

# Anesthetic management of a parturient with large atrial septal defect and mild pulmonary hypertension

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## Abstract

Atrial septal defect (ASD) is common cardiac anomaly that may be first encountered in the adults and occur more frequently in females. ASD accounts for 10% of congenital cardiac defects in adults. A 30 year old parturient Gravida3, Para2 and 2 living siblings with post dated pregnancy with previous two normal deliveries with diagnosis of ASD of more than 30 mm with mild tricuspid regurgitation and mild pulmonary hypertension with onset of labour pains was posted for emergency lower segment cesarean section. The procedure was carried out under spinal anaesthesia with 2.2 ml of 0.5% inj Ropivacaine and (0.5ml) 0.15 mg of Buprenorphine. No complications were seen during perioperative period.

**Keywords:** Atrial septal defect, Pulmonary hypertension, Cesarean Section, Spinal anesthesia.

## Introduction

Atrial septal defect (ASD) is a hole of variable size in the atrial septum. ASD is detected in 1 in 1500 live births and accounts for 5-10% of congenital heart defects. ASD makes up 30- 40% of all congenital heart diseases in adults (Second only to Bicuspid aortic valve) ASD occurs in women 2-3 times as often in men. ASD can be isolated or occurs with other congenital cardiac anomalies. Functional consequences of ASD are related to the anatomic location of the defect, its size and other associated cardiac anomalies. Anatomically ASDs are classified into 4 types based on the portion of atrial septum that has failed to develop normally as Ostium secundum (85%), Ostium primum (10%), Sinus venosus (5%) and coronary Sinus defects (rare). Defects of 3mm diameter close spontaneously by 18 months in almost all cases, defects with 3-8 mm closure occurs spontaneously in 80% of patients and defects of more than 8 mm rarely close spontaneously and may require surgery later in life<sup>[1]</sup>. Consequences of these physiological changes is dilatation of both left and right atria, the right ventricle and pulmonary arteries in order to accommodate increased blood volume. Clinical symptoms depend upon the

magnitude of left to right shunt. Effort dyspnoea is seen in 30% of patients by 3<sup>rd</sup> decade and more than 75% of patients by the 5<sup>th</sup> decade. Pregnancy with associated cardiorespiratory and hematological changes further complicates anesthetic management. In this case report, we present a parturient with ASD who underwent emergency cesarean section under subarachnoid block discusses the advantages and disadvantages of regional anaesthesia versus general anaesthesia.

## Case Report

A 40 year old and 65 kg woman Gravida3 Para2 with 2 living siblings with two previous normal deliveries, developed per vaginal leak of 12 hours duration with severe oligohydramnios and postdated pregnancy by two weeks in labour with fetal distress and mild breathlessness was taken up for emergency LSCS. High risk consent was taken from patient and patient's attenders in view of cardiac anomaly. There was no history of cyanosis, respiratory tract infection and fever. There was no history of palpitation, syncope and chest pain, pedal oedema or paroxysmal nocturnal dyspnoea. On examination, pulse rate was 98/m, good volume and regular in rhythm. Blood pressure was

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136/96 mm Hg, no pallor, icterus, clubbing. JVP was normal. Cardiovascular system examination revealed a loud wide fixed splitting of second heart sound, systemic flow murmur over left 2<sup>nd</sup> intercostal space. The respiratory system was normal. Hematological investigations were normal. ECG revealed complete right bundle branch block (RBBB), right axis deviation and inverted T waves (III, aVF) (Fig-1). Chest X ray showed prominent pulmonary vascular markings with cardiac enlargement. 2D echo reported congenital acyanotic heart disease with large 30 mm Ostium secundum atrial septal defect with left to right shunt (more than 2:1) dilated RA/RV, moderate TR, moderate PAH with normal Biventricular function and a mild pericardial effusion (Fig-2).

