

Coarctation of the Aorta in Caesarean section: An Anaesthetic challenge.

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ABSTRACT

Coarctation of the aorta is a narrowing of the aorta resulting from an abnormal junction of the aortic isthmus and the arterial duct. It can present in neonatal period, early childhood or in adulthood and accounts for 5% of all congenital cardiac defects. The maternal mortality for patients with uncorrected coarctation of the aorta is 3% to 9% and fetal mortality may be as high as 20%. A thorough understanding of impact of pregnancy on the hemodynamic response to the patient's cardiac lesion is required for successful anesthetic management. A meticulous approach is needed when planning anaesthesia for Caesarean section in such a case as associated haemodynamic effects of both general and regional anaesthesia can have serious and deleterious effects on both the mother and newborn. We present successful anaesthetic management under graded epidural anaesthesia for elective Caesarean section in a case of unrepaired coarctation of the aorta.

Keywords: Coarctation of the Aorta, Caesarean section, Epidural.

INTRODUCTION

Congenital heart disease is present in approximately 8 in 1000 live births and coarctation of the aorta making up approximately 5-10% of the abnormalities¹. Despite the advances in management of heart disease, pregnancy put the mother at risk due to marked increase in maternal cardiac output and oxygen consumption.

Principle risk to the mother with coarctation of the aorta is cardiac decompensation leading to left ventricular failure and complications like aortic dissection or rupture, endocarditis cerebrovascular accident due to aneurysm rupture can occur. Adverse neonatal effects, such as growth retardation, abruption placentae and premature deliveries are concerns in these populations. General anaesthesia is associated with sympathetic stimulation in response to endotracheal intubation and extubation, which can be detrimental to patients the patients with existing cardiac disease, in addition to the unwanted impact of a general anaesthetic and narcotics on the newborn. Spinal anaesthesia may lead to afterload reduction, hypotension and tachycardia; unacceptable in a case of fixed cardiac output. Carefully titrated epidural

anaesthesia is safe alternative to general and spinal anaesthesia. We report a successful graded epidural anaesthesia for elective Caesarean section in a patient with unrepaired coarctation of the aorta.

CASE REPORT

A 65 kg, 20 year female primigravida with 37 weeks of gestation was admitted to our hospital for elective Caesarean section for cephalopelvic disproportion. She was admitted to iccu during her 20th week of gestation for palpitations and breathlessness at rest and was diagnosed as coarctation of the aorta with moderate mitral regurgitation with mild aortic regurgitation with moderate pulmonary hypertension and discharged on 5th day with advice to continue antihypertensive.

She denied history of chest pain, palpitations, headache, and syncope. She was in New York heart association functional class II. She was on regular treatment with tab. Methyl dopa 500 mg b.d , tab. Losartan 50 mg od, tab. Minipress 5 mg od, tab. Nicardia-R 20 mg b.d.

She was of average built and her pulse rate was 100 beats per minute regular, blood pressure (NIBP) was 170/100 mmHg in the right arm and 108/70 in the left arm. NIBP reading in lower limb was 86/54 mmHg. Cardiac auscultation revealed holosystolic murmur in left fourth intercostal space. Respiratory system revealed respiratory rate 20 breaths per minute and harsh breathing sounds on auscultation.

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Routine blood and biochemical investigations were within normal limits. Her electrocardiogram revealed left ventricular hypertrophy and left axis deviation. Her x-ray chest showed cardiomegaly. Recent echocardiography revealed concentric left ventricular hypertrophy, degenerative calcific mitral and aortic valve, moderate mitral regurgitation and mild aortic regurgitation, moderate pulmonary hypertension and 62% left ventricular ejection fraction.

The patient and relatives were explained about the high risk and need for postoperative stay in the intensive care unit and written informed consent was taken. Patient was kept fasting overnight and was premedicated with injection pantoprazole 40 mg i.v. night before surgery and injection pantoprazole 40 mg i.v, injection ondansetron 4 mg iv 30 minutes prior to surgery. Antihypertensive drugs were continued as per schedule. Emergency arrangements including invasive monitoring, inotropes, vasopressors and vasodilator infusions were made in the operating room.

In the operating room, routine monitors (ECG, automated noninvasive blood pressure and pulse oximeter) were attached. Under all aseptic precautions under effect 2% lignocaine infiltration, left femoral arterial cannulation was achieved and invasive blood pressure monitoring was started. Central venous cannulation through right antecubital vein was done using cavafix after 2% lignocaine infiltration. Her baseline blood pressure was 182/96 mmHg in right upper limb (NIBP) and 86/54 mmHg (IBP). Her central venous pressure was 8 cm of water. Patient's urinary bladder was already catheterized in ward and one 20G peripheral access was present.

Epidural catheterization was done in L2-L3 lumbar interspace using 18G touhy's needle and epidural catheter. Loss of resistance technique to air was used for localization of epidural space. Catheter was kept 5 cm in the epidural space. Twelve milliliter's of plain Bupivacaine (0.5%) and 50 µg of fentanyl were injected through the epidural catheter in a graded manner until T6 level was achieved. A Caesarean section was performed and 2.8 kg female child with Apgar score of nine at 1 and 5 minutes after delivery. Oxytocin infusion at 10 U/ hour was started after delivery of baby. Good uterine muscle tone was achieved. The procedure lasted for 60 minutes. Intraoperative pulse rate was between 72 to 92 beats per minute. Right upper limb blood pressure was between 182/96 mmHg and 170/86 mmHg. Left femoral invasive blood pressure was between 85/54 mmHg and 110/56 mmHg. Patients mean arterial pressure at left femoral artery was more than 50 mmHg throughout the surgery. Intraoperative patient received 800 ml of ringer lactate. Urine output was more than 2 ml/kg/hour. Oxygen saturation remained between 98-100% on oxygen by facemask @ 4 liter per minute.

