



**ORIGINAL RESEARCH PAPER**

**Anesthesiology**

**POSTOPERATIVE MANAGEMENT OF EXTRAPLEURAL PNEUMONECTOMY- A CASE REPORT**

**KEY WORDS:**

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**ABSTRACT**

Malignant pleural mesothelioma is a rare tumour with survival of 9–17 months after diagnosis. Radical surgical resection by extra-pleural pneumonectomy is the mainstay of treatment with high perioperative morbidity and mortality. Anaesthetic management is challenging due to the complex pathophysiological changes associated with prolonged duration of surgery, one- lung ventilation, haemodynamic instability due to major blood loss and cardiac arrhythmias. The major cause of morbidity and mortality post operatively is respiratory complications. Our case report highlights the role of anaesthetic management in reducing postoperative complications by thorough pre-operative assessment and advanced intra-operative and post-operative management with prompt corrective interventions to improve patient outcome.

**INTRODUCTION**

Malignant pleural mesothelioma is a rare tumour with survival of 9–17 months after diagnosis<sup>(6)</sup>. Radical surgical resection by extra-pleural pneumonectomy has shown to improve patient survival<sup>(6)</sup>. Pulmonary complications results in significant morbidity and mortality in these patients. Meticulous patient selection with thorough preoperative assessment, intra-operative anesthetic management and careful post-operative management is very important for recovery of extrapleural pneumonectomy patients<sup>(c,8)</sup>.

**CASE REPORT**

A 62 year old male patient with malignant mesothelioma of left lung underwent extra pleural pneumonectomy. Pre-operatively patient had dry cough since 3 months. He was known case of hypertension and was on T.Telmisartan 40mg + T.Hydrochlorthiazide 12.5mg BD. He had taken 4 cycles of Neoadjuvant chemotherapy (PEMETREXED 750mg + CISPLATIN 500mg). On preoperative examination, heart rate was 80/minute, blood pressure was 130/90 millimetres of mercury, normal temperature and respiratory rate was 18/minute. On auscultation there was decreased air entry in upper zone of left lung. His pulmonary function test showed FEV1/FVC% predictive >95 and FVC % predictive>80 (within normal limits). ECG showed normal sinus rhythm and Echocardiogram showed EF-55% with reduced left ventricular compliance. Other blood investigations were within normal limits. CT Scan Thorax showed old calcified granuloma in left upper lobe of lung and moderate pleural effusion on left side.

Patient underwent extrapleural pneumonectomy under GA + ED anesthesia with right sided double lumen tube intubation for one lung ventilation. During surgery patient had sudden bradycystole following clamping of coronary artery which was reversed by Inj. Adrenaline bitartrate 1mg (1/1000) + Inj. Atropine sulphate 0.6mg. Subsequently he developed Ventricular Premature contractions after 5 minutes which was corrected by Inj. Xylocard 2% 4ml 80mg (given 2 times).

There was blood loss of 2200ml which was replenished by transfusion of 4 units of PCV, 500ml Hestarch 6% and 3000ml of crystalloids.

After surgery double lumen tube was removed and patient was intubated with single lumen portex tube. Patient was shifted to ICU and kept on elective mechanical ventilation (IPPV mode) with Inj. Vecuronium infusion (0.01mg/kg) (0.4mg/ml) @ 8ml/hr and Inj. Noradrenaline infusion (16mg in 50cc normal saline) @ 4ml/hr for maintaining blood pressure above 100mmHg Systolic blood pressure. Ventilatory setting was kept appropriate for one lung and was adjusted according to Arterial blood gas Analysis. In immediate post operative ABGA there was respiratory acidosis (CO<sub>2</sub> narcosis) (pH- 7.17, pO<sub>2</sub>-400, pCO<sub>2</sub>-70, HCO<sub>3</sub>-21.5). Initially the respiratory rate was kept on higher side (>20) so as to correct pCO<sub>2</sub> with tidal volume of 250ml, I:E ratio of 1:2 and FiO<sub>2</sub> of 80% but that did not improve the condition. Later, respiratory rate was decreased to 12, I:E ratio was changed to 1:4 (increased expiratory phase) with fiO<sub>2</sub> of 50% (COPD lung like setting) which improved ABGA (pH-7.40, pO<sub>2</sub>-178, pCO<sub>2</sub>-48, HCO<sub>3</sub>-29).

Immediate Post op ECG showed atrial fibrillation with fast ventricular rhythm (116/min). It was corrected by Inj. Diltiazem 12.5mg stat followed by Tab. Diltiazem 30mg TDS and Tab. Digoxin 0.25mg OD (5 days a week).

On 3<sup>rd</sup> POD patient was reversed with Inj. Neostigmine 4mg and put on SIMV mode of mechanical ventilation for 2 hours followed by CPAP mode for another 2 hours. Later T-piece trial with O<sub>2</sub> (4 litre/min) was given which patient tolerated well and then was extubated after normal ABGA.

