Evaluation of Optimal Timing of Thoracoscopic Decortication for Empyema

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ABSTRACT

Introduction: Although the VATS pleural drainage and decortication have been proven to be effective treatments in the early stages of empyema, the optimal timing of VATS is still not clear. To assess the effectiveness of early VATS, this study was conducted to examine patients undergoing decortication. Methods: Patients with empyema were treated with VATS and open decortication in Imam Khomeiny Hospital from October 2014 to October 2017. Forty four patients were divided into 3 groups based on the interval between the onset of chest symptoms and the time of operation. The first group consisted of patients with symptoms beginning from less than 2 weeks ago, the second group were the patients with 2 to 4 weeks of symptoms and the third were those with symptoms for more than 4 weeks. Data were collected using a checklist and analyzed by SPSS software. Results: Groups 1 and 2 showed shorter chest tube duration, postoperative hospital stay, surgical procedure time than group 3. Conclusion: Patients with symptom durations of less than 4 weeks showed better results than those with symptom durations greater than 4 weeks. Thus, symptom duration can be considered a reliable preoperative factor in deciding the surgical management of empyema.

Key words: Thoracoscopy, Decortication, Empyema, VATS

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Introduction

Thoracic empyema is a purulent effusion that occurs at all ages, but is more common in older people or patients with weaker immune systems. The most common conditions associated with empyema are parapneumonic process in patients with benign and malignant pulmonary disorders, heart problems, diabetes mellitus [1], drug and alcohol abuse, neurological disorders, post-thoracotomy complications, and immunodeficiency and trauma. The rate of empyema-related mortality can vary from 1% to 40% in patients with immunodeficiency, depending on the presence or absence of concomitant disease [2-4]. Nowadays, different strategies are adopted for the treatment of empyema, including treatment with antibiotics (with and without thoracosynthesis) to pig tail drainage under the guidance of radiology, chest tube or in more advanced cases, minimally invasive surgical interventions including VATS and finally Thoracotomy is open [5-7]. In conventional treatment after antibiotic administration, surgical intervention is often recommended if pleural fluid is localized. Recently, plurolysis and decortication by VATS have been approved for effective treatment in the early stages of empyema, especially in the fibroplorant phase [8-10]. Thoracoscopic imaging (VATS) surgery can play a link between drug therapy and invasive surgery, and therefore can be very important in the treatment of parapneumonic and empyema effusions. Many authors recommend the effectiveness of VATS in draining and decorating the empyema, even in prolonged cases, against open thoracotomy, although there is still controversy [11-13]. Accordingly, considering the advantages and advantages of VATS, including: 1- Less pain 2- Less postoperative morbidity 3- Less mortality 4- Maintaining respiratory mechanics 5- Shortening the length of hospital stay has caused VATS Be a logical procedure in the treatment of empyema in different stages [14-16]. In a systematic review study conducted by Hui Pan et al., The data obtained showed that in VATS surgery, the duration of surgery was shorter, the length of hospital stay was shorter, the duration of the chest tube was shorter, the amount of elongated air leakage was shorter, and the amount was morbid. And mortality was lower and indicates the superiority of thoracoscopic decoration compared to open thoracotomy [17-19]. A study conducted by Mr. Vaziri et al. In Iran in 2011 was a retrospective study of patients diagnosed with empyema who were classified into 5 different treatment groups. The results show that the success rate of thoracoscopy is 75% and thoracotomy is 90% and early thoracoscopy or thoracotomy is recommended, especially in the
elderly [20]. However, due to the high rate of conversion of VATS to open thoracotomy and technical problems during the drainage procedure with VATS, it shows better results in cases where thoracoscopic treatment is done at the right time [21]. Unfortunately, there is no accurate and complete information on the best time to do VATS and no comprehensive agreement has been reached. Delay in surgical intervention is associated with worsening of the patient and the patient's condition after surgery. Therefore, all of these cases necessitate the determination of an appropriate time for surgical intervention in the treatment of empyema. According to these cases, the aim of this study was to determine the best duration of thoracoscopic decortication surgery in empyema [22].

Material And Methods

The present study is a descriptive-analytical study that after approving the plan and obtaining permission from the Research Council and the Ethics Committee of the University of Medical Sciences, patient information by referring to the records of patients with empyema who underwent thoracoscopic decortication surgery from 2018 to 2020. Inclusion criteria included diagnosis of primary empyema, which is the presence of clear pus or pleural effusion consistent with the definition of empyema in terms of biochemistry and the presence of local effusion or the presence of pleural effusion with effusion and the presence of symptoms including pleural chest pain, Dyspnea, persistent fever, persistence of effusion despite the presence of chest tube and symptoms of septicemia in the field of pleural effusion, all of which are indicative of surgical intervention. In addition to demographic information of patients, including age and sex, other information extracted from the records including the time from the onset of symptoms to surgery, duration of surgery, type of procedure, duration of chest tube retention, length of hospital stay after surgery, duration of hospitalization in the intensive care unit, empyema stage, history of previous diseases, history of chest trauma, side involved, preoperative treatments. Quantitative variables were reported as mean and standard deviation and qualitative variables were reported as number (percentage) in the form of appropriate tables and graphs. Analysis of variance (if necessary, its non-parametric equivalent) and Chi-square for qualitative variables were used to compare the mean of quantitative variables in terms of grouping from the time of onset of symptoms to surgery. Data analysis was performed using SPSS 20 software and the level of significance in all tests was considered less than 0.05. All patient information is
available to the researcher only and the results of the study are presented in groups and without names. All stages of the study were approved by the University Ethics Committee (IR.UMSU.REC.1397.009)

