

Emergency laparotomy in a patient with severe mitral stenosis and severe pulmonary artery hypertension.

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Summary

A 40 years old female patient posted for laparotomy for duodenal perforation was diagnosed to have severe mitral stenosis (MS) with severe pulmonary artery hypertension (PAH). We are describing the management of the case using the dual approach of general anaesthesia and epidural analgesia.

Key Words:

Mitral stenosis, PAH, Pulmonary edema, general anaesthesia, epidural analgesia.

Introduction

Patients with valvular heart diseases coming for surgery pose many challenges to the anaesthesiologist. Mitral stenosis is almost always rheumatic in origin.¹ It exhibits a 2:1 female preponderance. Patients with pure MS or predominantly MS form 40% of this population. Less frequent causes include congenital defects, malignant carcinoid, rheumatic arthritis and prolapse of left atrial myxoma.

Patients coming for non cardiac surgery with a valvular heart disease pose many risks to anaesthesia. Variables like preload, after load, myocardial contractility, heart rate and rhythm need to be kept in mind.² There has been no universally preferred anaesthesia technique for these patients. This decision needs to be individualized as per the patient's general and cardiac condition and the type of surgery.

Case report

A 40 year old female was admitted through casualty with complaint of pain abdomen of one day history. There was no history of any surgery or any other major illness in the past.

On examination, patient was dehydrated with dyspnea at rest and was comfortable in sitting position than in lying position. There was loud S1 with pan systolic murmur at mitral region and mid diastolic murmur with loud P2. There were creptations in basal region of the lungs bilaterally.

Patient was anaemic with Hb 7.4 g%. The total count, differential count and urine examination were in normal range. Blood sugar was 71mg/dl; serum creatinine was 0.8 mg / dl. Serum electrolytes were Na⁺/K⁺ – 125/4.3m eq/l. Her ECG showed P mitrale.

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CXR showed prominent brochovascular marking with right para cardiac patch. ECHO revealed right heart dilatation with severe MS, valve area of 0.8 cm² with mild mitral regurgitation (MR) and severe PAH with LVEF of 48%. Physician diagnosed her to have critical MS with mild MR with severe PAH probably rheumatic in origin.

The cardiac condition and the risk due to anaesthesia were explained to the patient, her attenders and the surgical team and high risk (ASA 4 E) consent was obtained. Inj Ceftriaxone 2 gm and inj Gentamycin 75 mg i.v. was given as infective endocarditis prophylaxis.

Anaesthetic management

In the operating room the anaesthetics cardiac drugs and emergency drugs were kept ready. Basal reading of pulse rate (PR) and blood pressure (BP) were 104/min and 96/52 mm of Hg. 2 peripheral lines were established using 18 G cannule. Inj glycopyrrolate 0.2 mg, inj ondansetron 4 mg and inj ranitidine 50 mg were given i.v. Right sided internal jugular vein was cannulated using 16 G catheter under local anaesthesia by seldinger technique and inj nitroglycerine (NTG) was started at the rate of 0.25 mcg/ kg/min. The vitals at the time of induction were PR-92/min, SBP- 96/54mm of Hg and CVP-3 cm of water. A18 G epidural catheter was placed in the L2- 3 intervertebral epidural space.

Patient was pre-oxygenated with 100% oxygen for 5 mins. Patient was premedicated using inj midazolam 4 mg and inj morphine 8 mg. The patient was induced with inj Thiopentone 100 mg. After induction the SBP fell to 76 mm of Hg. Inj dopamine was started at a rate of 5 mcg/kg/min. The patient was intubated with no 7.5 cuffed endotracheal tube under succinyl choline 75 mg with cricoid pressure. Anaesthesia was maintained with 100% oxygen, inj vecuronium 4 mg. Analgesia was maintained with inj bupivacaine 10 mg and inj buprinorphine 75 mcg through epidural catheter.

The first half hour was uneventful. Patient was haemodynamically stable with Pulse ranging from 104 to 128/min, BP from 96 to 104mm of Hg and CVP 3-5 cm of water. Half an hour after induction an increase in bag resistance and froth in ETTC was noticed. On auscultation creptation was heard all over the lung field. Patient was treated with inj morphine 4 mg, inj furosemide 40 mg and NTG was increased to 0.50 mcg/kg/min along with dopamine infusion which was increased to 7.5 mcg/kg/min. Patient responded to the treatment and pulmonary edema reduced. The procedure lasted for 2 hrs. The vitals at the end of the procedure were PR 122/min., BP 98/54 mm of Hg, CVP 6 cms of water and urine output was 400 ml. patient received 500 ml RL, 200 ml DNS and one unit of whole blood throughout the procedure.

