
ORIGINAL ARTICLE

Unlimited Benefits of Muscle-Sparing Limited Thoracotomy in Management of Empyema Thoracis

GHULAM SHABBIR PERVEZ, SAIMA SULTAN, FARMAN ALI
Department of Thoracic Surgery, Gulab Devi Chest Hospital, Lahore

ABSTRACT

Introduction: Pleural empyema has got a very old history which dates back to the times of Hippocrates. The modern era of broad spectrum antibiotics has reduced the threat in developed countries but the danger persists in developing world. Early surgical intervention is what is recommended in great majority of cases. Closed aspiration / fibrinolysis, Tube Thoracostomy, Video Assisted Thoracoscopic Decortication and Open Lung Decortication are the measures in practice for the last many years. Open Lung Decortication (OLD) has been thought to be the most successful modality but its longer incision reserved its use in specific cases only. Limited Thoracotomy and Video Assisted Thoracoscopic Decortication however, have encouraged use of aggressive modalities in cases of Empyema.

Material & Methods: From 1st July 2011-31st December 2011, 152 OLD (open lung decortications) were done using limited thoracotomy and collected data will be presented in the study. Informed consent taken from all patients and only those were included who opted for thoracotomy.

Results: Out of these 152 patients, 82 were male and 70 females. Larger number of patients belonged to age group 20-30 yrs (55). The results were judged on specified criteria. The approach was quite successful in 129 patients and satisfactory results obtained. Improvement was judged on clinical and radiological basis and patients were followed up for 1 year. In 23 patients the approach did not succeed as incision had to be extended. All these patients however had a fibro thorax and the history of empyema was more than 8 weeks in all these cases. The hospital stay was < 2 weeks in nearly 70 % patients. There was very little morbidity and no mortality.

Conclusion: We conclude that OLD with muscle sparing limited thoracotomy has unlimited benefits and should be considered in all 2nd and 3rd stage empyema cases.

Key Words: Empyema, Decortication, VATS, Limited thoracotomy.

INTRODUCTION

Empyema means presence of pus in a natural body cavity. In chest the space is the pleural cavity, so pleural empyema is the term frequently used.

Pathogenesis: Empyema could be due to Non Traumatic and Traumatic causes. Non traumatic is by direct extension from adjacent site i.e. thoracic sepsis which may be due to pulmonary disease - pneumonias (obstruction), T.B, bronchiectasis, lung abscess. mediastinitis, Osteomyelitis of sternum, ribs and vertebrae or extra thoracic Sepsis because of subphrenic abscess and hepatic abscess. Traumatic may be iatrogenic as in lung resection, esophageal tears & anastomosis, paracentesis, liver biopsy or non iatrogenic caused by stab wounds, gunshot wounds, and blast injuries. An empyema always passes through three stages unless managed properly. 1-Exudative Stage- Infection by pathogenic organisms, pleural membrane edema, exudation of protein fluid, thin fluid with low white blood cell count & mobile

lung. 2-Fibrino- purulent stage- Pleural fluid more thicker & turbid with high white blood cell count, deposition of fibrin layers, lung movement restricted. 3-Organization stage (Chronic)- Thickened fibrinous layers organize as collagen & vascularization by in growing capillaries in 4 to 6 weeks, peel or rind up to 1 inch thick, trapped lung, localization due to septa, dorsal scoliosis, fibro thorax due to calcification(1).

Management: Whatever the cause, successful management rests on two basic principles: First is control of infection with appropriate antibiotic therapy & second adequate drainage of pus. While the first one is based on availability of culture and sensitivity, the second can be accomplished by the following means 1. Closed drainage achieved by Thoracentesis, closed tube thoracostomy, fibrinolytic & irrigation therapy, 2. Open Drainage using rib resection, window, (Elloser flap), Video Assisted Thoracoscopic Surgery, thoracotomy & decortication (surgical), pleuro pneumonectomy & thoracoplasty. It is agreed that management of this