### Anesthetic Management

Patient was shifted to the operation theatre, peripheral IV access was secured with 20G cannula in the non-dominant forearm and Ringers lactate solution was started. Inj. Ranitidine 150 mg, Inj. Ondansetron 4mg was given intravenously. Inj. Ceftriaxone 1.5mg was given through infusion in 100ml normal saline. Monitoring was done with multimonitor for NIBP, SPO<sub>2</sub>, HR and ECG throughout the surgical procedure

and carried out into the post-operative recovery room. Invasive monitoring in form of central venous catheter and pulmonary artery catheter was avoided because of fear of venous air embolism. Patient was administered 5 liters of oxygen through face mask throughout intraoperative period. Patient was put in a right lateral position and under strict aseptic precautions. SAB was given in L 3- 4 space with 26g Quincke type spinal needle, after free flow of CSF hyperbaric Ropivacaine 0.5% 2.2ml plus Buprenorphine 150 micrograms given, patient was turned to supine position gently and a wedge used under right hip to prevent aorto-caval compression. Sensory block up to 7<sup>th</sup> thoracic dermatomal level was achieved. Baby was delivered within five minutes, Inj. Oxytocin 10 units was added to the drip. Inj. methylergometrine 0.2 mg was given intramuscularly. BP was maintained in the range of 130 to 100 mmHg and pulse rate was maintained in the range of 96-72/minute and SPO<sub>2</sub> of 100 % throughout the surgical duration of 50 minutes. Adequate urine output was maintained and the estimated blood loss was 250-300ml. There was no nausea or vomiting. Patient was shifted to post operative recovery room monitored for an hour and later shifted to post operative ward.

