

Anaesthetic management of a patient with Atrial Septal Defect with Pulmonary Hypertension posted for Total Abdominal Hysterectomy: a Case Report

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Abstract : An asymptomatic 52 year old lady with Atrial Septal Defect of Ostium Secundum type with mild Pulmonary Hypertension was admitted in our hospital with complains of menorrhagia. After a thorough pre-operative evaluation, adequate preparation she underwent total abdominal hysterectomy under combined epidural and general anaesthesia. By providing proper intraoperative and postoperative care, patient was managed without any complication and was discharged home within a week.

Keywords: Atrial Septal Defect, Pulmonary Hypertension, Total Abdominal Hysterectomy, General Anaesthesia, Epidural Anaesthesia.

I. Introduction

Atrial Septal Defect (ASD) is a common cardiac anomaly in children occurring most commonly in females. The most common atrial septal defect involves fossa ovalis, is midseptal in location and is of the ostium secundum type¹. Based on the portion of atrial septum that has failed to develop normally, ASDs are anatomically classified into four types: ostium secundum (85%), ostium primum (10%), sinus venosus(5%), and coronary sinus defects(rare). Spontaneous closure occurs by 18 months in almost all patients born with ASDs <3mm diameter and 80% of those with defects 3-8mm. Defects with diameters >8mm rarely close spontaneously and may require surgery later in life². The majority of ASDs are detected in childhood although a significant minority is only diagnosed in adult life. Initially right ventricular compliance is substantially greater than the left ventricle and this is associated with the development of a left-to-right shunt. Pulmonary blood flow is increased and pulmonary hypertension develops with increasing age. A consequence of these physiological changes is dilatation of both left and right atria, the right ventricle and the pulmonary arteries in order to accommodate the increased blood volume. Ultimately either the right ventricle fails, or right ventricular compliance falls, resulting in a reduction in the magnitude of shunting, or even flow reversal³. Presentation depends upon the magnitude of the left to right shunt. Effort dyspnea is seen in 30% of patients by the third decade and more than 75% of patients by the fifth decade. Atrial arrhythmias (atrial fibrillation and flutter) are common and are secondary to atrial dilatation. Clinical examination reveal fixed splitting of the second heart sound coupled with a pulmonary flow murmur. The classically described electrocardiogram of an ASD is right bundle branch block (RBBB) and axis deviation (right for secundum and left for primum)⁴. Complications of ASD in adults include: paradoxical emboli, effort dyspnea, atrial tachyarrhythmia, right sided heart failure with pregnancy, pulmonary hypertension and mitral insufficiency⁵.

II. Case History

A 52 year old female G2P2 who is a known hypertensive was admitted in our hospital with a history of menorrhagia. She also has a history of exertional dyspnea NYHA grade II and repeated respiratory tract infections. She is on Tab Atenolol , Tab Torsemide and Spironolactone daily.no history of any past surgery or anaesthesia.

On examination her pulse rate was 80 beats/minute, regular and good volume, non-invasive blood pressure was 130/70mmHg. On auscultation, normal vesicular breath sounds were heard, pulmonary area revealed ejection systolic murmur.12 lead electrocardiogram showed Right Bundle Branch Block, Right Axis Deviation and rSR' pattern in lead V1. Echocardiogram showed Ostium Secundum type ASD (15mm) with left to right shunt, mild right atrium and right ventricular dilatation and mild Pulmonary Hypertension. Chest X-ray revealed increased broncho-vesicular markings and cardiomegaly. All the other blood investigation were within normal limits. Ultrasound of the abdomen revealed fibroid uterus and she was planned for Total Abdominal Hysterectomy.

III. Anaesthetic Management

After a detailed pre-anaesthetic evaluation and investigations, written informed consent was obtained from the patient. Patient was kept nil per orally for 6hrs. Oral hypertensives and diuretics were continued on the

day of the surgery. Tab Ranitidine 150mg, Inj Glcopyrrolate 0.2mg IM and Tab Lorazepam 1mg was given orally as premedication 1 hour before surgery. Antibiotic prophylaxis Inj Ampicillin 2 Gm IV was given pre-operatively. Venous access secured by an 18G intravenous cannula on the dorsum of the left hand and patient preloaded with 500 ml Ringer Lactate solution. Routine monitors were connected like pulse oximetry, non-invasive blood pressure and ECG. Basal values of vitals were recorded. For epidural anaesthesia, parts were painted and draped under strict aseptic precautions, patient lying on left lateral decubitus position. 18G Touhy's needle was used in L1-2 interspace with loss of resistance technique, loss of resistance felt at 4 cms and catheter fixed at 9 cms. Test dose of 2% lignocaine with adrenaline 3 ml was given after aspiration.

