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Case Report

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Elective Lower Segment Cesarean Section in Patients with Severe Mitral Stenosis under Sole Epidural Anesthesia: Initial Experiences Case Report

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ABSTRACT

Management of a pregnant females with rheumatic heart disease is always challenging due to pregnancy related hemodynamic changes, which is further complicated by the pre-existing heart disease. We, here, report unique successful management of two pregnant women with multi-valvular heart disease, amongst severe mitral stenosis, who underwent elective lower segment cesarean section, under sole epidural anesthesia on contrary to general or spinal anesthesia. In woman with severe stenotic valvular heart disease especially aortic and mitral stenosis, it is always challenging to carry out the pregnancy to term, hence planned cesarean delivery at 36-37 weeks of gestation is always preferred mode of delivery for better maternal and fetal outcomes.

Keywords

Cesarean section, mitral stenosis, rheumatic heart disease, sole epidural anesthesia

INTRODUCTION

Rheumatic heart disease (RHD) still remains the most common cardiac disease complicating pregnancy in developing countries and mitral stenosis is the highest prevalent in developing countries. In Asia proper, the prevalence of RHD has been reported as being as high as 12:1,000.[1] Moreover, the significant hemodynamic changes in pregnancy such as rise in intravascular volume, significant fall in systemic venous resistance (SVR), increased cardiac output, marked fluctuations in cardiac output during labor, hypercoagulability, etc. further favor worsening of the condition in pregnant women with pre-existing heart disease.[2]

Single shot spinal anesthesia (SSSA) is preferred mode of anesthesia for general parturient unless there is contraindication. With SSSA, there can be rapid drop in SVR which will reduce the preload and lead to hypotension in general parturient. The above effect is exaggerated in parturient with fixed cardiac output heart disease hence SSSA is contraindicated to such population. General anesthesia (GA) is the

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preferred mode of anesthesia in such population. However, there are risk of drug induced hypotension and tachycardia leading to refractory hypotension, risk of airway instrumentation, aspiration risk, risk of exposure of anesthetic agents to the fetus and risk of maternal awareness and requirement of ventilatory support in the postoperative period. Careful titration of anesthetic agents guided by invasive hemodynamic monitoring will help to achieve the tight control of hemodynamic but it always stressful even to qualified and experienced anesthesiologist. Epidural anesthesia has shown par promising outcome amidst valvular heart disease parturients with respect to both maternal and fetal outcome whilst contrasting both spinal and GA.[2,3]

CASE 1

A 27 year-old primigravida with rheumatic heart disease (RHD) for last 12 years had undergone two sessions of percutaneous transvenous mitral commissurotomy (PTMC) approximately six years back. Since then, she had no cardiovascular symptoms even at her daily physical activities (NYHA 1). Currently she was receiving Phenoxymethyl Penicillin 250 mg orally. Her antenatal checkups (ANC) visit during first, second and third trimesters were uneventful. Her recent echocardiography revealed severe mitral stenosis (Mitral valve area = 1.2/1.0 cm^2), moderate to severe aortic regurgitation, mild aortic stenosis (Peak/Mean gradients: 39/22 mm of Hg, V_{max} 315 cm^2), mild mitral regurgitation, with left ventricular ejection fraction of 60%. Twelve leads ECG suggested of sinus rhythm with heart rate 85 beats per minute (bpm). Rest systemic examination and investigation finding were within normal limit.

She was planned elective cesarean delivery at 39 weeks of gestation under sole epidural anesthesia with invasive monitoring. Risk related to intra-operative cardiovascular instability, possibility of conversion to GA and poor outcome of the mother and baby was counselled and written informed consent was received. She was fasted over night and oral Ranitidine 50 mg and Metoclopramide 10 mg was prescribed as aspiration prophylaxis.

At operating theatre, baseline heart rate of 80 bpm, regular, oxygen saturation (SpO_2) of 97% in room air with BP of 110/80 mmHg was recorded. Two peripheral veins were secured with 18G cannula and left radial artery was cannulated with 20G cannula. In sitting position, L_1-L_2 epidural space was identified using 18G Tuohy's needle by loss of resistance (LoR) to saline technique after infiltrating the skin with 1 % Lidocaine. The space was further confirmed by tracing the epidural waveform after connecting saline prefilled line from transducer to the epidural hub. LOR was at obtained at 4cm and epidural catheter was fixed at 9cm in the skin. After securing the catheter, she was laid down supine with 15° left tilt of operating bed.

