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Laparoscopic cholecystectomy in a patient with coronary artery disease: A case report

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Abstract

Laparoscopic cholecystectomy is a gold standard treatment for symptomatic cholelithiasis. Patients with cardiac dysfunction are at high risk of major cardiac events during such surgeries due to the haemodynamic effects of pneumoperitoneum. Patients of countries with low economies find difficulties as centre with high fidelity instruments, cardiology, cardiac services, specialist services are not readily available under one roof. Our case was patient with recurrent biliary colic who was deferred surgical intervention due to her coronary artery status multiple times and successfully managed at our centre with no perioperative complications and is doing fine six months after follow up.

Key words: Coronary artery disease; Laparoscopic cholecystectomy.

INTRODUCTION

Ischemic heart disease is the leading cause of increased morbidity and mortality worldwide.Patients with coronary artery disease for non-cardiac surgeries are at higher risk of complications like myocardial ischemia, arrhythmias, conduction abnormalities, and heart failure.[1] It presents a challenging aspect for anaesthesiologists to manage perioperative complications.

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Nowadays, laparoscopic surgeries are an emerging procedure. However, pneumoperitoneum and haemodynamic effects posecomplications. Some studies even suggest that pneumoperitoneum mimics closely as congestive heart failure.[2]Laparoscopic surgeries incardiac patient is a topic of controversy but can be safely practiced in New York Heart Association grade III and IV patients.[3]

CASE REPORT

Sixty-six-year-old female weighing 60 kg with a diagnosis of hypertension, type II diabetes mellitus for 15 years, and coronary artery disease (CAD), stable angina for five months was posted for laparoscopic cholecystectomy for symptomatic cholelithiasis. One and a half months before surgery, she was admitted for biliary colic with lower respiratory tract infection and was managed conservatively. She was receiving beta-blockers, nitrates, antihypertensive, diuretics, atorvastatin, oral hypoglycemic, insulin, and aspirin.

On examination, heart rate was 66 beats per minute (b/m) and blood pressure was 140/80 mmHg, oxygen saturation was 92% in room air and bilateral pedal pitting edema was present. Airway and respiratory system examinations and routine blood investigations were within normal limits. Chest X-ray showed cardiomegaly. Electrocardiography revealed sinus rhythm at 65/min, left ventricular hypertrophy, and inverted T-waves in leads V1-V4. Echocardiography showed concentric left

ventricular hypertrophy, Grade I left ventricular diastolic dysfunction, left ventricular ejection fraction was 60% with mild aortic regurgitation. Coronary angiogram was done five months prior to surgery which showed triple vessel disease (Left Anterior Descending: 70 %, Left Circumflex: 60 %, Right Coronary Artery: 60 % stenosis). Cardiac consultation was done and was advised treadmill test. It showed negative for myocardial ischemia but had to stop at six minutes due to weakness. The metabolic equivalent of task (METS) was seven. She was graded as New York Heart Association (NYHA) class II.

Lee's cardiac risk stratification showed class III risk for perioperative cardiac complications as she had history of ischemic heart disease and was treated with insulin. Oral hypoglycemic drugs were stopped 24 hours prior to surgery. All other routine medications were continued. Insulin was managed accordingly. Informed written consent was taken and she was premedicated with gabapentin for anxiolysis, ranitidine, and metoclopramide for aspiration prophylaxis. Nil per oral was maintained for eight hours for solid foods. Clear fluid was allowed until two hours before surgery. Glucose, insulin and potassium therapy was started via an 18G cannula. In the operating room, the standard American Society of Anesthesiologists monitors was established. For monitoring purpose, central venous pressure line, arterial line was placed under local anaesthesia. Oxygen supplementation was started. She was administered intravenous (IV) fentanyl 150 mcg, paracetamol 1 g slowly and induction was done with propofol in titrating the dose of up to 100 mg. which was followed by bag and mask ventilation. Thereafter, IV vecuronium 6 mg was administered. Bag and mask ventilation with oxygen and isoflurane was continued for three minutes. IV Lignocaine 60 mg was administered 90 seconds prior to intubation. Smooth tracheal intubation was achieved. After five minutes, while the surgeon was painting and draping before creating pneumoperitoneum, blood pressure was reduced to 70/40 mmHg, Heart rate: 50 b/m. Immediately, IV Normal Saline 300 ml bolus and mephentermine 6 mg was administered after which stable haemodynamics was maintainedthroughout the procedure with a heart rate between 60-70 beats per minute and blood pressure (Mean arterial pressure) between 70-90 mmHg. Anaesthesia was maintained with isoflurane 1.5% concentration in 100% oxygen. Ventilation was titrated to keep end-tidal carbon dioxide concentration between 30-35 mmHg. Bupivacaine 0.25% in 30 ml was infiltrated at surgical port sites, the diaphragmatic surface of the liver and Calot's triangle before surgical incision and dissection respectively. A nasogastric tube was placed. Laparoscopic cholecystectomy was performed using three surgical ports. Pneumoperitoneum was created with carbon dioxide at a flow rate of 2.5 liter/minute to maintain intra-abdominal pressure below 10 mmHg. The patient was kept in a reverse Trendelenberg position (15 degrees) with the table tilted to the left. The procedure lasted for 30 minutes. In the end, neuromuscular blockade was reversed with neostigmine and glycopyrrolate. Labetalol 10 mg was administered to blunt extubation reflex.