life threatening disease requires a multi disciplinary management as quoted by Jutley - Empyema Thoracis (pleural empyema) requires a multidisciplinary approach including physicians, surgeons, microbiologists and radiologists (2). Surgery has been considered essential component of management although its application has been controversial due to the morbidity associated to surgical therapy. However improved techniques of surgery and anesthesia have made it possible to treat many those patients by surgical interventions that were not considered for surgical therapy in the past. The management of 1st stage is always by tube thoracostomy, the 2nd stage has been a grey area. Some recommend that an early thoracotomy should be done to manage successfully an empyema while others believe that surgery should be reserved for only 3rd stage empyema. Thomas describes this fact in his words as *Thoracic empyema, the inflammatory process in a preformed anatomical space defined by the visceral and parietal pleura, was one of the first recognized thoracic pathological entities that had been a therapeutic challenge. Since then it seems to resist proper evidence-based approaches so far. As a paradoxical result of increased life expectancy, improved survival of malignant diseases and extended operability criteria within and outside the scope of thoracic surgery, the pool of potential candidates for empyema Thoracis is expanding.(3) . Thoracotomy has been the mainstay for surgical management for the past many decades. However its use was confined to stage 3 empyema due to the morbidity attributed to this procedure. A formal standard thoracotomy (postero-lateral thoracotomy) requires a quite long incision 10-12cm, division of major chest wall muscles with resection/removal of one or more ribs. This procedure ends up with a considerable magnitude of pain and morbidity that curtailed its use. On the other hand simple tube thoracostomy is in sufficient to resect the loculations made by empyema in 2nd stage. Current studies recommend an early surgical intervention into pleural space by opening Muscle-sparing limited thoracotomy has benefits of open lung decortication with little morbidity due to its limited incision, sparing muscles and preserving the rib cage intact.

The therapy for thoracic empyema requires appropriate antibiotics, prompt drainage of the infected pleural space and lung re-expansion. However, there is no clear consensus on the best

way to obtain these objectives (4). Although the history of disease is quite old and dates back to Hippocrates, the morbidity and mortality associated with disease is never underestimated. Different treatment options have been suggested in different era for successful management. There are isolated reports of the instillation of antibiotics, antiseptics and streptokinase (5, 6, 7, 8, 9, and 10) into the empyema space: Presently there is no general agreement on their use (11). Decortication is the method of choice when the underlying lung is unable to expand (trapped lung) due to the established thick inflammatory coat and the patient is fit enough for major intervention (3). Most of researchers have agreed that 2-6 weeks is sufficient time to evaluate success of tube thoracostomy. The morbidity associated with standard thoracotomy can be minimized by using muscle sparing techniques. Because most of these patients are in negative nitrogen balance, a check must be kept to improve their health status during this period. A tube thoracostomy alone cannot achieve the objective of restoration of normal lung function in most of the cases. Because of the indolent nature of many infections that leads to empyema and the potential for rapid pleural fluid loculations, patients frequently come to medical attention when the pleural fluid is not free flowing and closed drainage is unlikely to be successful (12). Therefore the need for a major surgical intervention cannot be denied. If we look on the other side of picture, Decortication by Thoracotomy is a painstaking procedure both for patients as well as surgeons. A muscle sparing limited thoracotomy is a definitive alternative to standard thoracotomy. The beauty of the procedure is that it gives complete view of thorax but the associated trauma is negligible. It is obvious that the more sophisticated an empyema treating system is, the higher the chance for a successful outcome (3).

Our hospital being a tertiary care cardio-thoracic hospital, we have to deal with a large number of empyema cases. We reviewed all the empyema cases that were referred to us by different pulmonologists for open surgical intervention from July 2011-Dec 2011.

MATERIAL & METHODS

We received 152 patients of different ages and sex. All of them were diagnosed as 2nd or 3rd stage empyema and medical therapy failed to achieve lung expansion. They had been managed by

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antibiotics in their wards before referral for surgery. The demographic data shows

Table 1: Age & Sex n = 152

Age in years	No. of patients	Percentage
<10	12	7.9 %
10-20	28	18.4 %
20-30	55	36.2 %
30-40	35	23.0 %
> 40	22	14.5 %
Males	82	53.9%
Females	70	46.1%

Majority of these patients belonged to age group 20-40 (90 /152) with more males than females (82/152). All had a history of previous tube thoracostomy. All patients were investigated by a battery of investigations which included.

Table 2: Hospital stay n=152

Stay in Days	No. of patients	Percentage (%)
Up to 7	65	42.7%
7-14	53	34.9%
14-21	27	17.8%
>21	7	4.6%

Investigations: X-ray Chest, C.T Scan Thorax Routine investigations required for surgical work up. All of them were subjected to M.S L Thoracotomy under general anesthesia. However in some cases (23/152) the incision had to be enlarged keeping in view the severity of disease resulting in thicker than expected pleura.

Exclusion Criteria:

Those patients who had some other pathology which was documented prior to surgery like cancer were not included in the study. All those patients who were diagnosed as malignant preoperatively or postoperative were essentially excluded from study.

RESULTS

The data was collected in reference to success of procedure, complications, and hospital stay. A note was also made to assess the time spent by the patient in hospital after surgery and we observed

that majority of our patients were discharged within 2 weeks of surgery (118/152).

Table 3: Surgical Approach

Subjected for limited thoracotomy	152
Incision extended	23
Limited thoracotomy done	129

The results of surgical procedure were evaluated in the following categories.