After the procedure the patient was shifted to ICU for elective ventilation. The patient was ventilated in control mode with FiO₂- 0.6, rate – 16/ min, tidal volume – 400ml/min and PEEP-5 cms of water. Patient was paralyzed with vecuronium 1 mg every half hour. The patient was electively ventilated for 4 hours. The patient was weaned from the ventilator through assisted control to CPAP mode. Then the patient was put on T piece and extubated. The patient was maintained on face mask oxygen at 6l/min. No sedation was used during post operative ventilation. Analgesia achieved with epidural top

up of buprinorphine 100 mcg. Patient hemodynamics were in acceptable range. Dopamine and NTG were tapered and discontinued by night. The patient was shifted to ward by 2nd post operative day.

Discussion

This case presented with a unique challenge as the patient had fixed low cardiac output state. The cardiac event incidence in the patient with cardiac disease undergoing non cardiac surgery is 1- 15%³. The risk of cardiac events depends on the severity of cardiac disease and the surgery. The surgery related risk depends on the hemodynamic stress and the extensiveness of the surgery. Emergency laparotomy in cardiac patient is classified as high risk procedure.⁴ This risk again rises if the cardiac condition is critical. If the situation is not an emergency, the cardiac condition needs to be treated to reduce the risk. For example, balloon valvotomy must be considered for a severe stenotic valvular lesion along with medical management like Digoxin and Diuretics. All the patients with valvular heart disease undergoing non cardiac surgery should be given antibiotic prophylaxis to prevent infective endocarditis.⁵

The fundamentals of anaesthesia for patients with MS include avoidance of sinus tachycardia, marked increase in central blood volume, decrease in systemic vascular resistance and any event that may exacerbate PAH and eventually right ventricular failure like hypoxemia and hypoventilation.⁶

Presence of PAH again suggest the severe nature of the valvular heart condition. PAH by itself results in arterial hypoxemia resulting from ventilation perfusion mismatch, depressed cardiac output. PAH may be treated with vasodilatation.

General anaesthesia is usually preferred over central neuroaxial blockade as anaesthetic technique of choice for patients with MS. Regional anaesthesia is avoided due to

- Technical or drug dependence and variation.
- Level of analgesia may not be achieved as excess volume may cause a greater cephaloid spread resulting in dangerously low cardiac output.
- These patients may not tolerate any excess fluid infusion or vasopressors used in case of higher block induced hypotension.
- Low or inadequate block can itself stimulate sympathetic system causing tachycardia which can be disastrous in patient with low cardiac output.
- Even giving position, pricking needle may cause tachycardia and rarely precipitate congestive cardiac failure.
- Any regional block where perfection of the block cannot be guaranteed, then it is better to avoid the block in these patients with low fixed cardiac output states.

Irrespective of the presence of cardiac disease any patient undergoing emergency laparotomy needs optimization. Aim of anaesthesia would be to maintain stable hemodynamics during induction and maintenance. Adequate analgesia and anxiolysis form integral part of anaesthesia. Drugs which are known to cause myocardial

depression, tachycardia and decrease in SVR must be avoided. Morphine, vecuronium and buprinorphine are relatively cardiac stable.

We preferred GA over regional technique as it provided a better hemodynamic stability, and we WERE able to give 100% oxygen to the patient and laparotomy can be extensive where epidural anaesthesia can be inadequate. Our patient developed pulmonary edema which could have been avoided by early detection of increase of pulmonary hypertension using monitors like PAP and PCWP .which were not available in our institution. The pulmonary edema was treated satisfactorily and measures were taken to prevent the development of repeated pulmonary edema. Care was also taken to prevent the occurrence of tachycardia, sympathetic stimulation, hypoxia, pain, etc in the intra operative and post operative period.

Conclusion

It can be concluded from the case report that patient with severe valvular heart disease can undergo non cardiac surgery if adequate precautions are taken keeping in mind the pathophysiological changes due to the disease. There can be no substitute for vigilant and careful monitoring which can prevent any untoward event during the perioperative period. It is again stressed that the type of anaesthesia needs individualization depending on the patient's condition and the type of surgery.

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