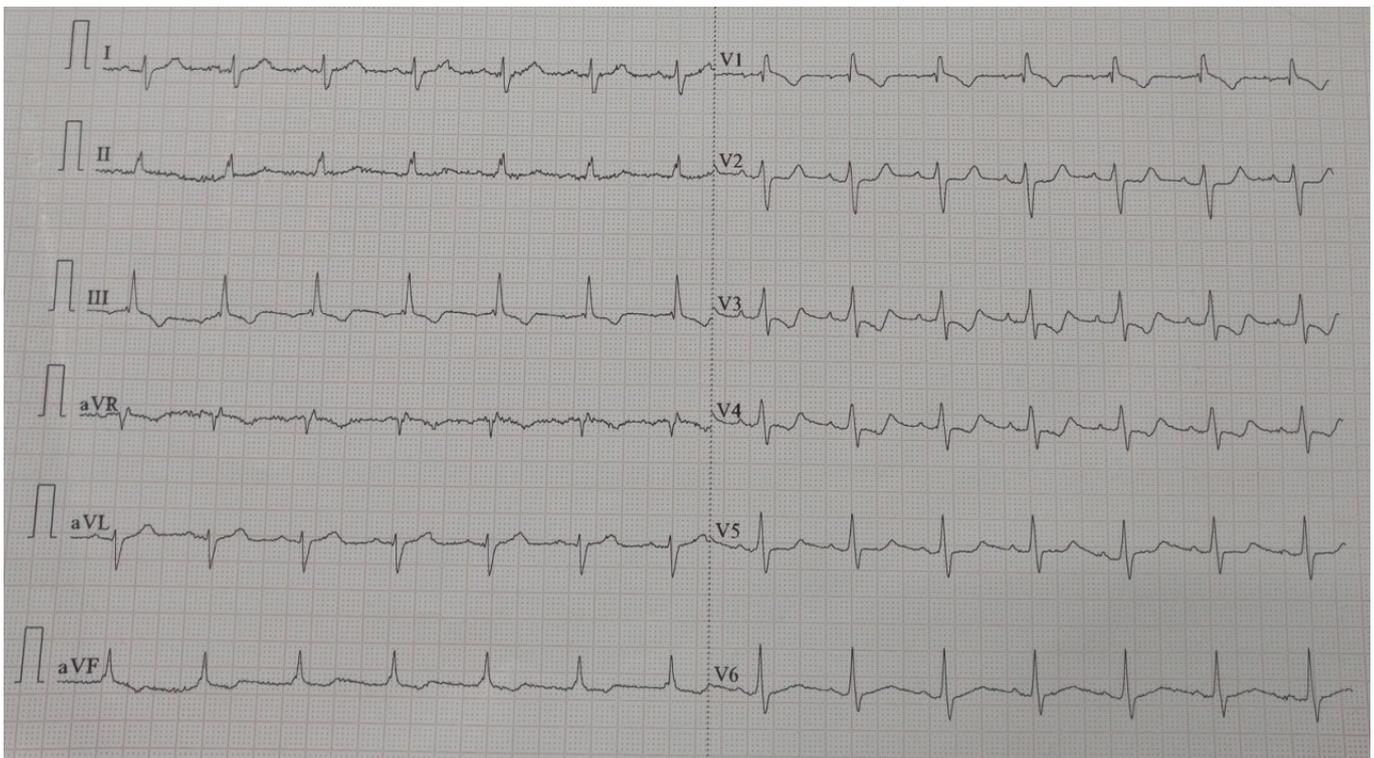
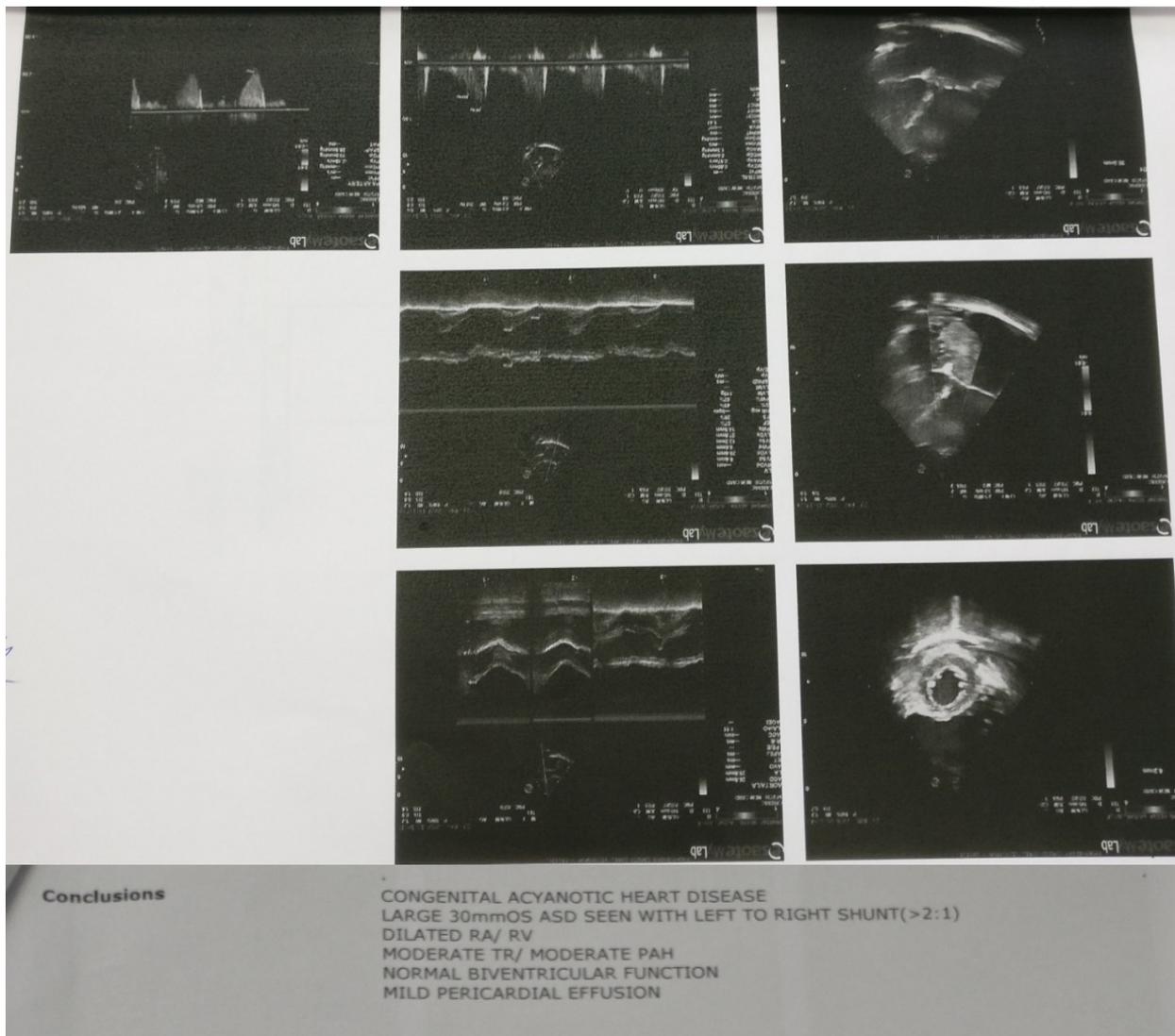


