

Case Report: Anaesthetic Management of Patient Planned for Exploratory Laparotomy With Ischemic Cardiomyopathy With Atrial Septal Defect

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Introduction

Atrial septal defects are reported in about one third of the cases of congenital heart disease detected in adults. Ostium secundum defects make up 75 percent of all atrial septal defects. A sizable defect (more than 20mm in diameter) may be associated with a large shunt, with substantial hemodynamic consequences.¹Persistence of the left-to-right shunt resulting from uncorrected defects can lead to complications such as pulmonary artery hypertension, right heart failure, atrial fibrillation, stroke, and Eisenmenger's syndrome.²

Ischemic cardiomyopathy (ICM) is a common cause of heart failure among middle-aged and elderly people. It often follows anterior wall MI and to a smaller extent inferior wall MI, which produces left ventricle remodelling with a drop in ejection fraction.³ Congestive heart failure, features of both supraventricular and ventricular arrhythmias and systemic or pulmonary emboli are common in ICM. The goals for anaesthetic

management include prevention of ischemic events, and consists of avoidance of drug-induced myocardial depression, maintenance of normovolemia, prevention of increased ventricular after load, and avoidance of tachycardia with maintenance of sinus rhythm.⁴

Case Report

46-year-old male presented in emergency with complaint of pain abdomen for 2 days, non-passage of stools and flatus for 24hrs and abdominal distension for 24hrs. Patient was planned for exploratory laparotomy.

As per the history given by patient, he had a history of angina 12 years back for which patient took treatment for 5 years (nature of treatment unknown). Patient was a chronic smoker for about 30 years and gave a history of cough with expectoration (yellowish white sputum) for one week. On general physical examination, weight= 90kg, BMI= 27.8, PR=124/min, NIBP = 126/88 mmHg, SpO₂= 90%, RR= 24/min, breath holding time= 10sec with pedal oedema was noted. Systemic examination of

the patient showed a GCS of 15/15, bilateral lung crepitations, wide split S₂, distended tense and tender abdomen.

Patient had Haemoglobin=13.5, TLC= 9900, Platelet count 60000, urea=74.4, creatinine=0.6, ECG= Right bundle branch, right axis deviation. 2D Echocardiography showed left ventricular ejection fraction (LVEF)=20%, ischemic cardiomyopathy with scarred LAD territory, dilation of all 4 chambers of heart, mild tricuspid regurgitation and ostium secundum atrial septal defect of 30mm with bidirectional shunt.

Patient was given injection furosemide 20mg IV. Blood sample for sent crossmatching for blood products. After taking an informed consent explaining the risk of perioperative cardiac event patient was taken up for surgery. Baseline vitals recorded (HR= 126/min, BP= 122/82mmHg, SpO₂= 90%). Epidural catheter secured in sitting position at T11-T12 intervertebral space. Preoxygenation with 100 oxygen done for 3 minutes. Induction was performed inj. Fentanyl 150mg, Inj. Propofol 80mg in graded doses and inj. Vecuronium 8mg. Airway was secured with cuffed endotracheal tube of size 8.0 mm ID using size 4 McIntosh laryngoscope. Patient had an episode of bronchospasm immediately after intubation which was relieved after 8 puffs given with salbutamol MDI, injection dexamethasone 8mg. Patient was maintained on IPPV (Pressure support= 22mbar, frequency=16/min, PEEP= 5mbar) with oxygen, nitrous oxide and sevoflurane to maintain a MAC of 0.9 ETCO₂ of 30-35 and to attain a tidal volume of 400-420 ml. Left radial artery cannulated with 18G arterial cannula, arterial blood sample collected and Invasive BP monitoring started using pressure transducer. Blood gas analysis of the arterial blood showed a Ph=7.4, pCO₂= 32, pO₂= 79.4, SO₂= 95.9, Right internal Jugular vein cannulated with triple lumen catheter using USG

guidance. 8ml of 0.25% bupivacaine injected via epidural catheter in graded doses.

