

Open Drainage with Rib Resection in The Treatment of Organized Thoracic Empyema

MMJ 2010; 9(1):67-70

Qais M. Ali

FICMS., Lecturer, Department of Surgery, Al-Mustansiriya College of Medicine

Abstract:

Objective: the aim of the study is to re-emphasize the importance of open drainage in the treatment of advanced thoracic empyema.

Methods: Fifty two patients with different types of thoracic empyema were received in advanced state with thick pus accumulating in the pleural cavity, in the period between 1996 and 2005. Most of

these patients were too catchexic to tolerate thoracotomy for decortication or more aggressive treatment. We treated them by open drainage with rib resection. .

Results: Nine patients (17.41 %) died'.while the rest of the patients survived. In 3 out of these 9 patients the death was due to the original pathology with empyema as an additional factor.

Conclusion: open drainage should not be ignored as one of the therapeutic options in treatment of advanced thoracic empyema. It might be the best therapeutic modality in catchexic patients, and 'where the facilities for more aggressive treatment are not available.

Key words: Thoracic empyema, Pleural empyema, Empyema thoracis.

Introduction:

Thoracic empyema is one of the oldest problems in medicine. Its pathological description is very old¹. Till now chronic advanced thoracic empyema is one of the most bothering problems in thoracic surgery carrying a significant mortality.

The most common causes of thoracic empyema are Parapneumonic, but post surgical or posttraumatic is also common ². In developing countries tuberculous empyema is also common. In general, infection of pleural effusion, traumatic haemothorax and chronic tuberculous effusion are the causes most commonly responsible for the development of empyema ³.

Repeated thoracocentesis carries a high risk of complications one of them is thoracic empyema ⁴. Tuberculosis is increasing again in developed countries for many factors. A very important factor is the increased number of immune-suppressed patients due to my infection and organ transplantation. Tuberculosis is one of the defining infections in AIDS ⁵. Patients with HIY have an increased propensity for developing thoracic empyema secondary to their susceptibility to polymicrobial pulmonary infections⁶.

Open drainage is the oldest modality for the treatment of thoracic empyema. It was described 2400 years ago⁷. In 1919 Sir William Osler required open drainage and rib resection for the treatment of empyema ⁸. In 1935, open drainage was revised by Elosser ⁹.

Many modifications of open drainage then were created, but still it was replaced by thoracotomy and decortication in the management of advanced thoracic empyema in most thoracic centers.

The aim of this study is to re-emphasize the importance of open drainage in the treatment of advanced thoracic empyema.

Patients and Methods:

In this study, 52 patients with thoracic empyema were treated with open drainage and rib resection. All these patients were in an advanced state. Their empyema was in the organized stage with thick puss accumulating in the pleural cavity. None of them was in the excudative or the

fibro-purulent stage. We received these patients in different hospitals according to the table (Table 1).

The causes of the empyema in these patients were: tuberculosis in 17 patients (32.69%), post-traumatic in 13 patients (25%), parpneumonic in 7 patients (13.46%), post thoracotomy for different diseases in 6 patients (11.54%), post thoracostomy for spontaneous pneumothorax due to rupture of emphysematous bullae in 6 patients (11.54%), and post repeated thoracentesis in 3 patients (5.77%). (Table 2).

The age of the patients ranged from 3years to 70 years with a mean of 28 years. Sex incidence was 10 females (19.23%) and 42 males (80.77%). 28 patients (53.85%) were with right sided thoracic empyema while 24 patients (46.15%) were left sided.

Most of the patients were cachexic with profound loss of weight, fever and loss of appetite.

Chest X rays were showing total or semi-total collapse of the lung with fluid level in the hemithorax involved by the empyema.

Most of these patients were already on medical treatment according to their causative disease and all of them were initially treated by thoracostomy tube.