The patient was shifted to post anaesthesia care unit for observation and further management. Analgesia in postoperative period was achieved with 8 ml of Bupivacaine (0.0625%) with 50 mg of tramadol epidurally 8 hourly. PACU stay for 48 hours was uneventful. The epidural catheter was removed before shifting the patient to the ward. The patient was discharged from the ward on 9th postoperative day with advice to continue antihypertensive medicines and follow up with cardiology OPD for further management of coarctation of the aorta.

DISCUSSION & CONCLUSION

Coarctation of the aorta is a narrowing of the aorta resulting from an abnormal junction of the aortic isthmus and the arterial duct. The incidence is 1 in 2000 live births and is twice as common in males as in females. It accounts for 5% of all congenital cardiac defects and mortality is greater than 80% if unrepaired. It is associated with other abnormalities, of which most frequent are bicuspid aortic valve, PDA, VSD, mitral valve anomalies and berry aneurysm of the cerebral circulation.^[2] Children with severe coarctation present in neonatal period with circulatory collapse. Children with moderate coarctation may present in early childhood with failure thrive, poor exercise tolerance or an incidental finding of upper limb hypertension. Patients with coarctation may present in adulthood with incidental finding of upper limb hypertension, headache, and fatigue or more dramatically with aortic rupture, intracranial hemorrhage, left ventricular failure. All patients with coarctation require treatment with either balloon angioplasty or surgery depending on the severity of the coarctation. The incidence of this disease in the pregnant population has been steadily decreasing because most cases are surgically corrected in early childhood. The maternal mortality for patients with uncorrected coarctation of the aorta is 3 to 8% and fetal mortality is as high as 20%. Even women who have their coarctation of the aorta repaired have an increased risk of aortic dissection and rupture of cerebral berry aneurysm in the third trimester and peripartum period due to haemodynamic and hormonal changes.^[3] Hypertension should be controlled adequately with beta blockers (plus methyl dopa if necessary) and this should be initiated if blood pressure is more than 130/80 mmHg.^[4] Poorly controlled hypertension leads to adverse neonatal (growth retardation, abruption placentae, premature delivery) and maternal (renal failure and hypertensive crisis) outcome. In addition, hypertensive surge may precipitate rupture of intracranial aneurysm. Significant stenosis at the site of coarctation with a pressure drop distally may result in placental hypo perfusion. Associated anomalies such as stenotic bicuspid aortic valve may become haemodynamically significant and

symptomatic with the physiologic changes of pregnancy.^[5]

Labor and delivery should be planned with a multidisciplinary team well in advance. It is important to communicate the delivery plan to the woman and to the other physicians involved in her care. Generally vaginal deliveries are recommended unless there is obstetric indication for Caesarean section. Vaginal delivery facilitated with low dose epidural analgesia and instrumental delivery without maternal pushing in the second stage, to avoid valsalva maneuvers. This avoids risk associated with Caesarean section – namely, bleeding, deep vein thrombosis, infection and increased requirement for Caesarean section in subsequent pregnancies.^[6] But in our patient Caesarean section was planned due to cephalopelvic disproportion.

General anaesthesia (GA), mainly opioid based GA is commonly used in cardiac cases. But in case of coarctation of the aorta, GA is not without disadvantages like sudden surge in blood pressure or tachycardia during intubation may lead to aortic dissection or aortic rupture, left ventricular failure or intracranial aneurysm rupture. Opioid used during GA may lead to respiratory depression in both parturient and newborn. In spinal anaesthesia, sympathetic blockade can cause large reduction in systemic vascular resistance, which can compromise uterine perfusion pressure and can jeopardize the fetus.^[7]

The epidural anaesthesia is an acceptable approach using careful titration of local anaesthetics and opioids with careful watch on mean blood pressure in lower limbs. We decided to use epidural anaesthesia technique using incremental doses of local anaesthetics with opioids, so that there was no sudden drop in blood pressure. Throughout the procedure patient didn't require vasopressors. Also epidural catheter was used to provide postoperative analgesia. Walker et al have reported use of epidural and CSEA in these patients.^[8] Sherer also reported use of CSEA in these patients.^[9]

We chose to use NIBP monitoring for right upper limb and lower limb blood pressure was monitored using left femoral invasive arterial line monitoring. Arterial line monitoring by both invasive and noninvasive methods in both upper and lower limbs has been described in literature of coarctation of the aorta. Fall of blood pressure distal to coarctation site may compromise uteroplacental circulation and marked increase in blood pressure may put the mother at risk. Being epidural block as a mode of anaesthesia, possibility of hypotension was more leading to compromised uteroplacental circulation and renal perfusion. Hence invasive left femoral arterial blood pressure monitoring was considered; right upper limb blood pressure was monitored using NIBP. Intravenous fluids were guided by CVP. Meticulous watch was kept on urine output every 15 minute. It was observed to be more than 2 ml/kg/hr,

indicating good renal perfusion distal to coarctation. Postoperative analgesia was achieved with inj. 0.0625% bupivacaine and inj. Tramadol epidurally. In conclusion, graded epidural anaesthesia has great advantage over general and spinal anaesthesia as titrated doses of local anaesthetic can be given without significant haemodynamic instability.

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