

# Epidural Anesthesia and Analgesia for Caesarean Section in Eisenmenger's Syndrome

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## Abstract

Eisenmenger's syndrome is defined as a complex combination of cardiovascular abnormalities leading to pulmonary hypertension close to systemic arterial pressure levels with reversed or bidirectional shunt through intracardiac or pulmonary shunt. Peripartum morbidity and mortality is very high in this group of patients with frequent deterioration post delivery. Anaesthetic management can be very challenging in these patients. We report a successful anaesthetic management of a 25 yr old female with 35 weeks of gestation for caesarean section. Slow titrated epidural anesthesia was administered with a mixture of 2% lignocaine and 0.5% bupivacaine. Drop in systemic arterial blood pressure was avoided by infusion of low dose norepinephrine through central line. Thus we conclude that titrated epidural anesthesia is an efficacious as well as safe method for caesarean section in Eisenmenger's syndrome.

**Keywords:** Eisenmenger's syndrome, caesarean section, epidural anesthesia, norepinephrine.

## Introduction

In Eisenmenger's syndrome various morphologically different congenital diseases with left to right shunt when untreated may progress to pulmonary vascular disease [1,2,3]. In these patients pulmonary artery pressure becomes near to systemic arterial pressures and the direction of shunt becomes reversed or bidirectional[4]. Pregnancy is generally avoided in this condition however if pregnancy occurs maternal mortality is considered to be 30-50% [4]. Anaesthetic management is very challenging and requires multidisciplinary team approach [6]. We report successful management of caesarean section in a patient with Eisenmenger's syndrome under epidural anesthesia.

## Case report

25 year old female G3 P1 L1 A1 with 36

weeks of gestation presented to us with dyspnoea NYHA grade 4 with severe restriction of functional capacity, orthopnoea requiring two pillows for sleeping. She was tachycardic (P-140/min, regular), blood pressure- 110/70 mm Hg and tachypneic (RR-44/min). Previous discharge records revealed diagnosis of congenital heart disease. She delivered a female child by normal vaginal delivery in her previous pregnancy. The patient was breathless with thin built (W- 35 kg) and short statured (H-140 cm) and had grade 3 clubbing with mild pedal oedema. Auscultation of cardio respiratory system revealed bibasal coarse crepitations, parasternal heave with loud P2 at pulmonary area with palpable 2nd heart sound, continuous systolic murmur grade III/VI, room air saturation was 65-70 % which improved to only 75-84 % on 4L/min of oxygen by face mask.

ECG revealed sinus tachycardia with right axis deviation, 2D echocardiography showed large ostium primum type of ASD (34 mm in diameter) with bidirectional shunt, severe tricuspid regurgitation and severe pulmonary hypertension and ejection fraction 70 % . Ultrasonography of the abdomen showed single live fetus with intrauterine growth restriction. ABG analysis sent showed pH-7.38, pco2-38, po2-44, Hb-14.9 gm/dl. The patient in the mean while was shifted to ICU and put on BIPAP overnight. Ampicillin 50 mg/kg + gentamicin 2 mg/kg for infective endocarditis prophylaxis was given. Cardiologist consultation was taken before administration of digoxin and furosemide. The patient was posted for elective caesarean section next morning. Epidural anesthesia was planned, left radial artery was cannulated for beat to beat monitoring and right internal jugular vein was

cannulated for central venous pressure monitoring and inotropic administration. Under all aseptic precaution epidural catheter was inserted at L2-L3 level. Patient was kept propped up at 45 degree with the help of 2 pillows. A total of 8 ml of local anaesthetic (3 ml of 2% lignocaine without

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adrenaline + 5 ml of 0.5 % bupivacaine + 25 micro grams of fentanyl) was slowly administered through epidural catheter in slow titrated manner over 15 min). Left uterine displacement was given. A prophylactic noradrenaline infusion was started through central line @ 0.15mcg/kg/min to counteract any hypotension. A good sensory block up to level T5 was achieved tested by sharp prick. HR, ECG, IBP, spO2 was monitored throughout the operation. SpO2 was maintained between 85-90 % with 6 litres/min of O2 through face mask. No drop in systolic blood pressure was seen with lowest reading being 112/80 mmHg. Preload was avoided to prevent fluid overload and 300 ml of colloid was administered.

A normal female child of 1.8 kg was delivered through caesarean section with a normal Apgar score. We chose to give oxytocin infusion instead of bolus. Tubal ligation was performed. Patient was shifted to ICU for further monitoring. Multimodal analgesia with epidural ropivacaine top ups and diclofenac suppository per rectally was given for postoperative pain relief. She continued to receive BIPAP for next 2 days; central venous pressure was maintained at 12 to 14 cm of H2O. Nor adrenaline infusion was stopped 24 hours later. 20 mg of low molecular weight heparin was given for anticoagulation after 24 hr post operatively and continued for 7 days. Rest all parameters and investigations were normal. Epidural catheter was removed on postoperative day 3, 12 hrs apart from the next dose of low molecular weight heparin.

