but did not meet the criteria due to improvement in regurgitation post-PCMP. On follow up of the patient one month after discharge, patient reported improved symptoms. Informed consent was obtained from the patient to report this case, even though all information is deidentified in this write up.

3. Discussion

Mitral valve disease is one of the most common valvular anomalies and due to

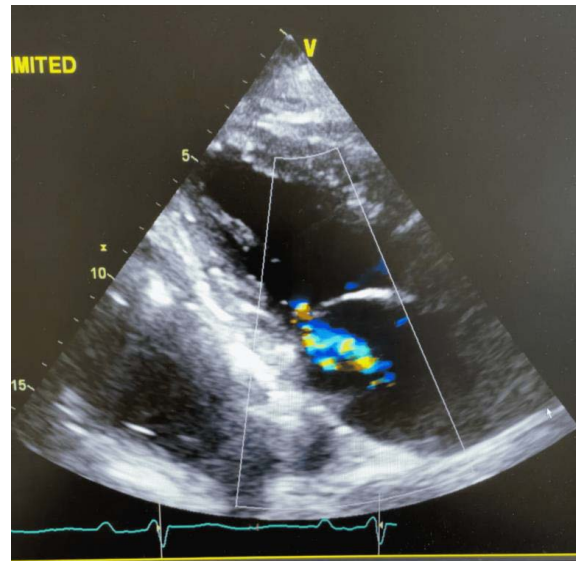


Figure 6. Echocardiogram in parasternal long axis view, with colour doppler (post-Per-cutaneous Mitral Clip Placement procedure), showing improved mitral regurgitation.

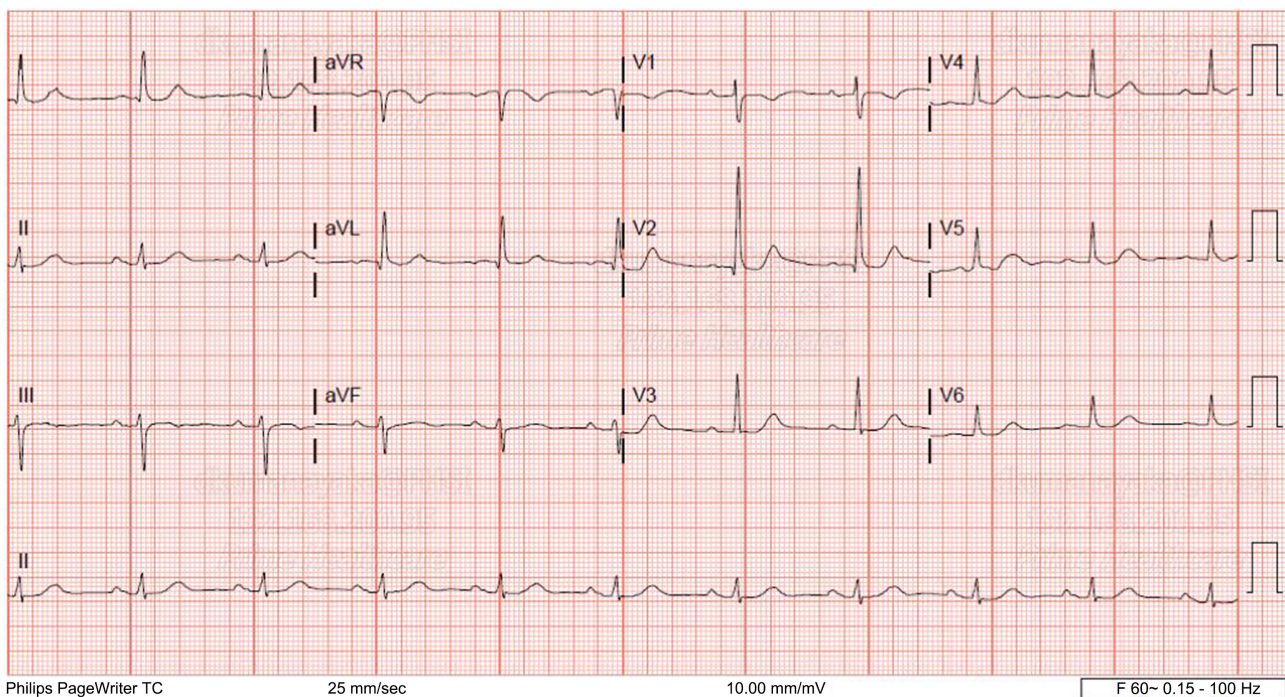


Figure 7. Electrocardiogram s/p mitral clip procedure attempt showed sinus rhythm.

the other associated comorbidities, many patients are at high surgical risk and necessitate alternative therapeutic options [7]. Up to 50% of patients with moderate to severe mitral regurgitation (MR) are not considered surgical candidates [7]. The consequences of trans-septal puncture resulting in iatrogenic atrial septal defects (iASDs) are being increasingly studied due to increased number of patients undergoing percutaneous treatment of severe mitral regurgitation with MitraClip placement. Incidence of persistent iASD after percutaneous mitral clip

placement (PCMP) procedure is significantly high and it is shown to be higher in prevalence in female gender and in patients with reduced left ventricular ejection fraction [8]. The resulting iatrogenic atrial septal defect (iASD) is not routinely closed after the PMCP [1] [2] [3] [4] [5] and is not shown to increase mortality or hospitalization [8]. Attempts to convert atrial fibrillation to sinus rhythm to improve mitral regurgitation had to be made before continuing with a mitral clip placement procedure in our case, as mentioned in the case presentation. In our case, the procedure itself did not help patient's symptoms because it had to be aborted due to elevated Mitral gradients, but the resulting acute left atrial pressure relief improved mitral regurgitation overall due to left to right shunt through iASD, which also improved the rhythm. Even though PMCP was unsuccessful in our case and had to be aborted, it's shown to decrease mortality and morbidity in non-surgical candidates with severe MR. Our patient did not qualify for TMVR due to decreased mitral valvular gradient created by iASD, when attempting PCMP. As mentioned above, patients eligible for MitraClip placement commonly have some degree of heart failure and they are considered high risk surgical candidates in most cases. This might make them more susceptible to any long term hemodynamic consequences of iASD and it is important to follow up with them and monitor for any worsening or new symptoms. More studies and case reports are required to investigate the long term effects of the iASD created during PCMP and patients can be followed up regularly after the procedure for this purpose.

4. Conclusion

We describe a case of improved mitral regurgitation after an unsuccessful percutaneous Mitral Clip placement procedure due to the iASD created. This case highlights the importance of carefully considering clinical outcomes post-procedure, before deciding on closure of iASD, in high risk non-surgical candidates.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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