

Management of Empyema Thoracis Peshawar Experience of 450 Patients

M. SALIM* A BILAL* T NISHTAR*** M. S NABI* G ALI** A MANSOOR* H SHAH*

*Department of Cardiothoracic Surgery, Lady Reading Hospital, Peshawar

**Department of Anesthesia, Lady Reading Hospital, Peshawar

***Department of Radiology, Lady Reading Hospital, Peshawar

Correspondence to Dr. Muhammad Salim

Objective: To observe the various clinical presentations of empyema thoracis and evaluate its management and outcome. **Study design:** An observational descriptive study. **Place and duration:** Department of Cardiothoracic Surgery, Postgraduate Medical Institute, Lady Reading Hospital from June 2001 to June 2004. **Materials and methods:** Clinical record of 450 patients who underwent various surgical procedures during 3 years were retrospectively analyzed. Detailed scrutiny of record was carried out to analyze the clinical presentation; various surgical procedures and outcome. **Results:** There were 270 (60%) male and 180 (40%) female patients. Majority of the patients 310 (68.8%) were in the age range of 20 – 40 years. Common presentation was fever (62%); cough (26%) and chest pain (11%). The duration of symptoms was less than 8 weeks in 57 % and more than 8 weeks in 42% cases. Common etiologies were pneumonia (31%), post tuberculous (37.7%), traumatic (24%) and iatrogenic (6.6%). Tube thoracostomy was the initial line of management in 200 patients. Decortication was required in 200 patients while 50 patients needed thoracoplasty to obliterate persistent residual pleural space. The mortality was 4% (18/450). Thirty one (7%) had wound infection, air leak in 18 (4%), wound dehiscence in 9 (2%) and septicemia in 14 (3%) cases. **Conclusion:** Depending upon the stage, various surgical options exist for the treatment of thoracic empyema. Selection of the most appropriate procedure must be individualized but the basic principle is evacuation of pus from the pleural space, appropriate antibiotic therapy and obliteration of empyema cavity.

Key words: Empyema thoracis, Management,

Pleural empyema or empyema thoracis is an accumulation of pus in the pleural space. It has been recognized as a disease entity since the time of Hippocrates and has been associated with high mortality. During World War I, the overall empyema mortality rate among US military forces was 61%¹. Before antibiotics were developed in the 1930s and 1940s, pleural empyema occurred in 10% of patients who survived pneumonia. Antibiotics effectively treated pneumonia and reduced the incidence of post pneumonic empyema. However, the incidence of postoperative empyema increased².

Treatment of an empyema depends on its course, whether it is acute or chronic, the state of the underlying lung, the presence of a bronchopleural fistula, the ability to obliterate the space and the patient's clinical condition and nutritional status³. In the exudative stage of parapneumonic, post resection and post traumatic empyema chest tube drainage and antibiotics according to culture and sensitivity is a safe, efficacious primary method of empyema management⁴. Failures are due to improperly placed tube, loculation, increased fluid viscosity and early peel on the lung⁵. Failures are managed with rib resection, intrapleural thrombolytics, Video-assisted thoracoscopic drainage (VATS) and decortication. Video-assisted thoracoscopy (VATS) surgery presents less invasive approaches to the management of empyema by minimizing access trauma. Video-assisted thoracoscopic drainage (VATS) has been found to be particularly useful for treating the fibrinopurulent phase of empyema in which multiple loculations could be easily disrupted to allow adequate drainage⁶. Chronic empyema begins

approximately 6 weeks after the onset of the acute illness. By then the wall of the empyema or the peel is organized by in growth of capillaries and fibroblasts and expansion of the lung by simple evacuation of the cavity can no longer be expected. Decortication or thoracoplasty can be used to obliterate the persistent space. In decortication thick visceral peel encasing the lung is removed to allow expansion and obliterate the space. A thick rigid parietal peel that restricts the mobility of thoracic cage should be excised^{7,8}.

Thoracoplasty is the last option to obliterate the pleural space resulting due to chronic empyema. It consists of the resection of a sufficient number of ribs to allow the chest wall to collapse and obliterate the space⁹. Thoracomyoplasty is the muscle interposition into the pleural space. Latissimus dorsi and Pectoralis major are usually interposed. This study was aimed to observe the clinical presentation, etiologies in our patients, the surgical techniques employed in various group of patients and determine the outcome.

