



Vaginal Delivery in a Case of Mitral Stenosis: Sevoflurane to the Rescue

Atchya Arun Kumar¹, Vishal Krishna Pai¹, Anil Prasad Singh¹, Mridul Dhar²

Departments of ¹Anaesthesiology and ²Anesthesiology and Critical Care, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Rheumatic heart disease is the most common cardiac disease associated with pregnancy in developing countries. In India, rheumatic mitral stenosis (MS) comprises 88% of heart diseases complicating pregnancy. Despite advances and improved anesthetic techniques, the management of parturients with cardiac valvular pathology can be challenging. Therefore, the anesthesiologist has to be vigilant and meticulous in planning the technique of anesthesia to aid in safe confinement. In this article, we present the anesthetic management of a parturient who presented to our hospital with a medical record of moderate MS, in active labor. We combined a technique most feasible at that moment, with tactful and detailed knowledge of the pathophysiology to guide our anesthetic management and facilitate a normal vaginal delivery. We have tried to highlight how clinically individualized and personalized care with sound pathophysiological knowledge of the patient's cardiac condition can achieve optimal outcomes, especially when conventional modes and techniques are not feasible.

Key words: Mitral stenosis, rheumatic fever, sevoflurane, labor analgesia

INTRODUCTION

Rheumatic heart disease is the most common cardiac disease associated with pregnancy in developing countries. In India, rheumatic mitral stenosis (MS) comprises 88% of heart diseases complicating pregnancy.¹ Despite advances and improved anesthetic techniques the management of parturients with cardiac valvular pathology can be challenging. Therefore, the anesthesiologist has to be vigilant and meticulous in planning the technique of anesthesia to aid in safe confinement. In this article, we present the anesthetic management of a parturient who presented to our hospital with a medical record of moderate MS, in active labor. We combined a technique most feasible at that moment, with tactful and detailed knowledge of pathophysiology to guide our anesthetic management.

CASE REPORT

A 26-year-old female, gravid two, para two, presented to our center in active labor. Review of her medical records revealed a history of rheumatic MS diagnosed in the 8th month

of her previous pregnancy 2 years ago which resulted in an uneventful previous vaginal delivery. The patient was taking tablet digoxin, tablet aspirin, and tablet diltiazem, however, the compliance to medication was questionable. The patient was irritable as she was having severe pain. Her blood pressure was 111/67 mmHg, respiratory rate was 26/min and a regular pulse with a rate of 98/min. There was no pedal edema or raised jugular venous pulsations. Chest auscultation revealed no crepitations and the breath sounds were vesicular. A mid-diastolic murmur, opening snap, and loud S1 could be appreciated in the left lateral decubitus position. Electrocardiogram revealed P mitrale and mild ST depression in lead V4, V5, and V6. Two-dimensional ECHO done 2 months ago revealed mitral valve area of 1.24 cm², left ventricular ejection fraction of 55% and moderate pulmonary hypertension. Per vaginal examination revealed 8 cm cervical dilatation and the head was fixed. The delivery was anticipated in the coming 45 min. Fetal Doppler monitoring revealed sustained bradycardia. Blood samples were drawn and sent to the laboratory for analysis of complete blood picture, viral

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Kumar AA, Pai VK, Singh AP, Dhar M. Vaginal delivery in a case of mitral stenosis: Sevoflurane to the rescue. J Med Sci 2017;37:26-8.

Received: July 25, 2016; Revised: December 09, 2016;
Accepted: December 28, 2016

Corresponding Author: Dr. Vishal Krishna Pai, Department of Anaesthesiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi - 221 005, Uttar Pradesh, India. Tel: +91-9628067942; Fax: 05422367568. E-mail: drvishalpai@gmail.com

markers, renal function test and cardiac enzymes and cross matching.

