# COMPLICATED PARAPNEUMONIC EFFUSION: ETIOLOGY AND RESULTS OF LUNG DECORTICATION

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**Abstract-** Parapneumonic effusion is a common accompaniment of bacterial pneumonia and mostly is resolved with medical management. We studied the etiology and possible underlying causes of complicated parapneumonic effusion and timing of pulmonary decortication. A descriptive study on 34 patients with postpneumonic empyema which required decortication carried out. Post surgical and post traumatic empyema were excluded. Patients' age ranged from 20 to 75 with a mean of 46 years. The most common clinical findings were fever (90%), pleural dull pain (80%), productive cough (73%) and dyspnea (70%). PPD test was negative in all patients. In 78%, white cell count was normal; in remainder it was more than 10.000. Bacteriological findings were negative and acid fast bacilli were not detected. All patients underwent posterolateral thoracotomy and decortication and completely expansible lung was achieved. Tissue diagnosis after decorticating showed tuberculosis in 8 (24%) patients and necrotic tissue in remainder. Average medical management time and postoperative hospital stay were 38± 2 and 6.7 ± 2 days, respectively. Morbidity rates were acceptable and there was one late mortality. No recurrence was happened. In parapneumonic effusions not responding to standard treatment, tuberculosis must be considered, especially in addicted persons, positive family history and ESR >100. In complicated parapneumonic effusion, early thoracotomy and full decortication is recommend because it is diagnostic, allows control of infection, releases the pulmonary entrapment, early discharge from hospital, need not further antibiotic administration and is cost benefit.

*Acta Medica Iranica* 2008; 46(4): 291-294.

**Key word**: Parapneumonic effusion, lung decortication, tuberculosis, empyema

## INTRODUCTION

Parapneumonic effusions are pleural effusions that occur as a complication of pneumonia and affect approximately 60,000 individuals in the US annually with a mortality of approximately 15% (1, 2).

Received: 28 Apr. 2005, Revised: 2 Jul. 2005, Accepted: 5 Aug. 2005
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Up to 20-60% of patients hospitalized for pneumonia have radiographic evidence of pleural fluid. Most of these effusions are uncomplicated *i.e.* they resolve with antibiotic therapy alone. However, five to 10% follow a complicated course and progress through the three phases of exudative, fibrinopurulent, and organizing empyema (3-5). In these situations, presence of an underlying cause must be considered.

Antibiotic therapy is most effective if initiated in the exudative phase. Patients in the early fibrinopurulent phase of empyema formation may

respond to antibiotics and pleural fluid drainage. Once patients progress to an organized empyema, however, presence of pleural peels and thickened pleural membranes that trap the lung makes decortication necessary (6). However, the time of abandoning medical management and surgical intervention is ill defined (7).

This study will focus on possible underlying causes of complicated parapneumonic effusion, etiology and timing of pulmonary decortication.

# MATERIALS AND METHODS

A descriptive study on 34 patients with complicated parapneumonic effusion which required decortication was carried out in Kashan, Shahid Beheshti General Hospital, from Oct 1999 to March 2008. During this study we also had 31 patients with empyema [Post surgical (n=7) and posttraumatic (n=24)] which required decortication but were excluded. The study was approved by Ethics Committee of University and written informed consent was obtained from all participants.

Management of patients such as appropriate antibiotic, thoracentesis and dependent thoracostomy tube drainage was carried out in internal medicine ward. Complicated cases were referred to us for thoracotomy and decortication. Sex, age, duration of disease, occupation, place of living, possible risk factors, surgical methods, pathological results and complications were considered.

## Surgical technique

Bronchoscopy was undertaken in all patients in order to exclude any endobronchial lesion that would prevent expansion of the lung following decortication. Single lung anesthesia was administered using a double lumen endotracheal tube.

All of the patients underwent posterolateral thoracotomy and complete evacuation of fibrin clots, septae, necrotic tissue and fluid from the pleural cavity including fissures and recesses. Fibrotic peel on the lung was taken and fully expansible lung was achieved. Open drainage was not performed for post pneumonic empyema.

# RESULTS

Mean age of patients was 47 (20-75) years. There were 28 (85%) male and 6 female with a female/male ratio of 5:1. Many of the patients lived in urban areas (n=21). Our patients risk factors were as follows: three patients had family history of tuberculosis, aspiration pneumonia was found in two patients and 4 were addicted. None of them had history of tuberculosis.

