

Case Report

Percutaneous Ostium Secundum Atrial Septal Defect Device Closure in a Pregnant Patient with Transeosophageal Echocardiography Guidance under Total Intravenous Anaesthesia

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Atrial Septal Defects (ASDs) are one of the most common acyanotic congenital heart lesions. We present a case report of a pregnant lady who successfully underwent Percutaneous Ostium Secundum ASD device closure employing total intravenous anaesthesia guided by Transoesophageal Echo (TEE). She was followed up after discharge every 2 weeks with echocardiogram to confirm the ASD device in position and no vegetations and shunt across the device and underwent a normal delivery at 33 weeks.

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Key words : Atrial Septal Defects, Pregnant, Device closure, TIVA.

CASE REPORT

In a registry of the European Society of Cardiology, congenital heart disease was the most prevalent form of structural heart disease (66 percent) affecting pregnancy outcomes Worldwide¹.

Atrial Septal defects are among the most common congenital heart lesions occurring in 1.64 per 1000 live births². Although many are diagnosed and treated in childhood, a significant number of ASDs are diagnosed in adulthood, accounting for 25-30% of newly diagnosed congenital heart lesions Worldwide with incidences ranging between 17-20% in Indian population^{3,4}.

Congenital heart disease has become the most prevalent chronic maternal heart disease in pregnancy, accounting for 66% to 80% of cases with ASDs being the most common.

We present here a 21 year old lady (G2P0A1) with 22 weeks of pregnancy with a diagnosis of large Atrial Septal Defect with features suggestive of congestive heart failure. Physical examination revealed tachycardia, tachypnoea and hepatomegaly, an Ejection systolic murmur. Preprocedure blood investigations were normal (CBC, RFT, LFT, PT/PTT/INR, Triple H markers) except microcytic anaemia (Hb 8 gm/dl) for which Packed RBCs were reserved. Chest X-ray revealed cardiomegaly and increased pulmonary blood flow. 2D Echocardiography revealed large 16 mm Ostium Secundum atrial septal defect with a PASP of 50 mm Hg and it was decided to take her up for ASD device closure.

She was kept nil by mouth for 4 hours pre-procedure & maintenance intravenous fluid started & premedicated with ranitidine & planned for ASD device closure under

Editor's Comment :

- In a developing country like India, where maternal and fetal mortality are high and where cause of perinatal mortality is often unexplained and not thoroughly investigated, early diagnosis and management of reversible maternal cardiac disease can be extremely beneficial and revolutionary, more so among the urban poor and rural population.
- In our country with lack of awareness and inadequate infrastructure, adequately timed cardiac interventions with minimal to no harm to the mother and foetus can not only decrease overall incidences of perinatal mortality but can also decrease the risk of cardiovascular disease and metabolic syndrome in later life.

Total Intravenous Anaesthesia.

After oral lignocaine gargle & intravenous Midazolam 1mg & Fentanyl 25 ug, Transoesophageal Echo (TEE) probe was inserted which showed a centrally located 16 mm 14 mm os Secundum ASD (shunting left to right) (Fig 1).

Foetal echo was normal & Foetal Umbilical Artery Doppler measured was normal PI – 1.43 (Fig 2).

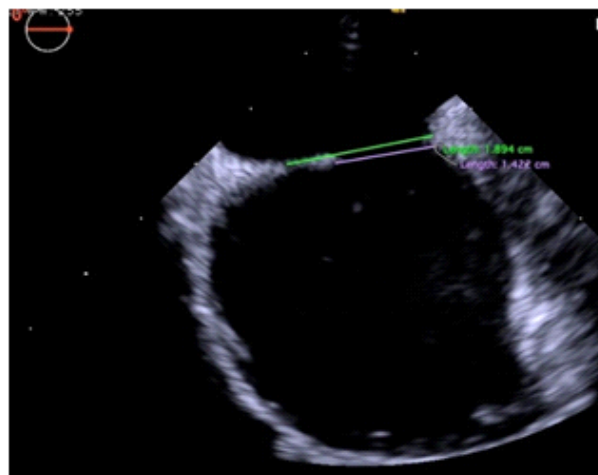


Fig 1 — Pre-procedure Atrial Septal Defect as on TEE

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Fig 2 — Intraprocedure foetal monitoring

Intraprocedure maternal haemodynamics were monitored regularly with Heart Rate 86-94 /min, BP 104-110/ 66-78 mmHg and saturations 97-99% on O₂ nasal prongs 2 l/min & fentanyl 25 ug IV.

The assisting Cardiologist regularly monitored the Foetal Echocardiography during the procedure.

The right femoral vein was cannulated using a 6 Fr short sheath by modified Seldinger technique. The ASD was crossed using a 5 Fr JR Catheter which was parked in the left atrium under TEE guidance. A J tip regular Teflon wire was then placed in the LA. The sheath was then placed in the LA and through the sheath a 20 mm St. Jude device was then passed and deployed across the defect so that LA disc was in the LA and the RA disc was in the RA (Fig 3). TEE showed proper device position and stability and thereby released using the plastic vise. The patient tolerated the procedure well. There were no adverse events during the procedure. The sheath was removed and haemostasis achieved.

