

Anaesthetic Management of a Patient with Pulmonary Stenosis for Laparoscopic Cholecystectomy

Akshaya N. Shetti*, V.K. Dhulkhed, Vinayak Panchagar and Mounish

Dept. of Anaesthesiology, Krishna Institute of Medical Sciences, Karad, Maharashtra, India

Abstract: A 32 year old female patient posted for laparoscopic cholecystectomy was diagnosed to have moderate pulmonary stenosis of rheumatic origin. We report, successful management of this case under combined epidural and general anaesthesia.

Keywords: Cholecystectomy, laparoscopic, pulmonary stenosis, rheumatic, thoracic epidural.

INTRODUCTION

Rheumatic heart disease (RHD) is more common in India. Such patients many a times undergo cardiac or non-cardiac surgery. Pulmonary stenosis (PS) is one of the rare rheumatic heart disease. The prevalence of RHD in India is 1.5-2/1000 population of all age group [1]. Even though the heart disease is detected early if not treated early either by medical or surgical, the pathological changes progress by adulthood to such an extent that, it will become irreversible. The anaesthetic management of uncorrected heart disease is very challenging to an anaesthesiologist. It is important to have the knowledge of pathophysiology of pulmonary stenosis to anaesthetize such patient. The PS is either congenital or acquired. It may be at the level of valvular or subvalvular or supra-valvular. In this condition blood flow from the right ventricle is hampered due to resistance caused by PS. This leads to compensatory right ventricular hypertrophy to overcome resistance. If right ventricular fails, right atrial pressure will increase, and this may result in opening of the foramen ovale if not completely fused. This leads to of deoxygenated blood from the right atrium into the left atrium there by mixing of oxygenated and deoxygenated blood leading to cyanosis. In some patient where foramen ovale is fused, which is seen in adult patients if right ventricle fails patient will develop right sided heart failure due to increased back pressure in right atrium leading on to raised jugular venous pressure, hepatomegaly, peripheral edema, decreased cardiac output and hypotension.

CASE REPORT

32 year-old, 33kg female with chief complaints of frequent abdominal pain in right upper abdomen for 6

months, was admitted for further evaluation. She gave history of some heart disease for which she was on regular injections and tablets since 20 years. Patient was diagnosed as having cholelithiasis based on clinical examination and investigation and planned for laparoscopic cholecystectomy.

On pre-anaesthetic evaluation, she was comfortable, gave history of breathlessness with mild exertion suggestive of NYHA (New York Heart Association) class II. Her general physical examination showed no cyanosis, clubbing or edema. Pulse rate was 80/min, regular with moderate volume. Blood pressure 120/70 mm Hg in supine position. Per abdomen examination showed tenderness in the right hypochondriac region. Cardio vascular system examination findings were, presence of precordial heave, normal S1 with wide split S2, delayed P2, ejection systolic murmur of grade III/VI in left upper sternal border. There were no signs suggestive of congestive cardiac failure and raised jugular venous pressure.

Routine blood investigations were within normal limits except for, AST-185 U/L, ALT- 237 U/L, alkaline phosphatase 900 U/L and coagulation profile was within normal. Ultrasound abdomen showed acute calculus cholecystitis due to large calculus impacted edematous neck of dilated gall bladder with sludge in the lumen. Her electrocardiogram showed normal sinus rhythm, and chest x-ray was within normal limits.

2-D echocardiography showed, moderate pulmonary valvular stenosis and peak/mean gradient of 39/16 mmHg, left ventricular ejection fraction of 55%. No abnormality was found in other valves. Intact inter atrial and ventricular septum, normal cardiac chambers, normal biventricular contraction with no patent ductus arteriosus (PDA) noted.

Patient was premedicated with, Tab Diazepam 5mg, Tab Pantoprazole 40mg oral night before surgery and

*Address correspondence to this author at the Dept. of Anaesthesiology, Krishna Institute of Medical Sciences, Karad, Maharashtra, India; Mob: 07507807673; E-mail: aksnsdr@gmail.com

Tab Diazepam 5mg on the day of surgery with sips of water. According to our institutional protocol she received Tab Amoxicillin 2gm orally 1 hr prior to surgery, as infective endocarditis prophylaxis. Standard monitors viz, Electrocardiogram, pulse oxymetry were connected after shifting to OR. A large bore I.V cannula (18G), invasive arterial BP (right radial artery) and central venous line (right internal jugular vein) were secured under local anaesthesia. An epidural catheter secured at T7-T8 level and confirmed. Patient was pre-oxygenated with 100% O₂ for 3 min and Inj Midazolam 0.03mg/kg I.V, Inj Fentanyl 1mcg/kg I.V given. Induction was carried with Inj Thiopentone 5mg/kg I.V and Inj Atracurium 0.5mg/kg I.V. To attenuate intubation response, Inj. Lignocaine 2% (preservative free) 1.5mg/kg I.V was given. A 7.5 mm cuffed oral endotracheal tube was put and confirmed. Volume control mode was chosen. The ventilation was adjusted to maintain the EtCO₂ of 30-35mm Hg. Anaesthesia was maintained with oxygen/ air mixture at 1:1, isoflurane with end tidal concentration of 0.8 and Inj Atracurium 0.1mg/kg as a top up accordingly. A nasopharyngeal temperature probe was inserted for temperature monitoring. The epidural was activated with 0.5% Inj.Bupivacaine a total of 10ml in titrated doses and monitoring vitals. Intravenous fluids were titrated to maintain CVP of 10mm Hg.

