Anesthetic Management of a Parturient with Severe Pulmonary Restenosis Posted for Cesarean Section

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Abstract

Adults with congenital heart disease are increasing due to improvement in infant heart surgery and availability of better cardiac care. Pregnancy in these patients requires multidisciplinary team approach due to circulatory changes. We describe an anesthetic management of the parturient undergoing cesarean section having severe pulmonary restenosis.

Keywords: Cesarean section, epidural anesthesia, pulmonary stenosis

INTRODUCTION

Pulmonary stenosis (PS) accounts for 10%–12% of the cases of congenital heart disease (CHD) in adults.[1] PS considered as mild maternal risk factor.[2] However, multidisciplinary team (MDT) approach required for successful pregnancy outcome.[3] Apart from few case reports, our review of literature could not find out recommendations on anesthetic management for cesarean section in these patients. Hence, we report anesthetic management of parturient with pulmonary restenosis already treated with pulmonary balloon valvuloplasty undergoing elective cesarean section.

CASE REPORT

A 22-year-old female, primigravida, with 34 weeks of gestation presented to obstetric and gynecology department for routine antenatal checkup for the first time. Her history was significant for severe PS with Gmax 92 mmHg on echocardiography, for which she had undergone balloon valvotomy 10 years back. She was not having any complaints of dyspnea, cyanotic episodes, chest pain, or palpitation in the recent past. Clinical examination was significant for a Grade 4/6 ejection systolic murmur best heard in the second intercostal space with regular 88/min pulse rate and 110/76 mmHg blood pressure. The echocardiography revealed severe valvular PS with a peak systolic gradient of 67 mmHg, an ejection fraction of 60% and normal systolic function. Tablet propranolol 10 mg thrice a day was started by cardiologist. She was readmitted for observation at 36 weeks, and the decision was taken to perform an elective cesarean section at 37 weeks.

The preoperative anesthetic examination revealed a New York Heart Association (NYHA) Functional Classification two patient with pulse rate of 80/min and blood pressure of 120/80 mmHg. Jugular venous pulse was not raised, airway examination was normal, and biochemical profile was normal. The electrocardiogram (ECG) showed normal sinus rhythm. Ranitidine 50 mg and metoclopramide 10 mg were given orally on the day of surgery.

In the operation theater, a five-lead ECG with ST segment analysis, noninvasive blood pressure, and pulse oximetry were applied. Patient’s blood pressure was 120/70 mmHg, pulse rate was 80/min, and oxygen saturation was 98% on room air. Intravenous (IV) access was secured with an 18-gauge cannula. Radial artery was cannulated for continuous invasive blood pressure measurement. Two hundred milliliters of Lactated Ringer infused before giving epidural anesthesia and then continued as 10 ml/kg/h. An epidural catheter (BD Perisafe, Belgium) was inserted after locating epidural space with an 18-gauge Tuohy needle at L3–L4 space by loss of resistance.
technique. The epidural catheter was fixed 10 cm at skin puncture with 5 cm length inside the epidural space.

The patient was placed in the supine position and 10 ml of 0.5% hyperbaric bupivacaine given through epidural catheter after test dose of 2 ml of 2% lignocaine with 1:200,000 adrenaline. After 5 min of epidural injection, patient’s blood pressure dropped down to 70/50 mmHg. The patient responded to the treatment of 200 ml of fluid bolus and blood pressure returned to 110/76 mmHg. Loss of sensation to pinprick at the fifth thoracic level achieved by the end of 15 min of epidural anesthetic dose. Although the patient had no somatic sensation to skin incision, she complained visceral pain due to stretching of tissues. Therefore, injection ketamine 50 mg IV supplemented to epidural anesthesia along with injection glycopyrrolate 0.2 mg IV as antisecretory agent. A live fetus of 2.3 kg was delivered. Intravenous infusion of oxytocin 5–10 μl/h started. The patient was shifted to postanesthesia care unit where she was monitored for 24 h for any hemodynamic instability. Injection morphine 3 mg in 10 ml of distilled water was given at 12 h interval for postoperative pain relief. The patient was shifted to the ward next day and discharged from hospital on the 4th postoperative day without any complication.