On further evaluation, the patient complained of severe pain with Visual Analog Scale (VAS) score of 10 which was a threat to her cardiac condition. Insertion of an epidural did not seem to be feasible as she was near delivery and an epidural would take time to insert and function. As the vertex was fixed and the cervix was near full dilated, we anticipated difficulty in extracting the already stressed baby by caesarean section. We did not want to try a low-dose spinal anesthesia owing to her pain, noncompliance to positioning, irritability and the fear of sympathetic cut down causing acute decompensation. We wanted good maternal effort for bearing down, to aid normal vaginal delivery. The patient was shifted to the operative room with standard monitoring. A wedge was placed under the right hip to help in left lateral tilt to prevent aortocaval compression. A 16 gauge peripheral venous cannula was secured in the right forearm. One unit of ringer lactate was started through a micro drip set at a slow rate. Placement of a 20 gauge radial arterial line was aborted after a failed attempt which was causing distress to the patient.

A face mask delivering sevoflurane plus 100% oxygen at 6 L/min was held against the patient's face and she was asked to breathe slow and deep. Sevoflurane was initially started at 0.2% and gradually increased up to 1% with subsequent contractions. In 3–5 min, the patient experienced less pain, and her VAS score was below 5. The dial concentration was titrated as per patient's response to verbal command and pain relief. However, at no time the dial concentration was increased above 1%. A 20 gauge arterial cannula was now placed successfully in the left radial artery and was accepted well. A liberal episiotomy was given after injecting local anesthetic and 50 µg fentanyl intravenously. Ventouse was applied to cut short and hasten delivery of the fetus. The neonatologist was called and intimated about the use of fentanyl and possibility of fetal respiratory depression. After delivery of the baby 15 units oxytocin was given intramuscularly in the right deltoid muscle and 20 mg injection furosemide was given intravenously to prevent the effects of autotransfusion in the mother following delivery. The baby was delivered in 35 min since the time of application of monitors on the operating table. The baby was vigorous with no respiratory depression, however, was shifted to the Neonatal Intensive Care Unit for observation and care. The patient had stable hemodynamics throughout, and her pain score was three while suturing the episiotomy. The patient was then shifted to the high dependency unit where she was monitored for the next 24 h. Chest auscultation revealed no crepitations and her vitals were stable throughout with urine output of 1400 ml in 24 h.

DISCUSSION

Rheumatic heart disease causing MS is the most common valvular disorder in females. Most of the time these disorders are discovered during adulthood, especially during pregnancy, as the symptoms of MS are aggravated due to the cardiovascular changes. A patient with MS usually presents with dyspnea on exertion, palpitations, pedal edema and rarely chest pain.

Our patient, in this case, sought medical help quiet late and was in active labor. However, the patient was hemodynamically stable despite having severe labor pains and dyspnea with no apparent findings suggestive of pulmonary edema, which placed her at low risk of an adverse cardiac event. The goal of our anesthetic management was to provide adequate maternal analgesia, prevent tachycardia, minimize maternal endogenous catecholamine release and maintain normal sinus rhythm while avoiding a rapid decrease in afterload or acute increase in preload.^{2,3} A near full dilated cervix on per vaginal examination was the main challenge which influenced our decision of the anesthetic plan. The fetal head was fixed, and fetal Doppler monitoring revealed bradycardia, so we did not want to risk giving general anesthesia. Furthermore, the surgeons felt it would be easier to deliver vaginally rather than through a cesarean section.

A ventouse application to assist delivery was planned in an attempt to limit the maternal valsalva and stress associated with expulsive efforts. Patients with MS have a limited ability to increase cardiac output, thus prevention of aortocaval compression helps to maintain venous return, maintain uteroplacental perfusion and maintain left ventricular end diastolic volume at near baseline levels, which in turn limits the need for a compensatory rise in cardiac output.^{4,5} Classically combined spinal epidural anesthesia (CSEA), or epidural technique has been successfully used in such patients. However, in our case, lack of time available, sustained fetal bradycardia, difficulty in positioning and the need for maternal bearing down efforts ruled out CSEA as an option. General anesthesia had potential hazards of an acute rise in pulmonary vascular resistance and heart rate during laryngoscopy and intubation, negative inotropic effects of anesthetic drugs and the obstetrician's opinion of an easier vaginal delivery made us opt away from general anesthesia.