Freshly prepared 2% lignocaine with adrenaline (5mcg/ml) with fentanyl (5mcg/ml) was injected as test and loading dose in fractionated dose of 2-3 ml every 2-3 minutes. Prophylactic phenylephrine was initiated at 25 mcg/min and titrated upto 50mcg/min. One episode of BP dropped to 50/30mm of Hg (MAP=36mm of Hg), which was treated with 100 microgram of phenylephrine bolus. Rest of the vitals parameters were within 10% of the base line prior to delivery. Sensory block height of T4 dermatome was achieved after injecting 15 ml of the solution in 15 minutes interval. In between she received Ceftriaxone 1gm as infective endocarditis prophylaxis.

Surgery was initiated and a baby girl of weight 2800 grams with APGAR scores of 8 and 10 at 1 minute and 5 minutes respectively was delivered comfortably. Following delivery, two-unit oxytocin bolus was administered slowly over 30 seconds, which was followed by oxytocin infusion (3U/L) at the rate of approximately 125ml/hr. The uterine tone was acceptable as per the obstetrician. Morphine 2 mg was supplemented through the epidural catheter and flushed with 1 ml of saline. She too received ondansetron 4 mg, dexamethasone 6mg and ketorolac 30 mg IV. Total blood loss was around 300 ml and she received 1000 ml of Ringer's lactate over 50 minutes. She was transferred to coronary care unit (CCU) after 1 hour of observation in recovery room. Phenylepherine infusion was continued for another 4 hours at 25 mcg/min rate and epidural catheter was removed after 6 hours of transfer. Her NRS pain score was 2-3/10 with Paracetamol 1 gm 6 hourly (i.e. round the clock) and ketorolac 30 mg 8 hourly IV. She was also supplemented with ceftriaxone and ondansetron IV. She was shifted to maternity ward after 48 hours, after removing arterial cannula and foley's catheter. Her postpartum periods were uneventful and she was discharged from hospital on the 7th post operative day.

CASE 2

A 28 years female (Gravida 2, Para 1) at 38 weeks periods of gestation with rheumatic heart disease with multiple valvular heart disease for 11 years, had undergone percutaneous transvenous mitral Commissurotomy (PTMC) 5 years back for symptomatic severe mitral stenosis. Currently she has bilateral pitting oedema with slight limitation in ordinary physical activity (NYHA 2). She also has early fatigueless and palpitation however there is no history of chest pain, paroxysmal nocturnal dyspnea (PND), orthopnea or syncope. Her 12 lead ECG confirmed the presence of Sinus arrhythmia with absent "P" waves in lead II with heart rate of

100-110 beats per minute. Her Echocardiography revealed Rheumatic heart disease with severe Mitral stenosis (Mitral Valve Area= 1.0/0.9 cm^2), mild Mitral regurgitation; severe tricuspid regurgitation (gradient 25 mm of Hg), moderate Aortic regurgitation, mild Aortic stenosis, dilated left atrium, right Atrium and right ventricle with left ventricular ejection fraction of 60%. However respiratory system, neurological system and gastrointestinal system were grossly intact including airway examinations. She was receiving phenoxymethylpenicillin 250 mg twice a day for 11 years.Her hematology reports hemoglobin of 9.5 gm%, with normal limits of other parameters including the renal function test.She was fasted over-night and aspiration prophylaxis was prescribed as that of the first case.

Anesthesia was conducted under sole epidural anesthesia as in the first case and invasive blood pressure monitoring was also done. As of the first case, she too received Ceftriaxone 1 gm as bacterial endocarditis prophylaxis. Same drug regimen was used for the cesarean delivery and the volume required to achieve the block was 15 ml. Phenylepherine infusion was started prophylactically as in the first case and continued at 25 mcg/hour dose. The outcome of baby was good in terms of weight and APGAR. Oxytocin was supplemented in the similar way and there was no hemodynamic fluctuation in response to oxytocin. She too received epidural morphine after the delivery of the baby and transferred to CCU for monitoring. Besides, she received ondansetron 4 mg, Dexamethasone 8 mg and Ketorolac 30 mg as of the first case. There were no major post-operative issues and she was discharged home after 5th postoperative day.

