



PLEURO-CUTANEOUS WINDOW IN MANAGEMENT OF CHRONIC EMPYEMA- A SINGLE CENTER STUDY

Dr. Anula Sisodia

Associate Professor, Department of Cardio-thoracic Surgery, Sawai Man Singh Medical College, Jaipur

Dr. Hemlata Verma

Associate Professor, Department of Cardio-thoracic Surgery, Sawai Man Singh Medical College, Jaipur

Dr. Manoj Saini*

Senior Resident, Institute of Respiratory Diseases, Sawai Man Singh Medical College, Jaipur *Corresponding Author

Dr. Chand Bhandari

Senior Professor, Institute of Respiratory Diseases, Sawai Man Singh Medical College, Jaipur

ABSTRACT

Background: Various treatment options are available for the management of empyema including medical therapy, open and closed drainage, decortication and thoracoplasty. Pleuro-cutaneous window (PC window) is an accepted method of treatment for optimal drainage of chronic empyemas. Open window thoracostomy should be considered in debilitated patients with empyema, where definitive surgery is not indicated and failure to control the disease by tube thoracostomy. **Materials and Method:** This was a single center study, conducted on 60 patients of chronic empyema at Institute of Respiratory Diseases during January 2016 to December 2020. These patients were initially treated with medical therapy and chest tube drainage but their lungs were not completely expanded. They were not the candidates for definitive surgery at that time because of their medical and lungs condition, hence they were treated by pleuro-cutaneous window. **Results:** Mean age of patients in our study was 35.63 ± 12.14 years and age range was 15 to 60 years. In our study 49 patients were male and 11 were females. Patients with left sided empyema were 34 (56.67%) and with right sided empyema were 26 (43.33%). Most of the patients 44 (73.33%) had chest tube drainage for 3 to 4 months. Average duration of hospital stay was 7 days. Lung expansion occurred in 32 (53.33%) patients. **Conclusion:** Open drainage by pleuro-cutaneous window expands the entrapped lungs despite the presence of broncho-pleural fistulas. Pleuro-cutaneous window also has psychological benefits in these patients

KEYWORDS : Broncho-pleural fistula, empyema, Pleuro-cutaneous window

INTRODUCTION

Pleural empyema is defined as collection of pus in pleural cavity. It is a commonly encountered disease of pleura. Various treatment options are available for the management of empyema including medical therapy, open and closed drainage, decortication and thoracoplasty.¹ Generally, primary treatment with closed thoracostomy drainage with chest tube is sufficient. However, in some cases open surgical management may be indicated.² When lung expansion does not take place and total or near-total collapse of lung is there, definitive operation is indicated. The reasons for lack of re-expansion of the lung in tuberculous patients probably are tuberculous pneumonia and endobronchial disease and obstruction, thickened pleura, frank fibrosis and cavitation.³ The resolution of parenchymal and bronchial disease by appropriate drug therapy and open pleural drainage allows the lung to reexpand. Pleural drainage and irrigation eliminates pleural infection and may prevent the formation of thickened visceral pleura. Chest tube drainage is often painful, bothersome, does not provide efficient drainage, and does not allow mechanical cleansing of the pleural cavity.³ Open drainage is usually well tolerated and having advantages that patient can easily clear their pleural cavity, feels socially acceptable and lung expansion occurs usually.

Pleuro-cutaneous window (PC window) is an accepted method of treatment for optimal drainage of chronic empyemas. Open drainage by pleuro-cutaneous window expands the entrapped lungs despite the presence of broncho-pleural fistulas (BPF).⁴ The Eloesser procedure or open-window thoracostomy is a surgical treatment for chronic pleural empyema in which a permanent opening is made in the chest wall for drainage of pus. Leo Eloesser described an operation by resecting a portion of rib and constructing a cutaneous flap for open drainage of empyema in tuberculous patients in 1935. Re-expansion of the lung occurred in their patients.⁵ It is very useful procedure for achieving optimal

drainage of chronic empyema for patients in poor medical condition. Open drainage does not result in pneumothorax because of presence of adhesions and thickened visceral pleura in most cases of empyema that prevent the lung from collapsing.⁶ Clagett's procedure is another procedure which involves open pleural drainage, serial operative debridement and filling the pleural cavity with antibiotic solution before closing chest.^{7,10} Window is made in second part of the procedure.¹¹ Pleural cavity is irrigated with antibiotics daily. As an alternative to the staged and time-consuming Clagett procedures, Weder modifies this by stuffing the cleansed cavity with antiseptic packages and changing them regularly, as Clagett's procedure takes more time.¹²

