



**ORIGINAL RESEARCH PAPER**

**Cardiovascular**

**THE ONSET OF ATRIAL FIBRILLATION AFTER IMPLANTATION OF MITRACLIP FOR MITRAL REGURGITATION: A CASE REPORT**

**KEY WORDS:** Mitral regurgitation, mitralclip, atrial fibrillation

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**ABSTRACT**

**BACKGROUND:** Mitralclip procedure is an effective and minimally invasive approach for mitral regurgitation in patients of advanced age and high risk to surgical intervention. Even though it is approved by USFDA for the treatment of high-risk patients with primary mitral regurgitation (MR), complications like atrial fibrillation have been observed. The primary objective of this case report is to bring to notice the incidence of atrial fibrillation after mitralclip implantation.

**CASE REPORT:** A 78-year-old patient with multiple co-morbidities like systemic hypertension, peripheral neuropathy, etc. presented with severe chest pain and found to have severe MR, severe pulmonary arterial hypertension, normal left ventricular function, an ejection fraction of 68% and was planned for mitralclip implantation procedure. A week after the mitralclip procedure, the patient was presented with atrial fibrillation.

**DISCUSSION:** Thus there is a possibility of side effects such as atrial arrhythmias, and this can also alter the mortality rates. The occurrence of atrial fibrillation should be kept in mind and necessary precautions should be taken to prevent it.

**INTRODUCTION:**

Mitral regurgitation (MR) is one of the most common valvular heart diseases. The condition usually progresses rapidly leading to left ventricular dysfunction, fluid overload, and heart failure. A Doppler echocardiogram can be used to determine the severity of the valvular disease. Severe MR can be treated by surgical valve replacement to help improve symptoms. [1] A newer technique called transcatheter mitralclip implantation is also widely being used to treat severe MR and has proven to be effective. Despite its benefits, certain risk factors and complications are found to be associated with mitralclip implantation such as atrial fibrillation (AF). [2,3,4] AF was especially noted in patients with heart failure, undergoing treatment for MR with mitralclip. [5]

**CASE REPORT:**

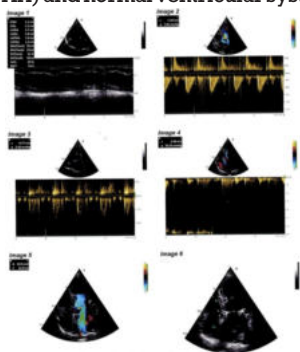
This is a case of a 78-year-old female. She is a known case of systemic hypertension, hypothyroidism, peripheral neuropathy, underwent hysterectomy and bilateral total knee replacement a few years ago. The patient is a non-smoker and does not consume alcohol. In January 2021, she presented with complaints of chest discomfort, pain in the arm, neck, shoulder region, and restlessness for a day. On examination, the patients' blood pressure was 170/90mmhg, pulse was 80/minute, and regular. The patient was admitted and further evaluation was done. Electrocardiography was done and revealed normal sinus rhythm. 2D Echo showed moderate-severe MR, mild Tricuspid regurgitation (TR), no left ventricular dysfunction, ejection fraction of 64% [Refer figure 1]. The patient was planned for coronary angiography, which revealed normal arteries. Post-procedure patient was stable and was discharged on anti-hypertensive and diuretic medication. 2 weeks after discharge, the patient was reviewed and a repeat 2D Echo was done, which revealed an ejection fraction of 60%, severe MR, mild TR, mild pulmonary artery hypertension (PAH) and normal ventricular systolic function.

**Figure 1:**

2D Echo demonstrating moderate-severe MR, mild Tricuspid regurgitation (TR), no left ventricular dysfunction, ejection fraction of 64%.

2 months after discharge patient presented again with symptoms of heart failure (NYHA- New York heart association, class 4 symptoms). The patient had multiple episodes of such symptoms in the last few months. On examination, vitals were stable, a pansystolic murmur was heard. The patient was admitted, all laboratory investigations were within normal limits. 2D Echo done showed an ejection fraction of 68%, severe MR, severe PAH, and normal left ventricular function. A surgical replacement was ruled out in this patient due to the presence of multiple co-morbidities. The patient was hence planned for a transcatheter mitralclip implantation for the severe MR and to treat its symptoms. Under general anaesthesia, via right femoral venous access mitralclip (2x clip) was implanted, with the guidance of a 3D transesophageal echocardiogram. Post-procedure echo showed trivial MR with a gradient of 4mmhg and no PAH. The patient was hemodynamically stable, failure symptoms resolved and the patient was discharged on antibiotics, anti-hypertensives, and dual blood thinners.

