

## Case Report

# The Novel Use of Mitraclip in a Patient with Combined Multiple Myeloma and Heart Failure with Severe Mitral Regurgitation

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## Abstract

Oncology patients with Heart Failure (HF) and severe Mitral Regurgitation (MR) are often considered to have a prohibitive risk for surgical mitral valve repair/replacement.

We describe a patient with active multiple myeloma and significant HF and MR who was treated with MitraClip, which improved symptoms and allowed delivery of optimal oncological treatment.

**Keywords:** Heart failure; Mitral regurgitation; Mitral valve repair; MitraClip; Cardio-oncology

## Abbreviations

HF: Heart Failure; MR: Mitral Regurgitation; LV: Left Ventricle; MM: Multiple Myeloma; TEE: Transthoracic Echocardiography; LVEF: Left Ventricular Ejection Fraction; RVSP: Right Ventricular Systolic Pressure; TEE: Transesophageal Echocardiography

## Introduction

Approximately 1.8 million new cancer cases and over 600,000 cancer deaths were reported in the U.S. in 2019 [1], with 10% having co-morbid HF. This impacts survival and is associated with increased health care costs [2-4]. Patients with HF are less likely to receive or complete chemotherapy [3]. Secondary mitral regurgitation is a common pathology among patients with HF. It occurs in up to one-fourth of patients with HF with reduced ejection fraction, in which Left Ventricular (LV) dilatation induces apical tethering of the mitral leaflets with incomplete closure. MR in these patients is associated with increased mortality [5]. Many of these patients, especially those treated for cancer, have a prohibitive risk for surgical mitral valve repair/replacement. Often, severe MR inducing symptomatic HF may prevent delivery of potentially cardiotoxic chemotherapy, and complicate fluid management with other cancer treatments. This specific subgroup of patients with cancer and severe secondary MR aggravating HF, could benefit from percutaneous edge-to-edge mitral valve repair (MitraClip).

## Learning Objectives

The objectives of this paper are:

- Highlight the concept that MitraClip treatment of patients with active neoplastic disease with HF and severe MR could improve symptoms and allow completing planned anti-cancer treatment.
- Demonstrating that active cancer should not be a reason to be excluded from novel interventional treatment such as MitraClip.

## Case Presentation

A 83 year-old male with history of Multiple Myeloma (MM)

with lambda light chain paraproteinemia, and long standing hypertension and ischemic heart disease, was admitted with acute HF exacerbation with pulmonary congestion and peripheral edema. The cardiovascular symptoms were significant enough to consider discontinuation of his anti-cancer therapy. The patient's previous treatment included melphalan, prednisolone and thalidomide (MPT), as well as radiation for a tumor mass in the right clavicle. Following two years the treatment was switched to lenalidomide, after which he entered remission. There was relapse of the MM three months prior the present admission to our department, and bortezomib and daratumumab were initiated.

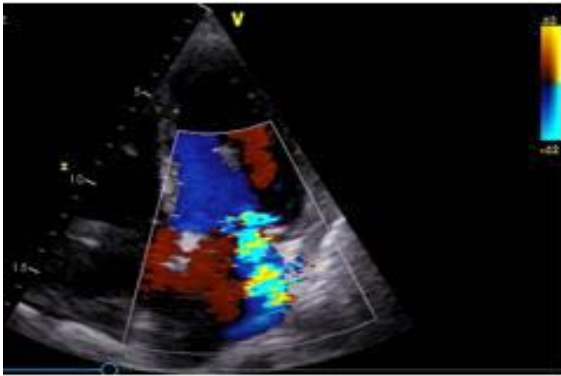
## Investigations

The patient did not have chest pain, the electrocardiogram did not show ischemic changes, and laboratory work up did not show significant elevations in cardiac biomarkers. Transthoracic Echocardiography (TTE) showed mildly reduced systolic LV function with a Left Ventricular Ejection Fraction (LVEF) of 50%, and severe MR causing severe pulmonary hypertension, estimated Right Ventricular Systolic Pressure (RVSP) (81mmHg), with no mitral stenosis (Figure 1). Transesophageal Echocardiography (TEE) showed mild thickening of the mitral leaflets, mild mitral annular calcification, and incomplete closure of the mitral leaflets due to apical tethering.

