

CASE REPORT

Left Ventricular Rupture during Balloon Mitral Valvuloplasty

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ABSTRACT

Balloon mitral valvuloplasty (BMV) is a viable alternative to valve replacement surgery in patients with mitral stenosis. One of the rare complications of the procedure requiring immediate resuscitation and surgical repair is cardiac tamponade due to ventricular rupture. We report the anesthetic management of a 38 year old female with hemopericardium during BMV due to left ventricular rupture.

Keywords: BMV, Capnography, Electrocardiogram, Left ventricular rupture.

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INTRODUCTION

Mitral stenosis is almost always due to fusion of the mitral valve leaflets at the commissure during the healing process of acute rheumatic fever. Since the initial description of balloon mitral valvuloplasty (BMV), the technique has become widely accepted as a viable alternative to surgery for rheumatic mitral stenosis. The occurrence of hemopericardium as a complication is between 1 and 3%, and most of these procedures are done with anesthesia standby or with mild sedation. We here present a case of cardiac tamponade due to left ventricular rupture during BMV in a patient with severe rheumatic mitral stenosis and who was successfully managed and discharged post the complication.

CASE REPORT

A 38-year-old female weighing 45 kg with a diagnosis of rheumatic heart disease with severe mitral stenosis since 5 years was posted for balloon mitral valvuloplasty (BMV) with anesthesia standby. Patient was found to

have a loud first heart sound and a mid diastolic murmur on examination. Her electrocardiogram showed right axis deviation with excessive overload of left atrium and two-dimensional (2D) echo showed severe mitral stenosis with a mitral valve area of 0.8 cm², mild mitral regurgitation (MR), moderate tricuspid regurgitation, severe pulmonary arterial hypertension with good biventricular function. Her routine blood investigations were within normal limits and she was on tab Digoxin 0.25 mg OD, tab Aten 25 mg OD, and tab Furosemide.

During the procedure, the patient developed sudden-onset hemodynamic collapse with drowsiness post the trans-atrial puncture. Her pulse rate went up to 120 bpm and blood pressure had fallen to 60/30 mm Hg. The procedure room 2D echo showed evidence of cardiac tamponade.

The patient had a 20G intravenous (IV) access before the procedure, and a femoral venous and arterial access was acquired for the procedure. Resuscitation in the catheterization lab was done by securing a 7 French catheter in the right internal jugular vein. Patient was intubated after induction with 0.2 mg/kg of etomidate. A pigtail catheter was inserted into the pericardium by cardiologists and autohemoperfusion was started. Patient was also started on inotropic support with dopamine at 10 U/kg and adrenaline at 0.6 U/kg. Patient was shifted to the operation theater (OT) with inotropic support and continued autohemoperfusion.

In the OT after establishing electrocardiogram, pulse oximetry, invasive and noninvasive blood pressure monitoring along with capnography and temperature using the nasal probe, the patient was given a nondepolarizing muscle relaxant, vecuronium, in a dose of 0.1 mg/kg. Inotropic support was continued with dopamine at 8 U/kg/min and adrenaline at 0.6 U/kg/min. Anesthesia was maintained on oxygen and air mixture and inhalational desflurane at 0.5–1 minimum alveolar concentration and IV vecuronium at 0.06 mg/kg/hour. For cerebral protection, patient was given IV methylprednisolone 1 gm and thiopental sodium of 1 mg/kg. During the surgery, patient was found to have 1.5–2 l of blood in the pericardium and a rent in the posterolateral wall of the left ventricle with free spurt of blood. Primary closure of the rent was done; bleeding was controlled and closure was done after drain placements. Patient received two pints of blood and two fresh frozen plasmas with 1 l of crystalloids intraoperatively with adequate bicarbonate correction on

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the basis of arterial blood gas. Patient was shifted to the intensive care coronary unit for elective ventilation on tapered doses of inotropes. Patient was gradually weaned off the inotropes and ventilatory support over 2 days after adequate correction of hemoglobin and coagulation status and was extubated on day 2 postoperatively, and discharged subsequently.

DISCUSSION

Balloon mitral valvuloplasty involves an Inoue balloon introduced across the mitral valve via the transseptal or the retrograde route. Inflation of the balloon causes fracture of the valve leaflets at the commissures improving leaflet excursion and orifice area. Complications of BMV (12%) include severe MR, embolization, cardiac tamponade, interauricular septal defect, acute myocardial infarction, and arrhythmias. The incidence of cardiac tamponade due to perforation is 0.3–0.8%. Perforation could be by the guidewire, dilator, or the septal puncture needle.

Cardiac tamponade is suspected when a still cardiac silhouette, hypotension, and elevated right atrial pressures are noted and can be confirmed by 2D echo.

Perforations of the right atrial appendage are usually not very severe, and in the majority of cases are resolved with pericardiocentesis and reversal of the anticoagulation. Left ventricular (LV) lacerations, however, result in immediate hemodynamic deterioration and usually require emergency corrective surgery with a very high mortality.

Joseph et al¹ in 1997 studied the mechanisms of cardiac perforation in ten cases of cardiac tamponade encountered in a series of 903 BMV procedures. Five of these were due

to LV rupture requiring primary repair, out of which one patient developed hypoxic encephalopathy.

Pan et al² found that 2 of the 8 patients developing cardiac tamponade out of the 300 patients undergoing BMV were due to LV rupture, one of whom died on the procedure table and the other postrepair.

Robertson et al³ in 1990 documented an LV rupture during a BMV with successful surgical repair but a brain dead patient.

Thus, in this very rare complication of BMV, most of these patients require surgical repair and hence general anesthesia, because only partial hemodynamic stabilization can be achieved by pericardiocentesis by a pigtail catheter and autohemoperfusion. The anesthetic considerations for such a complication include:

- Prompt recognition of the complication
- Avoidance of drug-induced myocardial depression
- Maintaining preload and afterload
- Avoiding cerebral hypoxia and residual neurological deficits and
- Maintaining body temperature in bleeding patients with poor cardiac reserve

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