A week after the mitralclip implantation procedure patient presented again, this time with complains of shortness of breath, nausea, and vomiting post exertion. On examination, vitals were stable and occasional crepitation were heard over the lungs. The patient was admitted for further evaluation. All investigations were under normal limits, except NTPro-brain natriuretic peptide which was slightly elevated. 2D Echocardiogram showed normal functioning mitralclips in situ with mild MR and left ventricular function with an ejection fraction of 70%. The patient was diagnosed with fluid overload most probably due to atrial arrhythmias such as atrial fibrillation [Refer figure 2]. She was treated with diuretics and discharged once failure symptoms resolved. The patient was maintaining well on medications. She was followed up after 10 days and a repeat 2D echo was done which showed mitralclip In situ, no regional wall motion abnormality, mild MR, mild PAH, adequate left ventricular function, ejection fraction 60%, no clots. ECG was also done which demonstrated atrial fibrillation. The patient was continued medical management with dual anti-platelets and anti-hypertensive, regular follow up was done to look for further complications caused by the AF.





**Figure 2:** ECG post mitralclip procedure demonstrating Atrial fibrillation with rapid ventricular response.

**DISCUSSION:**

Mitral regurgitation is a complex heart valve condition. In most cases, severe MR may not be treated due to the degree of severity, age, and co-morbid of the patients, and complications of the surgical procedure.<sup>[5]</sup> In such cases, mitralclip implantation is an established treatment option and plays an important role as it is a minimally invasive procedure.<sup>[2,6]</sup> It is also noted to have lesser complication rates according to a study done by nickenig G et al.<sup>[7]</sup> Few other studies mentioned that atrial fibrillation (AF) is noted to be one of the complications post mitralclip implantation.<sup>[3,5,8,9]</sup> The study done by Puls M et al. suggested that the incidence of AF is found to be 31.7%-67% in cases of mitralclip implantation.<sup>[8]</sup> This was also one of the complications noticed in the case presented above. A meta-analysis conducted by Shah S et al. compared the outcome of transcatheter mitral valve repair in patients with and without AF. According to this study patients with AF had a higher incidence of complications such as shock, heart failure, bleeding, re-hospitalization, and increased mortality.<sup>[10]</sup> This was also supported by another meta-analysis by Sun F et al., which also mentioned that these complications occur more with pre-existing AF.<sup>[6]</sup> The same study also mentions that severe MR can trigger AF. A study done by Godino C et al. shows that patients with severe MR complicating to heart failure can develop AF after repair of the mitral valve with mitralclip.<sup>[3]</sup> This case report also demonstrates the onset of AF in our patient with MR post-treatment with mitralclip implantation, after presenting with multiple episodes of heart failure.

In spite of many meta-analysis and review studies supporting that AF is common after mitralclip implantation, this fact remains unclear. The impact of AF on patients post mitralclip procedure is not completely understood. It remains unknown whether these complications occur due to newly developed arrhythmias or pre-existing AF. Also, this study is a case report hence exact incidence rates and statistical data cannot be provided.

**CONCLUSION:**

As a minimally invasive procedure and due to prohibitive risks for a surgical procedure in high-risk mitral valve regurgitation groups of patients, mitralclip has been widely preferred. Atrial Fibrillation has been shown to coincide with mitralclip implantation as seen in the above-reported case. Even though the mortality rates do not vary much in patients with or without AF, the occurrence of AF and associated heart failure should be kept in mind while treating mitral regurgitation patients with mitralclip implantation.

**REFERENCES:**

1. Shah, S., Raj, V., Abdelghany, M., Mena-Hurtado, C., Riaz, S., Patel, S., Wiener, H., & Chaudhuri, D. (2021). Impact of atrial fibrillation on the outcomes of transcatheter mitral valve repair using MitraClip: a systematic review and

meta-analysis. *Heart failure reviews*, 26(3), 531–543. <https://doi.org/10.1007/s10741-020-10051-z>

2. Chatzistergiou, K. T., Papanastasiou, G. A., Kokkinidis, D. G., Ziakas, A. G., Karvounis, H. I., & Karamitsos, T. D. (2019). MitraClip device for patients with functional mitral valve regurgitation: A systematic review. *Hellenic journal of cardiology : HJC = Hellenike kardiologike epitheorese*, 60(2), 101–107. <https://doi.org/10.1016/j.hjc.2019.02.003>