General anaesthesia was administered, with all precautions to avoid systemic hypotension and air entrainment through the venous circulation. Patient was pre-oxygenated with 100% oxygen for 3 mins using Bain's circuit. Induced with Inj. Fentanyl 50 ug, Inj. Propofol 120 mg and Inj. Vecuronium 5 mg. Used 7.5 ID endotracheal tube was secured, bilateral air entry was confirmed and end-tidal carbon dioxide monitor was connected. Controlled ventilation was maintained using air, oxygen and Sevoflurane. Nitrous oxide was avoided because of a risk of paradoxical air embolism. For analgesia intra-operatively 0.25% Inj Bupivacaine and Inj fentanyl 1ug/ml was used. Intra-operatively one episode of bradycardia was seen during the surgery which was treated with Inj Atropine 0.6 mg IV, rest all parameters were normal. Surgery lasted for 2hrs 30 mins. Intraoperatively intake was 1000 ml RL and 200 ml DNS. Urine output was 300 mL intra-operatively and blood loss approximately 150 mL. Patient was reversed with Inj Neostigmine 2.5 mg and Inj Glycopyrrolate 0.5 mg IV. Post-extubation patient was comfortable, breathing spontaneously and obeying commands. Post-operative vitals were stable. For post-operative analgesia 0.125% Bupivacaine with 100 ug Fentanyl infusion in 50 ml syringe was loaded, epidural infusion was started at 4ml/hr. Epidural analgesia was provided for 48 hours post-operatively and patient was comfortable. Post-operatively maintenance fluid was administered as per the urine output.

IV. Discussion

ASD occurs in 1 in 1500 live births and comprises 6% -10% of all congenital heart diseases. An ASD is an opening in the interatrial septum. ASD classification is based on ASD location relative to the fossa ovalis and developmental anatomy. It is also classified according to the defect size. ASD is one of the most common congenital heart diseases and a progressive disorder resulting in reversal of the shunt.

Anatomic classification includes:

1. Patent Foramen Ovale (PFO): it is a small interatrial communication in the foramen ovale region, with no deficiency of the septum primum or septum secundum. Foramen ovale is a normal communication in fetal life that closes at birth when left atrial pressure exceeds right atrial pressure.
2. Ostium Primum ASD: it is a crescent shaped defect in the inferior portion of atrial septum above the atrioventricular valve.
3. Ostium Secundum ASD: it is confined to the fossa ovalis region and is a deficiency of the septum primum. It is the most common type of ASD. Occasionally, these defects are part of the spectrum of Holt-Oram syndrome, which also includes limb anomalies.
4. Sinus Venosus ASD: this defect occurs high in the septum in the sinus venosus region, near the orifice of the superior vena cava. It may occur in the inferior sinoatrial junction region, near the inferior vena cava orifice.
5. Coronary Sinus ASD: is a defect in the atrial wall separating the left atrium from the coronary sinus. It allows blood to shunt from the left atrium to the right atrium via the coronary sinus.
6. Common Atrium: also known as single atrium, represents complete absence of an interatrial septum.

Classification based on defect size:

Small defects (<3mm) are expected to close spontaneously. 80% of medium-sized defects (3-8mm) close spontaneously. Defects larger than 8mm most probably will not close⁶.

Adverse effects of ASD due to persistently increased pulmonary blood flow may result in following pathophysiological changes:

- 1) Increase in pulmonary vascular resistance (PVR) and development of pulmonary arterial hypertension (PAH)
- 2) Cardiomegaly and cardiac remodeling
- 3) Arrhythmias: atrial, ventricular and other types of dysrhythmias can occur in patients with left-to-right cardiac shunt. These rhythm disturbances are either due to intrinsic nature of the anomaly or

to morphological changes secondary to blood overloading the right side of heart, or surgical palliation.

- 4) Myocardial ischemia .²

V. Conclusion

Septum secundum type of ASD do not close spontaneously and are usually progressive in nature, resulting in Eisenmenger's syndrome, however, the patient mentioned above did not show any evidence of complications of ASD. With the thorough pre-operative assessment, proper preparation and providing good intra operative and post-operative analgesia, non-cardiac surgeries like hysterectomy was performed safely. The mortality and morbidity will increase once the patient develops severe pulmonary hypertension.

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