



## PNEUMONECTOMY FOR CHRONIC PULMONARY ASPERGILLOSIS - A TERTIARY CENTRE ANALYSIS

### KEYWORDS

PNEUMONECTOMY, CHRONIC PULMONARY ASPERGILLOSIS, EMPYEMA, BRONCHOPLEURAL FISTULA.

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### ABSTRACT

**OBJECTIVE:** TO analyse the indications, details of operative technique, post-operative morbidity and outcomes of patients who underwent pneumonectomy for chronic pulmonary aspergillosis.

**METHODS:** We retrospectively analysed the records of 15 patients who underwent pneumonectomy for chronic pulmonary aspergillosis in our institute from January 2012 to September 2016. Data were analysed for presenting symptoms, details of operative technique, development of post-operative complications and details of followup.

**RESULTS:** There were 15 patients 10 men and 5 women with ages ranging between 20 and 55 years. The presenting symptoms were hemoptysis in 12 patients and 3 patients with non resolving pneumonia. Pneumonectomy was left sided in 12 patients and right sided in 3 patients. Completion pneumonectomy was done in 2 patients. Intraoperatively intrapericardial isolation was done in one patient. There was no operative mortality. One patient underwent peripheral cardiopulmonary bypass to control catastrophic bleeding. 1 patient had post-operative EMPYEMA which was managed conservatively. One patient had BRONCHO PLEURAL FISTULA which was treated with PECTORALIS MAJOR MYOPLASTY.

**CONCLUSION:** PNEUMONECTOMY for chronic pulmonary aspergillosis has been historically considered a high risk procedure. Proper preoperative patient preparation and stabilisation, meticulous operative technique, attention to post operative sterilisation of post pneumonectomy space and perioperative usage of ANTIFUNGAL therapy can lead to satisfactory outcomes.

### INTRODUCTION

Pneumonectomy for chronic pulmonary aspergillosis has been considered a high risk procedure in surgical literature (5, 7, 10) owing to fact that surgeons operate in an environment of dense scar and highly neovascularised tissue with an ever present risk of contamination. Both American and European guidelines stress the need for proper patient selection and balance between survival and development of perioperative complications.

### DEFINITIONS:

Chronic pulmonary aspergillosis includes - Aspergilloma, Aspergillus nodules, Chronic cavitary pulmonary aspergillosis and Chronic fibrosing pulmonary aspergillosis for which pneumonectomy is used in chronic cavitary and fibrosing forms.

**CHRONIC CAVITARY PULMONARY ASPERGILLOSIS:** Pattern of disease in immunocompetent patients in which there formation and expansion of one or more pulmonary cavities over months. This is preferred over the term " COMPLEX ASPERGILLOMA" because more than 70% of such patients don't have aspergilloma visible radiographically. 90% have aspergillus IgG antibodies in the blood.

**CHRONIC FIBROSING PULMONARY ASPERGILLOSIS:** Late stage manifestation of chronic pulmonary aspergillosis in which progression to marked and extensive lung fibrosis has occurred sometimes called "DESTROYED LUNG".

### MATERIALS AND METHODS:

The records of 15 patients who underwent pneumonectomy for chronic pulmonary aspergillosis between January 2012 and September 2016 were retrospectively analysed. There were 15 patients with 10 men and 5 women. Their ages ranged between 20 and 65 years. All patients were symptomatic. The main symptoms were hemoptysis in 12 patients and non resolving pneumonia in three patients. Comorbidities, nutritional status, general clinical status and ability to tolerate pneumonectomy were assessed in all patients.

Standard chest radiographs, pulmonary function tests and arterial blood gas analyses were done in all patients. BRONCHOSCOPY was done in all patients to assess for any endobronchial disease and bronchial aspirates were routinely sent for culture to exclude superadded bacterial infection. HIGH RESOLUTION CONTRAST SCANS were done to ascertain severity of disease in the affected lung and to rule out disease in the contralateral lung. SPUTUM cultures for fungus and SEROLOGIC tests for ASPERGILLUS antigen were done in all patients. All patients underwent cardiac evaluation by means of ELECTROCARDIOGRAM and ECHOCARDIOGRAM supplemented with TREADMILL testing and CORONARY ANGIOGRAPHY if deemed necessary.

### PREOPERATIVE PREPARATION:

All patients received preoperatively ORAL ITRACONAZOLE 200 mg thrice daily along with appropriate culture specific antibiotics if bacterial infection was found on bronchial aspirate culture. All patients were trained to perform incentive spirometry exercises and postural drainage of sputum was employed in all patients. BRONCHIAL ARTERY EMBOLISATION was done in patients with life threatening hemoptysis to stabilise them for elective procedure.