3. Seeburger, J., Borger, M. A., Doll, N., Walther, T., Passage, J., Falk, V., & Mohr, F.W. (2009). Comparison of outcomes of minimally invasive mitral valve surgery for posterior, anterior and bileaflet prolapse. *European journal of cardiothoracic surgery : official journal of the European Association for Cardiothoracic Surgery*, 36(3), 532–538. <https://doi.org/10.1016/j.ejcts.2009.03.058>

4. Puls, M., Lubos, E., Boekstegers, P., von Bardeleben, R. S., Ouarrak, T., Butter, C., Zuern, C. S., Bekeredjian, R., Sievert, H., Nickenig, G., Eggebrecht, H., Senges, J., & Schillinger, W. (2016). One-year outcomes and predictors of mortality after MitraClip therapy in contemporary clinical practice: results from the German transcatheter mitral valve interventions registry. *European heart journal*, 37(8), 703–712. <https://doi.org/10.1093/eurheartj/ehv627>

5. Godino, C., Sisinni, A., Pivato, C. A., Adamo, M., Taramasso, M., Parlati, A., Italia, L., Voci, D., Scotti, A., Munafò, A., Buzzatti, N., Denti, P., Ancona, F., Fiore, G., Sala, A., Vergara, P., Bodega, F., Ruffo, M. M., Currello, S., Castiglioni, A., ... MiZüBr registry (2021). Prognostic Value of Pre-operative Atrial Fibrillation in Patients With Secondary Mitral Regurgitation Undergoing MitraClip Implantation. *The American journal of cardiology*, 143, 51–59. <https://doi.org/10.1016/j.amjcard.2020.12.043>

6. Sun, F., Liu, H., Zhang, Q., Lu, F., Zhan, H., & Zhou, J. (2020). Impact of atrial fibrillation on outcomes of patients treated by transcatheter mitral valve repair: A systematic review and meta-analysis. *Medicine*, 99(40), e22195. <https://doi.org/10.1097/MD.00000000000022195>

7. Arnold, S. V., Chinnakondepalli, K. M., Spertus, J. A., Magnuson, E. A., Baron, S. J., Kar, S., Lim, D. S., Mishell, J. M., Abraham, W. T., Lindenfeld, J. A., Mack, M. J., Stone, G. W., Cohen, D. J., & COAPT Investigators (2019). Health Status After Transcatheter Mitral-Valve Repair in Heart Failure and Secondary Mitral Regurgitation: COAPT Trial. *Journal of the American College of Cardiology*, 73(17), 2123–2132. <https://doi.org/10.1016/j.jacc.2019.02.010>

8. Nickenig, G., Estevez-Loureiro, R., Franzen, O., Tamburino, C., Vanderheyden, M., Lüscher, T. F., Moat, N., Price, S., Dall'Ara, G., Winter, R., Corti, R., Grasso, C., Snow, T. M., Jeger, R., Blankenberg, S., Settergren, M., Tiroch, K., Balzer, J., Petronio, A. S., Büttner, H. J., ... Transcatheter Valve Treatment Sentinel Registry Investigators of the EURObservational Research Programme of the European Society of Cardiology (2014). Percutaneous mitral valve edge-to-edge repair: in-hospital results and 1-year follow-up of 628 patients of the 2011–2012 Pilot European Sentinel Registry. *Journal of the American College of Cardiology*, 64(9), 875–884. <https://doi.org/10.1016/j.jacc.2014.06.1166>

9. Feldman, T., Kar, S., Elmariah, S., Smart, S. C., Trento, A., Siegel, R. J., Apruzzese, P., Fail, P., Rinaldi, M. J., Smalling, R. W., Hermiller, J. B., Heimansohn, D., Gray, W. A., Grayburn, P. A., Mack, M. J., Lim, D. S., Ailawadi, G., Herrmann, H. C., Acker, M. A., Silvestry, F. E., ... EVEREST II Investigators (2015). Randomized Comparison of Percutaneous Repair and Surgery for Mitral Regurgitation: 5-Year Results of EVEREST II. *Journal of the American College of Cardiology*, 66(25), 2844–2854. <https://doi.org/10.1016/j.jacc.2015.10.018>

10. Enriquez-Sarano, M., Akins, C. W., & Vahanian, A. (2009). Mitral regurgitation. *Lancet (London, England)*, 373(9672), 1382–1394. [https://doi.org/10.1016/S0140-6736\(09\)60692-9](https://doi.org/10.1016/S0140-6736(09)60692-9)