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MITRAL VALVE REPLACEMENT AND INTRA-AORTIC BALLOON PUMP THERAPY IN SEVERE RHEUMATIC MITRAL STENOSIS: A CASE REPORT

Cardiothoracis

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ABSTRACT

This case report presents the management of a 43-year-old female with a history of rheumatic heart disease, severe mitral stenosis, and severe pulmonary arterial hypertension. The patient underwent mitral valve replacement and left atrial reduction. Postoperatively, the patient developed severe left ventricular dysfunction necessitating the use of intra-aortic balloon pump (IABP) support. Despite initial challenges, the patient showed significant improvement with IABP therapy, leading to successful recovery. This case highlights the importance of multidisciplinary management in complex cardiac cases and the role of IABP in postoperative valvular cases. IABP therapy is discussed as an effective adjunctive treatment in unloading the left ventricle and promoting myocardial recovery, serving as a valuable adjunct to left ventricular assist device or extracorporeal membrane oxygenation therapy.

KEYWORDS

Rheumatic Heart Disease, Mitral Stenosis, Intra-aortic Balloon Pump, Left Ventricular Dysfunction.

BACKGROUND:

Rheumatic heart disease (RHD) continues to pose a significant burden on global health, leading to substantial morbidity and mortality, especially in low-resource settings[1]. Among its complications, severe mitral stenosis (MS) is prevalent, often requiring surgical intervention to mitigate symptoms and enhance patient outcomes[2]. In the contemporary era, the management of complex cardiac conditions like severe MS in the context of RHD demands a comprehensive understanding of both traditional and advanced treatment modalities. Despite advancements in surgical techniques and perioperative management, certain patients may encounter postoperative challenges, such as left ventricular dysfunction, necessitating the implementation of mechanical circulatory support systems in the form of intra-aortic balloon pump (IABP) therapy[3].

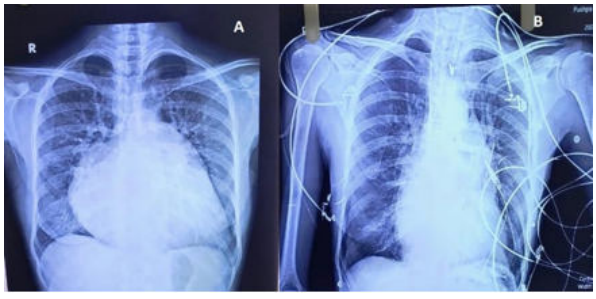
We present a case of a 43-year-old female with a history of RHD and severe MS who underwent mitral valve replacement (MVR) due to symptomatic progression refractory to medical management and previous balloon mitral valvotomy (BMV). The surgical procedure involved complex interventions, including left atrial appendage exclusion and left atrial reduction, owing to the extensive cardiac pathology. This case highlights the challenges encountered in the surgical management of advanced RHD and emphasizes the importance of meticulous intraoperative technique and postoperative care in achieving favorable outcomes.

Case Presentation:

A 43-year-old female, previously diagnosed with RHD and severe MS, presented with dyspnea, palpitations, and exertional intolerance persisting for the past 2-3 years despite being on medication. Having undergone BMV 26 years ago with regular follow-up, she was advised to undergo surgery. Upon examination, she appeared conscious and oriented with stable vital signs, including a pulse rate of 82 beats per minute and a blood pressure of 104/70 mmHg. Cardiovascular examination revealed a mid-diastolic murmur consistent with severe MS and severe Pulmonary Arterial Hypertension.

The patient subsequently underwent a surgical procedure consisting of mitral valve replacement with a prosthetic valve, left atrial appendage exclusion, and left atrial reduction. Intraoperatively, significant anatomical findings included a left aortic arch, large dilated left atrium, and dilated right atrium and right ventricle. Internally, the mitral valve exhibited features such as a large dilated left atrium and left ventricle, calcified and thick leaflets, and a thickened subvalvular apparatus.

