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Anesthetic Management of Emergency Caesarean Section in a Patient with Double Atrial Septal Defect and Moderate Pulmonary Hypertension

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Abstract

Atrial septal defect (ASD) is common congenital heart disease in adults. Most of the cases are detected in childhood, whereas few cases reach adulthood undiagnosed. It is the most common congenital heart lesion in child bearing age group girls. ASD leads to various complications depending upon size, position of ASD and shunt flow direction and hemodynamic change. Pulmonary artery hypertension is one such complication which occurs due to large blood flow across pulmonary artery due to left to right shunting. Pulmonary hypertension is defined as a mean pulmonary arterial pressure greater than 25 mm Hg at rest or greater than 30 mmHg during exercise. We reported a case of double ASD of size 10 mm and 5 mm with moderate pulmonary artery hypertension which underwent emergency caesarean section for meconium stained liquor. Under all aseptic precaution epidural catheter was placed at L3-4 level in sitting position by loss of resistance technique and then spinal anesthesia was given at the same level with 26G needle. Total drug given in spinal was 2.5 ml which includes 2 ml of bupivacaine (heavy) and 0.5 ml fentanyl. The patient was managed successfully under regional (epidural with low dose spinal) anesthesia without facing any complication. During anesthesia our main aim was to prevent complications, like hypotension, hypoxia, hypercarbia, reversal of shunt, fluid overload and maintain systemic pulmonary vascular resistance. As these complications adversely affect the outcome in heart disease patients.

Keywords: Atrial septal defect; Double defect ASD; Pulmonary artery hypertension; Caesarean section; Regional anesthesia; Hypotension; Hypoxia; Fluid over load; Reversal of shunt

Introduction

Among acyanotic congenital heart disease atrial septal defect is most frequent in adults and constitute about 10% case of congenital acyanotic heart disease. Ue large numbers of patients with ASD are diagnosed in childhood whereas only small numbers of case are detected in adulthood. Ue most frequently encountered atrial septal defect is ostium secudum (70%) which involve the fossa ovalis in mid-septal position and male: female ratio 1:2 [1]. Depending on the part of atrial septum that has failed to grow normally, ASDs are anatomically classified into four types: ostium secundum, ostium primum, sinus venosus, and coronary sinus defects (rare). Up to 18 month of age, patients born with ASD of size less than 3 mm diameter closed spontaneous in almost all patients. Whereas, 80% of those with defects size 3-8 mm also close spontaneously. However, patient with defects more 8 mm rarely close spontaneously and may require surgery later in life [2]. Based on the size of the defect, size of the shunt, and associated anomalies, this can result in a spectrum of disease ranging from no significant cardiac sequelae to right atrial dilatation, right ventricular volume overload, increased pulmonary blood flow (PBF), pulmonary hypertension, right ventricular hypertrophy and eventually congestive heart failure (CHF). On clinical examination, there is wide fixed splitting of the second heart sound along with a pulmonary flow murmur. Ue classically described electrocardiogram of an ASD is right bundle branch block (RBBB) and axis deviation (right for secundum and leI for primum) [3]. Complications of ASD in adults include: paradoxic emboli, e9ort dyspnea, atrial tachyarrhythmia, right sided heart failure with pregnancy, pulmonary hypertension and mitral insufficiency.

Case Report

A 33 year old female G2P2002 at 37th week of gestation with meconium stained liquor was posted for emergency caesarean section. Patient was diagnosed as a case of atrial septal defect in this pregnancy as an incidental finding on echocardiography. She did not reveal any sign and symptom of disease like repeated chest infection, chest pain, palpitation, easy fatigue or pedal oedma. However on auscultation wide split and fix second heart sound (S2) was present. ECG showed normal sinus rhythm. On echocardiography there were two defects in atrial septum, one was 10 mm of size (osteum secundum) and other was 5 mm (osteum primum), bidirectional blood flow across ASD, moderate pulmonary hypertension, mild tricuspid regurgitation and ejection fraction was 55-60 percent.

