The clinical utility of intrapleural streptokinase in a patient with bilateral pleural empyema

Nayef A. Al-Ahmadi, MBBS, SBIM, *Taysir S. Garadah,* FRCP, MSc, *Abdulaziz A. Nwasser,* DTM, FACCP.

ABSTRACT

Bilateral thoracic empyema is a rare clinical entity particularly when presented as an initial clinical manifestation. Antibiotic therapy with intercostal thoracostomy drainage tube of the infected pleural space in complicated parapneumonic empyema may not be adequate in many conditions due to multiloculation and adhesion. We describe in this case a previously healthy middle aged male, presented with a bilateral thoracic empyema that was treated initially with antibiotics and intercostal drainage tube without optimal drainage results. The administration of twice daily intrapleural streptokinase prolonged for the duration of more than 10 days proved to be safe and effective as an alternative line of management in such a clinical condition.

Saudi Med J 2003; Vol. 24 (9): 1010-1012

Bilateral thoracic empyema is a rare clinical entity, particularly when presented as an initial clinical manifestation.[1] Despite the widespread availability of antibiotic and multiple drainage of the infected pleural space, the best methods of treating complicated parapneumonic effusions and thoracic empyemas remain debatable. A previously healthy middle aged man presented with clinical and radiological bilateral effusions, proved to be empyema. That was treated with antibiotics, intercostal thoracostomy tube (ICT), which did not yield optimal results. Then intrapleural streptokinase was administered. We describe the safety and efficacy of early and prolonged administration of intrapleural streptokinase as an alternative line of treatment in such clinical condition.

Case Report. A 40-year-old male presented to the emergency room with a history of right-sided pleuritic pain associated with dyspnea and generalized fatigue for 10 days duration, no history of fever, sore throat or chest trauma of note. He had a history of allergic rhinitis that was managed with intramuscular hydrocortisone injection; the last injection was 6 months earlier. He had no history of tuberculosis or other medical illnesses. Clinical examination revealed the pulse of 80 beat per minute, blood pressure of 130/90 mm Hg, temperature of 37.3^{0}C and respiratory rate of 15 per minute, the jugular venous pulse was not raised, no lymphadenopathy or neck swelling, chest examination showed restricted chest expansion on both sides, percussion notes were stony dull bilaterally with diminished breath sounds, no crepitation or rhonchi detected. Heart examination showed no gallop or murmur of significance. The abdominal examination revealed no organomegaly and no focal neurological deficit noted. The initial chest x-ray and computerized tomography (CT) scan showed a large right pleural effusion with mediastinal shift to the left. No evidence

From the Department of Medicine, King Fahd Military Medical Complex, Dhahran, *Kingdom of Saudi Arabia.*

Received 25th March 2003. Accepted for publication in final form 3rd June 2003.

Address correspondence and reprint request to: Dr. Taysir Garadah, Consultant Cardiologist, Department of Medicine, King Fahd Military Medical Complex, PO Box 946, Dhahran 31932, *Kingdom of Saudi Arabia*. Tel. +966 (3) 8440000 Ext. 6181. Fax. +966 (3) 8440441. E-mail: garadaht@hotmail.com

of parenchymal lung disease, no hilar lymph node enlargement, no rib fracture and the cardio-thoracic ratio of 50%. Twelve leads echocardiogram (ECG) showed sinus rhythm with no ST segment or T-wave changes. Echocardiogram showed good left ventricle function, left ventricle cavity dimension and wall thickness were normal, no valvular disease of significance and no pericardial effusion. The aortic root dimension is within normal. Patient was treated with intravenous amikacin at 400mg twice daily and ceftazidime one gm twice daily along with the right thoracostomy drainage tube.