The surgical intervention commenced with a median sternotomy to access the thoracic cavity, followed by the establishment of standard cardiopulmonary bypass using appropriate cannulas for venous drainage and aortic cross-clamping. Antegrade root Del Nido cardioplegia was administered to induce cardiac arrest. Subsequent steps included interatrial dissection, mitral valve replacement with continuous prolene sutures, significant reduction of the left atrium by resection of specific walls and appendage exclusion, and closure of the left atrium in layers. Additional procedures included right atrial appendectomy, RV epicardial pacing, and decannulation of Superior and Inferior Venacava. (Figure 1)



A) Pre operative X-ray **B) Post Operative X-ray**

Figure 1: Pre and Post Operative Chest X-ray

Postoperatively, the patient experienced complications such as severe left ventricular dysfunction and biventricular failure, necessitating reintubation and initiation of IABP. After successful management with IABP for three days, the patient showed improvement and was eventually weaned off mechanical support. Pleural fluid collection requiring drainage was noted on postoperative day 10. Despite these challenges, the patient's recovery progressed satisfactorily, and she was discharged on postoperative day 21 with appropriate medications and follow-up instructions.

DISCUSSION:

IABP is the most commonly used mechanical circulatory support device, which is primarily utilized to treat cardiogenic shock. It can reduce the afterload of the heart and increase coronary artery perfusion[4]. The utilization of IABP support post-CABG has traditionally been a cornerstone in managing patients with compromised left ventricular function. Historically, IABP has been employed to enhance coronary perfusion and reduce LV afterload, thereby augmenting cardiac output and improving myocardial oxygenation in patients with impaired LV function following CABG[5]. However, with the advent of advanced mechanical circulatory support devices such as left ventricular assist devices (LVADs) and extracorporeal membrane oxygenation (ECMO), the role of IABP has evolved.

In the era of LVADs and ECMO, which offer more robust mechanical

support, the use of IABP as a primary means of LV unloading has diminished. LVADs provide continuous flow mechanical support, directly offloading the failing left ventricle and restoring systemic perfusion[6]. Similarly, ECMO serves as a temporary cardiac and respiratory support system, effectively bypassing the heart and lungs to maintain vital organ perfusion[7]. Despite the superior support provided by LVADs and ECMO, instances may arise where LV unloading with these devices fails to adequately improve LV function.

In such scenarios, IABP can serve as a valuable adjunct to LVAD or ECMO therapy. By further reducing LV afterload and enhancing coronary perfusion, IABP can complement the support provided by LVADs or ECMO, potentially facilitating recovery of native LV function over time[8]. This synergistic approach allows for tailored hemodynamic support, with IABP providing temporary assistance until LV function improves sufficiently to sustain cardiac output independently.

However, it is important to note that the use of IABP in conjunction with LVAD or ECMO should be carefully considered, as it may not always result in improved outcomes and can potentially introduce complications such as limb ischemia, thrombosis, and vascular injury[9]. Additionally, the decision to employ IABP in this context should be based on individual patient characteristics, hemodynamic parameters, and response to initial mechanical support.

While LVADs and ECMO have revolutionized the management of patients with advanced heart failure, IABP retains a supplementary role in cases where LV unloading with these devices is insufficient. By providing temporary support and facilitating LV recovery, IABP can contribute to improved outcomes in select patients undergoing CABG in the era of advanced mechanical circulatory support.

This case underscores the challenges associated with managing complex cardiac conditions such as severe MS in the setting of RHD. Despite successful surgical intervention, postoperative complications such as left ventricular dysfunction can occur, necessitating mechanical circulatory support. In this case, the use of IABP therapy facilitated myocardial recovery and ultimately led to a favorable outcome. Close monitoring and multidisciplinary management are essential for optimizing outcomes in such cases.

CONCLUSION:

In patients undergoing mitral valve surgery for severe mitral stenosis, postoperative left ventricular dysfunction may occur, requiring mechanical circulatory support. While options like LVAD or ECMO therapy exist, IABP therapy stands out for its cost-effectiveness and also serves as an effective adjunctive treatment for unloading the left ventricle and promoting myocardial recovery. This case underscores the importance of a comprehensive approach to patient care, highlighting the advantageous role of IABP in optimizing outcomes in complex cardiac surgery.

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Conflict of Interest: Nil

Consent: Written informed consent was obtained from the patient

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