

Intrapleural Fibrinolytic Therapy in Loculated Effusion in a Pediatric Patient



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10 year old girl, k/c/o epilepsy on treatment, Weight: 29.8 kg (- 1 SD)

Chief Complaints:

- **Fever** – 2 weeks
- **Dry cough** – 2 weeks
- **Loss of appetite** – 2 weeks
- **Breathlessness (MMRC grade 2)** - 1 week
- **Vomiting** – 5 days

No significant past history

No history of close contact with tuberculosis patient

Clinical Examination

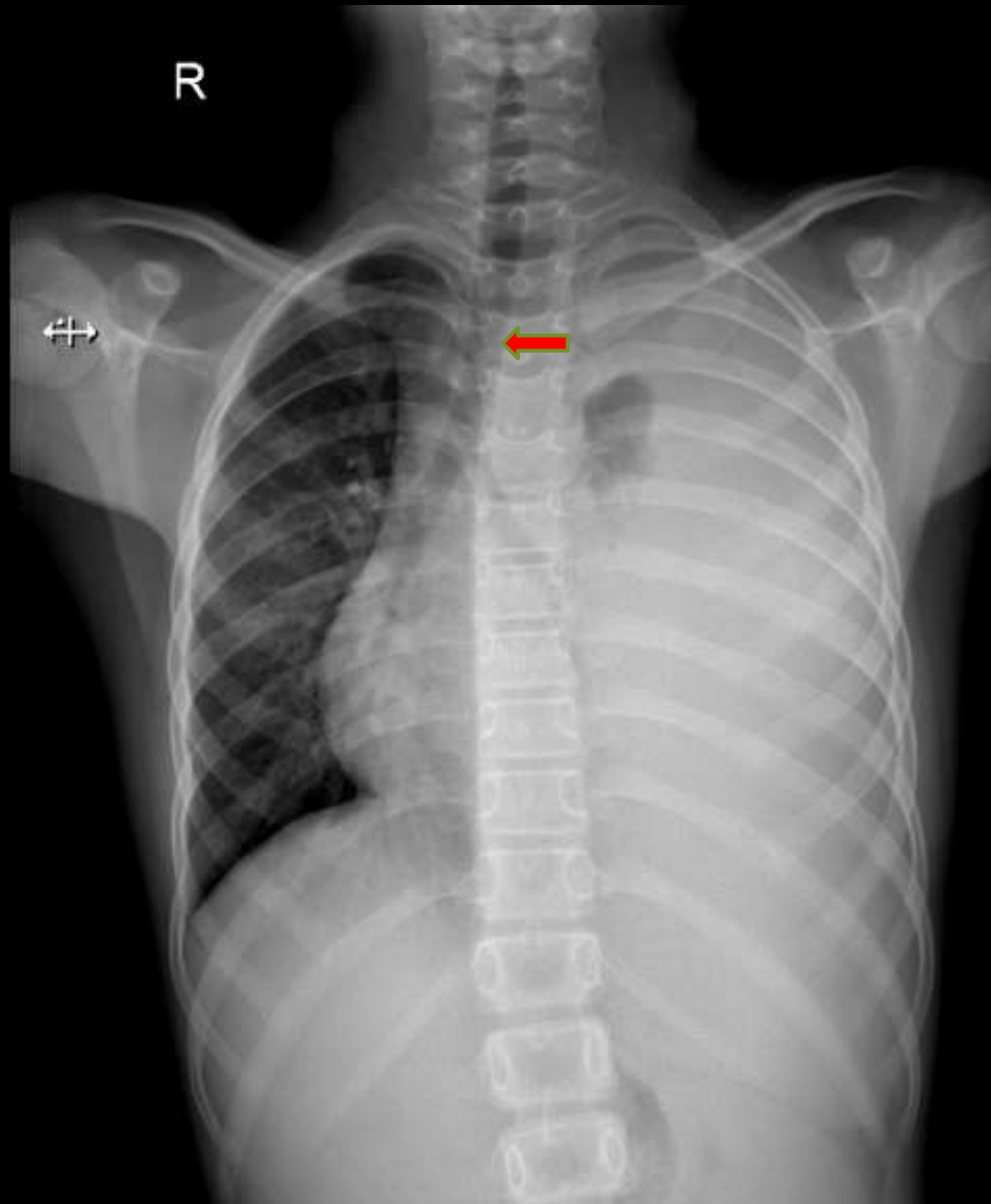
- **GCS-** 15/15
- **Temp-** 98.4° F
- **PR-** 130 beats/ min
- **RR-** 22 breaths/ min
- **BP-** 104/72 mmHg
- **SpO2-** 96% on room air

