



LESIONS OF THORACIC CAVITY: AN OVERVIEW

Oncology

Nikhil Mehta	Department of surgical oncology, Sri Aurobindo Institute Of Medical Sciences and PG Institute, Indore
Sanjay M. Desai*	Department of surgical oncology, Sri Aurobindo Institute Of Medical Sciences and PG Institute, Indore *Corresponding Author
Amar Jain	Department of surgical oncology, Sri Aurobindo Institute Of Medical Sciences and PG Institute, Indore
Elroy Saldanha	Department of surgical oncology, Sri Aurobindo Institute Of Medical Sciences and PG Institute, Indore
Dhruv Patel	Department of surgical oncology, Sri Aurobindo Institute Of Medical Sciences and PG Institute, Indore

ABSTRACT

BACKGROUND: Surgical treatment for intrathoracic lesions has evolved around the world. Better patient selection, optimization of medical comorbidities, better perioperative care; may lead to better outcomes.

METHODS: This is a prospective study conducted at Sri Aurobindo Medical College and Post-Graduate Institute, Indore, MP, India. All patients who were operated for intrathoracic lesions from August 2016 to October 2018 were included in the study. Average follow up period was 6 months in the study.

RESULTS: The mean age at presentation was 54.6 years. Most of the patients 50% (10) patients were operated for lung cancer. Most commonly patients presented with symptoms of dyspnea about 55% of them. Commonest procedure performed in our study was lobectomy. Nearly 50% (10) patients underwent lobectomy of which 6 were right sided and about 4 were left sided.

CONCLUSION: Thoracic surgery is the gold standard treatment for most of the intrathoracic lesions. Patients have to be promptly optimized and carefully selected for surgery. Preoperative optimization and postoperative care can lead to difference in outcomes.

KEYWORDS

thoracotomy, thoracic cavity

INTRODUCTION:

The current surgical treatment principle aims at curability with maximal functional preservation. Pulmonary complications are a major cause of morbidity and mortality in the immediate post-operative period after thoracic surgery.¹ Most patients are smokers or having occupational hazard and are at increased risk of developing lung complications.² Case selection should be befitting, pre-op preparation be adequate and surgery should be done in accordance to the oncologic principles. Lung capacity i.e. forced vital capacity (FVC) and functional residual capacity (FRC) decreases to <60% on Postoperative day 1 after thoracotomy.^{1,3} Lung cancer is a leading cause of cancer death both in women and men more than 1.35 million deaths per annum worldwide.^{4,5} Poor survival in lung cancer is because the majority of lung cancer patients present with advanced incurable disease. Malignant pleural mesothelioma is a fatal malignancy linked to asbestos exposure for which there is no known cure. Patients with early-stage disease and good performance status are suitable for multimodality treatment. Mediastinal masses has a wide spectrum. Commonly encountered lesions in the mediastinum are thymoma, neurogenic tumours and benign cysts amounting to 60% of patients with mediastinal masses.^{6,9} Major cause of morbidity and mortality in the post-operative period after thoracic surgery are pulmonary complications. The incidence is around 5% and 80%.

The purpose of this study was to perform a clinical audit of various mediastinal/lung pathology, to study management and its outcome, to increase efficiency and minimise complications in the current perspective with respect to the clinical profile of our patients and its clinical and oncological outcomes in patients undergoing surgery.

MATERIALS AND METHODS:

Sri Aurobindo Medical College and Post-Graduate Institute is a tertiary care center in the city of Indore, MP, India. This is a prospective study. All patients who were operated for intrathoracic lesions from August 2016 to October 2018 were included in the study. Average follow up period was 6 months in the study. Demographic data collected from the patients included age, sex, morbidity, etiology, imaging studies, clinical features and their duration, procedure performed, length of operation, blood loss, duration of surgery, post-operative stay in hospital, mortality were noted. A total of 20 cases were included in our study.