### OPERATIVE TECHNIQUE:

Surgery was performed under general anaesthesia with airway protection and separation achieved by means of a double lumen endotracheal tube. Epidural analgesia was used in all patients. The incision of choice was a standard posterolateral thoracotomy with entry into the pleural cavity through fifth intercostal space. In patients who underwent completion pneumonectomy entry into the pleural cavity was through an intercostal space lower than the previous entry space. Rib resection was done in 8 patients. Appropriate adhesiolysis was carried both extrapleurally as well as intrapleurally. The hilar blood vessels were isolated and the pulmonary artery was temporarily clamped and hemodynamics observed before proceeding for pneumonectomy. Intrapericardial dissection was done in one patient who underwent a completion pneumonectomy.

Pulmonary artery and vein branches were doubly ligated with no 1

silk and reinforced with 3-0 polypropylene suture. The main bronchus was divided carefully preventing contamination of the pleural space and without leaving an excessive stump and closed with intermittent 3-0 polyester suture. Bronchial reinforcement with 3-0 polypropylene was carried out in a continuous manner in all cases. Bronchial stump was tested under saline with a pressure of 40 cm water. Hemostasis was meticulously secured. The pleural cavity was thoroughly irrigated with povidone iodine and normal saline. One pleural drain was kept. Rib approximation was done using NO 6 POLYESTER SUTURE, muscles with 3-0 VICRYL suture.

We needed to go on peripheral cardiopulmonary bypass through the femoral route in one patient who underwent a completion right pneumonectomy in view of torrential haemorrhage

All lungs were sent for histopathological analysis. All patients were extubated in the operating room or within 4 hours after transfer to the intensive care. One patient who underwent completion pneumonectomy had to be extubated after one day when he had delayed chest closure on account of post operative bleeding. Antibiotics were administered intravenously for a period of 5 days and changed into oral formulations for a period of one month. All patients were started on oral DIGOXIN therapy (0.25 mg once daily) and continued for period of one month. Drain was removed on 1st postoperative day. Serial chest radiographs were carried out in all patients until discharge. Epidural analgesia was continued for a period of 3 days in all patients. Aggressive chest physiotherapy along with rehabilitation was commenced from the 1st postoperative day. ITRACONAZOLE at a dosage of 200 mg thrice daily was continued for a period of 3 months postoperatively to prevent possible microscopic contamination of the pleural space by aspergillus.

Patients were followed up after 14 days, one month, 3 months, 6 months and yearly thereafter with serial chest radiographs and clinical examination. Histopathological reports were analysed in all cases to rule out other unsuspected diagnosis and rule out invasion of fungus into lung tissue

#### RESULTS:

15 patients underwent pneumonectomy for chronic pulmonary aspergillosis.

There were 10 men and 5 women. The ages ranged from 20 to 55 years.

Predominant symptoms were hemoptysis in 12 patients and non resolving pneumonia in 3 patients. 2 patients underwent Completion pneumonectomy. Left pneumonectomy was done in 12 patients and right pneumonectomy in 3 patients. Operating time ranged between 180 and 360 minutes. Intrapericardial dissection was done in one patient who underwent a completion pneumonectomy. Rib resection was performed in 8 patients. Average intraoperative blood loss was 400 ml. 9 patients received intraoperative transfusion.

One patient had torrential haemorrhage during a completion pneumonectomy for which we needed to go on emergency peripheral cardiopulmonary bypass through the femoral route. On account of prolonged oozing his chest cavity was packed and closed secondarily.

One patient developed EMPYEMA which was conservatively managed with culture specific antibiotics and intercostal drainage. One patient had BRONCHOPLEURAL FISTULA for which he underwent PECTORALIS MAJOR MYOPLASTY.

Duration of postoperative stay ranged between 5 to 15 days.

#### DISCUSSION:

According to guidelines (1, 2, 3) optimal treatment strategy for chronic pulmonary aspergillosis is unknown. Therapy is directed at

preventing life threatening hemoptysis. Surgical removal is definitive treatment, but because of significant morbidity and mortality it should be reserved for high risk patients such as those with episodes of life threatening hemoptysis and for patients with underlying sarcoidosis, immunocompromised patients with aspergillus specific IgG titres.

We feel that prevention holds the key for acceptable outcomes following this historically high risk procedure. Blood is a good culture medium for bacterial growth. Meticulous haemostasis during extrapleural and intrapleural dissection helps in achieving a sterile post pneumonectomy space preventing formation of EMPYEMA.

