

Anesthetic Management of Pericardial Tamponade During Percutaneous Mitral Balloon Valvuloplasty-A Case Report

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Abstract

Percutaneous mitral balloon valvuloplasty (PMV) is the treatment of choice for symptomatic mitral valve stenosis. Most common complication of this procedure is pericardial tamponade. Early diagnosis and immediate management are essential and lifesaving as it determines the clinical outcome. Hereby a case report of successful management of pericardial tamponade following PMV in a middle-aged female patient with severe rheumatic mitral stenosis by multidisciplinary team approach with a focus on Anesthesia care and management.

Keywords: Valvuloplasty; Anesthetic management; Pericardial tamponade; Valve stenosis; Treatment; Early diagnosis.

Introduction

Percutaneous mitral balloon valvuloplasty (PMV) is often considered the procedure of choice for the management of symptomatic mitral stenosis with suitable anatomical valvular structure [1]. However, the procedure is associated with intraoperative and immediate postoperative complications including pericardial tamponade. The related complications can be mitigated with proper

patient selection and superior interventional skills [2]. The incidence of pericardial tamponade ranges from 1-3%; it most commonly occurs secondary to trans-septal puncture or left ventricular perforation. Here a case report of successful management of pericardial tamponade, a complication of PMV in a middle-aged female patient with severe rheumatic mitral stenosis by multidisciplinary team with a focus on Anesthesia care and management.

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Case report

A 46-year-old female patient reported with complaints of progressive exertional breathlessness and palpitations during mild activities in the last 6 months.

On Echocardiogram (Echo), severe mitral stenosis (mitral valve: 1 cm²), trivial mitral regurgitation (MR), calcified leaflets tips without commissure calcifications as well as mild mixed aortic valve disease were noted. Findings were suggestive of severe rheumatic mitral stenosis. Further, trans esophageal echocardiography (TEE) confirmed rheumatic mixed aortic valve disease with mild stenosis and regurgitation, and severe rheumatic mitral stenosis. Based on Wilkins score <8 and multidisciplinary discussion with cardiologist, Cardiac Anesthesiologist and cardiothoracic surgeon, patient was considered suitable for PMV.

Prior to the procedure, patient's oxygen saturation (SPO₂), electrocardiogram, and invasive blood pressure were monitored, left

radial arterial line was secured with 20-gauge needle and an intravenous line with 18-gauge needle was introduced in the left forearm. TEE probe introduced with 10% xylocaine spray. Following dexmedetomidine, midazolam and fentanyl sedation, the balloon mitral valvuloplasty was carried out via right femoral vein using TEE in the Cath lab. After balloon removal, pressure tracing Left atrium/left ventricle showed no diastolic gradient. Echo showed mild to moderate MR and low-pressure gradient across the mitral valve. Mean gradient decreased from 18 mmHg pre-PMV to 4-5 mmHg. The femoral access was closed with manual compression and sedation was cut off. The Procedure was uneventful and patient regained consciousness.

Immediately following this, there was a sudden drop in blood pressure (60/40mmHg) and oxygen saturation (76%). The patient lost consciousness and stopped responding. Pericardial effusion/tamponade was noted on Transthoracic Echo (Figure 1).