Detailed clinical history was recorded, and physical examination was done in each case. Preliminary chest radiographs were obtained. Computed tomography (CT) scan, magnetic resonance imaging (MRI), PET CT were further done to attain more detailed information. Results of routine hemogram and serological tests were also procured. Whenever feasible, CT-guided fine needle aspiration cytology (FNAC) or bronchoscopic biopsy was performed.

The operative notes, histopathological reports, and postoperative outcomes were recorded and analyzed. Surgical protocol included insertion of a double lumen endotracheal tube. Incision was decided in accordance to the pathology. Most often posterolateral thoracotomy was performed. However, sternotomy and cervical thoracotomy were also done occasionally.

All patients undergoing pulmonary resections should have a pre-operative assessment of their respiratory function taking into account three areas—lung mechanical function, pulmonary parenchymal function, as well as cardiopulmonary reserve. These in fact constitute the 'three legged stool' of respiratory assessment. Individualised strategy is essential.

All patients underwent pulmonary function tests preoperatively including FEV1 AND DLCO. All patients underwent preoperative spirometry and nutritional build up.

Postoperative management included the restricted use of intravenous fluid, chest tube drainage, physiotherapy and intensive spirometry, early mobilization and nutrition, and psychological reassurance. Epidural analgesia was used for the first 48 hours.

Intercostal drainage tubes were inserted at the end of surgery routinely. Intensive chest physiotherapy was initiated.

RESULTS:

Overall 20 patients underwent resection for thoracic cavity lesions from August 2016 to October 2018. The mean age at presentation was 54.6 years (range 15–77 years). 70 (14)% of patients were males whereas 30% (6) were females. 50% (10) patients were operated for lung cancer, 3 had aspergilloma, and 10% (2) patients were resected

for mediastinal tumors, 1 patient underwent extrapleuralpneumonectomy whereas 2 patients underwent metastatectomy for various indications [Table 1]. About 55% of patients had presented with dyspnea where as about quarter each number of patients had symptoms of cough and hemoptysis and chest pain. Patients were thoroughly investigated and optimized for surgery.

Nearly 50% (10) patients underwent lobectomy of which 6 were right sided and about 4 were left sided. About 25% patients underwent pneumonectomy for various indications. 3 patients had to undergo metastatectomy where as 2 patient underwent excision of mediastinal tumor.

Lobectomy:

Ten lobectomies were performed. Lung cancer was the commonest indication for lobectomy. Totally 7 lobectomy were performed for lung cancer of which 4 were for lower lobe and 3 upper lobectomy were performed. Aspergilloma was the reason for 3 cases. In all the patients upper lobectomy was done. All patients were older than 60 years. None of them was immunocompromised and their post-operative course was uneventful. Repeat thoracotomy was done in another case for ligation of thoracic duct for chylothorax which occurred after tumor was excised from cervical thoracotomy.

Pneumonectomy:

We had to perform 5 pneumonectomies of which 3 were for lung cancer and 1 each for tracheal schwannoma and 1 for mesothelioma. Patients were intensely prepared for surgery with spirometry, staircase exercises. 1 patient had endobronchial schwannoma of right main bronchus extending upto carina. Pre-operative biopsies were inconclusive. Since patient had long standing obstruction and lung was destroyed, pneumonectomy was performed.

Similar procedure was performed for bronchial carcinoid. 2 patients had bilobar carcinoma right lung. Postoperative course of all 4 patients were uneventful. Another case was malignant mesothelioma of right pleural cavity who underwent extra pleural pneumonectomy. This patient had prolonged intercostal tube drainage and surgical site infection.

Metastatectomy:

In our series, 3 patients underwent metastatectomy, i.e. wedge excision of lung. Indications were osteosarcoma and soft tissue sarcoma of lung. Both were done by staplers and post operative course was uneventful.

Mediastinal tumor excision:

Thoracotomy was done for 2 cases. 1 case was posterior mediastinum encapsulated tumor involving the spinal canal. The tumor was removed completely without breaching the dura. Histopathology confirmed ganglioneuroma. Postoperatively, patient did not have any neurological deficit. The other patient had mediastinal tumor on left died. She underwent left thoracotomy and removal of tumor. Even her histopathology was suggestive of schwannoma. Postoperative course was uneventful.