Criteria to evaluate Improvement

1. Both drains out within 2 weeks, complete expansion of lung, No pus drain and clinically significant improvement ----- GOOD
2. Drains out in 3 weeks or more, more than 80 % lung expanded, no pus drain and satisfactory improvement clinically ----- SATISFACTORY
3. Drains more than 3 weeks, persistent pus drain, bronchopleural fistula, further surgical intervention required ----- POOR

Table 4: Improvement Achieved n=152

Improvement	No. of patients	Percentage %
Good	76	50.0%
Satisfactory	57	37.5%
Poor	19	12.2

The objective of decortication is to restore the normal expansion of lung. Long illness doesn't allow patients to achieve complete expansion just after surgery. So the evaluation was made significant improvement on clinical and radiological basis. The evaluation also included the time of removal of chest drains. All the patients were followed up for at least 1 year. The results were quite satisfactory both regarding improvement and complications.

In vast majority of cases the results were promising and patients did well. A good improvement i.e complete expansion of lung with removal of chest drains within 2 weeks was attained in 76/152 patients. Another 57 made a satisfactory improvement. In them,

About 80% of lung expanded during the postop course and their drained for more than 2 weeks. 19/152 did not show a significant improvement and in all of them the incision had to be extended due

to fairly diseased underlying lung and thickened pleural peel.

There were very few complications encountered namely excessive bleeding in 6 patients and an air-leak which sustained for more than 1 week in 12 patients. All these complications however, required no further surgical intervention and were managed conservatively. All of them were followed up for 1 year and the follow-up results also show a significant postop improvement with no complication in the follow up period.

DISCUSSION

The role of surgery in empyema is well documented since the old times. Many studies have been conducted to elaborate various features of this fatal disease. Most studies recommend surgical remedy. We did this study to highlight the need for early surgery with a limited approach. No age is free of this disease. However young patients are prone to get this disease. In our study the majority of patients belonged to a younger age group. 39/43 patients were adults in study by Gregory et al (12). However number of patients studied in the same study was 43 in 44 months period. We managed 152 patients in 6 months duration which indicates that the number of victims of this disease is much higher in our scenario. This is explainable because of the lack of awareness, poor health facilities, poverty and lack of education. We concentrated our work on surgical aspects. Anyhow, antibiotic were given to all the patients in our study. The role of antibiotics is beyond any controversy. Antibiotics have to be given for very long duration which is cost-effective in our country. Amino glycosides concentrations are not detected in pleural pus after systemic administration either because they do not penetrate the blood-pleural barrier in empyema or are bio-inactivated by the pleural pus (13,14). It is possible that this situation exists with other antibiotics. Ciprofloxacin, however, has been shown to penetrate the pleural space easily and achieve concentrations well above the MIC90 of most pathogens normally associated with empyema (15). Early surgery is recommended in these cases to reduce the burden of antibiotics also. "Decortication" earlier in the clinical course (presumably during the fibrinopurulent stage) has been demonstrated to reduce morbidity and hospital stay (16,17). This fact is well supported in our study. Nearly 78% of our patients were discharged in 2 weeks time. Similarly the morbidity

was also very low in our study. The introduction of the "mini-thoracotomy" technique reduced the operative morbidity of open thoracotomy while hastening recovery (18). Following the above mentioned principles, we performed surgery in all the patients to evaluate the role of early surgery. Limited thoracotomy can be adopted in majority of patients suffering from empyema. Enough exposure can be achieved in most of the cases. We had to increase the length of incision in very few cases which proves that limited thoracotomy has no hindrance in exposure of lung. Breathing exercises and physiotherapy are required for restoration of normal lung. This objective cannot be easily achieved unless a patient is pain free. Muscle Sparing Limited Thoracotomy is known to cause much less pain as compared to standard thoracotomy. Although post operative pain was not an evaluation criterion in our study, yet our results show that this important cause of early recovery is significant in our study. Hence the patients in our study were extubated early; discharge from hospital was quicker and return to work was also early as compared to standard thoracotomy patients. In some of our patients we had to increase the length of incision and they were converted from limited to standard thoracotomy. This is also documented as all the surgical procedures where incision is economical, there is a provision to increase the incision where and when required. This does not compromise with the benefits of limited incision. We achieved very good results in majority of cases but those patients in whom surgery was delayed due to many reasons did not show satisfactory improvement. This indicates that early surgical intervention can get better results.

CONCLUSIONS

Pleural Empyema remains a persistent threat in developing countries where socioeconomic conditions do not permit frequent use of modern era broad spectrum antibiotics. Many cases of stage 2 pleural empyema can be easily managed by limited thoracotomy if standard thoracotomy seems to be too aggressive in this situation. Limited thoracotomy can not only reduce the morbidity of disease but can also reduce the economic burden by restricting hospital stay.

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