Care is to be taken for thorough irrigation of pleural cavity with povidone iodine and normal saline in accordance with age old surgical adage "THE SOLUTION TO POLLUTION LIES IN ITS DILUTION".

Postoperative usage of oral ITRACONAZOLE for a period of three months has proved to be useful in EMPYEMA prevention even though studies which showed good results were retrospective and unblinded and did not contain a control group. The dose and duration of ITRACONAZOLE were not standardised (1)

EMPYEMA is considered to be a dreaded complication of Pneumonectomy. Studies by MASSARD (5) et al who report a total of 4 empyemas in 5 patients, BABATASI et al (6) who report two empyemas following seven pneumonectomies, REGNARD et al (10) experienced two empyemas following 10 pneumonectomies. KIM et al (11) report that two of the three patients undergoing pneumonectomy develop empyema

Operative mortality in various series is greater than 7%. Previous studies have reported high complication rates for chronic pulmonary aspergillosis even though it is the ideal treatment (5, 7).

Our study is among the handful which reports a zero mortality and acceptable morbidity compared to other studies which report high complication rates.

Emergency pneumonectomy for life threatening hemoptysis is considered a high risk procedure according to surgical literature. Judicious use of BRONCHIAL ARTERY EMBOLISATION helps in tiding over the emergency and prepares the patient for an elective procedure (12).

Bronchial stump reinforcement with local muscle helps prevent disruption and subsequent BRONCHOPLEURAL FISTULA formation (8).

Various studies propound extrapleural dissection to be the ideal operative technique avoiding inadvertent opening and subsequent contamination (4).

Our average blood loss was the lowest of reported series (REED et al (7) reported a estimated blood loss of 2083±519 ml, range 800 – 7000 ml, MASSARD et al (5) report 2148±1220 ml blood loss).

Judicious use of EPIDURAL analgesia for a period of 3 days and early aggressive physiotherapy has been our approach in every patient. Our duration of postoperative stay is among the lowest compared to other studies which show a duration ranging between 27 to 70 days (median 37 days) (4).

#### CONCLUSION:

THE outcomes following pneumonectomy for chronic pulmonary aspergillosis are favourable when attention is paid to preoperative risk factor assessment, meticulous pre operative patient preparation, intelligent use of interventional bronchial artery embolization, postoperative sterilisation of pleural space to prevent contamination and postoperative continuation of anti fungal treatment for a period of three months.

**REFERENCES:**

1. Denning DW, Riniotis K, Dobrashian R, Sambatakou H. Chronic cavitary and fibrosing pulmonary and pleural aspergillosis: case series, proposed nomenclature change and review. *Clin Infect Dis* 2003; 37 Suppl 3: S265.
2. Denning DW, Cadranet J, Beigelman - Aubry C et al. Chronic pulmonary aspergillosis: rationale and clinical guidelines for diagnosis and management. *Eur Respir J* 2016 ; 47:45
3. Patterson TF, Thompson GR, 3rd, Denning DW, et al. Practice guidelines for diagnosis and Management of Aspergillosis: 2016 Update by the Infectious diseases society of America. *Clin Infect Dis* 2016; 63: e 1.
4. Yuji Shiraishi et al. Pneumonectomy for complex aspergilloma: is it still dangerous? : *European Journal of Cardio-Thoracic Surgery* 29(2006) 9 – 13.
5. Massard G et al. Pneumonectomy for chronic infection is high – risk procedure. *Ann Thorac Surg* 1996; 62: 1033 – 8.
6. Babatasi G et al Surgical treatment of pulmonary aspergilloma: current outcome. *J Thorac Cardiovasc Surg* 2000; 119: 906-12.
7. Reed CE. Pneumonectomy for chronic infection: fraught with danger? *Ann Thorac Surg* 1995; 59: 408 – 11.
8. Brown J, Pomerantz M. Extrapleural pneumonectomy for tuberculosis. *Chest Surg Clin N Am* 1995; 5: 289-96.
9. Shiraishi Y et al. Pneumonectomy for nontuberculous mycobacterial infections. *Ann Thorac Surg* 2004; 78: 399-403.
10. Regnard JF et al. Aspergilloma: a series of 89 surgical cases. *Ann Thorac Surg* 2000; 69: 898-903.
11. Kim YT et al. Good long term outcomes after treatment of simple and complex pulmonary aspergilloma. *Ann Thorac Surg* 2005; 79: 294- 8.
12. Corr P Management of severe hemoptysis from pulmonary aspergilloma using endovascular embolization *Cardiovasc Intervent Radiol.* 2006; 29(5): 807.