Total surgical duration was 45 min, with blood loss of 50 ml. Throughout the procedure heart rate was maintained between 70-90/min, systolic blood pressure of 120-140 mm Hg and diastolic 80-90 mmHg, total urine output was 60 ml. A total of 1 L crystalloid (500 ml of Normal saline and 500 ml of Ringer lactate) was used.

Reversal was done with of Inj.Glycopyrrolate (0.4mg) and Inj.Neostigmine (0.5mg) I.V. Patient was spontaneously breathing with stable vitals and pain free. She was shifted to high dependency unit (HDU) for further management. The patient received combination of 0.125% Inj.Bupivacaine with 2mcg/ml Inj Fentanyl at the rate of 6ml/hr under strict monitoring, through epidural for 3 days and she was pain free. Patient was discharged after 3rd post op day from HDU.

DISCUSSION

Rheumatic PS is a rare and serious cardiac disorder. According to recent guidelines, patient who undergoes gastrointestinal (GI) procedures infective endocarditis prophylaxis is no longer recommended. But in patients with an established GI tract infection, or

for those who receive antibiotic therapy to prevent wound infection or sepsis associated with a GI tract procedure, the antibiotic should be considered. It is important to know that maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and thus the risk of infective endocarditis [2]. Most of the patients visiting our hospital are of low socio-economic state with low hygiene, hence our hospital protocol is to give infective endocarditis prophylaxis.

Many physiological changes are noted during laparoscopic cholecystectomy. All the changes are due to pneumoperitonium, reverse trendelenberg position with right lateral tilt which leads to decrease in ventricular preload. All these changes add up to compromised cardiovascular system. In this patient, fluid was titrated and maintained at normal range of CVP, hence hypotension and tachycardia we could avoid. Changes in cardiac physiology are due to changes in pre and afterload which is due to increased intraabdominal pressure rather than transperitoneally resorbed carbon dioxide (CO₂). These effects are reversible by desufflation [3]. The insult which could have caused due to raised intra-abdominal pressure [4] was avoided by asking surgeon to restrict the intra-abdominal pressure of 10mm Hg, without compromising the surgical operating condition. There will be drop in core temperature due to CO₂ insufflation. The fall in temperature depends upon duration of surgery, amount of peritoneal surface exposed to CO₂, vasodilation due to anaesthesia and cold irrigation saline. Different modalities are practiced to prevent hypothermia [5-8]. In our case we monitored nasopharyngeal temperature and used pre-warmed fluids, keeping core body temperature between 36.5-37°C. Total duration of surgery was 45min. The EtCO₂ was kept in the range of 30-35 mmHg. Intraoperative Arterial Blood Gas showed PaO₂ of 100mmHg, PaCO₂ of 40mmHg, pH of 7.45. It is important to avoid hypoxia, hypercarbia, hypothermia, acidosis, hypovolemia and nitrous oxide to prevent undue increase in pulmonary vascular resistance leading to right heart failure. In our case all the factors are taken care.

Invasive monitoring helps to early recognition of any adverse events and also to treat it; hence it is recommended to use such monitoring system without compromising. We maintained end tidal concentration of isoflurane at 0.8 which is sufficient to maintain adequate depth of anaesthesia. It has been proved in previous studies that combination of general

anaesthesia with epidural decreases the volatile anaesthetic requirement [9, 10]. Thus the side effects of inhalationals agents.

Thoracic epidural anaesthesia should be considered as an adjunct to general anaesthesia as it not only helps in pain management for both intra and postoperatively but also there is a possibility of decreasing pulmonary vascular resistance [10]. Thoracic epidural anaesthesia also improves the post-op pulmonary function [12]. Hence the combination of general anaesthesia with thoracic epidural anaesthesia for laparoscopic surgery is a safe approach for a patient with pulmonary stenosis.

CONCLUSION

The severity of the pulmonary stenosis does influence the anaesthetic management and outcome during non-cardiac surgery. Combined general anaesthesia and epidural, with invasive monitoring is a safe approach in such cases. Even though single case study is not conclusive, in selected cases combination of this approach is a safe choice.

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