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Safety and efficacy of medical thoracoscopy in the management of loculated thoracic empyema



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ABSTRACT

Background: Pleural empyema can be subdivided into 3 stages: exudative, multiloculated, and organizing. In the absence of clear septation, antibiotics plus simple drainage of pleural fluid is often sufficient treatment, whereas clear septation often requires more invasive treatment.

Aim of study: To evaluate the safety and efficacy of medical thoracoscopy in the management of loculated thoracic empyema.

Methods: This study was conducted at chest department, Al-Azhar Faculty of medicine Al-Housein University Hospital in the period from October 2015 to August 2016. On 30 patients, 22 males and 8 females with age ranging between 20 and 74 years (mean age 48.3 ± 15.5 years). Diagnosed as loculated thoracic empyema (27 patients) or empyema failed to respond to medical treatment or chest tube drainage (3 patients) were undergo medical thoracoscopy.

Results: A total of 30 patients with loculated empyema were managed by medical thoracoscopy. Histopathological finding of study sample were (Non-specific inflammation 23.3%, Suppurative exudative reaction 16.7%, Tuberculous caseating granuloma 23.3%, Lymphocytic Inflammation 6.7%, fibrino purulent inflammation 13.3%, adenocarcinoma 3.3, Pleural fibrosis and thickening 10% and Pleural calcification, ossification, pleurisy 3.3%). Medical thoracoscopy was considered successful without further intervention in 26 of 30 patients (86.7%), 3 patients (10%) clinically improved but lung did not expanded and referred for thoracic surgery for decortication and 1 patient (3.3%) need for surgery to fistula closure.

Conclusions: Our study confirms that loculated pleural empyema could safely and successfully be treated by medical thoracoscopy.

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Introduction

Pleural empyema is defined by a collection of pus in the pleural space and it is associated with a significant morbidity and mortality of 2–30% [1]. Empyema is a critical illness that was already known to Hippocrates. Since then, considerable progress has been accomplished in the management of this disorder. Not with standing this favorable development, mortality and morbidity are still substantial [2,3]. The formation of a mature Parapneumonic effusion (PE) can be divided into three stages: (i) the exudative stage, (ii) the fibropurulent stage and (iii) the organization stage. The

exudative phase is characterized by a sterile exudate secondary to increased permeability of the visceral pleura. The fibropurulent phase represents pleural infection with the deposition of fibrin on visceral and parietal pleural membranes and the formation of loculations. Pleural fluid glucose and pH decrease and LDH increase in pleural fluid. The organization stage occurs with the influx of fibroblasts into the pleural space and formation of inelastic pleural peels and dense fibrous septations. The rapidity and extent of progression to a mature PE depend on the type and virulence of the pathogen, the patient's host defenses, and the timing and effectiveness of antibiotic therapy. Various classifications have been proposed to clinically stage the extent of pleural inflammation and PPE formation [4,5]. Ultrasound is particularly helpful in determining the nature of localized or diffuse pleural opacities, and is more sensitive than X-ray in identifying small or loculated pleural effusions, to identify and quantify the pleural septation at an early

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stage and the reduction of mobility of the diaphragm, which can correlate with the prognosis. Septations within the effusion are less readily seen on CT as compared to ultrasonography [6,7]. Medical thoracoscopy has been proven to be a safe tool in establishing the diagnosis in patients with multiloculated empyema and unresolving empyema [8]. Attributed this high yield to the fact that thoracoscopy allows the operator the advantage of visualizing the pleural cavity including the diaphragmatic and visceral pleura as well as the lung which gives a chance to gain good information on the extent of the disease, in addition, it allows adequate tissue sampling. They concluded that it is a valuable procedure which can achieve an accurate degree of staging by detecting tumor invasion to the pleura [9,10]. Its diagnostic yield in multiloculated empyema and unresolving empyema is reportedly 91.7% [11]. Several studies show success rates with medical thoracoscopy between 73% and 100% [12].

Patients and methods

The study was conducted at chest department, Al-Azhar Faculty of medicine Al-Housein University Hospital in the period from October 2015 to August 2016. Thirty patients (22 males and 8 females) diagnosed as loculated thoracic empyema (27 patients) or empyema failed to respond to medical treatment or chest tube drainage (3 patients) were undergo medical thoracoscopy.