Open-window thoracostomy controls sepsis, closes bronchopleural fistula (BPF), improves patient's general condition and achieves good results.¹³ Because of early diagnosis and treatment, complications of intra thoracic infection and empyema have decreased in India in recent years.^{14,15} Open window thoracostomy should be considered in debilitated patients with empyema, where definitive surgery is not indicated and failure to control the disease by tube thoracostomy.¹⁶ Marsupialisation of the cavity via rib(s) resection and open drainage carries low risk.^{5,17} It is the choice of treatment if there is presence of bronchopleural fistula. It can be considered either as a definite treatment with intent to cure, a preliminary procedure prior to definite treatment¹⁸⁻¹⁹ or as a last resort procedure when there is failure to stabilize disease.²⁰⁻²¹ The window usually closes by granulation tissue after the pleural cavity obliterates, but in some cases a persistent stoma may remain. Surgical treatment is needed in treatment failure, symptomatic complications and sequelae of the disease even after management with medical therapy.²²

MATERIALS & METHODS

This study was a single center study which was conducted at Institute of Respiratory Diseases, Sawai Man Singh Medical

College, Jaipur, Rajasthan. This study was conducted from January 2016 to December 2020. We included 60 patients, aged 15 to 60 years who were initially treated for empyema with medical therapy and chest tube for drainage of pus. Minimum duration of chest tube drainage was 3 months before PC window. Lungs of these patients were not expanded completely even after management with medical therapy and chest tube drainage. Their mediastinum was fixed and these patients were not the candidates for definitive surgery at that time because of their medical and lungs condition. All preoperative investigations were performed. Computed Tomography (CT) scan of chest were done pre-operatively to define the extent of disease, to demonstrate loculations, and to mark the exact location for the incision. A valid informed consent was taken before procedure. Under local anaesthesia an incision was given in dependent part through the skin, subcutaneous tissue, and muscle down to the ribs after taking all aseptic precautions, two or three adjacent ribs were resected to prevent closure of the drainage channel. The empyema is then entered and drained as completely as possible. Then the skin is folded inwards underneath chest wall and sutured to the parietal pleura and empyema peel. Pleural tissue was sent for histopathological examination. After procedure we closely watched for any bleeding from the site. Dressings were changed two times daily or whenever needed in initial post operative period then daily and drainage of pus was noted daily. Patient was followed for any complications and to check for lung expansion.

RESULTS

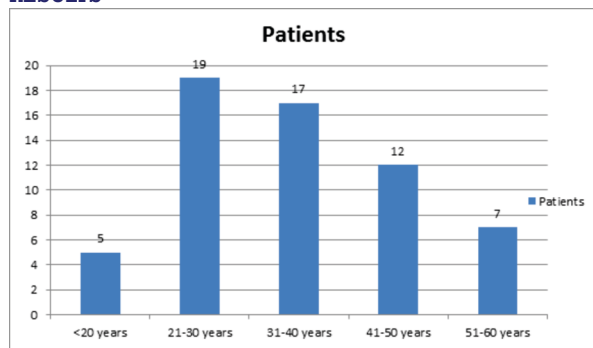


Figure 1: Age wise distribution of patients

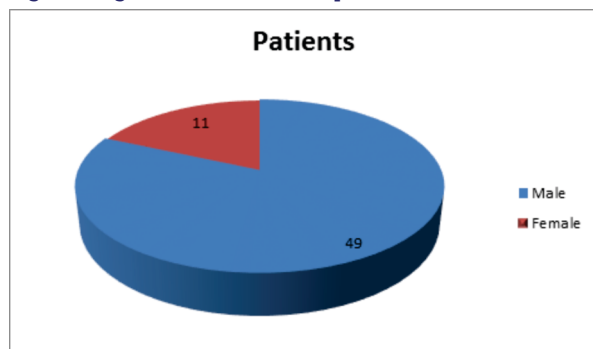


Figure 2: Sex distribution

Table 1: Distribution of Patients according to side operated

| Side Involved | No. of Patients (%) |
|---------------|---------------------|
| Left | 34 (56.67%) |
| Right | 26 (43.33%) |