DISCUSSION:

The indications of thoracic surgery for vivid thoracic lesions have changed in recent era. Previously thoracic surgery used to be routinely performed for pulmonary tuberculosis. But as in this era, the incidence of lung cancer has drastically increased, the commonest indication of surgery has changed.

With refinement in surgical technique with procedures like limited pulmonary resection, and minimally invasive approach to the thorax, more patients with early and localized cancers are managed by lung parenchyma preserving surgeries such as segmentectomy and sleeve lobectomy which has resulted in decrease in perioperative morbidity and mortality and increase in survival rates.^{10,11} First left pneumonectomy for primary lung cancer was performed by Graham in 1933. Cahanin 1960 invented anatomical lobectomy with systemic mediastinal lymphadenectomy as a standard procedure for lung cancer. Our study has a mixed share of lung cancer patients so equal amount of parenchyma-preserving surgeries and pneumonectomies were performed. Moreover, in patients with large sized and centrally located tumors pneumonectomy is more often required to achieve complete resection of disease with negative margins. Overall, pneumonectomy has higher showed higher perioperative mortality (5.9–6.2%) than

lobectomy (1.5–3.2%).^{12,13} In our study, we performed 6 lobectomies for lung cancer and 3 pneumonectomies for lung cancer. The increase in lung cancer in older patients has become an important problem surgically as they have associated comorbidities such as ischemic heart disease, chronic pulmonary disease, and diabetes mellitus, which are of concern during perioperative periods. Risk factors for mortality in thoracic surgery include age of patient, comorbidities, neoadjuvant therapy, surgical expertise, postoperative care.^{13,14}

Malignant pleural mesothelioma has an extremely grave prognosis and most of them are diagnosed in an advanced stage.⁷ Fast progression of disease and resistance to chemotherapy and radiotherapy leads to median survival time of 12 months.¹⁵ According to Mesothelioma and Radical Surgery (MARS), randomised controlled trial, patients treated with either pleurectomy/decortication had similar outcomes with Extrapleural pneumonectomy which raised a question about what surgery has to be performed.¹⁶⁻¹⁸

In our series we performed about 1 extrapleural pneumonectomy. However the patient had surgical site infection and had prolonged intensive care unit stay for 10 days.

The treatment of lung metastatectomy is constantly evolving.^{19,20} Till today, need for lung metastatectomy still remains the control of the primary disease, resecting all lung metastases and calculation of postoperative lung functions and quality of life.

Advancement in imaging such as Computerised Tomography (CT scan) and PET-CT helps in better selection of patients. This has helped to properly stage the patients, assess resectability and plan appropriate treatment. The preoperative cardiopulmonary clinical evaluation with lung ventilation perfusion scan (VQ) scan, diffusion capacity of lung for carbon monoxide (DLCO) and stress echo might have helped to identify patients optimally fit to undergo radical surgery. All patients had antientensive preoperative optimization with incentive spirometry, oral medications, and chest therapy with nebulisation; which might have played a significant role in the optimal outcome.

CONCLUSION:

Thoracotomy remains the best chance of cure for lung cancer and other intrathoracic lesions patients and is an invaluable treatment modality. Our efforts should concentrate on early diagnosis, better understanding of biology, effective systemic therapy. Surgical outcome depends on patient selection, control of comorbidities, perioperative and postoperative management. Physical activity and exercise are vital components targeting the cancer continuum: Prevention, mortality and morbidity.