### Discussion

Eisenmenger's syndrome is defined as pulmonary hypertension with bidirectional or right to left shunting of blood through aortopulmonary or intracardiac communication [1] Eisenmenger's syndrome was first described in 1897 by Victor Eisenmenger [2,3]. Wood further explained it as the final stage of pulmonary hypertension at systemic level due to high pulmonary vascular resistance (> 800 dynes/s/cm<sup>5</sup>) with reversed or bidirectional shunt. Pregnancy induced cardiovascular changes may lead to a reaction of pre-damaged pulmonary vascular bed in the presence of congenital heart disease [1,3]. Pregnancy is generally not well tolerated. The maternal mortality rate is

disappointingly high 30-50 % [4]. Mortality is high with caesarean section (47%) and vaginal delivery (33%) and significantly worse than that observed after spontaneous abortion [5]. The mortality peaks at delivery and first post partum week. The causes are thromboembolic phenomenon, arrhythmias, right heart overload, myocardial infarction and fall in systemic vascular resistance [6]. Generally when pregnancy does occur medical termination is considered safer than any mode of delivery [7]. Regardless of the risk some patients will choose to continue pregnancy or may have diagnosis made during pregnancy [8]. Anaesthetic management of Eisenmenger's syndrome can be quite a challenging affair. Multidisciplinary approach involving obstetrician, cardiologist, anesthetist is essential [9]. No significant improvement in mortality rate is seen, which remains disappointingly high inspite of various advancements in cardiology [10]. Recent surveys conducted shows mortality of upto 40% when pregnancy is continued upto second trimester [11, 12].

In view of worsening dyspnoea, failure to improve further with medical management obstetricians opted for caesarean section. We chose to administer epidural anesthesia. Martin et al has documented the safety of regional anesthesia in Eisenmenger's syndrome. A review of 57 articles involving 103 patients showed safety of regional anesthesia and recommended its use in Eisenmenger's syndrome. 13 Case reports have been reported in the literature where patients have been successfully managed with regional anaesthesia [5,6,14,15,16, 17,18,19]. Regional anesthesia offers many advantages especially slow titrated epidural provides better controlled hemodynamics and gradual fall in systemic gradual resistance [14,17]. In our patient to counteract any further drop in systemic vascular resistance and increasing right to left shunt, prophylactic noradrenaline infusion was started via central line as suggested by Bird et al [20,21]. Regional anesthesia also reduces the incidence of deep vein thrombosis [22]. Although epidural anesthesia does cause drop in systemic vascular resistance, but minimal respiratory and hemodynamic changes can be achieved with a well managed epidural [23,24,25]. Adrenaline was avoided epidurally to reduce sympathetic

stimulation causing tachycardia and increasing myocardial oxygen demand due to systemic absorption [26]. Epidural opioid was added to improve the quality of block and reduce intraperitoneal symptoms. It also allows adequate anesthesia for caesarian section at a lower sensory level [27].

General anesthesia is associated with several disadvantages. Positive pressure ventilation decreases venous return and systemic blood pressure which can increase the right to left shunt and causes ventilation perfusion mismatch. Rapid sequence induction with thiopentone causes myocardial depression and fall in systemic vascular resistance. Chances of maternal aspiration are higher with slower induction. Inhalational halogenated agents also cause myocardial depression, arrhythmias and decrease in systemic vascular resistance [27]

One of the most important causes of postoperative morbidity and mortality are thromboembolic complications. Pregnancy itself is a hypercoagulable condition which further exacerbates this condition. Heparin is the drug of choice as it does not cross the placental barrier. We started low molecular weight heparin (20 mg) which was continued for 7 days till patient was completely ambulatory [28] Oxygen was continuously administered as it is a pulmonary vasodilator and plays a pivotal role in reducing pulmonary vascular resistance [29]

Meticulous precautions to prevent air embolism were taken as even a small amount of air can cause paradoxical embolism. Central venous monitoring was essential in our patient in order to monitor the filling pressures. Pulmonary artery catheterization was not done as in case of large atrial septal defect or ventricular septal defect may not reflect the left ventricular pressures. Also in this particular scenario right ventricular dysfunction is more likely to occur and hence central venous catheterization will prove more beneficial [16,30].

In summary Eisenmenger's syndrome patients need to be managed with multidisciplinary team approach to ensure maternal and foetal well being. Caesarean section is an appropriate technique for the delivery of the baby. Slow titrated epidural anesthesia can be safe as well as efficacious technique if hypoxaemia and fall in systemic vascular resistance are avoided.

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