

Anaesthesia Management of Cyanotic Congenital Heart Disease Posted for Lower Segment Caesarean Section: A Case Series

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Abstract

The case of various womans with cyanotic congenital heart disease posted for lower segment caesarean section are presented with different gestation periods. Based on the diagnosis of the congenital cardiac lesion, cesarean delivery was performed under epidural anesthesia under management by a multidisciplinary team. This report highlights the anesthesia management of a rare cyanotic congenital cardiac lesion for lower segment cesarean delivery.

Keywords: Congenital heart; Diagnosis; Anesthesia; Cesarean delivery

sequence induction was performed with injectable Ketamine and trachea was intubated with cuffed endotracheal tube after succinylcholine. Baby was delivered within 3 minutes of induction [3]. Cefuroxime was administered for surgical prophylaxis. Sevoflurane was administered at a MAC of 0.7 to maintain amnesia. Adequate uterine retraction was achieved after oxytocin 20 units IV bolus over 30 min. Inj. paracetamol 1 gm, tramadol 50 mg per rectal suppository and local infiltration with bupivacaine was administered for peri-operative analgesia as per institutional protocol. Extubation was performed immediately post procedure after reversal and patient was shifted to cardiac recovery room for observation [4]. Thromboprophylaxis was achieved with enoxaparin (sc) on POD 1.

Introduction

Cyanotic Congenital Heart Diseases (CCHD) are structural embryological defects of heart or great vessels present. In spite of foetal screening and pregnancy testing, the prevalence of CCHDs is increasing globally [1]. With evolution in medicine and surgical technology, over 90% now survive to adulthood. As a result, parturient with CCHDs are expected to rise in coming decade. Presence of adult CCHDs pose increased risk of mortality and morbidity under anaesthesia. In this series, we present anaesthesia management of 4 cases of CCHDs [2].

Case Presentation

Case 1

A 29-year-old primi-gravida was posted for elective Lower Segment Caesarean Section (LSCS) 34 weeks of gestation. She presented with breathlessness (NYHA class 3) and a saturation of 88% on room air with improved to 95% with oxygen at 6 liters/min. She diagnosed with Patent Ductus Arteriosus (PDA) with Eisenmenger syndrome with severe pulmonary hypertension (87 mmHg) with dilated right atrium and right (RV). Diuretics and sildenafil were started. Patient was taken up for elective LSCS after written informed high-risk consent and adequate starvation. Routine ASA monitors were attached and left radial artery was transduced followed by central venous cannulation. After taking patient in confidence, painting and draping of the surgical site was done by surgeons. A rapid

Case 2

A 20-year-old primi-gravida was posted for LSCS at 32 weeks of gestation. She presented with progressive breathlessness (NYHA class 3) and saturation of 89% with oxygen supplementation at 6 litres/min [5]. She was diagnosed with Double Outlet Right Ventricle (DORV) with Ventricular Septal Defect (VSD) with Pulmonary Stenosis (PS) with Transposition of Great Arteries (TGA). Being an uncorrected CCHD, anaesthesia management was same as case 1.

Case 3

A 22-year-old primi-gravida was posted for LSCS at 36 weeks of gestation. She presented with breathlessness (NYHA class 3) and saturation of 80% with oxygen supplementation at 8 litres/min by Hudson's mask [6]. She was a known case of Ebstein's anomaly now presented with features of pre-eclampsia (BP 180/110). Echocardiography revealed severe displacement of tricuspid valve, grossly dilated right atrium and RV with 70% atrialisation of RV, moderate secundum atrial septal defect with bidirectional flow with normal LVEF (65%). There was no evidence of arrhythmia. Additional complication of pre-eclampsia was managed with labetalol and methyldopa. The anaesthesia management for this patient was on lines similar to case 1 [7].

Case 4

A 26-year-old lady with severe Bronchial Asthma (BA) was posted for LSCS. She presented with cyanosis, hypoxia (84% on air) and progressive breathlessness (NYHA class 3). Peripheral saturation increased to 90% with oxygen supplementation at 6 litres/min. She had a VSD with bidirectional flow and severe pulmonary hypertension. Considering the presence of BA and possibility of rise in Pulmonary Vascular Resistance (PVR) during intubation and extubation, a graded epidural anaesthesia was planned. 18G epidural catheter was inserted at L2-3 level in

sitting position under all aseptic precautions. Incremental doses of 2% lignocaine was administered every 5 min and a sensory block up to T6 was achieved with 17 ml of drug over 24 minutes [8]. The sensory block was intentionally kept no higher than T6 to avoid significant hemodynamic changes. Phenylephrine infusion was started prophylactically at 2 MCG/kg/min-5 MCG/kg/min to maintain the MAP over 80 mmHg. The procedure was uneventful. Peri op management was as per case 1. Both mother and foetus had a favourable outcome (Table 1).

