ORIGINAL ARTICLE

Outcome of pulmonary decortication in empyema thoracis

Niaz Hussain, Khurram Rais, Syed Waqar Ahmed, Tanveer Ahmed

Abstract:
Objective: To assess outcome of pulmonary decortication in chronic empyema thoracis.
Study Design: Prospective descriptive study.
Place and Duration of Study: Department of Thoracic Surgery JPMC Karachi.
Methodology: 50 patients of chronic empyema thoracis who were subjected to decortication were evaluated prospectively. Patients were evaluated by history, clinical examination, radiology, spirometry and other diagnostic tests. Decision for decortication was taken on the basis of duration of treatment, poor response to tube thoracostomy and thickness of pleural peel. Patients were followed in outpatient department for 6 months.
Results: Out of 50 patients in whom decortication was done, 36 were male and 14 female with mean age being 27.3 years (range 15-50 years). The mean duration of symptom was 65 days. Preoperative spirometry showed moderate restrictive defects FVC 51% (+ 13%) of the predicted value and FEV1 59% (+ 14%). Postoperative spirometry gave satisfactory results of FVC 66% (+ 14%), FEV1 70% (+ 13%) lung expansion with decortication was achieved in 36 (72%) patients. In 12 (24%) patients lung failed to expand 2 (4%) patients died due to uncontrolled sepsis.
Conclusion: Decortication can be safely performed in carefully selected group of patients which enables early resolution of the disease with expansion of lung and improved functional status.

Keywords: Empyema thoracis, Decortication, Tube thoracostomy.

Introduction:

An empyema thoracis is simply a collection of pus in the pleural space. An empyema may be associated with positive bacterial cultures or may even be sterile.[1] Empyema thoracis remains a common thoracic problem with challenging management strategies.[2,3] If empyema is not managed properly it progresses through exudative phase and fibrinopurulent phase to organizing chronic phase. An empyema cavity is formed and visceral pleural fibrosis limits reexpansion of lung, because of the presence of thick pus, and encapsulation by chronic inflammatory tissue poor drug penetration poses a genuine problem. Sub-therapeutic drug levels resulting in failure of medical treatment and development of acquired drug resistance are constant threats. Because many of the infections that cause empyema are indolent, a physician often sees patient after it has reached the fibrinopurulent or organized stage.[4,5] Empyema thoracis may follow pneumonia, pleural tuberculosis, ruptured liver abscess, clotted hemothorax and pneumothorax secondary to trauma, and bronchiectasis. Pulmonary decortication is the process of peeling or stripping away a constricting membrane from pleural surfaces. The term was first described by Delmore in 1896. Further refinement in techniques was described by Lloyed 1908, Lund 1911, Litenthal 1915, Ware 1917 and Eggers 1923. Samson and Tuttle 1946 renewed interest in this procedure. It involves thoracotomy with removal of all pus and fibrous tissue from the visceral pleura[6]. Neff CC et al suggest that it is not

Jinnah Post Graduate Medical Centre, Karachi
N Hussain
K Rais
SW Ahmed
T Ahmed

Correspondence:
Dr. Niaz Hussain
Flat # 402 Premier Arcade
Clifton Block 9, Karachi.
soomroniaz@yahoo.com
0333-2151543
Office Tel : 021-9201300
Ext. 2251

necessary to remove the parietal pleural at decortication as the underlying lung readily fills the space and the parietal pleural peel absorbs with time[7]. It is the procedure of choice for patients in whom pleural sepsis is not controlled by tube thoracostomy, intrapleural thrombolytic agents i.e. streptokinase and possibly thoracoscopy. Other indications include stage III (organized) empyema, infected clotted hemothorax, multiloculated empyema and bronchopleural fistula[8]. Contraindications are major bronchial cysts, destroyed lung, uncontrolled sepsis, contralateral disease, chronic debilitation and prohibitive concomitant organ dysfunction. Postoperative complications include damage to phrenic nerve or diaphragm, bleeding and air leaks, formation of bronchopleural fistula, hemothorax and re-emergence of pus, peel and entrapment.

Material and Methods:

A prospective study was conducted on 50 patients at the Department of Thoracic Surgery, JPMC, Karachi, over a period of 23 months January 2007 to November 2008. All consecutive patients with empyema irrespective of sex, above 12 years of age were included in the study. All symptomatic patients with extraparenchymal restrictive disease secondary to fibrothorax, with failed thoracocentesis, tube drainage or thoracoscopy and lung compression greater than 50% were selected for surgery. Those having major bronchial obstruction other than bronchial secretions, destroyed lung, uncontrolled sepsis, malignant pleural effusion, contralateral disease, chronic debilitation and prohibitive concomitant organ dysfunction were excluded from study. Patients were informed about the procedure to be performed and consent taken. After thorough history and clinical examination, chest x-ray, ultrasound chest, CT scan and spirometry was done and data was documented on proforma especially designed for this study. Patients with post tuberculous empyema were prescribed ATT at least for 3 months prior to surgery.

Bronchoscopy was done in all cases prior to surgery to rule out the bronchial obstruction. Posterolateral thoracostomy was done through the bed of 5th or 6th rib using double lumen endotracheal tube. After careful extrapleural dissection overlying cortical peel was removed from costal, diaphragmatic and visceral surfaces leaving mediastinal part. Care was taken to avoid injury to phrenic nerve, diaphragm and blood vessels. Drainage tube was placed and low pressure, high volume suction was applied to the drainage tube. Hemostasis ensured and wound was closed. Active chest physiotherapy was advised postoperatively. Antibiotics were advised. Postoperatively

ATT was continued in patients with tuberculosis. All patients were discharged between 2 to 5 weeks and followed in OPD for 6 months.

