Case Report

# Anesthetic management for laparoscopy surgery in a patient with residual coarctation of aorta and mild aortic stenosis

**Renu Sinha, Rakesh Garg**

Department of Anesthesiology and Intensive Care, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

## Abstract

Perioperative management of patients with congenital heart disease is a challenge for the anesthesiologist. We present successful anesthetic management for diagnostic laparoscopy and cystectomy for tubo-ovarian mass in a case of residual coarctation of the aorta along with bicuspid aortic valve and mild aortic stenosis.

**Key words**: Anesthesia, aortic stenosis, bicuspid aortic valve, coarctation of the aorta, laparoscopy

## Introduction

The incidence of congenital heart defects (CHD) is approximately 8 in 1,000 live births and it is the most common group of birth defects.[1] Coarctation of the aorta (CoA) accounts for 8% of all CHD.[2] CoA may be associated with aortic stenosis and bicuspid aortic valve in 5% and 20-40% of patients respectively.[3,4]

The literature is scarce regarding the perioperative management of laparoscopic procedures in patients with CoA. We present successful anesthetic management of a case of CoA along with bicuspid aortic valve and mild aortic stenosis scheduled for diagnostic laparoscopy and cystectomy for tubo-ovarian mass.

## Case Report

A 53-kg, 25-year-old female was scheduled for diagnostic laparoscopy and cystectomy for tubo-ovarian mass. She had undergone aortic dilatation for CoA two years back. Patient denied history of chest pain, palpitations, syncope, tachycardia or headache. She was in New York Heart Association (NYHA) functional Class II. She was of average built and her pulse rate was 60/min. Blood pressure was 140/74 mmHg in the right upper limb, 142/78 mm Hg in the left upper limb, 102/64 mmHg in the right lower limb and 107/64 mmHg in the left lower limb. Cardiac auscultation revealed a holosystolic murmur, heard loudest in the left fourth intercostal space. Routine blood and biochemical investigations were within normal limits. Her electrocardiogram (ECG) revealed left ventricular hypertrophy and left axis deviation. Recent echocardiography revealed Class I residual CoA. After taking the cardiologist's opinion, 2.5 mg ramipril oral was added to her scheduled therapy of amlodipine 5 mg and atenolol 50 mg. The patient was kept fasting overnight and was premedicated with oral ranitidine 150 mg and diazepam 10 mg, the night before and on the morning of surgery. Antihypertensive drugs were continued as per schedule.

In the operating room, routine monitors (ECG, automated noninvasive blood pressure and pulse oximeter) were attached. Intravenous (IV) midazolam 1 mg and fentanyl 50 $\mu$g was administered. After local anesthetic infiltration, right radial artery was cannulated. Epidural catheter was placed in the L3-4 interspace. Anesthesia was induced by IV fentanyl 150 $\mu$g, thiopentone 200 mg along with isoflurane 1% and nitrous oxide in oxygen (50:50). After achieving neuromuscular blockade with vecuronium 6 mg and administration of 60 mg preservative-free lidocaine, trachea was intubated. Ten minutes after intubation, heart rate decreased from 72/min to 40/min. Atropine 0.6 mg was administered IV. Heart rate increased to 82 beats/min. Central venous catheter was placed in the right internal jugular vein under ultrasound guidance. Anesthesia was maintained with isoflurane

**Address for correspondence:** Dr. Rakesh Garg,
Department of Anesthesiology and Intensive Care, 58-E, Kavita Colony, Nangloi, Delhi - 110 041, India.
E-mail: drrgarg@hotmail.com

| Access this article online | |
|---|---|
| Quick Response Code: | Website: www.joacp.org |
| | DOI: 10.4103/0970-9185.83698 |

and nitrous oxide in oxygen. Analgesia was provided with 3 mg morphine intravenous boluses (administered twice). After creation of pneumoperitoneum, blood pressure rose to 170/90 mmHg and was managed with 3 mg morphine intravenous and inhalational agents. The pneumoperitoneum pressure was maintained at 6-8 mmHg. The surgery was performed in Trendelenberg position and took 90 min. At the end of the surgery, residual neuromuscular blockade was reversed with IV glycopyrrolate 0.4 mg and neostigmine 2.5 mg and trachea was extubated. Patient was shifted to the intensive care unit (ICU) for monitoring. In the ICU, heart rate decreased to 40/min from 74/min. IV atropine (0.3 + 0.3 mg) was administered. The heart rate increased to 78/min and normal sinus rhythm was maintained. Morphine 3 mg diluted with normal saline to a volume of 8 mL, was administered epidurally. Further ICU stay was uneventful and the patient was shifted to the ward on the second day and discharged home on the third day.