Table 1: Various Thoracic lesions and vivid pathology

S.N.	PATHOLOGY	NUMBER
1.	LUNG TUMOR	10
2.	ASPERGILLOMA	3
3.	MEDIASTINAL MASS	2
4.	MESOTHELIOMA	1
5.	SECONDARIES	2

Table 2: Surgeries Performed

S.N.	TYPE OF SURGERY	NUMBER
1.	LOBECTOMY	10
2.	PNEUMONECTOMY	4
3.	WIDE EXCISION	2
4.	METASTATECTOMY	3
5.	EXTRAPLEURAL PNEUMONECTOMY	1

REFERENCE:

- Lawrence VA, Cornell JE, Smetana GW: American College of Physicians. Strategies to reduce postoperative pulmonary complications after noncardiothoracic surgery: Systematic review for the American College of Physicians. *Ann Intern Med* 2006;144:596-608.
- Sengupta S. Post-operative pulmonary complications after thoracotomy. *Indian J Anaesth* 2015;59:618-26.
- Nunn JF, Milledge JS, Chen D, Dore C. Respiratory criteria of fitness for surgery and anaesthesia. *Anaesthesia* 1988;43:543-51.
- Lung Cancer (Non Small Cell). Available from <http://www.cancer.org/cancer/lungcancer-non-smallcell/detailedguide/non-small-cell-lung-cancer-key-statistics>.
- Loi c Lang-Lazdunski. Surgery for non-small cell lung cancer. *Eur Respir Rev* 2013; 22: 382-404.
- Malvezzi M, Bertuccio F, Levi F, et al. European cancer mortality predictions for the year 2013. *Ann Oncol* 2013; 24:792-800.
- Konstantinos Porpodis I, Paul Zarogoulidis, Efimia Boutsikou et al. Malignant pleural mesothelioma: current and future perspectives. *J Thorac Dis* 2013;5(S4):S397-S406.
- Laurent F et al (1998) Mediastinal masses: diagnostic approach. *Eur Radiol* 8:1148-1159

9. SergiJuanpere ,Noemí Cañete , Pedro Ortuño et al. A diagnostic approach to the mediastinal masses. *Insights Imaging* (2013) 4:29–52.
10. Takeda S, Maeda H, Koma M, Matsubara Y, Sawabata N, Inoue M, et al. Comparison of surgical results after pneumonectomy and sleevelectomy for non-small cell lung cancer: Trends over time and 20-year institutional experience. *Eur J Cardiothorac Surg* 2006;29:276-80.
11. Warren WH, Faber LP. Segmentectomy versus lobectomy in patients with stage I pulmonary carcinoma. Five-year survival and patterns of intrathoracic recurrence. *J Thorac Cardiovasc Surg* 1994;107:1087-93.
12. Watanabe S, Asamura H, Suzuki K, Tsuchiya R. Recent results of postoperative mortality for surgical resections in lung cancer. *Ann Thorac Surg* 2004;78:999-1002.
13. Shah SH, Goel A, Selvakumar V, Garg S, Siddiqui K, Kumar K. Role of pneumonectomy for lung cancer in current scenario: An Indian perspective. *Indian J Cancer* 2017;54:236-40.
14. Nagai K, Yoshida J, Nishimura M. Postoperative mortality in lung cancer patients. *Ann Thorac Cardiovasc Surg* 2007;13:373-7.
15. Robinson BW, Musk AW, Lake RA. Malignant mesothelioma. *Lancet* 2005;366:397-408.
16. Kaufman AJ, Flores RM. Surgical treatment of malignant pleural mesothelioma. *Curr Treat Options Oncol* 2011;12:201-16.
17. Hiddinga BI, van Meerbeeck JP. Surgery in mesothelioma—where do we go after MARS? *J Thorac Oncol* 2013;8:525-9.
18. Flores RM, Pass HI, Seshan VE, et al. Extrapleural pneumonectomy versus pleurectomy/decortication in the surgical management of malignant pleural mesothelioma: results in 663 patients. *J Thorac Cardiovasc Surg* 2008;135:620-6, 626.e1-3.
19. Rusch VW. Pulmonary metastasectomy: a moving target. *J Thorac Oncol* 2010;5:S130-1.
20. Nichols FC. Pulmonary metastasectomy: role of pulmonary metastasectomy and type of surgery. *Curr Treat Options Oncol* 2014;15:465-75