**Discussion**

Obstruction to the right ventricle outflow tract in the adult patient can be either congenital or acquired. Congenital obstruction can be at the pulmonary valve, below the pulmonary valve, or above the pulmonary valve. Isolated PS during pregnancy is most commonly due to congenital obstruction at valvular level. Surgical or balloon pulmonary valvotomy is recommended in asymptomatic, nonpregnant patients with PS when mean Doppler gradient across the pulmonary valve is >40 mmHg, and periodic follow-up is recommended at least every 5 years even if patients remain asymptomatic. Our patient lost to follow-up after balloon valvuloplasty and attended antenatal care at 34 weeks of pregnancy when she was found to have severe pulmonary restenosis on echocardiography. Although PS considered as low risk factor (with mortality 0.1%–1.0%) in pregnant women with favorable outcome described in various literature, morbidity and even mortality can occur when it is associated with poor functional status (NYHA Classes III and IV) or the left ventricular dysfunction. Risks related to the operation and possible requirement of intensive and cardiac care were explained to the patient and relatives on preanesthetic visit. Intensive Care and Cardiac Care Unit were informed and kept standby to manage emergency complications.

PS increases intraventricular pressure and work of the right ventricle. The left ventricular output may be impaired by shifting of ventricular septum toward the left, and cardiac output is maintained by increase in systemic vascular resistance. Pregnancy induced increase in intravascular volume and heart rate can precipitate right heart failure (RHF) and cardiac arrest. Resuscitation in case of cardiac arrest is extremely difficult as cardiac compressions are not effective in forcing the blood out of stenotic pulmonary valve. The goal of anesthetic management is optimizing right ventricular preload, avoiding any increase in pulmonary vascular resistance and decrease in systemic vascular resistance, maintaining normal sinus rhythm, and effective ventricular contractility. It is important to maintain effective right ventricular filling pressure by optimum preloading but excessive preloading can also precipitate RHF.

Combined spinal and epidural anesthesia was used by Makkar et al. for cesarean section in a parturient with severe PS. General anesthesia was given by Sanikop et al. successfully in similar situation. We choose epidural anesthesia to avoid general anesthesia induced increase in pulmonary vascular resistance and spinal anesthesia induced precipitous hypotension.

An observational study was done by Greutmann et al. on 93 consecutive pregnancies in fifty patients with CHD and residual hemodynamic lesions of the right ventricular outflow tract cared for by specialist MDT which includes one specialist grown-up CHD cardiologist, two obstetricians, one anesthetist, one hematologist and a clinical nurse specialist. The most common primary cardiac defect was PS (45%). The rate of miscarriages and termination of pregnancy before 24 weeks of gestation was recorded. Maternal, obstetric, and neonatal outcomes along with cardiac complications were also assessed. They conclude that when treated by an MDT, maternal and fetal outcomes were good even in patients who developed RHF. A case–control study of 17 patients with PS on pregnancy outcome by Hameed et al. found the similar result. However, noncardiac complications in women with isolated congenital pulmonary valve stenosis were found to be high in a study of 81 pregnancies (>20 weeks) by Drenthen et al.

In conclusion, our case report is evidence to successful outcome with epidural anesthesia in parturient with severe pulmonary restenosis, but no recommendation can be made on this single case report. Prepregnancy counseling should be offered to all women with CHD to prevent pregnancy-related risk. Favorable outcome of pregnancy is feasible for women with CHD when appropriate counseling and optimal care by MDT approach are provided.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Bricker ME, Hillis LD, Lange RA. Congenital heart disease in adults. First of two parts. N Engl J Med 2000;342:256-63.
2. Hameed AB, Goodwin TM, Elkayam U. Effect of pulmonary stenosis on pregnancy outcomes – A case-control study. Am Heart J 2007;154:852-4.
3. Uebing A, Steer PJ, Yentis SM, Gatzoulis MA. Pregnancy and congenital heart disease. BMJ 2006;332:401-6.
4. Warnes CA, Williams RG, Bashore TM, Child JS, Connolly HM, Dearani JA, et al. ACC/AHA 2008 guidelines for the
management of adults with congenital heart disease. Circulation 2008;118:2395-451.
5. Joubert IA, Dyer RA. Anaesthesia for the pregnant patient with acquired valvular heart disease. Anaesthesia 2005;19:1-2.
6. Makkar JK, Jindal S, Jain A, Wig J. Anaesthetic management of a parturient with severe pulmonary stenosis undergoing caesarean section. S Afr J Anaesthesiol Analg 2010;16:28-30.
7. Sanikop CS, Umarani VS, Ashwini G. Anaesthetic management of a patient with isolated pulmonary stenosis posted for caesarean section. Indian J Anaesth 2012;56:66-8.
8. Greutmann M, Von Klemperer K, Brooks R, Peebles D, O'Brien P, Walker F. Pregnancy outcome in women with congenital heart disease and residual haemodynamic lesions of the right ventricular outflow tract. Eur Heart J 2010;31:1764-70.
9. Drenthen W, Pieper PG, Roos-Hesselink JW, Schmidt AC, Mulder BJ, van Dijk AP, et al. Non-cardiac complications during pregnancy in women with isolated congenital pulmonary valvar stenosis. Heart 2006;92:1838-43.