Admitted in Pediatric ward on 25/12/23

- **Respiratory System-** Reduced breath sounds on the left side of chest
- **Other systems-** Normal

INVESTIGATIONS

Investigation	Value	Investigation	Value
Hb	11.6 gm/dl	Total protein	7.2 g/dl
TLC	7600 / μ l	S. LDH	218 U/Lt
N / L	57 / 32	CRP	77.90 mg/L
Platelet count	460000 / μ l	ESR	48 mm/hr
Peripheral blood smear	Mild hypochromia, microcytosis & anisocytosis	Urine R/M	Pus cells 1-2 No RBCs
Bilirubin (T/ C/ U)	(0.21/ 0.10/ 0.11)	Mantoux test	Negative
SGOT/ SGPT/ ALP	23/ 12/ 183	Rapid malarial antigen	Negative
Urea/ Creatinine	21/ 0.43	Dengue profile	Negative
HIV	Negative	Widal	Negative



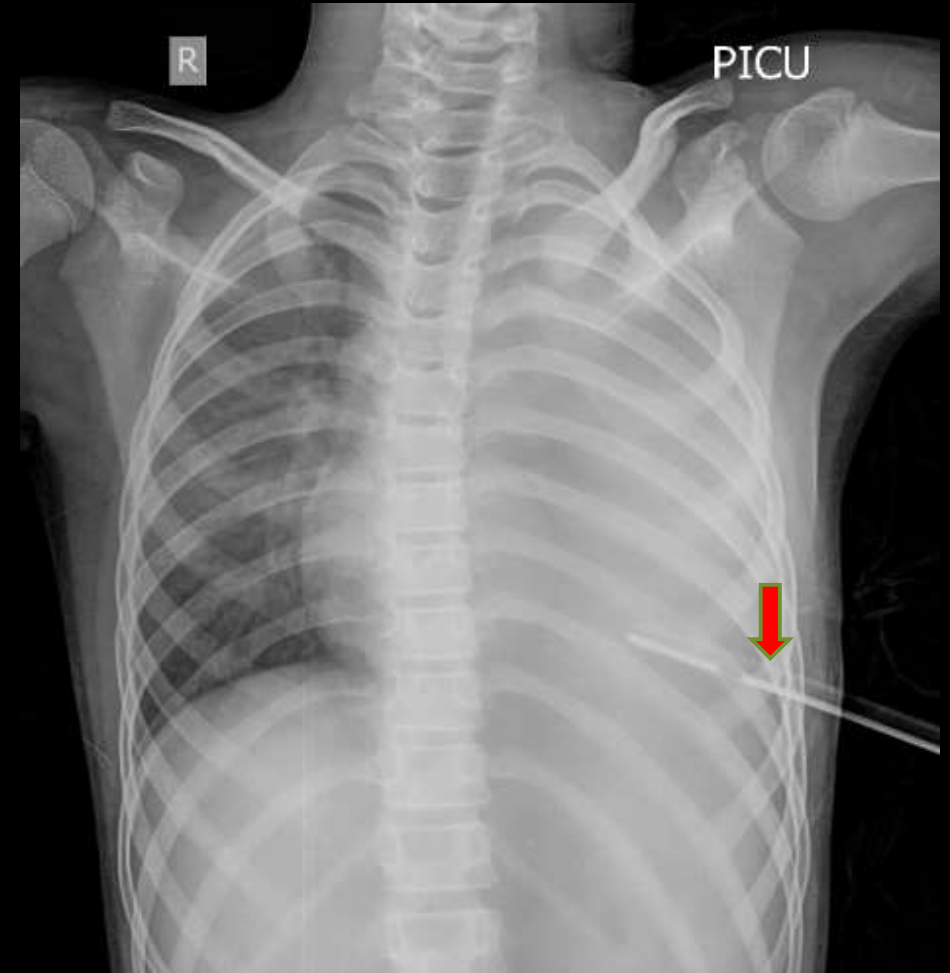
USG thorax

- Left sided pleural effusion
- Approx 1000 – 1200 cc volume
- Incomplete internal septations
- Consolidation and collapse of underlying lung parenchyma