## Discussion

The blood flow across a stenosed artery depends on the pressure proximal to the stenosis. If the proximal pressure decreases, the flow across the stenosis decreases and thus in CoA one should monitor distal aortic pressure (pressure distal to CoA). Anesthetic goals aim at maintenance of higher arterial blood pressure (ABP) proximal to coarctation, so as to keep ABP distal to coarctation above 60 mmHg. The presence of other associated lesions such as left ventricular hypertrophy, ischemic heart disease, and intracranial aneurysm may alter management.[5]

In laparoscopy, the main concerns include insufflations of carbon dioxide, patient positioning and increased intra-abdominal pressures. Pneumoperitoneum should be started with reduced gas flow and intra-abdominal pressures should be kept as low as possible to minimize hemodynamic changes.[6] The pressure threshold during pneumoperitoneum, associated with minimal changes in the hemodynamics, is 12 mmHg. An increase in intra-abdominal pressure results in a fall in the preload, and an increase in the afterload, along with an increase in the systemic vascular resistance, and a consequent surge in ABP.[7] The high ABP tends to affect the upper part of the body mainly. Creation of pneumoperitoneum causes an increase in total peripheral resistance along with a decrease in stroke volume, cardiac and ejection velocity indices.[8,9] These changes can lead to further decrease in blood flow distal to the coarctation. We used invasive ABP monitoring to help maintain the blood pressure within acceptable limits. The selection of the site for ABP monitoring is important. It is prudent to measure the perfusion of the body by measuring ABP both proximal and distal to the coarctation. We however measured the ABP from the radial artery only.

We took measures to obtund hemodynamic responses so as to avoid the adverse effects of hypertension and tachycardia. Our patient had an episode of bradycardia soon after tracheal intubation. We administered a combination of vecuronium and fentanyl in a patient treated with atenolol. This may have precipitated bradycardia as the depth of anesthesia was possibly inadequate at that point of time.[10] There was a second episode of bradycardia in the immediate postoperative period. This could possibly have been due to inadequate analgesia. Increased ventricular mass may also cause rhythm disturbances or an imbalance between myocardial oxygen supply and demand. We administered epidural morphine for postoperative analgesia. Excellent postoperative analgesia, a feature of regional anesthesia, reduces cardiovascular stress and release of cathecholamines, and its adverse effects.[3]

To summarize, patients with CoA need thorough evaluation for associated lesions. The intra-abdominal pressures for laparoscopic procedures should be kept just enough to allow adequate visibility for conduct of surgery. The anesthetic management includes general anesthesia with opioid along with ABP monitoring distal to coarctation. Epidural analgesia can ensure postoperative analgesia and avoid pain-associated adverse effects.

## References


1. Riou B. Anesthesia for noncardiac surgery in adults with congenital heart disease. Anesthesiology 2009;111:432-40.
2. Zwiers WJ, Blodgett TM, Vallejo MC, Finegold H. Successful vaginal delivery for a parturient with complete aortic coarctation. J Clin Anesth 2006;18:300-3.
3. Findlow D, Doyle E. Congenital heart disease in adults. Br J Anaesth 1997;78:416-30.
4. Divitiis MD, Pilla C, Kattenhorn M, Donald A, Wallace S, Redington A, *et al.* Ambulatory blood pressure, left ventricular mass, and conduit artery function late after successful repair of coarctation of the aorta. J Am Coll Cardiol 2003;41:2259-65.
5. Zwiers WJ, Blodgett TM, Vallejo MC, Finegold H. Successful vaginal delivery for a parturient with complete aortic coarctation. J Clin Anesth 2006;18:300-3.
6. Koivusalo AM, Pere P, Valjus M, Scheinin T. Laparoscopic cholecystectomy with carbon dioxide pneumoperitoneum is safe even for high risk patients. Surg Endosc 2008;22:61-7.
7. Sood J, Jayaraman L, Kumra VP. Endoscopic surgery – anaesthetic challenges – a historical review. Indian J Anaesth 2006;50:178-82.
8. Kamolpornwijit W, Iamtrirat P, Phupong V. Cardiac and hemodynamic changes during carbondioxide pneumoperitoneum gynaecologic surgery in Rajavithi Hospital. J Med Assoc Thai 2008;91:603-7.
9. Reuter DA, Felbinger TW, Schmidt C, Moerstedt K, Kilger E, Lamm P, *et al.* Trendelenberg positioning after cardiac surgery: Effects on intrathoracic blood volume index and cardiac performance. Eur J Anaesthesiol 2003;20:17-20.
10. Samad K, Khan F, Azam I. Hemodynamic effects of anesthetic induction in patients treated with beta and calcium channel blockers. Middle East J Anesthesiol 2008;19:1111-28.


**How to cite this article:** Sinha R, Garg R. Anesthetic management for laparoscopy surgery in a patient with residual coarctation of aorta and mild aortic stenosis. J Anaesth Clin Pharmacol 2011;27:412-3.
**Source of Support:** Nil, **Conflict of Interest:** None declared.