Result:

Most of these patients were too cachexic to tolerate thoracotomy for decortication or resection. All the 52 patients included in our study, were treated primarily by closed thoracostomy drainage followed by open drainage with rib resection once the mediastinum was fixed. Fixation of the mediastinum was confirmed simply by disconnection of the thoracostomy tube from the underwater seal drainage system. If there was no deterioration in the respiration, this would mean that the mediastinum was fixed.

All the three patients who had got empyema after repeated thoracentesis for transudative effusion, died because of their causative disease (2 patients with advanced heart failure and one with chronic renal failure). Empyema was an additional factor in their death.

Among the six patients with chronic obstructive lung disease who had developed empyema after thoracostomy for treatment of spontaneous pneumothorax, four patients had died. Both chronic obstructive lung disease and empyema were important factors in their death.

Two out of the 17 patients with tuberculous empyema died. Both of these patients were with massive broncho-pleural fistula. All post-traumatic, post-pneumonic, and post thoracotomy patients were cured with no need for further surgical treatment.

For those who survived, daily dressing was needed for the first week after surgery, and then was remarkably less frequent.

Change of dressing 2-3 times a week was enough after one month from surgery and became once weekly after another month in most of the patients.

Medical treatment was continued accordingly. In most of the patients, hospitalization was needed for 1~2 weeks only.

In few weeks most of these patients were free of fever with better appetite, and finally all of them began to gain weight remarkably.

Soon after surgery, chest X ray showed the space in the hemithorax free of any air-fluid level and in few weeks proved remarkable lung expansion. The space in between the lung and the chest wall was diminishing continuously until it disappears in few months.

In 6-9 months the drainage ceased completely and the opening of the open drainage \was closed spontaneously with the patient free of symptoms with no need for further surgical treatment.

Table 1 Hospitals in which the patients were treated

Name of the hospital	No
Karkook military hospital	16
Al-Rasheed Military hospital	9
Ibn-Seena Teaching Hospital of Medical College/Hathramoot	26
Al-Yermook Teaching Hospital	1
Total	52

Table-2 Types of thoracic empyema according to their causative disease

Causative disease	No	%
Post-traumatic	13	25%
Para-pneumonic	7	13.46%
Tuberculous	17	32.69%
Post-thoracotomy	6	11.54%
Post-thoracostomy for management of spontaneous pneumothorax with emphysema	6	11.54%
Post-thoracocentesis for transudative pleural effusion	3	5.77%
Total	52	100%

Discussion:

Many treatment modalities have been described for thoracic empyema but the optimal timing of appropriate treatment remains controversial¹⁰. Success in treatment may depend on choosing the proper modality at the proper time. Selection of such a modality depends on the advance of the stage of the empyema, the general condition of the patient, the presence and severity of associated broncho-pleural fistula, the size of the empyema sac¹¹ and the facilities for the treatment.

Thoracic empyema was classified in 1962 by the American association of thoracic surgery into:

- 1- Excudative stage.
- 2- Fibro-purulent stage.
- 3- Organized stage¹².

The objectives of treatment for all stages of thoracic empyema are:

- 1- Control of the primary infection and its secondary manifestation, the empyema.
- 2- Evacuation of the purulent contents of the empyelna sac and eradication of the sac to prevent chronicity.
- 3- Re-expansion of the underlying lung to restore function^{7,13}.

The single most important intervention is early and effective drainage of the pleural cavity¹⁴. For patients in the excudative stage, evacuation of the fluid by repeated thoracentesis or thoracostomy tube with proper antibiotic therapy is usually successful^{15,16}. For patients in the fibro-purulent stage, tube thoracostomy with antibiotic therapy is needed. Video-assisted thoracoscopy (VATS) and Fibrinolysis may be needed.