Laboratory results. The oxygen saturation in room air was 90%. White blood count of $30x10^9$/L, hemoglobin of 10.4 gm/dl, platelets of $723x10^9$/L. White blood count differential with neutrophil of 74%, lymphocyte of 6% eosinophil of 1% and monocyte of 2%. The erythrocyte sedimentation rate (ESR) of 55mm/h. Blood urea nitrogen of 6.5 mmol/l, and creatinine of 80µmol/l, sodium of 131 mmol/l, potassium of 5.1 mmol/l. Total protein of 69 gm/l, albumin of 27 gm/l, calcium of 2.1 mmol/l, phosphate of 1.9 mmol/l. Total bilirubin of 23 µmol/l and conjugated bilirubin of 3 µmol/l, alkaline phosphatase of 759 U/l, aspartate amino-transferase of 78 U/l , and alanine amino-transferase of 67U/l, gamma-glutamyl transferase 122 U/l, serology for human immunodeficiency virus was negative. The anti-nuclear factor and rheumatoid factor titers were within normal limits. The pleural aspirate was turbid with glucose level of one mmol/l and total protein of 44 mg/dl, lactate dehydrogenase of 15025U/l. Cell count with WBC 48,520 /uL with polymorph of 84% and lymphocyte of 16%. Acid-fast bacillus stain was negative; gram stain and culture showed 3+ ß-hemolyticus group F streptococci sensitive to clindamycin and augmentin. He was commenced on augmentin at 1.2 gm twice daily and clindamycin at 4 mg/kg, 6 hourly. Three days later repeat CT chest showed a large pleural effusion on the left side and moderate amount of effusion on the right side. Thoracostomy tube was inserted in the left side, the drainage was sub-optimal, therefore, intrapleural streptokinase was administered at a dose of 250,000 unit diluted in a 100 ml saline daily at both side and the tubes were clamped for 4 hours after the streptokinase administration. Repeat CT chest showed multiple adhesion and multilocular areas (**Figure 1**) on both sides. The intrapleural streptokinase was increased to twice daily with 4 hours ICT clamp following each administration. In the span of 2 weeks the pleural fluid drained completely and the ICT, tube was removed. Patient was discharged on oral augmentin 625mg 3 times daily and clindamycin 150 mg twice daily for the duration of 4 weeks.

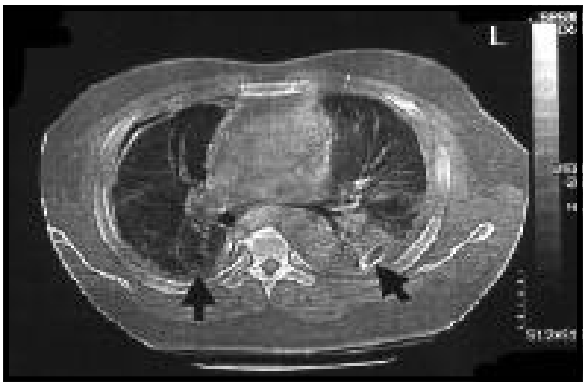

Figure 1 - Computerized tomography of the chest showed bilateral pleural empyema (arrows) and intercostal thoracostomy tube in the left side.

Discussion. Most thoracic empyema is the result of infectious process spreading from contiguous structures, mostly due to extension of a pulmonary infection.[2] In this case, the pathogenesis of the empyema however, is not clear. Aspiration of infected oropharyngeal or nasal sinuses secretion to the lung, leading to pneumonia and empyema may be a possible mechanism. On the other hand, hematogenous spread from distant foci can be another possibility. However, there was no obvious source of infection detected. Likewise, there was no history of trauma, surgical intervention, malignancy, mediastinal or subdiaphragmatic infection seen. Without optimal treatment parapneumonic effusion turn very viscous, purulent with intrapleural fibrin deposition and loculation, which is difficult to be drained. The duration of the empyema, the characteristics of the fluid and the presence or absence of loculation as well as the overall condition of the patient, are all important factors for the selection of pleural drainage as effective line of therapy in such cases.[3] The early drainage and proper antibiotics usually improve the outcome in the absence of loculation and fibrin deposit in majority of cases.[4] The use of intrapleural streptokinase (IP-SK) has been reported by others; to improve the drainage in loculated effusions and very viscous empyema and to reduce the need for direct decortication or video assessed thoracoscopic surgery.[5,6]

In this case, patient received twice daily dose of intrapleural streptokinase of 250,000 IU for approximately 2 weeks with no complications such as anaphylactic reaction, fever, or hemorrhagic pleural effusion, which could be life threatening, also the systemic fibrinolytic activity of intrapleural streptokinase was insignificant. The twice daily regime of IP-SK in this case is different compared to others where intrapleural streptokinase was given in a single daily dose of 250,000 IU for average of one week.[7,8]

In conclusion, the bilateral empyema with loculation, the early and prolonged administration of intrapleural streptokinase is effective, safe and can obviate the need for surgical intervention in such cases.