Inclusion criteria

- 1) Loculated empyema defined as ultrasonographic presence of empyema loculations with presence of intrapleural septa.
- 2) Empyema failed to respond to medical treatment or chest tube drainage was undergoing medical thoracoscopy.
- 3) Patients who are fit for thoracoscope e.g. acceptable bleeding and coagulation profile and no contraindications as; uncooperative patients and patients with limited respiratory reserve.

Exclusion criteria

- 1) Transudative pleural effusion.
- 2) Bleeding disorders.
- 3) Hemo-dynamically unstable patients.
- 4) General contraindications to thoracoscopy e.g. unstable angina, left ventricular failure, uncontrolled hypertension, bleeding tendency...etc.
- 5) Recent history of chest trauma or proved hemothorax.

The following will be done for all patients

- 1) Thorough medical history including:
 - a) Personal history; name – age – sex – occupation – special habits.
 - b) History of present illness.
 - c) History of other diseases or associated co morbidities (diabetes, hypertension, cardiac or hepatic diseases).
 - d) Past history especially of pulmonary tuberculosis or malignancy.
 - e) Full clinical examination including: General and local examination.
 - f) Family history of any chest diseases especially pulmonary T.B or malignancy.
- 2) Routine hematologic investigations:
 - a) Complete blood count (CBC).
 - b) Erythrocyte sedimentation rate (ESR).

- c) Liver function tests: serum bilirubin, plasma proteins, serum albumin, SGPT, SGOT.
- d) Kidney function tests: Blood urea and serum creatinine.
- e) Prothrombin time and partial thromboplastin time.
- f) Fasting and two hours post prandial blood glucose, simultaneous with measurement of pleural fluid glucose level.
- g) Serum LDH simultaneous with measurement of pleural fluid value of LDH.
- h) Serological analysis: 1-Serum rheumatoid factor (RF), 2-Serum antinuclear antibody (ANA).
- 3) Pleural fluid aspiration and analyses for:
 - 1) Thoracentesis and pleural fluid examination (empyema defined as frank pus with or without positive Gram stain smear and bacteriological culture or pH < 7.2 with signs of infection.
 - 2) Pleural fluid examination, for determination of glucose, protein, lactate dehydrogenase, adenosine deaminase (ADA), culture and sensitivity for bacteria, fungi, Ziehl Nielsen Stain (ZN) staining and cytological examination.
- 4) Radiological investigation
 - Chest X ray and CT scan to localize pleural fluid collection and assess the echogenicity of the effusion.
 - Chest ultrasound. Loculated empyema defined as ultrasonographic presence of empyema loculations with presence of intrapleural septa.
- 5) Medical thoracoscopy (MT)

The procedure was carefully explained to the patient, and consent was obtained. MT was done at bronchoscopy suite by the medical thoracoscopist on schedule, under local anesthesia.

Thoracoscopy procedure

- MT was done at bronchoscopy suite by the medical thoracoscopist on schedule, the operator and assistant hands were scrubbed and surgical masks, gowns and gloves were worn.
- Ultrasonography on bed suit
- Sterilization of the studied hemithorax was done by antiseptic solution.

Anesthetic techniques

- A. After skin sterilization, local anesthesia by about 20 ml of 2% lidocaine, infiltrating the skin, the subcutaneous tissues, the intercostal tissues deep down to the parietal pleura, as well as the periosteum of the rib. The caudal rim of the upper rib was also infiltrated to anesthetize the intercostal nerve.
- B. Moderate analgesia/sedation (Conscious sedation) mild sedation (midazolam 3–5 mg IV).
 - Oxygen was administered using nasal prong catheter.
 - The patient's heart rate, blood pressure, and oxygen saturation were continuously monitored throughout the procedure.
 - A rigid thoracoscope connected with a camera with a working channel was used. Various instruments such as the biopsy forceps and suction catheter were used through the working channel.
 - Thoracoscopy was performed with the patient in the lateral decubitus position with the hemithorax to be studied facing upwards.
 - An incision about 2–3 cm was done at the fifth or sixth intercostal space between the mid- and anterior-axillary lines through which the trocar was introduced.
 - After the trocar was introduced, the pleural fluid was removed as completely as possible and a pneumothorax of several hundred ml of air was induced.

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