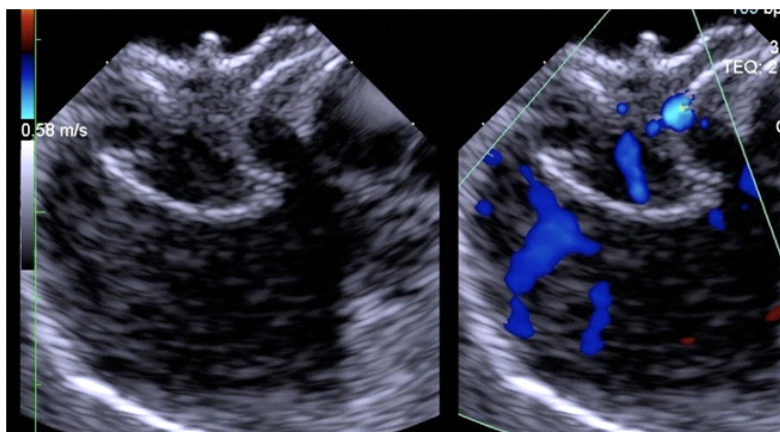


Fig 3 — Deployed device across Atrial Septal defect

Post procedure maternal haemodynamics were Heart Rate 76 /min, BP 106/76 mmHg and saturations 98% on O₂ nasal prongs 2 l/min and normal Foetal echo and Foetal Umbilical Artery Doppler measured PI-1.43.

She was shifted to the ICU & continued on Nasal prongs @ 2 L/min for 2 hours, (R) leg mobilised after 6 hrs & Aspirin started & shifted to ward the following day.

Discharge Echocardiography revealed ASD Device in situ and no vegetation or shunt across device and advised aspirin 75 mg after food for 6 months. She was followed up every 2 weeks after discharge and had a normal delivery at 33 weeks.

Follow up after 1 year was uneventful and during her last follow up she was two months pregnant with no residual shunt on Echocardiography.

DISCUSSION

Pregnancy is associated with severe haemodynamic changes like increasing blood volume (35-50%), increase in Cardiac output (by up to 30-50%), redistribution of regional blood flow and increased oxygen consumption which are well tolerated by normal women but can be challenging for women with heart disease⁵. Our young lady had all the features of decompensated Cardiac Status with her symptoms and signs.

Although many women with ASDs tolerate the haemodynamic changes of pregnancy, Maternal Cardiovascular Complications occur in 5-25% of such pregnancies. The most common clinical presentation of these patients include palpitations (68.38%), breathlessness (23.59%), leg oedema (8.45%) and chest pain (8.1%). The common complications are Congestive Heart Failure, Thromboembolism & Arrhythmias⁶.

The anaesthetic management of pregnant patient with an ASD can present unique challenges. Besides the changes in airway anatomy, maternal – foetal physiology, shunt across the defect, specific risks & potential crises all have to be considered during assessment of such patients.

Pre-procedure assessment should include a detailed clinical evaluation (Airway, Heart, Lungs, Foetal USG).

The presence of associated severe pulmonary hypertension carries a very high Maternal & Foetal Mortality and our patient had a PA systolic pressure of 50 mm Hg suggestive of moderate Pulmonary Hypertension but given the patient's past pregnancy history and the present condition it was decided to go ahead with procedure after explaining the risks preprocedure.

Potential concerns during the procedure are risks resulting from physiological changes of pregnancy, conditions compelling surgery during pregnancy, placental transfer of drugs, teratogenicity, preterm labour, radiation dose exposure & maternal factors leading to foetal compromise^{7,8}.

Timing of the percutaneous ASD device closure (after 18 weeks gestation), 22 weeks in our case is also of relevance to minimise the risk of teratogenicity due to placental transfer of anaesthetic drugs.

Here we limited the anaesthetic effects on Foeto - maternal circulation by avoiding inhalation agents and minimising the dose of Intravenous Anaesthetic Agents.

Also women with an unrepaired ASDs are at increased risk of neonatal events in comparison with women with repaired ASDs^{6,9,10}.

Although Cardiac Surgical Closure of ASD with Cardiopulmonary bypass carries mortality risk similar to non-pregnant women, there is significant morbidity including late Neurological impairment in 3-6% of children and high foetal mortality. The surgical closure should be the last option when the device closure is not feasible⁷.

Nonetheless we were able to perform a percutaneous closure under Total Intravenous Anaesthesia with Transoesophageal echocardiography, thus avoiding the use of inhalational agents and radiation and consequently foetal risk.

We continuously monitored haemodynamics and Foetal Cardiac Function by Foetal Echo to prevent Neonatal depression.

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