Table 2: Duration of Chest Tube before Pleuro-cutaneous window

| Duration (in months) | No. of Patients (%) |
|----------------------|---------------------|
| 3-4 months | 44 (73.33%) |
| 4-5 months | 15 (25.00%) |
| >5 months | 1 (1.67%) |

Table 3: Duration of Hospital stay after Pleuro-cutaneous

window

| Duration (in days) | No. of Patients (%) |
|--------------------|---------------------|
| 5-7 days | 37 (61.67%) |
| 8-10 days | 17 (28.33%) |
| > 10 days | 6 (10.00%) |

DISCUSSION

Mean age of patients in our study was 35.63 ± 12.14 years. In our study youngest patient was 15 years old and oldest one was 60 years old and 49 patients were male and 11 were females. In the study conducted by Kohli et al.²³, age range was 14 to 70 years and 32 (64%) patients out of 50 were male. Patients with left sided empyema were 34 (56.67%) and with right sided empyema were 26 (43.33%) in our study. In the study conducted by Memon et al.²⁴ male patients were 98 and female patients were 65 (Total 163 patients) and patients with left and right sided pleural effusion were 85 and 78 respectively. Minimum duration of chest tube drainage was 3 months before performing open drainage window. Most of the patients 44 (73.33%) came to us after 3 to 4 months of chest tube drainage. Single person presented to us after 5 months, and because of this subject's medical condition, PC window was performed at that time. In most patients duration of hospital stay was 7 days. During hospital stay daily pus drainage was noted. After 2-3 days, pus decreases in amount and at the time of discharge amount of pus was minimum. Some patients were admitted for more than 10 days because of other issues, not related to procedure. Approximately all patients were presented with broncho-pleural fistula and well managed after the procedure. Tuberculosis was the etiology in almost all patients. Lung expansion occurred in 32 (53.33%) patients in our study. Lung re-expansion occurred in 28 (56%) patients in the study conducted by Kohli et al. 28 patients out of 47 (59.57%) achieved complete re-expansion of the lung in the study conducted by Ali SM, et al. They concluded that open drainage by pleuro-cutaneous window expanded the entrapped lungs despite the presence of broncho-pleural fistulas.⁴ It is very useful procedure for achieving optimal drainage of chronic empyema for patients in poor medical condition.⁶ Open drainage does not result in pneumothorax because most cases of empyema are associated with adhesions and thickened visceral pleura that prevent the lung from collapsing. Almost our all patients tolerated procedure well but in 1 person pneumothorax developed. Ahmed Abdul et al.²⁵ concluded that the surgical procedure of Modified Eloesser flap was very effective in treatment of chronic empyema in patients who did not respond to more conservative treatment like tube thoracostomy and/ or are not fit for major surgical interventions like thoracotomy and decortication. This procedure is not only performed as a definitive treatment of chronic empyema but also as a preparatory treatment for radical procedures which can be performed later when patients are fit.²⁶ Patients with chronic empyema are usually subjected to the trauma of repeated tube thoracostomy for recurrence of their effusion. This causes depression, economic loss to the family and the cosmetic defect from the many scars of repeated tube insertion in these patients.²⁷ Thus pleuro-cutaneous window also has psychological benefits in these patients. In our experience, empyema and BPF are best managed by prolonged tube drainage followed by open-window thoracostomy and thoracoplasty, if required. Drainage of the empyema cavity is essential to control the sepsis. Open-window thoracostomy controls sepsis, closes bronchopleural fistula (BPF), improves patient's general condition and achieves good results. It promptly ambulates the patient and allows early chance to go back to work to earn his livelihood. It has least chance of premature fistula closure, so avoids re-empyema and redo surgeries. It prevents recurrent sepsis, morbidity and mortality so better quality of life.²⁸ Open drainage for empyema is an option for the management of chronic empyema patients who are too sick to withstand definitive surgery and whose residual lung is so diseased that it is not expected to re-expand by any