References

1. Hamm H, Light RW. Parapneumonic effusion and empyema. ***Eur Respir J*** 1997; 10: 1150-1156.

2. Snider GL, Saleh SS. Empyema of the thorax in adults; review of 105 cases. ***Chest*** 1968; 54: 410-415.
3. Huang HC, Chang WC, Tzuen RH. Predicting Factors for Outcome of Tube Thoracostomy in Complicated parapneumonic Effusion or Empyema. ***Chest*** 1999; 115: 751-756.
4. Mandal AK, Thadepalli H. Treatment of spontaneous bacterial empyema thoracic. ***J Thorac Cardiovasc Surg*** 1987; 94: 414-418.
5. Bourous D, Schiza S, Panagou P, Dgsitis J, Siafakas N. Role of streptokinase in the treatment of acute loculated Parapneumonic pleural effusion and empyema. ***Thorax*** 1994; 49: 852-855.
6. Sahn SA. Use of fibrinolytic agent in the management of complicated Parapneumonic effusion and empyema. ***Thorax*** 1998; 53 (Supp 2): S65-S72.
7. Chin NK, Lim TK. Controlled trial of Intrapleural streptokinase in the treatment of pleural empyema and complicated Parapneumonic effusions. ***Chest*** 1997; 111: 275-279.
8. Sanchez J, Ramevez RA, Elizalde J, Delgado R, Cicero R. Intrapleural fibrinolysis with streptokinase as an adjunctive treatment in hemithorax and empyema: a multicenter trial. ***Chest*** 1996; 109: 1514-1519.

Search Word: empyema

Authors: Banjer AH, Siddiqui MA, Abdul-Hameed KH, Al-Amri SM, Ali MF
Institute: Al-Noor Specialist Hospital, Makkah, Kingdom of Saudi Arabia
Title: Decortication for empyema thoraces
Source: Saudi Med J 1999; 20: 775-778

Abstract

Objective: Late presentation and late referral of empyema thoracis poses a common and difficult problem in medical practice. It reflects the lack of awareness of some of the practitioners as regards the pathogenesis of the disease and available diagnostic tools and therapeutic options. The aim of this study is to outline clinical presentation, thoracentesis, radiological findings and treatment with empyema thoracis. **Methods:** From April 1996 to April 1998, the records at 34 patients at Al-Noor Specialist Hospital, Makkah, Kingdom of Saudi Arabia with the confirmed diagnosis of empyema thoracis who required thoracotomy and decortication were retrospectively reviewed. **Results:** There were 28 males and 6 females; ages ranged between 8 months to 80 years (mean (SD) 29.13 $\pm$ 20.16 years). Fifty percent were Saudi nationals. Organisms were recovered only in 20% of cases. Thoracentesis with biochemical study was performed in only 58% of the cases. Tube thoracostomy concurrent with several trials (2-5 types) of broad spectrumantibiotics were the initial methods of treatment in all except 4 cases. Only 5 patients had received antibiotics against anaerobic bacteria. Thirty-three thoracotomies were performed in 32 patients; one of them underwent bilateral staged thoracotomy. Two patients refused surgery. Thickened pleural peel was decorticated in all patients although it was seen in only 22 CT scans of the chest. There was no mortality but morbidity occurred in 9 patients (28%). The main complications were wound infection, prolonged air leak and residual cavity. **Conclusions:** Analysis of our patient's series emphasizes the importance of thoracentesis in pleural effusion, early aggressive management by tube drainage and proper antibiotics against both aerobic and anaerobic organisms. These measures prevent progression of pleural injection into the late stage thus reducing the need for open thoracotomy.