**Results**

The present study is an analytical study with the aim of determining the best time for effective treatment of empyema with thoracoscopic technique, which were included in the study based on the inclusion criteria of patients who underwent thoracoscopic decoction surgery. Patients were divided into three groups A (under 2 weeks) and B (2 weeks to 4 days) and C (4 weeks and up) based on the time from the onset of symptoms to surgery. Retention of chest tubes, duration of hospitalization after surgery, duration of hospitalization in intensive care unit, empyema stage, history of previous diseases, history of chest trauma, involved side, preoperative treatments in patients under study it placed. In the study, a total of 44 people were included in the study based on inclusion criteria. Fifteen patients were in group A, 14 in group B, and 15 patients in group C. In the present study, the mean age of the studied patients was 46.29 years with a standard deviation of 18.79 years. The highest age among the studied patients was 70 years and the lowest age of the studied patients was 2 years. In group A, the mean age and standard deviation of patients was 49.46 ± 19.44 years and in group B, the mean age and standard deviation of patients was 44.92 ± 16.32 and in group C, the mean age and standard deviation of patients was 41 ± 21.02. There was no statistically significant difference between the groups in terms of age (P = 0.731). Among the patients studied, a total of 35 cases (79.54%) were male and 9 patients (20.46%) were female, of which 11 were male (73.33%) in group A, respectively. 4 patients (26.67%) were female and in group B 11 cases (78.57%) were male and 3 cases (21.43%) were female. In group C, 13 cases (86.66%) were male and 2 patients (13.34%) were female and there was no statistically significant difference between the two groups in terms of male to female ratio (P = 0.660). Mean white blood cell count was evaluated in the three groups studied. In group A, the mean WBC of the studied patients was 6776.26 ± 1449.18; in group B, it was 11945.64 ± 3650.46, and in group C, 69. It was 11706 ± 10872, in which the three groups had a statistically significant difference (P = 0.048). Also, disease stage was compared in three groups, which were not statistically significant in terms of disease stage. In the study, the residence time of chest tubes was studied in three groups. In general, the mean duration of chest tubes was 6.20
±2.67 days, which in group A was 5.35 ±1.63 and in group B was 6.91±3.16 days, and in group C, it was 7.86±3.98, which was statistically significant between the groups (P=0.009).

**Discussion**

Plural effusion generally occurs in approximately 40% of cases of pneumonia and can often be cured with antibiotic and supportive treatment, but if it is resistant, its secondary treatment after antibiotic treatment has always been controversial. Especially regarding the role of surgery, the treatment of this complication in different stages of the disease has always been a challenge for doctors and surgeons(5 , 7). Recent epidemiological studies show that the prevalence of empyema appears to have increased in the last 2 decades. Unlike simple pleural effusions, empyema has a rapid clinical progression and any delay in treatment may increase mortality, and the importance of prompt surgical intervention has been reported in several studies, including early use of VATS drainage or decocction. It has had better treatment outcomes than thoracotomy patients, and VATS is currently the best treatment for empyema patients in the early stages, especially the fibroplerant stage [23]. However, due to the lack of sufficient information regarding the optimal timing of surgery in pleural effusion and empyema, many surgeons are still skeptical about the timing of this surgery. In most clinical cases, the decision to intervene surgically is based solely on the patient's clinical condition (eg, fever, leukocytosis, chest x-ray, and chest CT) and relies heavily on the physician's clinical experience and subjective perspective, resulting in delay. In performing surgery and performing the necessary intervention, the patient's condition worsens [24-26]. Therefore, in order to clarify the optimal surgical time during the management of empyema patients, we divided the patients into three groups based on the onset of symptoms until the time of surgery, based on previous studies. It takes 2 weeks for the fibroplerant phase to change and enter the next phase, so we divided the patients into three groups based on previous studies: 2 weeks and 2 weeks to 4 weeks and 4 weeks and above [27-29]. In our study, patients whose surgery was performed less than 2 weeks after the onset of symptoms had better treatment outcomes in terms of the length of time the chest tube remained, the length of hospital stay after surgery, and even the level and duration of hospitalization. Although the ICU was not significantly different, it was significantly lower in patients who underwent surgery for less than 2 weeks. Our study showed that white blood cell count and the time of onset of symptoms are two important factors in predicting surgery time, length of
hospital stay, and length of stay in the chest tube, although patients' WCC is a much weaker factor and seems to be longer. Symptom time can be an effective factor in estimating the time of empyema and pleural effusion surgery [30].

**Conclusion**

Finally, empyema is generally an infectious disease of the pleural space with a wide range of clinical symptoms that generally requires surgical intervention and thoracoscopic surgery with the help of imaging is a less invasive and effective method in the treatment of empyema. Our study showed that timely surgery time and surgical phase (fibroplant) can enhance the role of this treatment in the treatment of these patients. Be. In our study, no case of mortality was reported among patients and the duration of hospitalization among patients was reported to be about 8.5 days. Although the sample size of our study was less than Chang's study, it seems that the surgeon's experience plays a key role, especially in cases where the duration of the onset of empyema is long, and the surgeon's experience is the first and most basic option in choosing the course of treatment, and becomes more prominent if the symptoms have been longer for a long time.

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