Started on antibiotics- Ceftriaxone, Vancomycin

Left sided Intercostal drainage tube
was established on 25/12/23 in PICU

↓
Drain ~ 900 ml

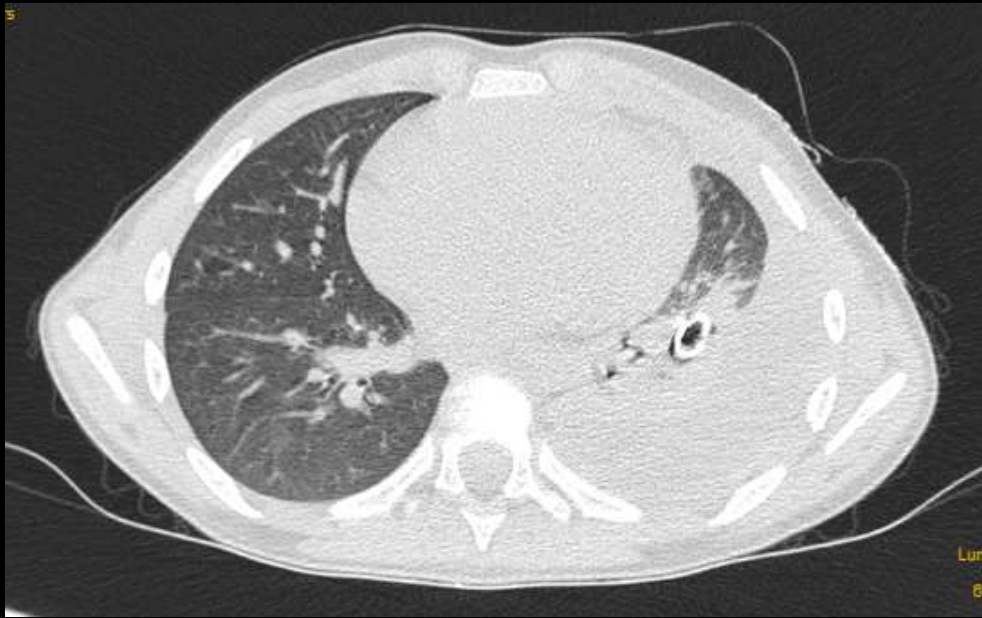


PLEURAL FLUID ANALYSIS



Pleural fluid	Result
Protein	5.7 gm%
Glucose	81 mg/dl
TLC	1600 per cmm
ADA	47.40 U/L
LDH	450 U/L
Culture	No growth
Staining (Gram, ZN)	Negative
Gene Xpert	Mtb not detected
Malignant cytology	No malignant cells seen

**Exudative lymphocytic effusion of
Tubercular etiology**



After ~ 1500 ml drain, there was no drain from intercostal tube over the next 4 days



HRCT thorax was done



Pediatric surgery consult was sought:
Advised Video assisted thoracoscopic surgery (VATS); SOS thoracotomy



Simultaneously, Respiratory medicine consultation was given for further management of pleural effusion. It was opined that the patient may not require VATS/ thoracotomy.



