

Case Report

Ileostomy closure in a patient with severe pulmonary hypertension and COPD - Anaesthetic consideration

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ABSTRACT

High morbidity and mortality occur in patients with pulmonary hypertension (PH) undergoing non-cardiac surgery under any type of anaesthesia technique. Right heart failure occurs due to increased pressure in pulmonary artery secondary to pain, stress and ventilation. It is important to maintain preload, ventricular contractility, pulmonary vascular resistance and right ventricular afterload. It is also necessary to avoid hypoxia, hypercarbia, hypothermia and pain. A 45 year old male patient, known case of chronic obstructive pulmonary disease (COPD) with severe PH was posted for ileostomy closure. General anaesthesia (GA) with epidural catheter for analgesia was given.

Keywords: Pulmonary hypertension, COPD, Epidural analgesia, General anaesthesia

INTRODUCTION

The Fourth World Symposium defined PH as a mean pulmonary artery pressure (mPAP) greater than 25mmHg at rest, based on a review demonstrating that normal mPAP is 14.0 ± 3.3 mmHg.¹ PH is divided into five distinct categories. They can be PH associated primary pulmonary hypertension (PPH), associated with disorders of the respiratory system and/or hypoxemia, due to chronic thrombotic and/or embolic disease and disorders directly affecting the pulmonary vasculature.² PH due to respiratory diseases occur due to hypoxic vasoconstriction.³ Physiological insults like apnoea, hypothermia, hypotension and sympathetic stimulation occurring due to pain and mechanical ventilation can occur under anaesthesia.¹

CASE REPORT

A 45 year old, 52kg male patient, who had undergone emergency exploratory laparotomy for intestinal obstruction with ileostomy-in-situ before 5 months was posted for ileostomy closure. Patient complained of breathlessness on exertion since last 1 year. Patient was a

known case of COPD since last 2 years and smoker since last 20 years. Patient was diagnosed with PH 5 months back and was taking sildenafil 100mg BD, ramipril 1.25mg OD orally since 5 months and combimist nebulisation 6hrly.

On examination patient was conscious and cooperative. There was no cyanosis and clubbing. Patient had non-pitting oedema in both lower limbs. His heart rate was 92 beats per minute, BP 132/82mmHg, RR 25 per minute. On systemic examination, patient had barrel shaped chest and bilaterally decreased air entry. All routine investigations like haematogram, renal function test, liver function tests were within normal limit. Chest X-ray showed cardiomegaly and hyperlucency on both sides. Electrocardiogram showed right axis deviation. Echocardiogram findings were ejection fraction of 60% and right ventricular systolic pressure (RVSP) 70mmHg, severe PH, dilated right atrium and right ventricle. High resolution computed tomography (HRCT) chest showed emphysematous changes in lungs, mild pericardial effusion and dilated right atrium and right ventricle. CT pulmonary angiography showed atelectasis in right lower lobe. Main pulmonary artery diameter was 33mm.

Written and informed consent for ASA IV was taken. GA with epidural catheter for analgesia was planned. Peripheral line secured with 18g cannula and ringer lactate (500ml) infusion was started. Patient was monitored for ECG, NIBP, SpO₂, ETCO₂, CVP and urine output. Preoperatively patient was nebulized with salbutamol respule. Patient was premedicated with ondansetron 4mg i.v., cefotaxime 1g i.v., methylprednisolone 60mg i.v. and glycopyrrolate 0.2mg i.v. In sitting position, under aseptic precautions, local anaesthesia with lignocaine 2% 2ml was given in L2-L3 space. Using 18G Touhy needle, epidural space was located using hanging drop method. Epidural catheter was inserted cephalad up to 4cm and fixed. Bupivacaine 0.25% 10ml was given through epidural catheter after test dose.

GA was given after preoxygenation with 100% oxygen via Bains circuit for 3-5 minutes. Induction of anaesthesia was done with fentanyl 100mcg i.v., propofol 130mg i.v. and vecuronium 5mg i.v. Trachea was intubated using 8mm internal diameter portex cuffed endotracheal tube. Maintenance of anaesthesia was done by O₂ (100%) + sevoflurane (1-2%) + vecuronium. Intraoperatively patient had a heart rate in the range of 80 to 104 beats per minute and mean BP 90 to 102mmHg. 1500 ml crystalloid was given. Patient had urine output of 300ml. On completion, neuromuscular block was antagonized with neostigmine 2.5 mg i.v. and glycopyrrolate 0.4 mg i.v. Patient was conscious, cooperative and followed verbal commands. Pulse was 82 per minute and BP was 112/72 mmHg. Muscle tone and power was adequate. Duration of surgery was 90mins.

