

## CASE REPORT

# Intrapleural Streptokinase in a Two-Year-Old Child with a Parapneumonic Effusion

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### ABSTRACT

A two-year-old child was hospitalised with features of parapneumonic effusion. He was initially managed with parenteral antibiotics and chest tube drainage. After three days drainage became insignificant inspite of chest tube being patent and appropriately positioned. CT scan of chest showed multiloculated effusion. In view of multiloculated effusion it was decided to try intrapleural fibrinolysis with streptokinase. Streptokinase in a dose of 1,25000 IU dissolved in 50 ml of normal saline was instilled through the chest tube daily. After instilling three doses, there was a significant increase in the drainage followed by almost complete radiological resolution. There were no side effects. Intrapleural streptokinase is a useful adjunctive threapeutic modality in the management of complicated parapneumonic effusion or empyema in paediatric patients.

*Key words : Parapneumonic effusion, Streptokinase, Fibrinolysis.*

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### INTRODUCTION

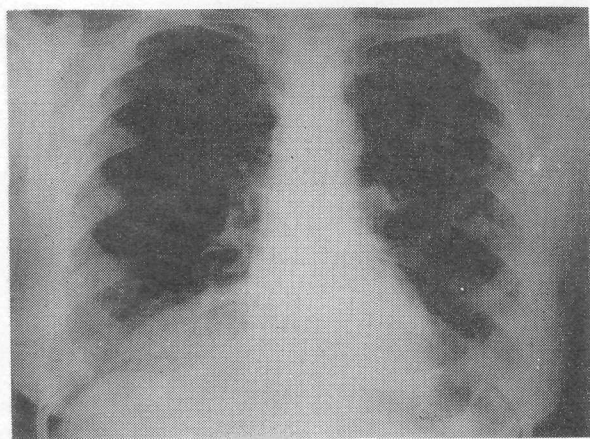
Parapneumonic effusions, if not treated timely and with appropriate antibiotics, may ultimately lead to development of complex complicated parapneumonic effusions. Drainage of this type of effusion by standard chest tubes or small bore (8-14F) radiologically guided catheters usually fails because of multiple pleural space loculations and obstruction of the tube by viscous fluid. In case of failure of drainage, the other more invasive modalities of treatment are empyectomy and decortication. The use of intrapleural fibrinolytic agents, in the from of streptokinase and urokinase, as an adjunct in management of complicated parapneumonic effusion has

shown encouraging results as reflected in another case series<sup>1</sup>. There are only few case reports from India describing the use of intrapleural streptokinase in adults<sup>2,3</sup>. To the best of the author's knowledge the use of intrapleural streptokinase in paediatric patients in India is yet to be reported, although there are reports in this regard from abroad<sup>4,5</sup>.

### CASE REPORT

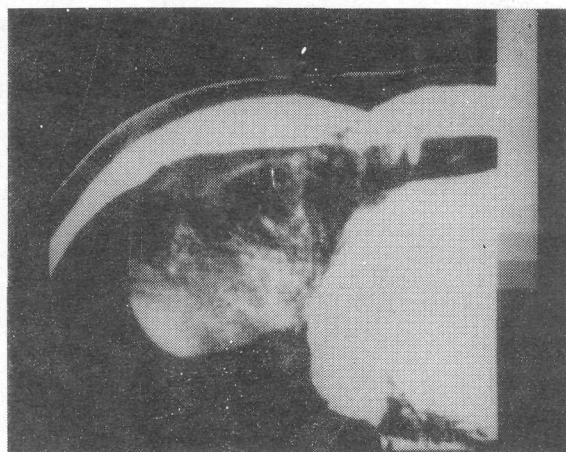
A two-year-old male child was hospitalised in May 1999 with complaints of high grade intermittent fever, cough with mucopurulent expectoration and breathlessness of one week duration. He was treated with oral antibiotics in

inadequate dosages for four to five days before admission. On physical examination he was febrile, tachypneic and had signs consistent with consolidation of right lower lobe. Investigations revealed polymorphonuclear leukocytosis and sputum examination with Gram and Ziehl-Neelsen stains did not reveal any organism. Culture for aerobic organisms was also sterile. Chest radiograph showed consolidation of right lower lobe with a parapneumonic effusion. Diagnostic pleural aspiration revealed turbid fluid with proteins level of 4 gm%, and the sugar was 10 gm%. Total white blood count was 800 per cumm with neutrophils being the predominant cells. Microscopy and culture did not show any organism. He was diagnosed as a case of pneumonia with parapneumonic effusion and was empirically put on intravenous cefotaxime, amikacin, metronidazole and intercostal tube drainage was established. There was total drainage of about 200ml over a period of three days. Chest radiograph (Figure 1) at this stage showed a multiloculated effusion which was confirmed on computed tomography of chest (Figure 2). The child continued having low-grade fever. There was no significant drainage



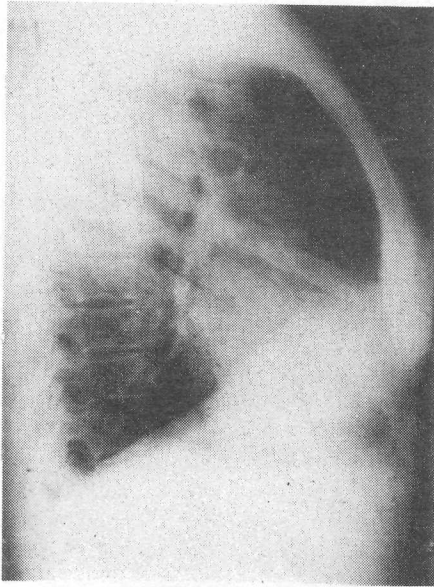
**Figure 1.** Chest radiograph showing multiloculated effusion on right side.