Transferred to female pulmonary ward for further management on 3/1/24



- Patient was still having fever spikes in spite of receiving 9 days of antibiotics
- Repeat TLC was 7100 / μ l
- Antibiotics were stopped
- Patient was registered on DOT'S

HRZ	E
50/75/150	100
3 + 1A*	3

A* - Adult FDC (HRZE = 75/ 150/ 400/ 275)

H- Isoniazid

R- Rifampicin

Z- Pyrazinamide

E- Ethambutol

COURSE IN RESPIRATORY MEDICINE

- USG thorax showed approx. 200 to 300 cc effusion with internal septations.

- In view of left loculated tubercular pleural effusion, it was decided to initiate **Intrapleural Fibrinolytic Therapy** for the patient.

PRE-REQUISITES OF IPFT

- IPFT is indicated only in those cases where **significant loculated** pleural fluid is present.
- The tube or catheter should be correctly **positioned and patent**.
- The drainage from intercostal tube or catheter should be **less than 50ml per day**.

DOSAGE & ADMINISTRATION SCHEDULE

**First dose: 1 lakh IU of Inj Streptokinase
was instilled**

ICD was clamped for 2 hours

ICD was unclamped and drain was noted

Second dose administered after 8 hours

**3 doses given in 24 hours complete
1 cycle of IPFT**

DOSAGES FOR PEDIATRIC PATIENTS

Age group	Streptokinase	Urokinase
6-12 years	1 lakh IU	50000 IU
1-6 years	50000 IU	25000 IU
< 1 year	25000 IU	10000 IU

*M S Barthwal. Intrapleural Fibrinolytic Therapy in Loculated Pleural Effusions.
Journal of The Association of Physicians of India. Vol. 68. June 2020*