The most common clinical findings are shown in Table 1. Purified protein derivative (PPD) test was negative in all patients. In 76% of cases, white blood cell (WBC) count was normal and in the rest it was more than 10000.

Bacteriological findings, due to previous antibacterial administration, were negative and acid fast bacilli were not detected.

Tissue diagnosis after decortications revealed tuberculosis in 8 (24%) patients, and the rest were necrotic tissue and pus. The mean erythrocyte sedimentation rate (ESR) in tuberculosis patients was 103 and in remainder it was 71.

Average medical management time was 38 ± 2 days while postoperative hospital stay was 6.7 ± 2 days. Morbidity rate was acceptable: wound infection in 3 and new chest tube insertion in 2 patients. In one patient late mortality was seen, due to respiratory insufficiency. No recurrence happened. Tuberculosis affected patients were successfully treated with anti-tuberculosis drugs.

# DISCUSSION

More than 50% of empyemas are secondary to a primary pulmonary process (3). This study showed tuberculosis as an underlying cause that had an important role in complicated parapneumonic effusion. Various frequencies of pleural effusion

**Table 1.** The most common clinical findings

| Clinical finding | Percent |
|---|---|
| Fever | 90 |
| Pleural dull pain | 80 |
| Productive cough | 73 |
| Dyspnea | 70 |

among tuberculosis patients has been reported: 6.7% in a large series of 5480 patients (8), 22% in Rwanda (9), 11.2% in Spain (10), but only 3% and 4.9% in the United States (11, 12).

In our study, a tuberculosis frequency of 24% is alarmingly high. So in confrontation with complicated parapneumonic effusion, one must have strong suspicion of tuberculosis empyema, admit the patient in isolated room, and general nursing self-care must be considered. In our study, ESR was significantly higher in tuberculosis patients compared with non tuberculosis patients (102 vs. 72) and it can be used as an important indicator of tuberculosis.

In spite of prolonged hospitalization, more than 5 weeks medical management, chest tube drainage and administration of various antibiotics, our patients were still febrile and dyspneic. We believe that such prolonged admission time is not cost benefit, in some patients leads to deterioration, and increased mortality and morbidity. It seems that in the early fibrinopurulent phase of empyema, if response to antibiotics is slow and unsatisfactory, because of the increasing viscosity, pleural fluid drainage is inadequate and before progression to an organized empyema surgical decortication is required. On the other hand, complete pleural space drainage usually is not possible, and often the tube became obstructed by fibrinous debris and stops functioning. The criteria for abandoning conservative therapy and adopting a surgical approach are at best ill defined. Failure to resolve sepsis, persistent leucocytosis and elevated erythrocyte sedimentation rate indicates the ongoing presence of infection (7)

The literature appears to support early surgical intervention, within 1-5 days of diagnosis, for either failed medical therapy or as a first-line therapy (13, 14). Conservative treatments using lytic agents are of little value and are associated with long hospitalizations and greater morbidity and mortality than operation (15). Thoracoscopy has been used to achieve pleural drainage in patients with tuberculosis empyema, but this technique, as well as intrapleural fibrinolytic agents, is not useful in chronic cases with a marked pleural thickness (16, 17).

It seems that early thoracotomy and decortication can be life saving in the presence of post pneumonic empyema, either due to tuberculosis empyema or non tuberculosis empyema. This approach is required to control infection and release the pulmonary entrapment and severely restricted movement of the entire hemithorax (18). In chronic empyemas, the pleural wall is thickened and penetration of the anti-tuberculous drugs is impaired, which leads to sub therapeutic levels in pleural fluid (19). Progressive acquired resistance to anti-tuberculous drugs has been described in patients with tuberculosis empyema (20). Nakaoka and coworkers treated 22 patients with chronic empyema with simple decortication, which was successful in 11 (50%) (21). All of our patients also were managed with simple decortication, and did not need other surgical options and antibiotic administration.

In conclusion, in parapneumonic effusion not responding to standard treatments, tuberculosis as an underlying cause must be considered, especially in addicted persons, positive family history or ESR > 100. Once medical therapy is seemed to have failed, early formal thoracotomy and full decortication is recommend. This may identify underlying causes and allows control of infection, release of pulmonary entrapment and early discharge from hospital without prolong antibiotic administration.

## Conflict of interests

The authors declare that they have no competing interests.

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