

Case Report

## Mitral Bioprosthetic Failure due to Strut Entrapment by Suture Loop with Delayed Diagnosis and Misleading Presentation- A Case Report

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### Abstract

*Biologic heart valve prostheses are increasingly being used especially in the aortic position due to their lower thrombogenic risk. Structural valve dysfunction (SVD) remains the main complication and begins 8 years post-implantation with a greatly increased rate after 10 years.*

*Early prosthetic valve failure is rare with newer generation tissue valves and should raise suspicion of endocarditis, thrombosis, rarely early SVD. Surgical technical errors are much rarer; valve failure is then evident during or immediately after surgery.*

*We present a case of delayed diagnosis of technical surgical error causing mitral bioprosthetic valve failure. This case represents a rare but serious error that is preventable by modern techniques and emphasizes the importance of clinical and echocardiographic follow up after surgery.*

**Keywords:** *severe mitral regurgitation; mitral valve replacement; infective endocarditis; early bioprosthetic failure; strut entrapment.*



## Introduction

Technical errors causing prosthetic valve failure are rare. They cause difficulty in weaning from cardiopulmonary bypass and are identified intraoperatively or rarely immediately after surgery. Herein, we present a case of mitral prosthetic failure caused by a surgical error with a misleading presentation.

## Case report

A 71 years old man was admitted to another hospital for prolonged fever and shortness of breath associated with constitutional symptoms: anorexia, weight loss and night sweats. The patient has a history of bioprosthetic mitral valve replacement for severe primary mitral regurgitation (MR) 2 years ago.

Blood tests showed elevated inflammatory markers with low platelets and normocytic anemia (table1). Blood cultures grew *Enterococcus* spp. Echocardiography showed severe mitral regurgitation, the patient was treated for endocarditis and received intravenous antibiotics for eight weeks. There was the resolution of fever and improvement of inflammatory markers but the patient was still complaining of shortness of breath. He was referred to our institution for further management.

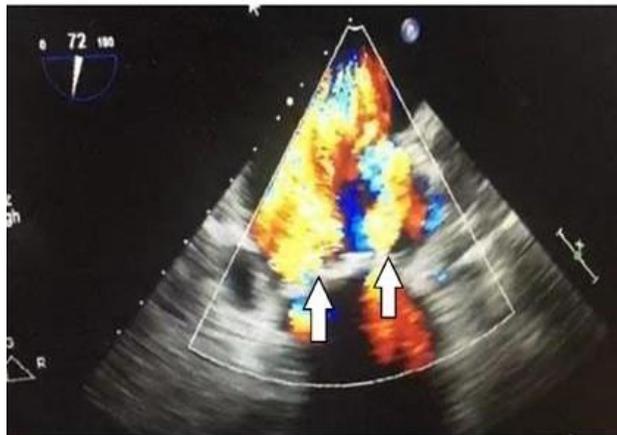
ESR 1hr(mm)	CRP (mg/l)	WBC (/mm <sup>3</sup> )	Seg (%)	Platelets (/mm <sup>3</sup> )	Hb (g/dl)	hematocrit (%)	MCV(fl)
71	83	5100	61	38000	9.8	30.0	88

**Table 1:** laboratory tests results on primary admission

A transesophageal echocardiogram (TEE) was done and showed severe intraprosthetic mitral regurgitation with 2 distinct jets. The mechanism was not very clear, probably perforated leaflet (figures 1-2) due to endocarditis, the left atrium was severely dilated. There is good LV systolic function, SPAP estimated at 60-65 mmhg.

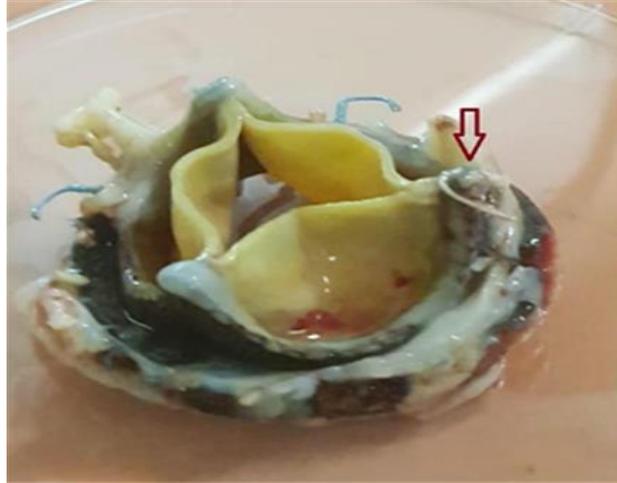


**Figure 1:** 3D TEE of the mitral bioprosthesis, a systolic frame showing 2 defects(arrows)



**Figure 2:** Corresponding color flow doppler showing 2 significant regurgitant jets(arrows)

The patient was then referred for redo mitral MVR. The prosthesis was replaced by a mechanical Medtronic ATS prosthesis. The mechanism of severe mitral regurgitation was revealed intraoperatively and was surprisingly due to strut entrapment by suture loop and not due to endocarditis (figure 3).



**Figure 3:** explanted bioprosthesis, looping suture around a strut(arrow)

There is a complete resolution of patient symptoms after the second operation in comparison to the first surgery where symptoms persisted postoperatively.

## Discussion:

Mitral valve replacement is done classically as follows:

After median sternotomy, total cardiopulmonary bypass is established and myocardial protection is achieved with cardioplegia. Left atriotomy exposes the mitral valve. An incision in the mid anterior leaflet 2-3 mm from the annulus is done. With continued traction on the anterior leaflet, sutures are mounted through the annulus with a pledget on its atrial side. After incision of the anterior leaflet, the surgeon decides intraoperatively to preserve or excise the subvalvular apparatus, then the posterior leaflet may be excised. The sutures are passed through the sewing ring of the prosthetic valve in a horizontal mattress fashion.

The prosthesis is then tied in place.

Care should be taken to avoid cusp entrapment by preserved subvalvular apparatus, LVOT obstruction by prosthetic struts, injury to a left circumflex artery or aortic valve cusps, or strut entrapment by suture loops.



Cases of technical errors causing bioprosthetic failure are rare in the literature. They are usually identified intraoperatively before total weaning off cardiopulmonary bypass directly or by intraoperative TEE. Most cases are due to the preservation of subvalvular apparatus causing leaflet entrapment and prosthetic failure.

In our case, the suture loop was wrapped around one strut causing restriction of leaflets mobility and severe leak. One similar case is reported using Perimount Magna Mitral Ease bioprosthesis (Carpentier –Edwards, Edwards Lifesciences, Irvine CA) and the etiology was determined intraoperatively 10 months later during redo MVR (El Gharably et al.2017).

This complication is avoided by using special techniques to prevent suture entanglement in the struts of bioprosthesis or by using systems that deflect the three commissures towards the center of the valve-like the Cinch Implant System (for Medtronic stented tissue valve) or the Tricentrix Holder System (Edwards Lifesciences). Furthermore, intraoperative normal saline injection to examine valve competence should be routinely performed. The use of TEE during valve replacement should be encouraged.

## Conclusion

This case showed that care must be taken to avoid valve failure by technical error and the importance of intraoperative TEE before total weaning of cardiopulmonary bypass as well as the importance of baseline postoperative echocardiography before discharge from hospital or 2-4 weeks later as recommended by the existent guidelines (W Zoghbi et al.2009).

## Disclosure:

The authors declare that there is no conflict of interest or financial ties to disclose.

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