CLINICAL COURSE

1st cycle of
IPFT

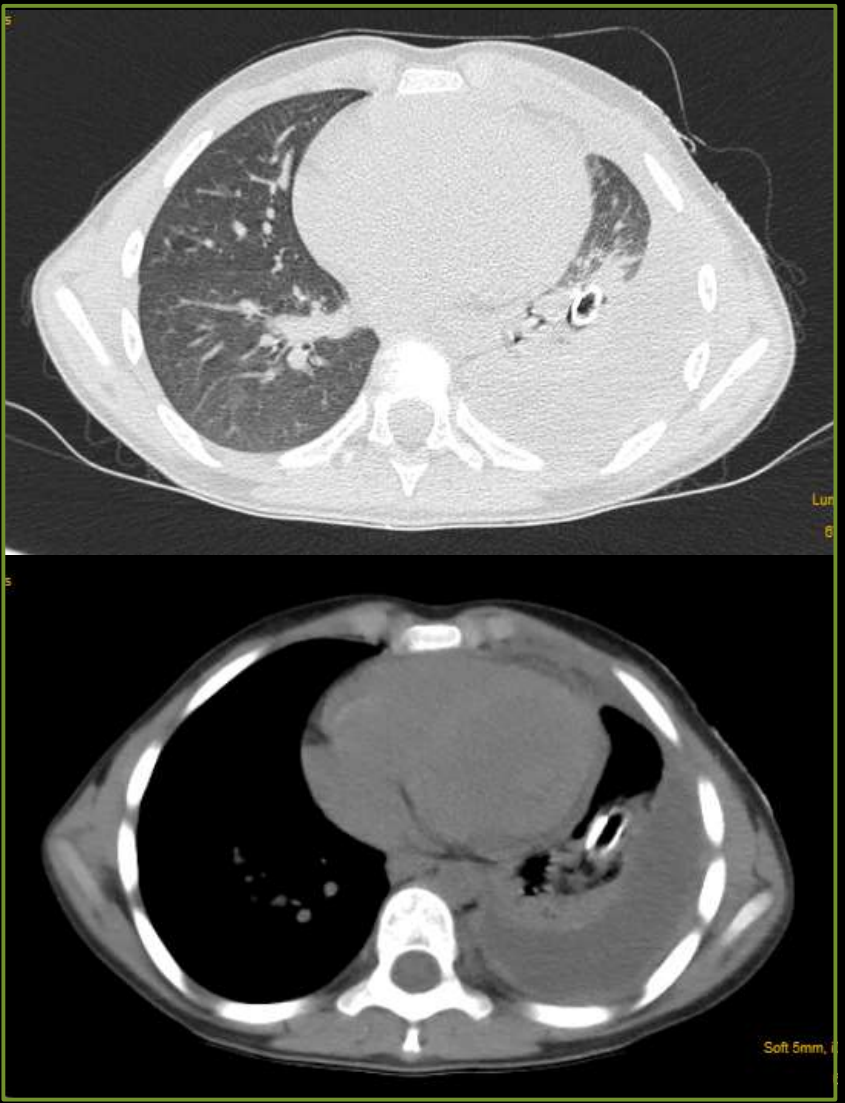
- 4/1/24
- 900 ml drain

2nd cycle
of IPFT

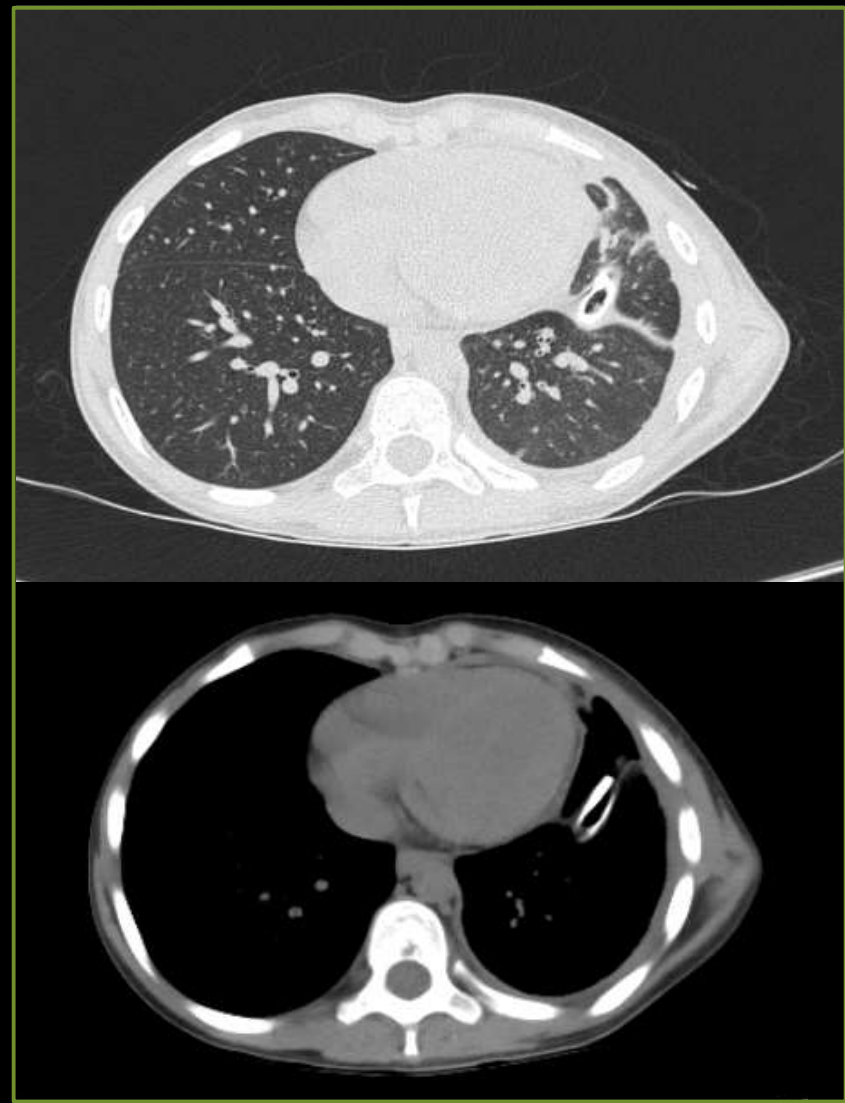
- 6/1/24
- 400 ml drain

**Total Drain
1300 ml**

PRE IPFT



POST IPFT



OPTIONS AFTER FAILED TUBE DRAINAGE



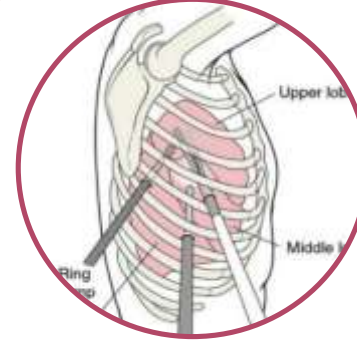
Saline flushes



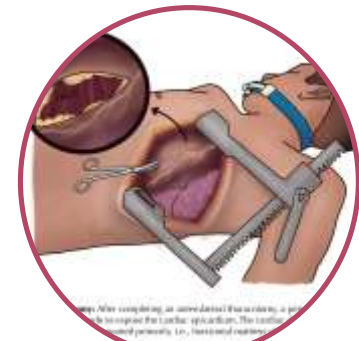
Image guided catheter drainage



Intrapleural Fibrinolytic Therapy



Video Assisted Thoracoscopic Surgery



Thoracotomy