Fibrinolysis is effective in prevention of loculations of the purulent material leading to complete drainage through the closed thoracostomy drainage ending in cure of the patient¹⁷. VATS is a safe and effective treatment option in treating fibro-purulent empyema whether used primarily or after fibrinolytic therapy failure¹⁸. VATS proved safe even in infants and children¹⁹

Video-assisted thoracoscopic debridement offers an ideal surgical technique for the treatment of early empyema¹⁶. VATS facilitates the evacuation of multilocular purulent effusions and division of fibrin septa^{20,21}. Early usage of VATS helps in avoidance of going into the organized empyema.

Some authors believe that pleural fluid collections which do not resolve after 2 days of thoracostomy drainage should be evacuated by VATS²²

In the chronic organized stage, thoracotomy with decortication is usually needed. Decortication can achieve all the objectives for the treatment, but it carries significant mortality in cachectic patients.

Open drainage is another option in these cases. For patients with long standing chronic empyema, intercostal thoracostomy drainage can be converted to rib resection and open drainage⁹.

This usually requires an open flap procedure which was first designed by Elosser in 1935. In this procedure, a full thickness skin flap is elevated after rib resection and then is inverted and sutured to the parietal pleura to ensure a wide opening⁹. Still it is very simple and very effective option. It provides adequate exposure allowing evacuation of pus and breaking up loculations and adhesions.

In comparison with closed thoracostomy drainage, it has the advantages of offering more free and more dependent drainage with the feasibility of free mobilization of the patient without the hindrance of the underwater seal system. In advanced empyema, closed thoracostomy drainage is often inadequate, and early rib resection is a safer and more efficient approach²³.

Open drainage will lead to complete evacuation of the purulent content of the empyema sac to eradicate infection, improve the general condition of the patient and give time for natural reexpansion of the lung which will usually take weeks or even months.

If the empyema cavity is unusually thick-walled and does not decrease in size satisfactorily, a decortication procedure can be planned after the inflammatory reaction in the region has subsided²⁴ and the general condition of the patient is improved.

In comparison with thoracotomy and decortication, open drainage can be better tolerated by cachectic patients especially if facilities of a good thoracic center are not available. Decortication in cachectic patients is carrying significant mortality²⁵.

The treatment of patients with open drainage will take a long period, but this is not so bothering for the patients. Hospitalization is usually needed for 1-2 weeks only. In 2 months it will demand no more than once weekly visit to the hospital for change of dressing. The whole period of treatment is 6-9 months.

Patience is needed in managing empyema patients with open drainage. The concentration should be paid in the first few days to the clinical evidence of improvement in the general condition of the patients and the radiological evidence of full evacuation of pus from the pleural cavity rather than to the decrease in the size of the empyema space. In our study, all patients v/hose general conditions had improved, there empyema space decreased later on with no need for further decortication.

Conclusions:

Open drainage with rib resection is still one of the effective therapeutic options in managing advanced thoracic empyema. It might be the best option in managing cachectic patients, and were the facilities for treatment are poor.

References

- 1- Tom Treasure, The Thorax, Pleural Empyema, In Baily and Love Short Practice of Surgery, Russell, Williams, Bulstrode, 24th ed; Arnold-Hadder headline group, 2004, pp 852-853.
- 2- Michael A. Maddaus and James D. Luketich, Chest Wall, Pleura, Lung and Mediastinum, In Schwartz Principles of Surgery, F. Charles Brunica, Dana K. Andersen, Timothy R. Billiar, David L. Dunn, John G. Hunter, Raphael E. Pollock, 8th Ed, The McGraw-Hill Inc, 2005, pp 601-602.
- 3- Elhassani 1[1]3, The Trapped Lung, J. Fac. Med. Baghdad, 1994; 36: 435-440.