means. This is particularly true in our environment where patients present late either due to poverty and ignorance. So we found the usefulness of pleurocutaneous window in many ways like the patient become free from chest tube, become ambulatory and can undergo treatment at home. It also facilitates re-expansion of the lung obviating any major definitive surgical procedure and it is suitable for sick patients who are not fit for general anaesthesia and major surgical operations.

CONCLUSION

Successful treatment of chronic pleural empyema requires adequate timing of surgical procedures. Thus, in cases of empyema regardless of origin, where lungs not fully expanded, the initial management with drainage with closed-chest tube thoracostomy and appropriate medical therapy should be followed by open drainage. Pleuro-cutaneous window (PC window) is an accepted method of treatment for optimal drainage of chronic empyemas. Open drainage by pleuro-cutaneous window expands the entrapped lungs despite the presence of broncho-pleural fistulas (BPF). Pleuro-cutaneous window has psychological benefits in these patients as it makes patient ambulatory, socially acceptable and free from pain of tube and patient can easily clean their pleural cavity, no need for hospital visit to drain pus regularly. It acts as a bridge procedure in patients of chronic empyema before definitive surgery.

Financial support & Sponsorship: Nil

Conflicts of interest: Nil

REFERENCES:

- Somers J, Faber LP. Historical developments in the management of empyema. *Chest Surg Clin N Am* 1996; 6: 403.
- Mayo P Early thoracotomy and decortication for nontuberculous empyemata in adults with and without underlying disease. *Am Surg* 1985;51 :230-236.
- Sohaila Mohsin Ali, Abdul Aziz Siddiqui, and Joseph S. McLaughlin. Open Drainage of Massive Tuberculous Empyema With Progressive Reexpansion of the Lung: An Old Concept Revisited. *Ann Thorac Surg* 1996;62:218-24.
- Ali SM, Siddiqui AA, Mc Laughlin JS :Open drainage of massive tuberculous empyema with progressive reexpansion of the lung: An old concept revisited *Ann thorac surg* 1996; 62: 218.
- Eloesser L. An operation for tuberculous empyema. *Surg Gynecol Obstet* 1935;60: 1096-7.
- Alka Chandra, J N Banavaliker. Epidural Anaesthesia for Pleuro-cutaneous Window in a Patient with Massive Empyema. *J Anaesth Clin Pharmacol* 2010; 26(1): 115-116.
- Gharagozloo F, Trachiotis G, Wolfe A, DuBree KJ, Cox CL. Pleural space irrigation and modified Clagett procedure for the treatment of early postpneumectomy empyema. *J Thorac Cardiovasc Surg* 1998;116: 943—
- Zaheer S, Allen MS, Cassivi SD, Nichols Jr FC, Johnson CH, Deschamps C, Pairolero PC. Postpneumectomy empyema: results after the Clagett procedure. *Ann Thorac Surg* 2006;82:279—86.
- Hollaus PH, Huber M, Lax F, Wurnig PN, Bohm G, Pridun NS. Closure of bronchopleural fistula after pneumonectomies with a pedicled intercostals muscle flap. *Eur J Cardiothorac Surg* 1999;16:181—6.
- Deschamps C, Pairolero PC, Allen MS, Trastek VF. Management of postpneumectomy empyema and bronchopleural fistula. *Chest Surg Clin N Am* 1996;6(3):519—27.
- Miller JL. Postsurgical empyema. In: Shields TW, LoCicero Jr J, Ponn RB, editors. *General thoracic surgery*. 5th ed., Philadelphia, PA: Lippincott Williams&Wilkins; 2000. p. 709—16.
- Schneider D, Cassina P, Korom S, Incl I, Al-Abdullatif M, Dutly A, Kestenholz P, Weder W. Accelerated treatment for early and late postpneumectomy empyema. *Ann Thorac Surg* 2001;72:1668—72.
- Mariano Garcı́a-Yuste, Guillermo Ramos, Jose’ L. Duque, Felix Heras, Manuel Castaneda, Luis J. Cerezal, and Jose’ M. Matilla. Open-Window Thoracostomy and Thoracomyoplasty to Manage Chronic Pleural Empyema. *Ann Thorac Surg* 1998;65:818—22.
- Mubashir A, Abdul M, Nadeem U. Clinical profile and surgical outcome for pulmonary aspergilloma: Nine year retrospective observational study in a tertiary care hospital. *Int J Surg*. 2011;9(3):267-71.
- Janso Kollanur, Kevin Abraham Chacko, Vishnu Sharma. M, Madhav Kamath M. Thoracic surgery in a tertiary care institute-Our experience of 4 years. *Indian Journal of Immunology and Respiratory Medicine*, July-September, 2019;4(2):194-196.
- Light RW. A new classification of parapneumonic effusions and empyema. *Chest* 1995;108:299—301.
- Deslauniers J, Jacques LF, Gregoire J. Role of Eloesser flap and thoracoplasty in the third millennium. *Chest Surg Clin N Am* 2002;12:605—23.
- Regnard JF, Alifano M, Puyo P, Fares E, Magdeleinat P, Levasseur P. Open window thoracostomy followed by intrathoracic flap transposition in the treatment of empyema complicating pulmonary resection. *J Thorac Cardiovasc Surg* 2000;120:270—5.
- De la Riviere AB, Defauw JJ, Knaepen PJ, van Swieten HA, Vandershueren RC, van den Bosch JM. Transsternal closure of bronchopleural fistula after