IPFT is a cost effective solution for draining loculated parapneumonic effusions and this option must be exercised in our country for eligible patients before considering surgery.

RATIONALE OF IPFT

Fibrin adhesions



Loculations

Fibrinolytics

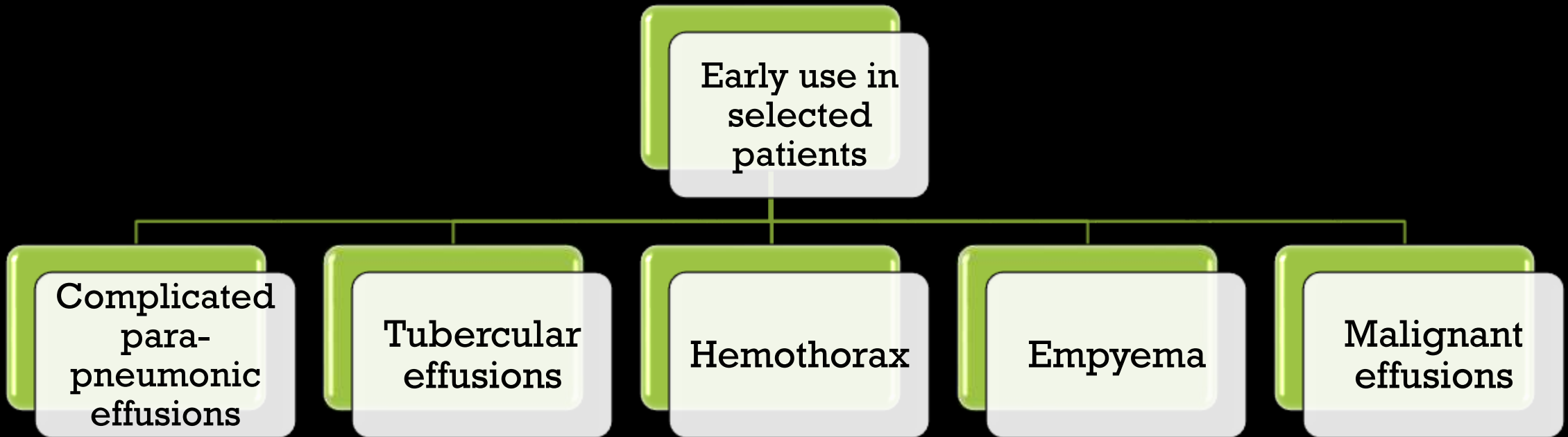


Fibrinolysis



Facilitates
drainage

RATIONALE OF IPFT



IPFT VS VATS

IPFT	VATS
No anesthesia	Under GA, Single lung ventilation
More accessible	Lesser accessibility
Expertise not required	Expertise required
Lesser invasive (ICD)	More invasive (2 or 3 ports)
Cost effective	Significantly costlier
Fibrinolysis	Adhesiolysis, debridement, decortication
Less effective	More effective