Material and methods:

This is a retrospective analysis of patients with thoracic empyema who needed various surgical intervention over three years period (June 2001 to June 2004). All patients between 10 to 50 years of age were included while those with associated intraabdominal sepsis were excluded from study. The hospital records and operation reports of these patients were carefully analyzed for demographic features, operative procedures and outcome before surgery all patients we evaluated for fitness for general anesthesia by

anesthetist. Double lumen endotracheal tube was used with one lung anesthesia during surgery. Routine monitoring of pulse, blood pressure, ECG, SPO₂ and ETCO₂ was done during surgery and postoperatively. Surgical options included closed tube thoracostomy, decortication and thoracoplasty. Video-assisted thoracoscopic surgery (VATS) was not done due to non-availability of this facility at our department. Selection of appropriate treatment was chosen on the duration and extent of diseases and the site and nature of collection. Tube thoracostomy was used for cavity collection. Forth or fifth intercostal space in mid axillary line was the site of insertion. The skin; intercostal muscles and parietal pleura were infiltrated with 2% lignocane. Skin incision about 2 cm was done to make a tract. Chest tubes of different sizes (24 – 32F) were used according to the age and built of the patient. Drainage was assessed both clinically and radiologically. The progress was monitored if there was clinical and neurological improvement then suction was continued, otherwise, they were prepared for surgery.

Decortication was done for stage III empyema, clotted hemothorax and multiloculated empyema. Decortication was done through a standard posterolateral thoracotomy. Both parietal and visceral restricting peels were removed taking care to avoid lung damage and to reduce postoperative air leak. All loculations were broken down with finger and debris evacuated. Postoperatively patients were given effective analgesics. Patients were given regular physiotherapy and encouraged to cough. Continuous low pressure suction to chest drain was maintained for one week. Muscle flaps were not used because majority of our patients were weak and cachectic.

Thoracoplasty was done for failed decortication, destroyed lungs and postpneumonectomy empyema and bronchopleural fistula. Sufficient numbers of ribs were removed during the procedure to achieve complete collapse of chest wall towards mediastinum and obliterate persistent empyema cavity.

Results:

A total of 450 patients admitted for treatment of empyema thoracic were studied. There were 270 (60%) males and 180(40%) females. Their age ranged from 10 -50 years. Majority of the patients i.e. 69% were in younger age group (age range 20 - 40 years). The mean duration of symptoms was less than 8 weeks in 260 (57.7%) and more than 8 weeks in 190 (42.2%) cases. The presenting symptoms were fever 62%, cough in 26% and chest pain in 11% at the time of initial examination (Table I).

An underlying cause for empyema was sought. One hundred and seventy (37.7%) cases of empyema were posttuberculous; 140 (31.1%) postpneumonic, 110 (24.4%) postfirearm injury and 30 (6.6%) of iatrogenic etiology including postoperative empyema (Table III).

Table III depicts various surgical procedures performed at our department. Tube thoracostomy was the

initial procedure employed in 200 patients; decortication in 200 cases while only 50 patients needed thoracoplasty. The commonly used procedure decortication had the best success rate 94%, followed by thoracoplasty (83%).

Mortality was 4% (18/250). Causes of death included empyemic septicemia (eight cases), myocardial infection (four cases), Pulmonary embolism (three cases) and renal failure (three cases). Most common postoperative complication was wound infection 7%, followed by air leak 4%, wound dehiscence 2% and septicemia 3%.

Table I: Preoperative data of patients (n=450)

Variable	=n	%age
Sex		
Male	270	60
Female	180	40
Age (year)		
10-20	70	15.5
21-30	160	35.5
31-40	150	33.3
41-50	70	15.5
Duration of symptoms		
<8 weeks	260	57.7
>8 weeks	190	42.2
Symptoms		
Fever	280	62.2
Cough	120	26.6
Chest pain	50	11.11

Table II: Etiology

Variable	=n	%age
Post pneumonic	140	31.1
Post tuberculous	170	37.7
Traumatic	110	24.4
Iatrogenic	30	06.6

Table III: Surgical procedures (n=450)

Proceudre	=n	Success %age
Group A		
Tube thoracostomy	200	92(46)
Group B		
Decortication	200	188(94)
Group C		
Thoacoplasty	50	41(83)

Table IV: Mortality and morbidity

Mortality	=n	%age
Decortication/thoracoplasty (Group B & C)	18	4.0
Complication		
Wound infection	31	7.0
Air leak	18	4.0
Wound dehiscence	09	2.0
Septicemia	14	3.0

Discussion:

The American Thoracic Society classified empyema into three phases¹. The exudative or acute phase characterized by fluid of low viscosity; the lung is expandable². Fibrinopurulent or transitional phase characterized by

more turbid fluid, the lung is progressively less expandable³. The chronic or organized phase is characterized by very viscous pleural fluid, organization of pleural peel which traps and fixes the lung. These three phases exist as a continuum and the transition from exudative to fibrinopurulent phase is not always clear out^{10,11}. The basic principal of empyema thoracis management irrespective of stage is prompt drainage; appropriate antibiotics and reexpansion of the lung¹². Of all empyemas currently diagnosed, 50% are secondary to complications of a primary pneumonic process in the lung. Other causes are spontaneous pneumothorax, tuberculosis, chest trauma, subphrenic abscess, foreign bodies retained in the bronchial tree, esophageal perforation and operations involving lungs and mediastinum^{6,13}. Postpneumonic empyema was noted in 38% patients of our study. Tubercular etiology was found in 170 patients 37%. Massard et al¹⁴ reported an incidence of 29% in 1989, but this was significantly lower than what had been reported in various earlier studies^{15,16} where tuberculosis was responsible for majority patients with empyema thoracis.

There are few conditions in which management depends as much on the timing of treatment in the course of disease. Although it has been recognized for a longtime, the importance of timely intervention in empyema has not been emphasized enough¹⁷. The surgical approach to empyema has evolved over the years. During World War I, empyema treated by thoracotomy was associated with mortality. This prompted the establishment of the Empyema commission, which recommended chest tube drainage for treatment. Tube thoracostomy is usually the first step in the treatment of acute empyema. The success for tube thoracostomy is 70 – 85% but in our study initially 92 patients had adequate drainage with a success rate of 46%, more likely because most of our patients presented late with empyemas in organizing stage. Intrapleural instillation of fibrinolytic agents is being increasingly used for management of empyema thoracis. Intrapleural streptokinase appears to be a useful strategy to preserve lung function and reduce need for surgery in patients with early stage empyema thoracis¹⁷. We did not use this modality in our patients because patients we receive patients in very late stage.

The Successful application of VATS to debride and drain loculated empyemas and clotted hemothoraces has been described; by Hutter and Associates (1985), Ridley and Braimbridge (1991). Empyemas that are demonstrated, either on CT scan or intraoperative evaluation to have a thick and fibrotic peel with lung entrapment should be decorticated by open technique¹⁸. VAT (Video Assisted Thoracoscopic) debridement was not used in any of our patients due to non-availability of this modality in our setting. VATS is not indicated for TB with thick peel. Most empyemas that we see which have not responded to chest drain fall into this category. Decortication allows a more rapid recovery with a

decreased number of chest tube days, and decreased length of hospital stay¹⁹. The success rate for decortication is 90-95%; in our series it also had an excellent result (94%). Empyemectomy is rarely performed. It requires an extrapleural dissection of the pleural surface and tedious dissection of the sac from the lung²⁰. Just as in decortication of a chronically collapsed and trapped lung, lung damage requiring undesirable and unnecessary resection is often the result. Thoracoplasty is used primarily in the treatment of chronic thoracic empyema in cases in which either insufficient or inefficient pulmonary tissue exists to obliterate the pleural space. Although a great variety of thoracoplasty procedures have been described, the extraperiosteal paravertebral thoracoplasty described by Alexander (1937) is the standard operation. Ordinarily, seven ribs are resected which allows scapula and attached extracostal musculature to drop into the space and helps to maintain the collapse^{6,21}. Thoracoplasty in our series had 83% success rate. The hospital mortality in our patients (Group B & Group C) was 4%. Postoperative complications were few. Sepsis, wound infection, empyema, hemorrhage, prolonged air leak, and bronchopleural fistula are the most common complications. These postoperative problems are minimized by meticulous surgical techniques that control air leaks and bleeding and ensure complete re-expansion of the lung with obliteration of the pleural space. Wound infection especially of old intubation site is the main problem postoperatively.

Conclusion:

Thoracic empyema remains a common problem in third world countries. Early referred is advocated to prevent late complications of fibrothorax and reduced lung capacity. Timing of the surgical intervention is of paramount significance. First line of treatment is the chest drain and suction. Decortication being the second option should be considered early in any who have good surgical risk because it has high success rate low mortality and morbidity. Thoracoplasty still remains the last surgical option. Muscle flaps interpositioning can be accomplished in one setting with thoracoplasty. Therapeutic delaying of decortication in order to gain 6 / 12 months ATT, preoperatively is not recommended. If other lung is healthy the sooner definite management (decortication, thoracoplasty) done the better. If other lung is also diseased then surgical intervention can be delayed till the completion of ATT.

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