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Anesthetic Management of Previously Right Sided Pneumonectomy Patient For Laparoscopic Transabdominal Hysterectomy

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IMPORTANCE Preoperative pulmonary disease is one of the recognized risk factors for postoperative respiratory complications. Lung resection surgeries especially pneumonectomy can lead to significant respiratory complications and can have grave consequences intra-operatively as well as postoperatively. Increasing number of patients require general anesthesia after pneumonectomy but very limited data is available to guide anesthetists. We present a case of 41 years old female who underwent laparoscopic transabdominal hysterectomy and bilateral salpingo-oophorectomy at a tertiary care cancer hospital with previous history of right sided pneumonectomy due to pulmonary tuberculosis. A thorough knowledge and understanding of anatomical and physiological changes after lung resections can help anesthetist to manage these difficult surgical patients to have a safe and uneventful perioperative outcome.

KEYWORDS pneumonectomy; laproscopic surgery; anesthesia management;

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Case Report

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Lung resection especially the pneumonectomy leads to significant respiratory insufficiency in selected number of patients if they have been planned for another surgical procedure. This can lead to increasing risk of postoperative prolonged hospital stay, morbidity and mortality when compared with limited lung resection cases. Considering post pneumonectomy five-year survival rates of more than 75% for benign disease and 40% for malignant disease, published data to guide anesthetist regarding management of laparoscopic surgeries after pneumonectomy is scarce[1]. Considering pneumonectomy, post-operative complications rate could be as high up to 40-60%[2]. Robust preoperative evaluation, optimization, intraoperative invasive monitoring, careful fluid administration and postoperative analgesia planning are key to success. The main aim is to avoid hypoxia, hypercarbia and pulmonary edema along with providing optimum pain control and judicious fluid management.

CASE PRESENTATION

A 41 years old lady with history of lower abdominal pain from last one month, presented for laparoscopic transabdominal hysterectomy and bilateral oophorectomy at Shaukat Khanum Memorial Cancer Hospital and Research Center Lahore, Pakistan. Previous history was significant of pulmonary tuberculosis, thoracolumbar scoliosis and right sided pulmonary decortication followed by right sided pneumonectomy. Detailed pre-operative evaluation, history, clinical examination, and investigations including routine blood investigations, arterial blood gas analysis, chest x-ray and CT scan were done. Anesthetic plan was formulated and discussed with patient and she signed informed written consent for general anesthesia and epidural.

Following WHO safety check list, standard anesthetic monitoring, and lower thoracic epidural catheter was placed. After pre-oxygenation with 100% oxygen, general anesthesia was induced with midazolam, fentanyl, propofol and atracurium, oxygen and sevoflurane. Easy bag mask ventilation, endotracheal intubation with ETT 7.5 mm, confirmed with capnography and secured at 20cm at lips. Mechanical ventilation was commenced with pressure control ventilation with target exhaled tidal volume of 400 ml approximate. Peak pressures were less than 25cm H20. Arterial line was inserted at left radial artery to aid invasive monitoring and frequent arterial blood gas analysis. Pneumo-peritoneum was maintained with at 12-14cm H2O along with progressive Trendelenburg position to avoid sudden increase in airway pressure. Rise in peak pressure was managed by reducing intra-abdominal pressure and tidal volumes. Epidural was loaded with Bupivacaine 0.125%-

10 ml followed by continuous infusion for pain relief. Arterial blood gas analysis was done intra-operatively to guide ventilation strategy. Restricted intravenous fluid was given; urine output was adequate. Moreover, she was given paracetamol and ketorolac along with anti-emetics. Few boluses of phenylephrine were required to maintain blood pressure. The procedure lasted for 3 hours and 40 minutes. At the end of the surgery, after reversal of muscle relaxants, she was extubated fully awake with good head lift. Arterial blood gas was repeated in recovery room, which was within normal limits. After two hours of recovery, she was shifted to Intensive care unit for postoperative monitoring and pain management.