(20ml/day) over the next three days inspite of the intercostal tube being patent and appropriately positioned.



**Figure 2.** Contrast enhanced computed tomogram (CECT) of chest showing multiloculated effusion on right side.

In view of multiloculated effusion resulting in tube drainage failure, it was decided to try intrapleural fibrinolysis before subjecting the child to a more invasive surgical procedure. The coagulogram was normal and there was no contraindication for use of intrapleural streptokinase. Injection streptokinase in the dose of 1,25000 IU dissolved in 50 ml of normal saline was instilled into the pleural cavity through intercostal tube which was clamped for two hours. After releasing the clamp about 200ml of thin pus was drained till the next due dose of streptokinase. The same dose of inj. streptokinase was repeated after eight hours and the drainage noted was about 150 ml. The third dose was repeated after another eight hours and this time the total drainage was about 100 ml. over the next seventy-two hours after which there was no significant drainage. The patient was clinically monitored for signs and symptoms of anaphylaxis, bleeding and chest pain. No such side effect was observed during or after the procedure. A repeat chest radiograph (Figure 3) showed almost complete resolution. A coagulogram repeated after twenty-four hours after the third dose of streptokinase was normal. The child became afebrile after one week and the chest tube was removed eight days after instillation of streptokinase. He remained asymptomatic and the latest chest radiograph on regular follow up showed only minimal pleural thickening.



**Figure 3.** Chest radiograph after intrapleural streptokinase showing near complete resolution.

## DISCUSSION

Treatment for parapneumonic effusion consists of empirical use of antibiotics for the most prevalent bacteria and drainage of the infected pleural cavity. Some uncontrolled studies<sup>6,7</sup> have suggested that the various causes of tube thoracostomy drainage failure are improper tube positioning, kinking of tube, loculations or presence of highly viscous fluid. In a recent controlled trial<sup>8</sup> loculation and pleural effusion leukocyte count  $<6,400$  per cumm were independent predicting factors for poor outcome of tube thoracostomy drainage. The drainage failure in our case was because of loculations.

Since its first use in loculated empyema by Tillet and Sherry<sup>9</sup> in 1949 there have been many uncontrolled studies in the last twenty years suggesting that many patients who fail chest tube drainage can avoid open surgical drainage with fibrinolytic therapy<sup>1</sup>. The clinical efficiency of adjunctive fibrinolysis using streptokinase

has been evaluated in two controlled trials<sup>10,11</sup>. Both studies reported that significant larger volumes of pleural fluid were drained from patients with daily intrapleural instillation of streptokinase than from control patients. However, it has also been shown that the administration of streptokinase did not result in significant improvement in the key measures of clinical outcome such as duration of hospital stay, the need of surgical drainage or mortality<sup>11</sup>. An aggressive approach combining adjunctive intrapleural fibrinolysis and early surgical intervention has been suggested which results in shorter hospital stay and reduced mortality<sup>12</sup>. Nevertheless intrapleural streptokinase is relatively safe, and may induce prompt resolution in some patients<sup>11</sup>.

There have been reports of use of these agents in paediatric patients<sup>4,5</sup>. Rosen *et al*<sup>4</sup> reported successful use of intrapleural instillation of streptokinase in persistent empyema in five paediatric patients with age groups ranging from 5 to 10 years. The dosage chosen empirically (2,300 to 136,000  $\mu$ /kg per dose) was diluted in 50 ml of saline and after instillation the tube was clamped for two hours and patient rotated at five minute interval. The same protocol was repeated daily for maximum of five days. The only side effect noticed was transient fever and chest wall discomfort and none of the patients had major complication in the form of bleeding or anaphylaxis. Lysy *et al*<sup>5</sup> used intrapleural streptokinase successfully in a four-year-old girl with complicated parapneumonic effusion. The daily dose used was 2,50000 IU diluted in 100 ml of saline and tube was clamped for four hours. No side effects were observed. In our country, the minimum strength of streptokinase available is 7,50000 IU. The dosage used in the present case was 1,25000 IU. In order to utilise reconstituted drug maximally, we decreased the frequency of administration from the usual twenty-four hourly to eight hourly since the reconstituted drug can be stored upto twenty-four hours at 2-8°C. This way we could avoid the wastage of this costly drug. The same dosing schedule was followed in previously reported cases in adults<sup>2,3</sup>. Intrapleural streptokinase does not produce any



significant systemic fibrinolytic effect<sup>13</sup>. The alternative fibrinolytic agent, e.g. urokinase has also been used successfully in paediatric patients in the dosage of 10,000 IU daily<sup>14</sup>. As compared to streptokinase it has the advantage of being non-antigenic and freely available in the strength required but is costlier than streptokinase.

On the basis of its extensive use in adults, cost effectiveness and non-invasive nature, intrapleural streptokinase appears to be a safe adjunctive therapeutic modality in paediatric patients as well, however, further studies are still required.

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