- 4- Elhassani NB, Momtaz Jabir Omar, \Valeed Mustafa, Malignant Pleural Effusion, Iraqi Postgraduate ~1edical Journal,2001; 1:136-140.
- 5- Michael M. Henry, Jeremy N. Thompson, Thoracic Empyema In Clinical Surgery, M.Dusmet, 2ed Ed, Elsevier Sandres, 2005, pp 263-264,
- 6- Khwaja et al, 2005, Surgical Treatment of Thoracic Empyema in HIV Patients: Severity and Treatment ~1odality is associated with CD4 Status.
- 7 - Stewart M. Scott, Timothy Takaro, Disorders of the Lungs, Pleura and Chest Wall, in Sabiston Textbook of Surgery, David C. Sabiston JR, H. Kim Lyerly, 5th ed, WB Saunders Company, 1997, pp1835-1837
- 8- Thomas C. King and Craig R. Smith, Chest Wall, Pleura, Lung, and Mediastinum, In Principles of Surgery, Schwartz, Shires, Spencer, Fifth Edition, Kim Hup Lee Ltd, 1989, pp 676-681.
- 9- Harvey 1. Pass, Chest Wall and Pleura, in Hardys Textbook of Surgery, James D. Hardy, John S. Kukora, Harvey 1. Pass, 2ed ed, Lippincott Company, 1988, pp 824-825.
- 10- Ozel S. Kerem et al, Conservative Treatment of Postpneumonic Empyema in Children, Surgery Today, 2004; 34: 1002- 1005.
- 11- V.H.Thourani et al, Evaluation of Treatment 110dalities for Thoracic Empyerna: a Cost-Effectiveness Analysis, The .Annals of Thoracic Surgery, 1998; 66: 1121-1127.
- 12- Andrews NC, Parker EF, Sha\v RP, et al, P~merican Review of Respiratory Diseases, 1962; 85 :935-936.
- 13- Thurer RJ. Decortication in Thoracic Empyema, Indications and Surgical Technique, Chest Surg Clin N .Am, 1996; 6:461-490.
- 14- Hamm H., The Treatment of Parapneumonic Effusions and Pleural Elnpyemas, Pneumologie, 2005; 59: 696-703.
- 15- Michael J. Bono, Recognizing and Managing Thoracic Empyema, Emergency Medicine, 2004; 36:37-40.
- 16- Peter N. Wurnig et ai, Video-Assisted Thoracic Surgery for Pleural Empyema, The Annals of Thoracic Surgery,2006; 81:309-313
- 17- P. Misthos et al, Early Use of Intrapleural Fibrinolytics in The Management of Post pneumonic Empyema. A Prospective Study, European Journal ofCardio-Thoracic Surgery, 2005; 128(4): 599-603.
- 18- Petrakis Ioannis E et al, Video-Assisted Thoracoscopic Surgery for Thoracic Empyema: Primary or After Firinolytic Therapy Failure, The American Journal of Surgery, 2004; 187:471-474.
- 19- Ure B.M. et al, Thoracoscopic Surgery in Infants and Children, European Journal of Pediatric Surgery, 2005; 15: 314-318
- 20- S.P .Luh et ai, Video Assisted Thoracoscopic Surgery in the Treatment of Complicated Parapneumonic Effusions or Empyemas: Outcome of234 Patients, Chest, 2005; 127:1427-1432.
- 21- Striffeler H. et al, Video-Assisted Thoracoscopic Surgery for the Treatment of Fibropurulent Pleural Empyema in 67 patients, Annals of Thoracic Surgery, 1998; 65: 319-323.
- 22- T.K. Lim, Management of Pleural Empyema, Chest, 1999; 116: 845-846
- 23- John H. Lernmer et al, Modem Management of Adult Thoracic Empyema, The Journal of Thoracic and Cardiovascular Surgery, 1985; 90:849-855.
- 24- Tom R. DeMeester and Edwin Lafontaine, The Pleura, In: Gibbons Surgery of the Chest, David C. Sabiston Jr, Frank C. Spencer, 4th ed, , W.B. Saunders, 1983, pp 381-389.
- 25- Musket A. et al, Management of Refractory Empyema with Early Decortication, American Journal of Surgery, 1988; 156: 529-532.