The patient was monitored electively in the intensive care unit for 24 hours which was uneventful. After four hours, she was started on oral fluids. Pain management was done with paracetamol, NSAIDs, and opioids with the use of the Numerical Rating Scale system. On the first postoperative day, the patient was shifted to ward and regular medications were started. She was kept on observation one more day and was discharged.She was in regular follow up and had no postoperative cardiac and surgical complications.

DISCUSSION

Perioperative morbidity and mortality due to CAD is not known yet in Nepal. Patients with diabetes mellitus under insulin are on major risk factors for perioperative cardiac complications according to Lee's cardiac index.[4] In the USA, among more than 10 million non-cardiac surgeries performed, perioperative major cardiac and cerebrovascular events were more common in patients with diabetes.[5]Our patient was at high risk of major cardiac events but was managed successfully without any perioperative events.

Sadhu et al. conducted a study in 1248 patients with cardiac comorbidities who underwentelective laparoscopic cholecystectomy. Out of them, 77 patients had a history of ischemic heart disease. Some of the patients were even NYHA grading II and III. For the induction of anaesthesia, they used oxygen, fentanyl, sevoflurane, and vecuronium. After peritoneal insufflation three patients had hypertensive issues and were managed accordingly. They also used low flow carbon dioxide insufflations at 5 l/min and low intra-abdominal pressure <8 mmHg for pneumoperitoneum. In contrast, we used oxygen, fentanyl, isoflurane, propofol, and vecuronium with the addition of intravenous lignocaine. She developed hypotension immediately after intubation which could be due to propofol or lignocaine(which was used to blunt the intubation reflex) and was managed accordingly. In our case, low flow carbon dioxide insufflation was done and

pneumoperitoneum was maintained below 10 mmHg during the surgery. Maintaining less intrabdominal pressure during laparoscopic surgeries are associated with less perioperative cardiac events.[3]

During laparoscopic surgeries, carbon dioxide insufflations tend to develop haemodynamic and pulmonary syndrome which results in a decrease in cardiac index, increase in right-sided filling pressures, and derangement of the respiratory mechanics leading to respiratory acidosis. These effects can lead to an increase in cardiac complications in high-risk patients. Whereas in gasless laparoscopic surgeries, these adverse effects are less likely.[6]This highlights that gasless surgery should be selectively done in such patients.

We performed meticulous monitoring with the additional help of central venous line and arterial line placement. A study done by Kumar et al. concluded that fentanyl plus lignocaine effectively decreases the stress response to endotracheal intubation in a hypertensive patient.[7] In our case, we used a titrated dose of anaesthetic drugs along with lignocaine to blunt the effect of sympathetic surge during intubation. Supplement of local anaesthesia to the skin before incision and, the diaphragmatic surface of the liver and Calot's triangle was an added benefit.[8] Studies have shown that patient receiving beta-blockers preoperatively decrease the risk of cardiac events which also favors for our patient stable outcome.[9]

Lee et al. presented a case with hypertension, acute fatal postoperative myocardial infarction, who underwent coronary artery bypass graft (CABG) two years prior to lap cholecystectomy for triple vessel disease. His intraoperative period was uneventful however after 40 minutes of surgery he developed myocardial infarction, had to receive cardiopulmonary resuscitation, followed by intraaortic balloon pump (IABP) placement in catheterisation lab and extracorporeal membrane oxygenation (ECMO) was delivered, however, the patient died on 19th postoperative day.[10] Our patient was diabetic and hypertensive and both risk factors are considered a major risk for ischaemic events. Contrary to the case of Lee et al., our patient was tested on a treadmill and METS of seven considered be low risk for a cardiac event. It is well known that most ischemic events are more common after the end of surgery and during emergence from anaesthesia, and peak occurrence third day after surgery with an exceptionally high mortality rate. So, management of such high-risk patient needs a high index of suspicion, multidisciplinary team approach, surgical expertise, adequate optimization of anaesthetic techniques, specialized cardiac anaesthesiologist, cardiologist, accessible catheterisation lab and high fidelity instruments like IABP, ECMO, in the same centre to conduct laparoscopic cholecystectomy safely in a patient with coronary artery disease.

CONCLUSION

Our case report highlights that laparoscopic cholecystectomy may be safely performed in patients with coronary artery disease. Such patients need proper evaluation by cardiologists and anaesthesiologists. Such patient should not be deferred from the benefits of laparoscopic cholecystectomy.

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