Figure 1. ECG changes



**Figure 2. Echocardiography changes**

### Discussion

There are no evidence based recommendations to guide the anesthetic management of patients with ASD, given the large scope of abnormalities encompassed by ASD, it is also impossible to propose a single approach for anesthetic management that would address every possible defect<sup>[2]</sup>. However a major objective of intra- operative management is to promote tissue oxygen delivery, maintain a balance between pulmonary and systemic flow by optimizing hematocrit and hemodynamics. Spinal anesthesia though produces sudden and sometimes extreme systemic hypotension that may produce reversal of shunt but Ropivacaine produces less hypotension than Bupivacaine, and meticulous use of inotropes and vasopressors with left lateral uterine displacement can be made use to overcome sudden hypotension<sup>[3]</sup>. Epidural anesthesia may have the

advantage of better hemodynamic stability compared to spinal block<sup>[4]</sup> but is time consuming in emergency situations, technically difficult in labour and requires expertisation, and may sometimes be difficult to locate the epidural space. Epidural venous plexus injury and consequent hematoma formation may be added disadvantage, there is delay in onset of action unlike spinal anesthesia which is easy to perform and quicker in onset. General anesthesia (GA) may be deemed in full stomach parturients, with its own complications. GA has its own disadvantages such as difficult airway and intubation with pressor response leading to dysrhythmias, heart failure, heart block and infective endocarditis<sup>[5]</sup>. Intra-operative bleeding, lower neonatal APGAR scores at 1 minute, perioperative nausea and vomiting, post-operative pain are other concerns. Intermittent positive pressure ventilation has negative effects on hemodynamics which has

adverse effects in ASD. Residual curarisation due to inadequate reversal and resulting hypoxemia are the other disadvantages of general anaesthesia.

Considering all the above factors, subarachnoid block was chosen as anaesthetic technique of choice wherein adequate preload was maintained, a near normal systemic vascular resistance (SVR), pulmonary vascular resistance, heart rate and optimum cardiac contractility was ensured throughout perioperative period. ECG was closely monitored to detect dysrhythmias. Control of SVR is critical to limit bidirectional shunting.

**Conclusion:** The goals of adequate intravascular volume status, normal or a modest decrease in systemic vascular resistance, decrease in pulmonary vascular resistance, avoidance of tachycardia, hypoxia, hypercarbia, acidosis and hypothermia is very well achieved with spinal anaesthesia. Graded epidural and general anaesthesia are the other alternative choice of anaesthetic techniques. Central neuraxial blockade and general anaesthesia have their own merits and demerits and one should tailor the anaesthetic technique with meticulous intraoperative and post operative monitoring. Therefore understanding of hemodynamic derangements in patients with ASD and diligent care are essential prerequisites for successful cesarean delivery.

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