

## CASE REPORT

### INTRAPLEURAL STREPTOKINASE AS ADJUNCTIVE TREATMENT IN EMPYEMA

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#### ABSTRACT

Pulmonary infections with secondary pleural involvement lead to considerable morbidity and mortality. Accepted management consists of systemic antibiotics and drainage of pleural cavity, achieved either by chest tube drainage or surgery. Open thoracotomy or video-assisted thoracoscopic surgery (VATS) achieve best drainage in gross empyema or loculated effusions but are limited by operative risk, cost and local availability. Intrapleural instillation of fibrinolytic agents like streptokinase dissolves fibrinous clots and membranes to prevent fluid sequestration and hence improve drainage. We report a case of 40 years old female with loculated empyema who was treated with adjunctive installation of serial intrapleural streptokinase after ultrasound guided pigtail insertion. Significant and early improvement of the symptoms and pathophysiology were achieved.

**Key Words:** *empyema, pigtail drain and streptokinase.*

#### INTRODUCTION

Empyema is a well-known complication of pneumonia, since the time of Hippocrates. <sup>1</sup> Antibiotics and tube drainage are the first line of treatment for empyema. However, sometimes loculated empyema fails to drain which carries significant mortality. <sup>2</sup> Tillet and Sherry first used intrapleural fibrinolytic agents as early as 1949 to achieve fibrinolysis and increase tube drainage. <sup>3</sup> Despite antibiotic treatment and chest tube drainage, multiloculations take place by forming fibrin strands with sequestration of infected fluid. Most patients progress to fibrinopurulent stage with multiple loculations and viscous pus.<sup>4</sup> Streptokinase dissolves loculations and septations permitting free flow of pleural fluid <sup>5</sup> Many authors have suggested the use of streptokinase for avoiding major thoracostomies for decortications. <sup>6,7,8</sup> Aggressive surgical therapy like resection, open flap drainage to thoracoplasty can be avoided with this adjunctive treatment. Increased drainage through the intercostal drain, reduced mean duration of drainage and significant radiological improvement were seen with adjunctive fibrinolytic therapy as compared to the drainage without fibrinolytic therapy. <sup>9</sup> So this treatment is considered as a viable alternative to facilitate drainage and lung expansion in empyema as inadequately treated by chest tube alone. <sup>10</sup>

#### CASE REPORT

A 40 years old female presented to the emergency room with history of shortness of breath for 3 weeks and productive cough. The patient was afebrile. Examination revealed decreased air entry on right side. Oxygen saturation was 98%, ECG showed sinus rhythm. Lab investigations revealed leucocytosis (16,000/

cumm) with elevated ESR (120). Blood glucose, urea, creatinine and electrolytes, LFT were within normal limits. Chest xray revealed gross right sided pleural effusion (Figure 1).



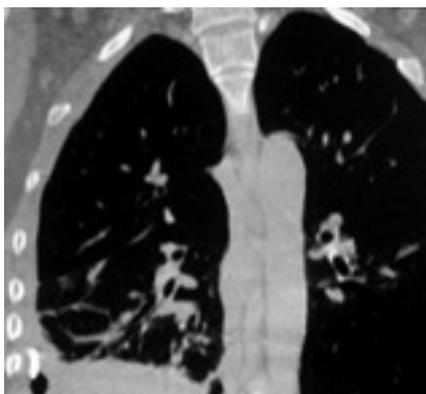
**Figure 1: Chest xray at presentation to Emergency room show opaque right hemithorax due to empyema.**

10 F pigtail catheter was inserted into the right pleural cavity under ultrasound guidance. Thick pus was drained into the waterseal bag (Figure 2). Pleural fluid aspirate showed plenty pus cells, however no organisms were seen even in culture samples. Pleural fluid ADA was raised (161 units). Pleural fluid sugar 20 mg/dl and protein 5.5 gm/dl. Sputum for AFB was negative. Presumptive diagnosis of Tubercular empyema was made and she was started on Antitubercular treatment CAT-1



**Figure 2: Serial chest xray post pigtail catheter drainage Day 3 show loculated empyema under drainage. Note the thickened visceral pleura.**

along with IV antibiotics (amoxicillin-clavulanic acid). Aliquots of 2,50,000 units of streptokinase was diluted into 50 ml of normal saline and instilled into the pleural cavity via pigtail drain and tube was clamped for 30 minutes. The patient was rotated in various positions to improve the dispersal of streptokinase. The treatment was repeated for 3 consecutive days. Serial chest x-ray and ultrasound chest were done to evaluate the treatment response. The adjunctive fibrinolytic treatment resulted in complete resolution of empyema in 12 days post pigtail insertion (Figure 3). Her symptoms resolved and patient was discharged on ATT.



**Figure 3: Coronal sections in CT chest done prior to removal of pigtail show near total resolution of empyema with complete lung expansion.**

## DISCUSSION

Our case management showed the beneficial effect of streptokinase that avoided surgical referral for decortication. Adjunctive fibrinolytic treatment leads to better lung expansion.<sup>9</sup> Various studies showed intrapleural streptokinase more useful in multiloculated empyemas if used early as 3-4 weeks after onset of illness, before empyema fluid is fully organised.<sup>10</sup> The success rate of over 86% was found in one study by Nissar Khan et al in 15 patients.<sup>9</sup> Another study showed loculated fluid, total fluid protein > 5 g/dl, WBC >20,000/ microlitre, PH<7.2, glucose<40 mg% and LDH >100 IU/L were selected for adjunctive streptokinase treatment via chest tube drain. Study by TK Lim et al suggested adjunctive streptokinase if failure of pleural sepsis to resolve by 48-72 hours, less than 100 ml of chest tube drain in presence of pleural collection. Instillation of streptokinase is safe however rare possibility of

anaphylaxis and haemorrhages have been suggested, however no such case reports have been made.<sup>10</sup> Common adverse reactions like chest pain, dry cough, fever, hypotension have been seen.<sup>9</sup> Most common adverse effect is rise of temperature. Exclusion criteria for streptokinase treatment are history of allergy to streptokinase, bleeding diathesis, recent surgery/hemorrhage, severe hypertension and severe kidney and liver disease.<sup>10</sup> Dose of streptokinase was 2,50,000 units in almost all the researches done, however the saline instillation range from 50 ml to 100 ml. Also the duration of tube clamping were from 30 minutes to 6 hours. We clamped the tube for 30 minutes which was effective. Regarding duration of treatment, 3 days of treatment were done in our case, however study showed upto 6 days were necessary for the treatment. However each patient should be evaluated individually with consideration of stage, characteristics of empyema and condition of the patient. Subsequent surgical intervention is not jeopardized by the prior use of streptokinase.<sup>9</sup>

## CONCLUSION

Intrapleural streptokinase should be used in the drainage of loculated empyema in early stage to enhance the drainage of fluid, which is too viscous or loculated to be drained by tube thoracostomy alone. Thus, intrapleural streptokinase is adjunctive to the chest tube drainage which reduces the need for surgery and improves the clinical treatment success in patients with pleural empyema.

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