Because of the patient's cardiac condition, we chose a balanced anesthetic that included a moderate dose of narcotic and a combination of sevoflurane and oxygen to perform the delivery. Sevoflurane in labor has been studied previously and found to be a good labor analgesic.⁶ Subanesthetic concentrations of sevoflurane offer advantages of lack of irritation to the respiratory tract and a pleasant odour.⁷ Sevoflurane has a low blood-gas partition coefficient of 0.65

Vaginal delivery in a case of mitral stenosis

thus enabling rapid uptake and washout from the central nervous system resulting in swift clinical effect and recovery. We used an incremental technique to titrate analgesic and sedation property of sevoflurane by having a constant verbal contact with the patient.⁶ The intensity of pain drastically reduced as reflected by the VAS scores. Nitrous oxide was avoided as it is known to increase pulmonary vascular resistance and heart rate.

Irrespective of the anesthetic technique and mode of delivery, such patients are at high risk for hemodynamic stress due to autotransfusion of blood from the uterus after delivery, which may lead to pulmonary hypertension, pulmonary edema, and cardiac failure. Intravenous fluids should be restricted to prevent over-hydration which can lead to pulmonary edema and failure. Loop diuretics and beta blockers might be considered to control preload and heart rate after delivery. Therefore, intensive care should be continued till the hemodynamic parameters return to normal. The patient was comfortable except for pain around the face caused by mask holding which was relieved in few hours.

Rheumatic MS complicating pregnancy is still a frequent cause of maternal death, especially in developing countries. Ideally, women diagnosed with MS need a cardiology evaluation before planning pregnancy. If the woman develops symptoms during pregnancy, mitral valvuloplasty during the second trimester might be considered to improve maternal and fetal outcomes. For optimal maternal and fetal outcomes, such patients must be managed through a multidisciplinary evaluation, including early consultation by an anesthesiologist so that an anesthetic plan can be formulated well in advance.

CONCLUSION

There may not be very strong evidence in the literature for an ideal analgesic or anesthetic technique for parturients in such clinical scenarios, however, we have tried to highlight how clinically individualized and personalized care with the

sound pathophysiological knowledge of the patient's cardiac condition can achieve optimal outcomes, especially when conventional modes are not feasible. Further studies are needed in the areas of efficacy and safety of sevoflurane for labor analgesia in patients with cardiac diseases during pregnancy.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Bhatla N, Lal S, Behera G, Kriplani A, Mittal S, Agarwal N, *et al.* Cardiac disease in pregnancy. *Int J Gynaecol Obstet* 2003;82:153-9.
2. Camann WR, Thornhill ML. Cardiovascular disease. In: Chestnut DH, editor. *Obstetric Anesthesia: Principles and Practice*. St. Louis, MO: Mosby; 1999. p. 776-808.
3. Clark SL, Phelan JP, Greenspoon J, Aldahl D, Horenstein J. Labor and delivery in the presence of mitral stenosis: Central hemodynamic observations. *Am J Obstet Gynecol* 1985;152:984-8.
4. Reimold SC, Rutherford JD. Clinical practice. Valvular heart disease in pregnancy. *N Engl J Med* 2003;349:52-9.
5. Ziskind Z, Etchin A, Frenkel Y, Mashlach S, Lusky A, Goor DA, *et al.* Epidural anesthesia with the Trendelenburg position for cesarean section with or without a cardiac surgical procedure in patients with severe mitral stenosis: A hemodynamic study. *J Cardiothorac Anesth* 1990;4:354-9.
6. Yeo ST, Holdcroft A, Yentis SM, Stewart A. Analgesia with sevoflurane during labour: I. Determination of the optimum concentration. *Br J Anaesth* 2007;98:105-9.
7. Toscano A, Pancaro C, Giovannoni S, Minelli G, Baldi C, Guerrieri G, *et al.* Sevoflurane analgesia in obstetrics: A pilot study. *Int J Obstet Anesth* 2003;12:79-82.