Intraoperatively two units of platelets and one unit of packed cells transfused. HR ranged between 112-118/min, O₂ saturation maintained between 92-95%. Nor adrenaline infusion started at 6mcg/min and titrated to maintain mean arterial pressure of >65mmHg. During the surgical procedure 500ml of pus was drained from abdominal cavity, primary repair of bowel perforation done and end sigmoid colostomy done. Patient was given 700ml of ringer lactate. Total blood loss of 600ml and urine output of 150ml was noted during the surgery. ABG at the end of surgery showed pH=7.34, Pco₂= 34, po₂=80.4, spo₂= 95, HCO₃⁻ = 19.

After the completion of surgery since the patient was on inotropic support with compromised lung condition plan for immediate post operative extubation of patient was retracted and patient was shifted to Intensive care unit for monitoring and further management. Sedation and analgesia were maintained with intravenous fentanyl infusion, injection PCM and epidural top ups with 0.125% bupivacaine. Patient was extubated 24hrs after surgery.

Discussion

Dilated cardiomyopathy, heart failure and atrial septal defects are well-recognised entities in isolation, but are rarely seen together.⁵

ASD usually remains asymptomatic and hence undetected in majority of patients uptill fourth decade of life. ASD is associated with left to right shunting of blood, dilation of right ventricle, right bundle branch block with fixed split wide S₂.⁶ The echocardiography helps to establish the size and location of the ASD, magnitude and hemodynamic impact of the left to right shunt, and the presence and the degree of pulmonary hypertension. The most common type of ASD, ostium

secundum, as seen in this patient involves fossa ovalis and is mid septal in location. The complications pertaining uncorrected ostium secundum type of ASD include pulmonary artery hypertension, right sided heart failure, atrial fibrillation or flutter and Eisenmenger's syndrome. Hence the anticipated perioperative problems in this case include paradoxical air embolism during vascular access, dysrhythmias, heart failure, heart block and in some situations infective endocarditis. The variation of systemic vascular resistance during perioperative period has important implications in patients with ASD since it affects the direction of shunt. Either general anesthesia or regional anesthesia can be employed. General anaesthesia (GA) provides more stable perioperative hemodynamics and also helps to avoid hypercarbia and hypoxia which are factors known to cause shunt reversal.⁷ Therefore in this patient general anaesthesia was employed with measures to maintain systemic vascular resistance using inotropes. To prevent right ventricular overload in order to avert right ventricular failure patient was given diuretic and restricted iv fluid administered. To lower the PVR, we performed continuous monitoring to maintain normothermia. Adequate monitoring was done to detect atrial arrhythmias and to avoid hypercarbia and hypoxia. ICM, which produces clinical picture that is often indistinguishable from DCM with or without preceding history of angina or myocardial infarction (MI), develops as DCM with depressed ventricular function not explained by the extent of coronary artery obstructions or ischemic damage. These patients may become haemodynamically unstable due to the depressant effect of anaesthetics, fluid shifts and blood loss, which add to poor myocardial function. High-risk patients include those with LVEF <25%, pulmonary capillary wedge pressure >20 mmHg, cardiac index <2 L/min/m²,

pulmonary artery hypertension, raised CVP and mitral and tricuspid regurgitation.⁸ Inotropic support is commonly required. propofol and inhalational agents cause vasodilation hence a vasoconstrictor agent like noradrenaline was used. Ischemic heart disease is a major predictor of perioperative morbidity and mortality. Therefore, optimal management of perioperative analgesia has several benefits like reduction of stress response, morbidity and improving myocardial outcome.⁹ To ensure intra operative and post operative analgesia a lower thoracic epidural catheter was placed and analgesic doses of bupivacaine (0.24%, 0.125%) were injected via the catheter in graded doses during the perioperative period. With higher dose of fentanyl, NSAID and use of epidural analgesia we minimised the use of propofol and sevoflurane to maintain adequate depth of anaesthesia.

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