Table 1: Cyanotic congenital heart diseases in different cases.

No. of cases	Age of a patient	Breathe saturation	Treatment	
			Oxygen supplementation (liters/min)	Diagnosis
1	29	88%	6	Patent ductus arteriosus
2	20	89%	6	Double outlet right ventricle
3	22	80%	8	Echocardiography
4	26	84%	6	Graded epidural anaesthesia

Discussion

The incidence of congenital heart disease varies between 8-9/1000 live births and approximately 25% of these are CCHDs. Approximately 35% infant deaths are due to congenital malformations and related cardiac anomalies. The risk factors for CCHDs are gestational infections (Rubella), addictions (alcohol and tobacco), consanguineous marriage, poor nutritional status, family history of CCHDs and genetic conditions (down's, turner's and marfan's syndrome). However, in most of the cases the exact cause is usually not known. Management of CCHDs are challenging as it requires planning and vigilance to maintain Systemic Vascular Resistance (SVR) over PVR and minimising the intra cardiac shunts [9]. These patients usually have polycythaemia and thus are at increased risk of thrombosis leading to tissue infarction and high foetal mortality. This emphasizes the importance of initiating thromboprophylaxis in the peri-operative period. Cyanotic heart diseases eventually lead to pulmonary hypertension and later Eisenmenger syndrome. In case 1 and 4, simple cardiac lesions like PDA and VSD lead to Eisenmenger syndrome due to lack of correction. Anaesthesia complications for these patients include pulmonary hypertensive crises and cardiac arrest. In addition, these patients are at a high risk of bleeding due to platelet dysfunction, thrombosis due to polycythaemia, paradoxical embolism and arrhythmias. Anaesthesia management should be focused on maintaining high SVR and low PVR, maintaining low myocardial contractility, prevention of hypovolemia and arrhythmias.

Additionally physiological changes in pregnancy like an increase in blood volume by 40%-50%, increase in cardiac output, decrease in SVR pose additional challenges. Four predictors of cardiac events during pregnancy include prior

cardiac events or arrhythmias, baseline NYHA class >2 or cyanosis, left sided obstructive lesions and decreased SVR. The lowest effective dose of oxytocin must be administered as slow infusion as increased uterine contractions pushes additional 300 cc-500 cc of blood in the circulation thereby increasing the risk of heart failure. Moreover, vasodilation after oxytocin decreases the SVR and increases the shunt fraction.

Although Regional Anaesthesia (RA) is the preferred choice for LSCS there is always a risk of precipitous fall in SVR after induction specially with sub arachnoid block. Hence, GA is the choice for most cardiac consideration as it gives a better hemodynamic control. However, GA can cause rise in PVR due to positive pressure ventilation, hypoxia, hypercarbia, acidosis, hypothermia [10]. RA on the other hand allows spontaneous respiration with little disruption of ventilation perfusion relationship and no rise in PVR. Few case reports advocate graded epidural as an effective alternative as it causes gradual fall in SVR allowing adequate time to optimise the hemodynamic parameters.

Conclusion

Although Regional Anaesthesia (RA) is the preferred choice for LSCS there is always a risk of precipitous fall in SVR after induction specially with sub arachnoid block. Hence, GA is the choice for most cardiac consideration as it gives a better hemodynamic control. However, GA can cause rise in PVR due to positive pressure ventilation, hypoxia, hypercarbia, acidosis, hypothermia. RA on the other hand allows spontaneous respiration with little disruption of ventilation perfusion relationship and no rise in PVR. Few case reports advocate graded epidural as an effective alternative as it causes gradual

fall in SVR allowing adequate time to optimise the hemodynamic parameters.

The principle of management of CCHDs, irrespective to the choice of anaesthesia, revolves around maintenance of SVR over PVR and reduction in right to left shunt along with thorough understanding of the underlying patho-physiology and choice of attending anaesthesiologist.

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