Fig 1: X-ray chest

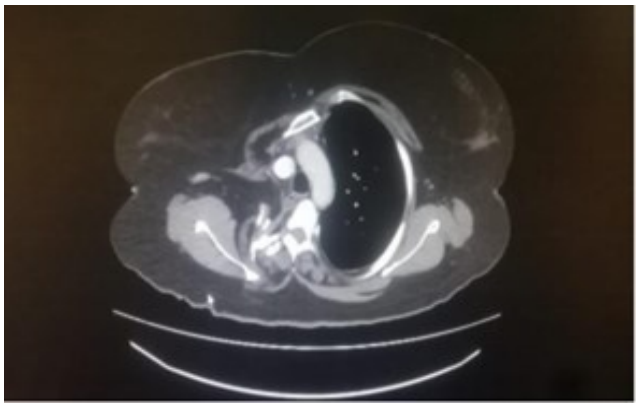

Fig 1b: CT Thorax

	Intra operative	Post Operative
FiO2	0.45	0.4
pH	7.45	7.39
PO2 (mmHg)	88	158
PCO2 (mmHg)	38	38
HCO3 (mmol/L)	25.8	23.1
BE (mmol/L)	1.7	-2.0
HCT (%)	42	33

Table 1: Arterial blood gas analysis

DISCUSSION

Lung resections surgical procedures ranging from video assisted biopsy to more invasive lung lobectomy or total pneumonectomy are performed at specialized centers. These patients are on risk of respiratory compromise during post-operative period and that range from immediate post-operative period to long term complications. These long term complications include various anatomic and physiologic changes as well as mediastinal deviation towards surgical side. There is also compensatory hyperinflation of remaining lung and its herniation across midline. Pneumonectomy also leads to anatomical changes in throracic spine and mild degree of thoracic scoliosis is common in lung resection patients[3] which we saw in our patient as well. Scoliosis also compromise lung functions and leads to difficult epidural catheter placement in such patients. Anatomic site of lung resection surgery also has a significant impact on postoperative complications as for example, right pneumonectomy is associated with a threefold greater chances of mortality when compared with left pneumonectomy[4]. Other postoperative complications after pneumonectomy include broncho-pleural fistula, empyema, pulmonary edema, cardiac arrhythmias, pulmonary artery thrombosis, and the post-pneumonectomy syndrome. One of the major post-pneumonectomy complications is pulmonary edema and it indicates the early onset of hypoxia and respiratory insufficiency. Brunelli and colleagues suggest a routine cardiopulmonary exercise testing before pneumonectomy. Pre-operative evaluation also includes assessment of cardiac status of the patient with the help of echocardiography and more invasive testing where indicated to rule out right heart failure and pulmonary hypertension[5]. Considering surgical options for post pneumonectomy patients, minimally invasive surgical techniques like laparoscopic surgery, would be more appropriate keeping in view the risk of respiratory complications secondary to large abdominal incision and splinting and leading to respiratory insufficiency and respiratory failure. However, carbon dioxide pneumo-peritoneum presents a challenge in a patient with decreased functional reserves and the raised intra-abdominal pressure further compresses the lung, reducing diaphragmatic excursion, lung compliance, and functional residual capacity. Endotracheal intubation is the key to maintain airway but endobroncheal intubation must be avoided. It is necessary to hyperventilate the patient to maintain acid base balance. The intraoperative use of PEEP depends upon patient condition and airway peak and plateau pressure. Functional changes in esophageal motility are common in patients with

a history of pneumonectomy[6], although most patients do not report dysphagia. It is unclear whether these patients are at increased risk of aspiration during anesthesia but the remaining lung should be protected from any insult.

CONCLUSION

We concluded that, a thorough knowledge and understanding of anatomic and physiologic changes due to pneumonectomy and carbon dioxide pneumo-peritoneum can help us to devise and apply various measures to manage these patients and to improve their perioperative outcome.

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