



ORIGINAL ARTICLE

Effectiveness of Decortication in Chronic Pleural Empyema

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ABSTRACT

Background: Chronic empyema thoracis is a debilitating illness with high morbidity and, and is seen among all age groups.

Our objective was to review all cases of chronic empyema thoracis treated by lung decortication and highlight the outcome.

Methods: 86 patients with chronic empyema thoracis were admitted and managed in our thoracic surgery unit who underwent surgery of lung decortication through posterolateral thoracotomy.

Results: Forced expiratory volume in 1sec (FEV1) and forced vital capacity (FVC) were significantly increased in postoperative than preoperative. There had significant improvement in the pre, post values of the lung volume on the diseased side and both lungs.

Conclusions: Lung decortication is followed by a significant improvement in spirometric parameters and CT findings.

Key words: Lung, Decortication, Empyema, Vital capacity, Expiratory volume.



INTRODUCTION

The development of disease would lead to permanent constriction by a fibrous tissue which causes stiffness of the thoracic wall, further constriction of large areas of the lung. In addition to that, residues of the empyema had responsible for general malaise, septicemia. Also, some authors reported critical of oxygen uptake in the atelectatic lung, which resolved critical after re-expansion. [1]

The underlying lung had usually unaffected unless the fluid production began as a parenchymal trouble, e.g. P.T.B, necrotising pneumonia, penetrating trauma or cases Therefore, this condition cannot be dealt with by conservative means. This lead to the fact that lung had the stone in management of empyema [2]. Lung had a technique procedure that involves; removal of parietal pleura, mobilization of lung, rectification of fissures, and removal of fibrous peels over pleura, suctioning of space [3]. The function depends on mechanics (muscles function), ventilation, perfusion, alveolar epithelial permeability. Lung function after treatment of C.P.E had evaluated by many authors, especially with regard to parameters. Such as vital capacity (V.C), forced vital capacity (F.V.C), forced volume in 1st second (F.E.V1) [4].

We had reviewed our experience, in the management of empyema, focusing on postoperative management, functional results.

The aim of the study was to evaluate the critical of operation in empyema.

METHODS

Study design

This prospective clinical study had conducted at the cardiothoracic surgery department; Zagazig University Hospital on 86 cases underwent elective lung operation for management of empyema from March 2018 to May 2019. Written informed consent was obtained from all participants, the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University.

All cases had subjected to preoperative evaluation included; History taking, Clinical examination: General examination vital signs, and local examination.

Investigations

Full laboratory investigations– x-ray (C.X.R) – Computed tomography (CT) chest; transverse, anteroposterior diameters. Although this distinction had based on analysis of fluid, certain C.T. features had been described as being highly suggestive of empyema. These include findings of enhancement, thickening of the parietal, pleura, thickening of the extra-subcostal tissues, and

increased density of the extra-subcostal fat. Function tests including forced vital capacity, forced volume in 1st second.

All cases underwent lung through a posterolateral thoracotomy. The parietal wall of the empyema sac had detached from wall. Thickened fibrous peel had completely removed from parietal wall, pleura. Any resultant tiny or large air leakage had repaired by suturing closely followed by irrigation. Two tubes had inserted before closing the cavity. Postoperative evaluation had done in clinic 6 months post operatively including: Full clinical examination, Investigations as C.T. chest. – P.F.T had done on fasting case in the morning, it included following values (forced volume in 1 sec (F.E.V1), forced vital capacity (F.V.C).

Ethical Approvals

The study was approved by "Institutional Review Board" (IRB) committee at Faculty of Medicine, Zagazig University. A written consent was taken from all subjects for ethical consideration. This research was carried out in agreement with the Statement of Helsinki.

Statistical analysis:

Statistical analysis had done by SPSS v25 (IBM Inc., Chicago, IL, USA). Numerical variables had presented as mean, standard deviation (S.D.), compared between pre, post measurements by utilizing paired Student's t- test. Categorical variables had presented as critical,

percentage (%). A two tailed *p* value < 0.05 had considered critical.

The rate of thoracic asymmetry had calculated by the following formula:

$$\text{Asymmetry \%} = \frac{\text{AP diameter on normal side} - \text{AP diameter on diseased}}{\text{AP diameter on normal side}} \times 100$$

Improvements in lung volumes, functions, asymmetries had calculated by :

$$\text{Improvement \%} = \frac{\text{postoperative value} - \text{preoperative value}}{\text{preoperative value}} \times 100$$

RESULTS

Table 1 showed that age of cases ranged from 25-60 with mean value 43.14±15.41. Empyema was more common in males on right side.

Table 2 showed that the most common cause was due to pneumonia in 27 patients (31 % of cases), lung abscess in 25 patients (29 %), TB in 6 patients (6.9 %), Hdatid disease in 5 patients (4.3 %), addiction in 11 patients (12.7 %), post traumatic in 12 patients (13.9 %) of cases.

Table 3 showed that forced volume in 1 sec (F.E.V1) and forced vital capacity (F.V.C) had significant increase in postoperative than preoperative (*p* <0.001).

Table 4 showed that significant improvement in the pre, post values of the lung volume on the diseased side and both lungs.

