Pneumothorax during Laparoscopic Cholecystectomy

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Introduction

Classical cholecystectomy had been the traditional method of choice in surgical management of cholelithiasis. Recently laparoscopic cholecystectomy has taken over and is now considered the gold standard in the management of cholelithiasis. The most important complications of laparoscopic cholecystectomy are biliary tract injuries. Among the non biliary complications, spontaneous pneumothorax after creation of pneumoperitoneum has been described in 1939. It remains an extremely uncommon complication of pneumoperitoneum with a reported incidence of 0.01-0.4% [1-3]. A case of spontaneous left sided pneumothorax during laparoscopic cholecystectomy is discussed.

Case Report

A 65 year old female patient with cholelithiasis was admitted for elective laparoscopic cholecystectomy. Ultrasound investigation of the abdomen revealed a distended gall bladder with multiple small calculi, a normal common bile duct. Routine haematological and biochemical investigations were within normal limits. She did not have any major respiratory or cardiovascular ailment and was accepted for anaesthesia in ASA I.

General anaesthesia was administered via a 7.5mm endotracheal tube fixed at 22 cm mark at incisor level and bilateral air entry was confirmed by auscultation. Volume-controlled intermittent positive pressure ventilation without any positive end expiratory pressure (PEEP) was given throughout surgery. The airway pressure was maintained between 15-17mm Hg. Supraumbilical trocar was placed by the closed method and pneumoperitoneum was created with carbon dioxide limiting the intra-abdominal pressure at 12mm Hg. The other three ports were placed under vision and examination of the peritoneal cavity and viscera was normal. Dissection in the Calot's triangle was started and the surgery proceeded without any technical difficulty. After 20 minutes of surgery, the anaesthesiologist noticed a rise in the heart rate (HR) from 74 per minute to 120-130 per minute accompanied with a rise in blood pressure to 180/110- 190/

116 mmHg and fall in oxygen saturation (SpO₂) from 100% to 85% over the next 10 minutes. Auscultation revealed decreased breath sounds on the left side, without any wheeze or crackles. While the intra abdominal pressure was limited to 12 mm Hg, airway pressure showed a rise to 35-40 mm Hg and capnography revealed EtCO₂ in the range 60-72 mmHg. With the given clinical findings, the important diagnoses to be excluded were bronchospasm, pulmonary aspiration and pneumothorax. Muscle relaxation was enhanced and bronchodilators (salbutamol through the endotracheal tube) alongwith corticosteroids were administered to alleviate the probable bronchospasm. When a thorough tracheal suction did not improve the oxygen saturation, the anaesthesiologist changed the endotracheal tube, without any improvement in the clinical status. Keeping the stage of surgery in mind, it was decided that the surgery be completed while measures to stabilize the patient be continued. The gall bladder was delivered through the epigastric port and detailed laparoscopy was performed examining the diaphragm but no rent or injury could be visualised. Haemostasis was ensured and pneumoperitoneum was deflated. The patient's SpO₂ improved to 98% after deflating the pneumoperitoneum. In the immediate post operative period there was rapid improvement in breath sounds on the left side as compared to intra operative status.

Patient was shifted to post operative recovery room and a chest radiograph was done. It revealed an apical pneumothorax on the left side (Fig.1). The patient was however gradually stabilizing with a heart rate of 90-98 per minute and SpO₂ of 92-94 % on oxygen via facemask. At this stage, the patient was kept under observation with conservative treatment, expecting the carbon dioxide to get absorbed with time. The patient was put on parenteral antibiotics, oxygen by facemask, and close monitoring in the intensive care unit. The haemodynamic parameters and breath sounds normalised on the same evening. A repeat chest radiograph done on the fourth postoperative day revealed a fully expanded lung with no pneumothorax. She was discharged on the fifth postoperative day.

Discussion

Amongst the few procedures that have rejuvenated

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Fig. 1 : Chest radiograph showing left apical pneumothorax (arrows).

general surgery in recent past, none has made as big an impact as laparoscopic cholecystectomy. In spite of numerous advantages and better patient comfort, this method may have complications, of which the biliary complications are most common. Pneumothorax during laparoscopic cholecystectomy is a very rare complication and can develop spontaneously or due to direct injury to the diaphragm. Diaphragmatic injury can occur during the dissection of gall bladder off the liver bed [2]. While giving traction to the gall bladder upwards, an accidental rent in the diaphragm may act as a flap valve, opening during inspiration and closing during expirations, causing a tension pneumothorax [3]. Exact aetiology of spontaneous pneumothorax still remains unknown. Various hypotheses include congenital weakness in the diaphragm, oesophageal hiatus and weakness or failure of fusion of the sternal, costal or lumbar part of diaphragm which may disrupt due to pressure of pneumoperitoneum resulting in pneumothorax [1]. Leak of carbon dioxide through the oesophageal or aortic hiatus may cause a pneumomediastinum that may rupture in the pleural space causing a spontaneous pneumothorax [4].

Pneumothorax during laparoscopic cholecystectomy is a potentially life threatening complication. Intraoperative pneumothorax can aggravate physiological effects of intraperitoneal carbon dioxide

insufflation which can affect cardiorespiratory function, particularly in elderly patients with co-morbidities [5]. The resultant problems such as decreased functional residual capacity, increased airway pressure, hypercarbia, and circulatory impairment are well known [6]. Appropriate monitoring and a high index of suspicion can result in early diagnosis and treatment of such a complication. The management of spontaneous pneumothorax depends on the stage of surgery and cardiorespiratory status of the patient. If detected early during the surgery, pneumoperitoneum should be deflated, a chest tube inserted and then the surgery completed [1]. If detected towards the end of the procedure in a stable patient, the operation should be completed and nothing further needs to be done, as the carbon dioxide in the pleural cavity gets reabsorbed rapidly after deflating the abdomen [1,7].

In conclusion, although spontaneous pneumothorax during laparoscopic cholecystectomy is rare, it can be life threatening. A high index of suspicion, intensive monitoring and judicious management results in a successful outcome.

Conflicts of Interest

None identified

References

1. Prystowsky JB, Jericho JB, Epstein MH. Spontaneous bilateral pneumothorax: complication of laparoscopic cholecystectomy. *Surgery* 1993; 114: 988-92.
2. Fathy O, Zeid MA, Abdallah T, Fouad A, Eleinien AA, el-Hak NG, et al. Laparoscopic cholecystectomy: a report on 2000 cases. *Hepatogastroenterology* 2003; 50 :967-71.
3. Dawson R, Ferguson CJ. Life threatening pneumothorax during laparoscopic cholecystectomy. *Surg Laparosc & Endosc* 1997; 7:271-2.
4. Jean L Toris. Anaesthesia for laparoscopic surgery. In: RD Miller, L A Fleisher, RA Johns, editors. *Miller's Anaesthesia*. 6thed. New York: Churchill Livingstone, 2005.
5. Leonard IE, Cunningham AJ. Anaesthetic considerations for laparoscopic cholecystectomy. *Best Pract Res Clin Anaesthesiol* 2002 ; 16:1-20.
6. Tugal T, Gulhas N, Cicek M, Teksan H, Ersoy O. Carbon dioxide pneumothorax during laparoscopic surgery. *Surg Endosc* 2002; 16 :1242-4.
7. Singh R, Kaushik R, Sharma R, Attri AK. Non-biliary mishaps during laparoscopic cholecystectomy. *Indian J Gastroenterol* 2004;23:47-9.