Safety and Efficacy of Streptokinase in Multiloculated Pleural Effusion in Pediatric Population

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> [Chest](#). 1993 Apr;103(4):1190-3. doi: 10.1378/chest.103.4.1190.

Intrapleural streptokinase as adjunctive treatment for persistent empyema in pediatric patients

H Rosen¹, V Nadkarni, M Theroux, R Padman, J Klein

ORIGINAL ARTICLE

Randomised trial of intrapleural urokinase in the treatment of childhood empyema

A H Thomson, J Hull, M R Kumar, C Wallis, I M Balfour Lynn, on behalf of the British Paediatric Respiratory Society Empyema Study Group

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 therapeutic modality in the management of complicated parapneumonic effusion or empyema in paediatric patients.

Key words : Parapneumonic effusion, Streptokinase, Fibrinolysis.

A Five-Year Study of Intrapleural Fibrinolytic Therapy in Loculated Pleural Collections

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Indian J Chest Dis Allied Sci. 2016

Table. Demographic and clinical characteristics

	No. (%)	Mean Age±SD
Gender		
Male	183 (91.5%)	
Female	17 (8.5%)	
Age (in years)		
Above 12	185 (92.5%)	31.7±8.4
Below 12	15 (7.5%)	6.4±2.4
Aetiology of pleural effusion		
CPE	106 (53%)	
Tubercular	59 (29.5%)	
Empyema	23 (11.5%)	
Traumatic hemothorax	12 (6%)	

Definition of abbreviations: SD=Standard deviation; CPE=Complicated parapneumonic effusions

- Response rate to Streptokinase and Urokinase was similar.
- The interval between the onset of loculated pleural collection and initiation of IPFT was more than 6 weeks in non responders.
- Adverse effects observed: mild chest pain, low-grade transient fever.

Intrapleural Fibrinolytic Therapy in Loculated Pleural Effusions

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MS Barthwal

Abstract

About 36% to 57% of bacterial pneumonias develop parapneumonic effusion. When the chest tube is correctly positioned as evidenced by postero-anterior and lateral chest radiographs and there is a significant amount of pleural fluid, the major reasons for failed drainage are multiple pleural space loculations or tube obstruction by thick and viscous fluid. The various modalities of treatment available for loculated pleural effusion are: saline flushes, placing one or more catheters in loculi under image guidance, video assisted thoracoscopic surgery (VATS), standard thoracotomy with drainage of empyema and decortication. The first two modalities are not so effective in improving drainage. The last two surgical modalities are more invasive, not easily available and, if available, are not affordable by majority of patients in the developing countries like India. The fibrinolytic agents, if used early in loculated pleural effusions, break loculations and early pleural peel thereby facilitating pleural space drainage.

1949 in 23 patients who had loculated empyema or hemothorax. Their patients received intrapleural instillation of both streptokinase and streptodornase, which was extracted from concentrated filtrates of streptococci of Lancefield group C. There was significant improvement in drainage of pleural fluid. However, the initial enthusiasm waned because of significant systemic adverse effects in the form of fever, leukocytosis and general malaise. These side effects were due to immunological reaction caused by impurities in the preparation of agents. There was not much of use of this therapy until Bergh and colleagues⁴ in 1977 used purified

TAKE HOME MESSAGE

✓ IPFT is a safe and cost effective option in the management of loculated effusions of varied etiologies and also in pediatric patients.

✓ For a developing country like ours, this option must be exercised in eligible patients before subjecting them to costlier, not so easily accessible and more invasive surgical options.

**THANK
YOU**