Central line catheter was inserted in left internal jugular vein on 1<sup>st</sup> POD for CVP monitoring and administering maintenance fluids at 1–2 ml/kg/h, such that a positive fluid balance of 1 litre was not exceeded (according to urine output). This was done to mitigate the risk of multifactorial

post operative acute lung injury/ARDS. Care was taken not to over hydrate the patient and Ryles tube feeding was started from 3<sup>rd</sup> POD.

Pain relief was done with epidural analgesia with Inj. Tramadol 50mg in 10cc normal saline epidurally, i.v analgesics (Opioids, NSAIDS) and local infiltration of surgical incision site and ICD site with Inj. Xylocard 2%. Later patient was started on Tab. Morphine 10mg 3 times a day.

Patient was started on chest physiotherapy including deep breathing, coughing exercises and 3 ball spirometry; nebulization with bronchodilators and restriction of intravenous fluids. On 10<sup>th</sup> POD, patient developed edema in left hand. USG was done, which showed thrombus in left subclavian vein. Central line was removed; Inj. Clexane 0.6mg s/c OD and limb elevation with physiotherapy was started. Edema was relieved by 13<sup>th</sup> POD. Patient developed hematemesis on 15<sup>th</sup> POD and CT Scan Thorax showed herniation of stomach, spleen, small bowel loops, mesentery and omentum through left dome of diaphragm into left hemithorax; shift of trachea and mediastinum to right side which caused dyspnoea and mild chest pain. Patient was managed conservatively and was started on Inj. Pantoprazole infusion and sucralofate syrup. Patient improved and was later discharged on 23<sup>rd</sup> POD.

**DISCUSSION**

Extra-pleural pneumonectomy (EPP) is the mainstay of treatment for Malignant pleural mesothelioma (MPM). It carries high rate of perioperative complications<sup>(b)</sup>. The incidence (19-59%) is much higher than following upper (16-17%) or lower abdominal surgery (0-5%). The overall incidence of complications following thoracic surgery varies from 15% to 37.5%<sup>(6)</sup>. Postoperative care of EPP patients is a very important part of patient recovery and can be very challenging.

In post operative management of these patients following aspects are of prime importance:-

1. Mechanical ventilator support
2. Intravenous fluid management
3. Management of cardiac arrhythmias and related complications
4. Pain management
5. DVT prophylaxis, physiotherapy and early mobilization
6. Surgical complication like diaphragmatic herniation

Pulmonary complications are responsible for increased morbidity and mortality of patients undergoing EPP. It includes atelectasis, pulmonary infections, pneumonia, CO<sub>2</sub> narcosis, bronchopleural fistula ,chylothorax, post pneumonectomy syndrome<sup>(b)</sup>, etc. Protective ventilation approaches including smaller tidal volume, with lower inspiratory pressures seem to be favorable in thoracotomy patients<sup>(1a)</sup>.

Our patient encountered CO<sub>2</sub> narcosis which was corrected by keeping ventilatory settings as controlled ventilation with respiratory rate of 12/minute, tidal volume according to single lung (350ml) and I:E ratio ( inspiratory to expiratory ratio) of 1:4 which allows the patient to spend more time of breathing in expiratory phase which helps in washout of CO<sub>2</sub>. This setting helped in improvement of ABG findings.

Intravenous fluids in pneumonectomy patients should be used judiciously. A high index of suspicion for pulmonary insufficiency should be adopted if there is volume overload. At the same time silent hypovolaemia, impaired oxygen delivery and acute kidney injury should not be missed. If there are signs of hypoperfusion inotropic/vasopressor support should be considered.

Arrhythmia, more particularly atrial fibrillation(AF), is the

most common cardiac complication after thoracic surgery, with an incidence ranging from 10% to 20% after lobectomy and as much as 40% after pneumonectomy, so it needs timely diagnosis and pharmacological correction<sup>(b)</sup>.

Another important aspect postoperatively is of pain management as surgeries lead to pain which if not treated can cause inadequate chest movement and later atelectasis of the lung. It is essential so that the patients can comply for chest physiotherapy and ambulation which they will be unable to do if they have severe pain<sup>(5)</sup>. Epidural analgesia, local infiltration of surgical incision site and ICD site, intravenous and oral analgesics provided good analgesia in our patient. Other methods like paravertebral blocks, intrapleural analgesics, cryoanalgesics, PCA devices, TENS can also be used. Postoperatively pulmonary insufficiency may occur because of infection, inability to clear secretions or oedema. Early ambulation and physiotherapy reduces complications like atelectasis, pneumonia, empyema and DVT. To prevent these, our patient was started on chest physiotherapy including deep breathing, coughing exercises and 3 ball spirometry; restriction of intravenous fluids and nebulisation with bronchodilator.