Table 1 Demographic data in all cases

| Cases (N = 86) | | |
|----------------|---------|-------------|
| Age | Mean±SD | 43.14±15.41 |
| | Range | 25-60 |
| Sex | Males | 55 (64.%) |
| | Females | 31 (36%) |
| Side | Right | 48 (55.8%) |
| | Left | 38(44.1%) |

Table 2 Etiology of empyema

| Causes | N | % |
|------------------------|----|---------|
| Pneumonia | 27 | 31 % |
| Lung abscess | 25 | 29 % |
| TB | 6 | 6.9 % |
| Hydatid disease | 5 | 4.3 % |
| Addiction | 11 | 1 2.7 % |
| Post traumatic | 12 | 13.9 % |

Table 3 Comparison of pre-, postoperative spirometry parameters

| Spirometry parameters | Pre | | Post | | % Change | p value |
|-----------------------|-------|-------|-------|-------|----------|---------|
| | Mean | SD | Mean | SD | | |
| F.V.C | 2.101 | 0.273 | 2.726 | 0.414 | 29.8 | 0.001 |
| F.E.V1 | 1.239 | 0.278 | 2.024 | 0.550 | 63.4 | 0.001 |

F.V.C: forced vital capacity, F.E.V1: forced volume in one second.

Table 4 Lung volume, improvement of thoracic asymmetry in all cases

| Lung volume (mL) | Pre | Post | Range of improvement | of p value |
|-------------------------------|----------|----------|----------------------|------------|
| Operated side | 1239±454 | 1848±522 | 71% (-- 22 to 248) | <0.001 |
| Non operated side | 2094±561 | 2311±508 | 15% (-- 20 to 100) | 0.026 |
| Both lungs | 3333±840 | 4159±918 | 31% (- 13 to 132) | 0.001 |
| Thoracic asymmetry (%) | 4.3±3.3 | 2.8±2.2 | 25.5% (-50 to 100) | 0.026 |

DISCUSSION

The purpose of this operation had to ensure full debridement of the pleura, re-expansion of the lungs without air leakage or dead space. Had generally thought to improve function tests. However, in the literature, the results of reviews examining the critical of this operation on functions had contradictory. Some reviews had reported that the lung had functionally improved, while others found that parameters deteriorated [5]. Its worth to be mentioned that the operative time critical decreases with delayed presentation to technique [6]. However, shorter tube duration, postoperative hospital stay, technique procedure duration had noted in early drainage, cases in other several reviews [7].

The mortality rate of cases with related empyema had considerably higher than that of empyema due to other causes. Most of the early empyema cases had reportedly been successfully administered with a range of anti-regimen, thoracocentesis, thoracic drainage [8] While, cases with empyema, with complications of empyema require a long-and sequential course of treatment, technique. Empyema generally brings worse outcomes than in non-etiologicals because of the associated complications such as fibro-cavitary parenchymal disease, frequent bronchofistulae Among functional reviews in cases with C.P.E, spirometry had the most common [9]. In our study 2 cases of T.B. empyema showed prolonged air leak for more than 2 weeks which stopped with continuation of antituberculous treatment.. The conclusions had contradictory to differences in numbers, quality of analysed material. When T.B.C or other destructive lung disease had a dominant etiologic factor, parameters do not improve after the treatment. Hassan et al. conclusion, based on results of reviews where T.B.C had an etiologic

factor only in 25% of cases that mean V.C. for the whole gathering does not improve after the treatment. They also noted that only for cases with preoperative V.C. decrease of more than 40% of the predicted value, could profit functionally postoperatively [10].

In agreement with our results, Abraham, Chikkahonnaiah 2020 included 35 cases with empyema who underwent via a posterolateral thoracotomy had reviewed, followed up for 6±3 months after technique. The mean F.E.V1, F.V.C values improved critical during the follow-up period [11].

In agreement with our results, Mohaptra B et al. included 50 cases with empyema that underwent lung via a posterolateral thoracotomy. The mean % of predicted F.E.V1 had critical between the 2 gatherings [12]. Burt, colleagues categorized 65 cases who underwent into 2 gatherings parameters showed critical improvement after technique in each gathering, but the degree of improvement had not statistically different between the 2 gatherings [13].

Wang et al. established a direct relationship between higher levels of lactic dehydrogenase, longer disease duration. Imaging reviews consisted of roentgenograms, ultrasound, C.T. These reviews demonstrated a thick cortex, constriction of the thoracic cage. C.T. had particularly useful for showing the cortex, loculations, size of the empyema, evidence of constriction of the thoracic cage [14]. Yang, colleagues applied 3-dimensional reconstruction C.T. to evaluate lung volume expansion in the follow-up after in case There had no specific indicators to confirm the chronicity of the empyema however, in this series, the presence of the cortex, constriction of the thoracic cage coupled with evolution times of more than 15

days had indicative of empyema in all cases [15]. In a recent study, Liu, colleagues reported good results of technique for empyema in its initial stages, but noted that severe forms of empyema with intense adhesions need open technique techniques. [16].

Open thoracotomy, had the standard treatment for empyema, There had many technique reviews that show decortications to be safe, critical for treating empyema. In general, both V.A.T.S, open decortications had been shown to be safe, critical in the organized empyema enabling lung expansion. With the advancements in medical sciences, V.A.T.S.D had a feasible treatment in the fibrin purulent phase of empyema (Stage II) when drainage alone had critical [17]. It had shown rewarding results in several reports, had an attractive invasive approach, had made the technique intervention a more acceptable early treatment option It allows a more rapid recovery with a decreased number of tube days, decreased length of hospital stay [18]. Our results had similar to earlier reviews, which had shown critical improvement in functions after especially due to the late presentation of our cases in study. The success rate for had 90-95%. In our series success rate had similar but there had been no prospective, randomized reviews comparing open thoracotomy, with videothoracoscopy. Such a study had necessary to define with certainty which cases would benefit from open thoracotomy, which ones from videothoracoscopy.

CONCLUSIONS

Lung had a technique procedure that involves; removal of parietal pleura, mobilization of lung, rectification of fissures usually followed by a critical improvement in parameters, C.T. findings. We prefer open thoracotomy than V.A.T.S due to the late presentation of our cases.

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