- pneumectomy. *Ann Thorac Surg* 1997;64:954—7.
- Athanassiadi K, Kalavrouzotis K, Bellenis I. Bronchopleural fistula after pneumectomy: a major challenge. *Acta Chir Hung* 1999;38(1):5—7.
- Gossot D, Stern JB, Galetta D, Debrosse D, Girard P, Callendo R, Harper L, Grunenwald D. Thoracoscopic management of postpneumectomy empyema. *Ann Thorac Surg* 2004;78(1):273—6.
- Ravindra Kumar Dewan. Surgery for pulmonary tuberculosis — a 15-year experience. *European Journal of Cardio-thoracic Surgery* 37. 2010. 473—477.
- Arvind Kohli, Gurjit Singh, Anita Vig, Kavi Raj Dubey and Rajinder Singh. Pleurocutaneous Flap: How Useful It is in Management of Chronic Empyema. *The Indian Journal of chest diseases and allied sciences*. 2006. 48(4). 257-259.
- Rizan Aziz Memon, Syed Ali Arsalan, Ali Raza Uraizee, Jarved ahmed Memon, Aneel Roy Bhagwani, Imroz Arif Farhan. Tuberculous Empyema Thoracic-Surgical Perspective. *JBUMDC* 2014;4(1):12-15.
- Ahmed Abdul-Ameer Daffar, Ali Mohsin Obeid Al- Sinjery, Aqeel Salman Saleh Al-Mindel, Rafid Remthan Hussein Al-Temimi. Management of Chronic Empyema Cavity in Cachectic Patients: Review of 30 cases. *Thi-Qar Medical Journal (TQMJ)*. 2017.13(1).
- Ravindra K. Dewan. Therapeutic Management of Empyema. *Indian J Chest Dis Allied Sci*. 2012;54:219-221.
- Edaigbini SA, Anumenechi N, Odigie VI, Khalid L, Ibrahim AD. Open drainage for chronic empyema thoracis: clarifying misconceptions by report of two cases and review of literature. *Arch Int Surg* 2013;3:161-5.
- Dr Kevin R Ajudya, Dr Arunkumar Haridas. Quadrangular Eloesser Flap Technique an Innovative Controlled Open Thoracoplasty for Chronic Organised Empyema and its Outcome. *International Journal of Science and Research (IJSR)*. 2019; 8(12); 1020-1023.