Anesthetic management

Ue patient was taken into operation theatre. Intravenous cannulation done with 18G cannula in bilateral upper limb and normal saline was started as maintenance fluid. Standard ASA monitors were attached (ECG, NIBP, PULSE OXYMETRY) and also arterial line placement was done in right radial artery and invasive blood pressure was monitored before the induction of anesthesia. Baseline vitals were recorded, which were within normal limit. Uen patient was put in sitting position and under all aseptic precaution epidural catheter was inserted in L3-L4 intervertebral space with 18G touhy needle by using midline approach. Ue epidural space was confirmed by loss of resistance technique and catheter was inserted and fixed at 11 cm and test dose of 3 ml lignocaine mixed with adrenaline was given. Aler this

single shot spinal anesthesia was given at the same level as of epidural with 26G Quincke needle through midline approach and free flow of CSF technique. Total drug given was 2.5 ml (2.0 ml of bupivacaine heavy +0.5 ml (25 microgram) of fentanyl. Aler this, patient was made supine and right hip was raised by placing soI pillow in order to prevent supine hypotension syndrome. Level achieved up to T5 level. Caesarean section started and the baby (weight 2.9 kg) was delivered with apgar score 10 at 1 min and 5 min. Oxytocin infusion started 25 units in 500 ml normal saline. Total procedure time was 45 min. During the whole surgery patient remain stable except mild hypotension (BP fall around 25 percent of baseline for 2 to 3 mins) and tachycardia (HR120/min for 5mins) aler 10 mins of spinal anesthesia, but it was managed by 300 ml bolus of normal saline. Overall patient was stable, there were no sever hypotension, tachycardia or desaturation. Patient shiled out with stable vital to intensive care unit for observation.

Discussion

We reported a case of double defect ASD in pregnant patient who underwent emergency caesarean section under regional anesthesia safely and successfully without any complication. We used regional anesthesia in this patient, keep in mind that regional anesthesia is more superior then general anesthesia for both mother and fetus in elective as well as emergency caesarean section [4] we used low dose of spinal drug 2.5 ml because the total dose of local anesthetic required to achieve anesthesia is considerably less with a spinal than with an epidural route (10 to 20% of an epidural dose). Ue smaller dose requirement for spinal anesthesia decreases the risk of systemic toxicity and results in low maternal and fetal drug levels [5] the other major advantage of low dose spinal is that it causes less hypotension as comparable to normal dose which is useful in patient ASD where hypotension is undesirable. We placed epidural catheter in this patient as a backup plan in case there was partial e9ect, early weaning of e9ect of single shot spinal anesthesia or if surgery was prolonged. We omitted preloading in order to avoid complications associated with fluid overload in cardiac (large ASD) patient. Presence of ASD is 1 in 1500 live birth and constitute about 6-10% of all congenital heart diseases. Based upon size of defect ASD is of three types: Small defects (less than 3 mm) expected to close spontaneously, Medium-size defect (3-8 mm) 80% of them closed spontaneously, large defect (more than 10 mm) probably not closed [6]. Large ASD results in significant leI to right shunt and enlargement of right heart and heart failure. Change in SVR during perioperative period has significant impact on outcome in patient ASD [7]. We found two defects in atrial septum of 10 mm and 5 mm on echocardiography which leads to bidirectional blood flow. Uncorrected secundum type of ASD leads to various complications like pulmonary arterial hypertension, right sided heart failure, atrial fibrillation/flutter, stroke and Eisenmenger's syndrome [8].

Ue echocardiography can demonstrate the size and position of the ASD, magnitude and hemodynamic e9ect of the leI to right shunt, and the presence and the degree of pulmonary hypertension [9,10]. Ue normal mean pulmonary artery pressure (mPAP) at rest is 14.0 ± 3.3 mm Hg, and the upper limit of normal is 20.6 mmHg [11]. Nevertheless, PH is defined as an increase of mPAP ≥ 25 mm Hg at rest, as assessed by right heart catheterization [12]. Comprehensive echocardiography, with Doppler and tissue Doppler imaging, is essential for screening and initial noninvasive assessment of PH [13]. Pulmonary artery hypertension is divided into mild, moderate, sever depending on estimated right ventricular systolic pressure gradient detected by Doppler echocardiograpghy [8].

Conclusion

Pregnant patient with two atrial septal defect (one was large and another was smaller) was underwent caesarean section successfully with single shot, low dose spinal anesthesia and epidural as backup plan. Ue Patient did not undergo any complications of ASD.

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