Results:

50 patients with empyema were included in the study out of which 36 (72% were male and 14 (28%) female with age range between 15-50 years. Mean age being 27.3 years. 29 (58%) had right sided empyema, 21 (42%) had left sided involvement. Common presenting symptoms were fever (80%), progressive chest pain (84%), and fatigue/malaise (88%). Other symptoms were dry cough (32%), dyspnea (30%), hemoptysis (20%) and expectoration (8%). All patients had decreased chest wall movement, diminished breath sounds and impaired sound transmission on the affected side. 18 (36%) patients developed empyema secondary to trauma. 10 (20%) patients had post tuberculous empyema, 8 (16%) had ruptured liver abscess, 6 (12%) had post pneumonic and post pneumothorax each. 2 (4%) patients had empyema due to bronchiectasis (table 1). Chest tube was removed between 5-10 days mean 7.5 (SD +2.5). Mean duration of postoperative hospital stay was 3 weeks. In 36 (72%) patients there was complete lung expan-

Table 1: *Causes of Empyema*

Causes of Empyema	No. of Patients (%)
Post traumatic	36%
Post tuberculous	20%
Ruptured liver abscess	16%
Post pneumothorax	12%
Post pneumonic	12%
Bronchiectasis	4%

Table 2: *Postoperative Complications of Decortication*

Postoperative Complications	No. of Patients (%)
Bleeding	12%
Minor Air Leaks	6%
Wound Infection	8%
Septicemia	4%

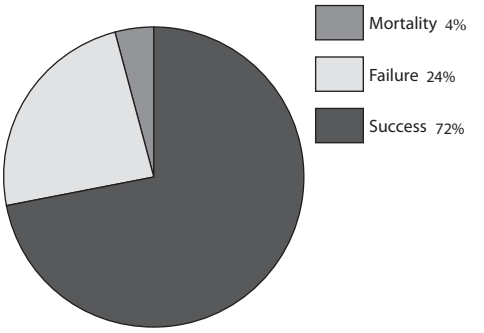

Figure 1: *Success*

sion while in 12 (24%) lung failed to expand. 2(4%) patients died due to recurrence of empyema and uncontrolled sepsis (fig. 1). Duration of postoperative hospital stay ranges between 2 to 5 weeks. The outcome of decortication was assessed on the basis of expansion of the lung on postoperative chest x-ray and improvement of postoperative spirometry results in relation to preoperative assessment, which showed preoperative forced vital capacity (FVC) 51% (+13%) of the predicted value and FEV1 59% (+ 14%). Postoperative spirometry gave satisfactory results of FVC 66% (+ 14%), FEV1 70% (+ 13%). Reasons of failure of expansion were thin emaciated patients with less respiratory efforts, decortication through deeper planes caused air leaks and excessive bleeding. Postoperative complications were bleeding in 6 (12%) patients, wound infection in 4 (8%) patients, air leaks in 3 (6%) patients, and septicemia in 2 (4%). We followed the patients for 6 months.

Discussion:

Decortication is the safe and effective treatment in the organized empyema, enabling complete expansion of lung.[4,5] The treatment of empyema thoracis requires appropriate antibiotics, drainage and re-expansion of the lung. The aim of decortication is to free the trapped lung and to obliterate the pleural space.[8] Treatment of empyema varies with the progression of disease. Stage I (exudative phase) usually require antibiotics with thoracocentesis.[9] As it advances to fibrinopurulent stage II disease, antibiotics with tube thoracostomy may provide cure. The optimal management include breakdown of adhesions to effect drainage of infected pleural fluid.[10] It may fail due to improperly positioned tube, small sized tubes, loculations, increase fluid viscosity and formation of early pleural peel. If no or partial response is observed with tube thoracostomy or empyema become organized (stage III) surgical intervention should not be delayed.[11] In general both VATS and open decortication have been shown to be safe and effective enabling complete expansion.[12, 13] Decortication allows a more rapid recovery with a decreased number of chest tube days and decreased length of hospital stay.[14] A usual cause of empyema reported in clinical studies is pneumonia where fever being the usual symptom.[14, 15] Our study shows trauma as the most common cause. Most of our patients presented with fever and progressive chest pain, fatigue and malaise. Patients presented with tuberculosis had longest duration of symptoms. It is essential to rule out significant lung parenchymal damage before decision of surgical intervention as perfusion and spirometry of normal lung improves significantly after decortication but the function of affected lung remains impaired. Since most of our patients had post traumatic empyema with healthy lung parenchyma, decortication gave good results. Success rate in this study was 72%. In contrast other authors have also found good success rate after decortication for empyema thoracis Asif et al reported 94% of success[14], while LeMense et al reported 90-95%.[15] Even some authors reported 100% success rate.[9] Success of decortication was observed by lung expansion on chest x-ray and improvement in spirometry results in relation to preoperative status. Mortality rate in this study was only 4%, which was due to recurrent empyema and uncontrolled sepsis. For all stages, mortality rate may be as high as 10% in healthy patients and 50% in elderly or debilitated patients.[16] Non-fatal postoperative complications were few like wound infection, bleeding and minor air leaks,

which were managed successfully although it increased the hospital stay. Similar complications were reported by different other authors[14,16]. The results of this study are encouraging enough to opt for decortication in those cases in which other modalities failed to control the disease.

Conclusion:

Decortication can be safely performed in carefully selected group of patients which enables early resolution of the disease with expansion of lung and improved functional status.

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