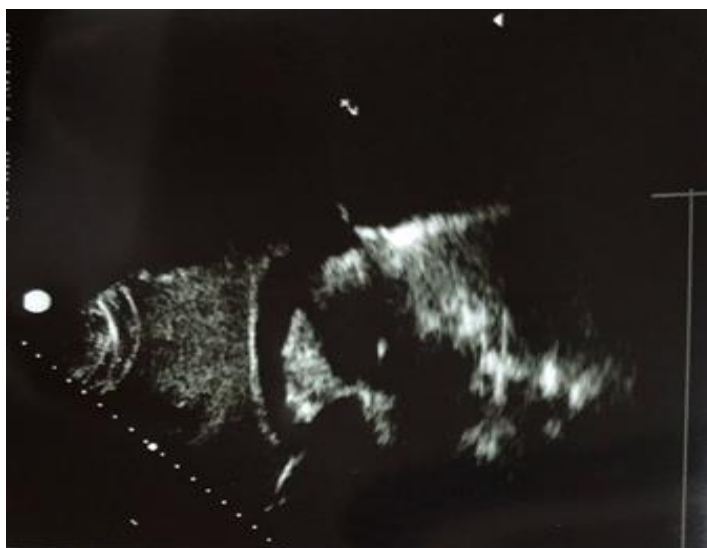


Figure 1: Echocardiogram showing pericardial tamponade.

Since 10% xylocaine spray was already used during TEE, and patient was non-responsive, additional use of induction drugs were avoided to prevent further fall of blood pressure and subsequent cardiac arrest. Laryngeal mask airway (I-gel) was inserted and connected to ventilation with 1% sevoflurane and started on Noradrenaline 0.01mcg/kg/min infusion. Pericardiocentesis was performed and 250ml blood was aspirated. Following this, blood pressure returned to normal and Echo confirmed resolution of tamponade. After stopping Inotropes and sevoflurane, patient regained consciousness. The I-gel was removed, patient was shifted to the intensive care unit (ICU) with a pericardial drain for further observation and management. A total of approximately 300ml blood was drained over 24 hours.

Patient was discharged on 3rd day after procedure and was advised on mobilization. On 1 week of follow up, patient was clinically well, with improvement in breathing and movement. Echocardiography showed normal left ventricular function, open mitral valves without doming and mild to moderate eccentric MR. Patient was continued on beta blocker therapy and is regularly being followed up.

Discussion

PMV is an intervention that involves insertion of percutaneous transcatheter with a balloon into the mitral valve followed by inflation of the balloons across the valve to reduce the valve obstruction in Cath lab. Among the intraoperative complications, perforation during cardiac catheterization is rare and

only one-third result in pericardial tamponade [3]. The reported incidence of pericardial tamponade ranges between 1-9% with an associated mortality rate of 0-3% [4,5]. Needle puncture of left/right atrium or small tear in the myocardium during valvuloplasty are amongst the common reasons for cardiac tamponade. In the case report, pericardial tamponade was identified immediately following the procedure, however the cause remains unknown.

Pericardial decompression remains the choice of management of pericardial tamponade irrespective of the site [6]. Immediate and long-term outcomes depend on the site of perforation [2,7] While the perforation at right atrial appendage responds well to pericardiocentesis and closes spontaneously, apical ventricular perforation requires repair [3,4]. Additional intervention requiring coagulopathy correction, resuscitation, intravenous fluids, blood transfusion, cryoprecipitate, fresh frozen plasma and platelet transfusion is of prime importance [5,8]. Reports have also defined the role of factor VII in combination with tissue factor for coagulation initiation [5]. As per the standard procedures, the patient was immediately connected to ventilation, started on noradrenaline and pericardiocentesis was performed.

Timely diagnosis and immediate management are critical in PMV related complications [1,7]. This can be achieved by immediate postoperative hemodynamic monitoring of patients undergoing PMV using TEE. While careful hemodynamic monitoring is essential to intervene early pericardiocentesis as a life- saving procedure

[3], Echocardiographic score is important in assessing the outcome.

It is important to note that the hemodynamic changes following valvuloplasty depends on the morphological characteristics of the valve, [5,8] whereas, immediate outcome depends on the mitral valve area, cardiac output, left atrial pressure, pulmonary vascular resistance and echo-score [9]. In the case, the following pericardiocentesis and inotropic

management were noticed significantly improvement in the patient's condition. Therefore, surgical intervention was not deemed necessary.

Conclusion

This case demonstrates the importance of perioperative care of pericardial tamponade, a complication following treatment of symptomatic mitral stenosis with PMV.

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