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ORIGINAL ARTICLE

Medical thoracoscopy versus intrapleural fibrinolytic therapy in complicated parapneumonic effusion and empyema☆

Asem Hewidy *, **Mohsen Elshafey**

Chest Medicine Department, Mansoura University, Egypt

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KEYWORDS

Medical thoracoscopy;
Fibrinolytic therapy;
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Abstract *Aim:* The aim of this study is to compare the therapeutic yield of medical thoracoscopy and intrapleural fibrinolysis by streptokinase in complicated parapneumonic effusion and empyema regarding both efficacy and safety.

Patients and methods: This study included 40 inpatients with complicated parapneumonic effusion and empyema. Included patients had frank pus, pH < 7.20, positive Gram stain or culture. Patients were randomly divided into two groups; first group was managed by medical thoracoscopy (20 patients) and the second group was managed by intercostal tube drainage plus intrapleural instillation of streptokinase (20 patients). Patients who were diagnosed as tuberculosis, bronchial carcinoma, chronic obstructive airway diseases and uncompensated liver cell failure were excluded from the study. Clinical, laboratory, radiological data and hospital stay duration were adopted for comparison between two groups.

Results: Comparing both groups, in group 1, 19 patients (95%) had total improvement and 1 patient (5%) had partial improvement, in group 2, 12 patients (60%) had total improvement and 6 patients (40%) had partial improvement in radiological end points which is statistically significant. The duration of hospital stay was 4.70 ± 1.45 days in group 1 and 6.95 ± 2.04 days in group

* Corresponding author. Tel.: +20 1005210674.
E-mail addresses: ahewidy@yahoo.com, ahewidy2@gmail.com (A. Hewidy).

☆ Parapneumonic effusion and empyema are common problems and still in need for safe and effective intervention to improve patient outcome and shorten hospital stay.

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2 which is statistically significant. There were no serious complications, and no mortality in both groups.

Conclusion: Medical thoracoscopy is superior to streptokinase fibrinolysis in complicated parapneumonic effusions and empyema in terms of safety and efficacy.

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Introduction

Parapneumonic effusion is a pleural effusion associated with bacterial pneumonia, lung abscess or bronchiectasis. An effusion is called empyema when the concentration of leukocytes becomes macroscopically evident as a thick, highly viscous, whitish-yellow, opaque, and turbid fluid (pus) [1].

Parapneumonic effusion can be divided into three stages: the exudative phase in which, fluid moves into the pleural space due to locally increased capillary vascular permeability and the activation of immune processes such as neutrophil migration. Pro-inflammatory cytokines including interleukin (IL)-6, IL-8 and tumor necrosis factor alpha (TNF-a) produce changes in the anatomical shape of pleural mesothelial cells creating intercellular 'gaps' which further enhance permeability and additional fluid accumulates. The accumulating pleural fluid has a normal glucose level (> 40 mg/dL) and pH (> 7.20), with no detectable bacteria, and hence no microbiological or biochemical evidence of bacterial invasion. The effusion will usually resolve spontaneously with antibiotic therapy for the underlying pneumonia [2].

In the fibropurulent phase, the high levels of fibrinolytic activity which characterize the normal pleural space are rapidly depressed and titers of specific inhibitors of fibrinolytic activity such as tissue plasminogen activator inhibitors (PAI) 1 and 2 rise. PAI 1 and 2 and mediators such as TNF-a are directly released from mesothelial cells and are increased in infected pleural fluid compared with fluid from malignancy and other causes. This leads to fibrin deposition over the visceral and parietal pleura, with the division of the pleural space by fibrinous septae, producing fluid loculation and pleural adhesions [3].

In the organizing stage there is proliferation of fibroblasts and evolution of pleural scarring which forms an inelastic peel on both pleural surfaces with dense fibrous septations across the pleural cavity. As this solid fibrous peel replaces the soft fibrin, lung re-expansion is prevented, impairing lung function [4].

PPE is categorized to 4 categories for evaluating the risk of poor outcome in patients with PPE based on three variables, pleural space anatomy, pleural fluid bacteriology, and pleural fluid chemistry. Pleural effusion drainage for patients with moderate (category 3) or high (category 4) risk for a poor outcome, but not for patients with very low (category 1) or low (category 2) risk for a poor outcome.

- Category 1 (parapneumonic effusion)
  - Minimal free-flowing fluid, smaller than 10 mm on decubitus films.
  - Culture, Gram stain, and pH unknown.
  - No thoracentesis needed; treatment with antibiotics alone.
- Category 2 (uncomplicated parapneumonic effusion)
  - Larger than 10 mm fluid and less than half the hemithorax on decubitus films.
  - Gram stain and culture negative.
  - pH higher than 7.20.
  - Treatment with antibiotics alone.
- Category 3 (complicated parapneumonic effusion)
  - Large free-flowing effusion, more than half the hemithorax.
  - pH lower than 7.20, LDH level greater than 1000 U/L and glucose level greater than 40 mg/dL.
  - Gram stain or culture positive.
  - Treatment with tube thoracostomy and antibiotics.
  - Multiloculated effusions may require multiple tubes.
  - Thrombolytics may help resolution.
- Category 4 (empyema)
  - Large free-flowing effusion, greater than or equal to half the hemithorax.
  - Loculated effusion or effusion with thickened pleura.
  - Gross pus on aspiration.
  - Treatment with tube thoracostomy.
  - Thrombolytics may help resolution.
  - May require decortications [5].

Indications for pleural fluid drainage in pleural infection:

1- Patients with frankly purulent or turbid/cloudy pleural fluid on sampling should receive prompt pleural space chest tube drainage.
2- The presence of organisms identified by Gram stain and/or culture from a non-purulent pleural fluid sample indicate/indicates that pleural infection is established and should lead to prompt chest tube drainage.
3- Pleural fluid pH < 7.2 in patients with suspected pleural infection indicates a need for chest tube drainage.
4- Parapneumonic effusions that do not fulfill any of these criteria for chest tube drainage could be treated with antibiotics alone provided clinical progress is good.
5- Poor clinical progress during treatment with antibiotics alone should lead to prompt patient review, repeat pleural fluid sampling and probably chest tube drainage [6].

Patients and methods

This study included 40 patients with complicated parapneumonic effusion and empyema were admitted to chest department Mansoura university hospital from January 2012 to July 2013, informed consent was obtained from all patients. Patients had both symptoms and signs of a bacterial

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