For postoperative analgesia, tramadol 70mg diluted in 10ml N.S. was given at 12hrly intervals for 48hrs through epidural catheter. Patient was monitored in ICU for 48hrs. He had an uneventful intraoperative and postoperative course and was discharged on 9th postoperative day.

DISCUSSION

The anaesthetic management of patients with PH is based on understanding pathophysiological changes and maintenance of perioperative systemic vascular resistance (SVR) and myocardial contractility.¹ Pathophysiological changes in form of endothelial dysfunction seems to play major role in structural changes.⁴ Preoperative investigations like electrocardiogram, chest radiograph, arterial blood gas, and echocardiogram should be available. During surgery administration of oxygen, bronchodilators, antibiotics and steroids to the patients with obstructive lung disease, and vasodilators and inotropes to the patient with cardiac disease is necessary.³

Bird and Strunin administered a small dose of metaraminol during preoxygenation to avoid a decrease in systemic vascular resistance but the patient developed bradycardia, hypertension and cyanosis. After

administration of atropine 0.6mg i.v. his condition improved.⁵

Successful management for non-cardiac surgery needs proper preoperative assessment, monitoring systemic and pulmonary artery pressure and selecting proper anaesthetic technique. It is also important to avoid increase in PVR from hypoxia, hypercarbia, acidosis, agitation, pain and hypothermia.³

In patients with PH, GA, epidural anaesthesia (EA) and GA combined with EA has been described in literature. For abdominal surgery, combined general and epidural anaesthesia reduce the consumption of anaesthetic agents and reduce the requirements of systemic opioids for postoperative analgesia. It also helps to provide adequate oxygenation.³

Advantage of only regional anaesthesia is maintaining stroke volume and avoiding mechanical ventilation induced elevated pulmonary pressure.³ With continuous infusion of an epidural catheter, postoperative analgesia can be maintained. However, uncontrolled hypotension can endanger myocardial perfusion.⁶

Advantage of GA is safe oxygenation and airway is well secured.⁶ But if intubation is performed in lighter stage of anaesthesia, it can elevate pulmonary pressure. Also mechanical ventilation decreases venous return and cardiac output and can cause hypotension.⁴

We had used lumbar epidural with GA for the ileostomy closure surgery.

Induction with ketamine has little effect on PVR and SVR.⁴ Propofol and thiopentone sodium reduces SVR, venous return and myocardial contractility. Etomidate maintains haemodynamics without affecting the PVR, but may not be as effective in blunting the hypertensive response to laryngoscopy and intubation. Opioids (eg: fentanyl) can be administered to attenuate the sympathetic response to laryngoscopy and intubation, which can otherwise potentially increase mPAP to super-systemic levels and trigger haemodynamic decompensation.¹

Muscular relaxation can be achieved with depolarizing (succinylcholine) or non-depolarizing (vecuronium, rocuronium) neuromuscular blocking agents.¹ Histamine releasing relaxants (atracurium, mivacurium) should be avoided for patients with PH, as they may further increase pulmonary resistance.^{2,3} Hence, vecuronium and rocuronium are preferred. Volatile anaesthetic agents, sevoflurane and isoflurane produce pulmonary vasodilatation and thereby reduce mPAP.⁷

Capnography monitoring is useful to adjust ventilator settings.¹ Intraoperative fluid management should be done under CVP monitoring.⁶

Postoperative analgesia after abdominal surgery helps to optimize respiratory function, thereby; avoiding hypoxia, hypercarbia and acidosis.⁸ For this purpose we had used lumbar epidural analgesia in our patient.

Systemic hypotension should be aggressively treated to avoid decreased right ventricular coronary perfusion.³ Postoperatively patient should be monitored in ICU as patients are at risk of developing elevated pulmonary pressure and right heart failure.¹

CONCLUSION

Our conclusion hereby is that patients having PH associated with respiratory disorder pose a severe risk during administration of anaesthesia. The main emphasis is the importance of invasive investigation and monitoring, the absence of which could lead to occurrence and delayed detection of unexpected complications in the perioperative period. GA combined with EA offers a good anaesthetic technique. EA provides adequate analgesia in the postoperative period which decreases the hospital stay and various complications.

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