DISCUSSION

RHD can complicate pregnancy as a result of stenosis and regurgitation occurring in due course of the disease. Patients with regurgitation tolerate the physiological burden of pregnancy better than those patients with stenosis.[1] The reason why stenotic valvular diseases are poorly tolerated is the inability of the body to increase cardiac output in accordance with the increased plasma volume preload, especially in severe mitral and aortic stenosis.[2] The main hemodynamic goal in Mitral stenosis is to avoid tachycardia to optimise left ventricular diastolic filling time. Other goals are the maintenance of normal to high pre-load, after-load and contractility.[2] The most hemodynamically significant valve lesion will generally be the predominant influence determining risk and care for patients during pregnancy.[3] In our 2 case studies, severe mitral stenosis is the dominant lesion.

Single shot Spinal anesthesia (SSSA) is less tolerated by such patients due to acute fall in systemic venous resistance after blockade. General anesthesia (GA) may provide very stable hemodynamic if the sympathetic stimulation associated with laryngoscopy, intubation and extubation are attenuated and also provide the advantage of definitive airway control. Usually, GA with invasive monitoring with multiple use of vasopressors/ vasodilators are provided for CS. However, there is a thin margin of safety between the choice of anesthetics agents and their doses relative to hemodynamics in response to laryngoscopy, intubation and extubation, sympathetic blockage, maternal awareness, aspiration risk and drug exposure to fetus.[4,5] Even the anesthetics agents have myocardial depressant activity which will further worsen the primary pathology of heart. Epidural anesthesia is preferred in pregnant women with rheumatic heart disease and valve defects because slower onset of blockade, ease of re-dosing and absence of significant major hemodynamic changes after anesthesia.[2,4,6,7] There can be episodes of mild hypotension which usually respond well with intermittent fluid bolus or vasopressor bolus or prophylactic vasopressor infusion.[5] Expert opinion is that the choice of anesthetic technique must be individualized.[2,4] It is dependent on understanding the pathophysiology of pregnancy and its interaction with the individual patients' pathophysiology, including lesion severity. In our both cases, stable hemodynamic parameters were achieved with gradual titration of epidural and meticulous fluid management and prophylactic phenylephrine bolus/infusion.

Basically the choice of epidural local anesthetics is usually based on the speed of onset required for the clinical situation and the possibility of systemic toxicity.[8] Epinephrine (1:200000) is added to epidural local anesthetic solution to increase the density of block, reduce systemic absorption local anesthetics and to prolong the duration of anesthesia.[8] Opioids when added speeds the onset and quality of anesthesia and/or provides post operative analgesia.[9] In our cases, , we used 2% lignocaine with epinephrine (5mcg/ml) with fentanyl (5mcg/ml).

Bacterial endocarditis prophylaxis should be provided in such cases appearing for the cesarean section and in our both cases we achieved that by Ceftriaxone. Use of oxytocin as a dilute solution instead of bolus dose is recommended.[7]

To our knowledge, there are few reportings of sole epidural anesthesia for cesarean delivery of pregnant women with severe mitral stenosis, especially from our parts. Thus, we think sole epidural anesthesia can be safe alternative to general and spinal anesthesia in pregnant women with severe mitral stenosis for cesarean delivery. We also recommend for the larger study or randomized controlled trial.

CONCLUSION

In women with severe mitral stenosis, it is wise to conduct cesarean delivery at 36-37 weeks of gestation for better maternal and fetal outcome. An experienced anesthesiologist with sound knowledge of pathophysiology of disease itself and changes related with pregnancy involving multidisciplinary team always favours good outcome. Sole epidural anesthesia can provide promising result for conduction of cesarean delivery.

CONSENT

Written informed consent was obtained from the patients for publication of this case report.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

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