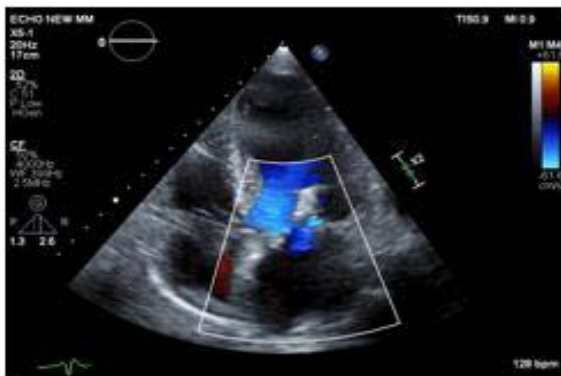
A multidisciplinary team including the heart-failure specialist, interventional cardiologist, imaging cardiologist, cardio-oncologist, hemato-oncologist, and cardiothoracic surgeon recommended performing MitraClip since a surgical intervention was considered to be at a prohibitive risk.

## Management

Under general anesthesia the patient underwent a percutaneous edge-to-edge mitral-valve repair with a MitraClip (Abbott) procedure, *via* femoral vein access, and trans-septal puncture under TEE guidance. Two clips were implanted to achieve reduction of the MR from severe (grade 4+) to mild regurgitation (grade 1+).



**Figure 1:** TTE, apical four-chamber view, showing severe MR before MitraClip.  
TTE: Transthoracic Echocardiography; MR: Mitral Regurgitation.



**Figure 2:** TTE, apical four-chamber view, showing significant reduction in MR after MitraClip.  
TTE: Transthoracic Echocardiography; MR: Mitral Regurgitation.

## Follow-up

Follow-up by TTE on the following day showed mild residual MR (Figure 2), and mild mitral stenosis (mean gradient 5mmHg), mild to moderate pulmonary hypertension (estimated RVSP of 41mmHg). The patient was discharged from the hospital in good cardiac condition to continue outpatient hemato-oncologic treatment and follow up. A follow up TTE one month later showed mild MR. The patient received the planned oncological treatment. During the three-month follow up, there were no additional hospitalizations for HF exacerbation.

## Discussion

Cancer is a major public health problem worldwide, and is the second leading cause of death after cardiovascular diseases in the United States. The overall cancer death rate, however has declined continuously from 1991 to 2016 by a total of 27% [1]. In recent years new oncology treatment and personalized medicine approach have brought improvement in oncology patients' outcome [6].

Cardiac dysfunction and resulting HF are complications of both radiation and chemotherapy that impact survival and quality of life in a large group of cancer patients [7]. Oncological patients with HF are less likely to receive and complete the optimal anti-neoplastic therapy protocols because of these anti-cancer toxicities. These daily and complex issues of patients with combined oncologic and cardiac problems have led in recent years to the emergence of the cardio-oncology sub-specialty that focuses on screening, monitoring and treating patients with heart disease during and after cancer treatment [6,7].

HF patients with moderate-to-severe or severe MR, who are at high surgical risk, can be successfully treated with the MitraClip device and benefit from improvement in HF symptoms and reduction in hospitalization, with morbidity and mortality less than that predicted for surgery [8].

## Conclusion

Percutaneous mitral-valve repair with the MitraClip device for oncology patients with HF and moderate-to-severe or severe MR is a feasible approach to allow optimal oncological treatment in selected HF patients with MR.

We suggest therefore that being a patient with cancer should not be a reason to prevent patients from receiving the evolving interventional treatments such as MitraClip for heart failure with severe MR, if indicated.

Further larger trials are needed to evaluate the role of percutaneous MR repair in this group of patients.

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