Surgical complication like mesh dehiscence is a rare but well described complication after EPP<sup>(7)</sup>. It causes herniation of abdominal content or cardiac herniation into thoracic cavity which may be dealt conservatively or may require immediate surgical correction. In our patient mesh dehiscence lead to herniation of abdominal contents into thorax which was managed conservatively.

Postpneumonectomy syndrome is another rare but important sequelae of pneumonectomy. It refers to bronchial compression occurring as a result of massive mediastinal shift<sup>(8)</sup>. There is stretching, distortion, and compression of the left main bronchus between the pulmonary artery anteriorly and the aorta and vertebral column posteriorly. Patients present with exertional dyspnea, stridor, and recurrent pulmonary infection. surgical repositioning of the mediastinum and Implantation of saline filled prosthesis is the most commonly used treatment<sup>(8,9)</sup>.

Thus early recognition of complications and its management with proper postoperative care is required for early recovery in EPP patients.

**CONCLUSION**

EPP carries a high rate of intra-operative and post-operative complication. Postoperative management including ventilatory management for carbon dioxide retention, diaphragmatic herniation and mediastinal shifting; management of cardiac arrhythmias like atrial fibrillation; IV fluid management; and pain management, hold prime importance for improved patient outcome. Thus thorough pre-operative assessment and preparation, advanced intra-operative monitoring, prompt corrective interventions and proper post-operative management can help in improved patient outcome.

**REFERENCES**

- 1) Tsao AS, Wistuba I, Roth JA, Kindler HL. Malignant pleural mesothelioma. J ClinOncol 2009;27:2081-90.
- 2) Ramegowda JK, Salam MA, Nayak V, Zaveri S. Anaesthetic management of extra-pleural pneumonectomy and hyperthermic intrathoracic chemotherapy procedure. Indian J Anaesth 2015;59:807-10.
- 3) Stephane Collaud, Marc de Perrot. Technical pitfalls and solutions in extrapleural pneumonectomy, Vol 1, No 4 (November 2012). Annals of Cardiothoracic Surgery (Ann Cardiothorac Surg. Print ISSN 2225-319X; Online ISSN 2304-1021).
- 4) Sugarbaker DJ, Jaklitsch MT, Bueno R, et al. Prevention, early detection, and management of complications after 328 consecutive extra pleural pneumonectomies. J Thorac Cardiovasc Surg 2004;128:138-46.
- 5) Opitz I, Kestenholz P, Lardiniois D, et al. Incidence and management of complications after neoadjuvant chemotherapy followed by extrapleural pneumonectomy for malignant pleural mesothelioma. Eur J Cardiothorac Surg 2006;29:579-84.
- 6) Soll C I, Hahnloser D, Frauenfelder T, Russi EW, Weder W, Kestenholz PB. The

- postpneumonectomy syndrome: clinical presentation and treatment. *European Journal of Cardiothoracic Surgery*. 2009 Feb;35(2):319-24. doi: 10.1016/j.ejcts.2008.07.070. Epub 2008 Nov 21.
- 7) Amato MB, Barbas CS, Medeiros DM, Magaldi RB, Schettino GP, Lorenzi-Filho G, et al. Effect of a protective-ventilation strategy on mortality in the acute respiratory distress syndrome. *N Engl J Med*. 1998;338(6):347-54.
  - 8) Tugrul M, Camci E, Karadeniz H, Senturk M, Pembeci K, Akpir K. Comparison of volume controlled with pressure controlled ventilation during one-lung anaesthesia. *Br J Anaesth*. 1997;79(3):306-10.
  - 9) Koen De Decker, Philippe G, Jorens, Paul Van Schil. Cardiac complications after noncardiac thoracic surgery. *Ann Thorac Surg* 2003;75:1340-8.
  - 10) Anandiyer and SumitYadav .Postoperative Care and Complications After Thoracic Surgery.Department of Cardiothoracic surgery, Townsville Hospital, Queensland, Australia. <http://dx.doi.org/10.5772/55351>
  - 11) Peter Slinger .Update on anesthetic management for pneumonectomy. Department of Anesthesia, University of Toronto, Toronto, Ontario, Canada. Wolters Kluwer Health. Lippincott Williams & Wilkins .0952-7907 .Current Opinion in Anaesthesiology 2009, 22:31-37.
  - 12) Hermes CG, Jo-Anne OS, Douglas JM, David JK. Postpneumonectomy syndrome: diagnosis, management and results *Ann Thorac Surg* 1992;54:638-51.
  - 13) Shen KR, Wain JC, Wright CD, Grillo HC, Mathisen DJ. Postpneumonectomy syndrome: surgical management and long-term results. *Thorac Cardiovasc Surg* 2008;135(6):1210-6.