Management of Hemothorax – A Novel Approach

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Clinical Course

- 35 year old male, Car Mechanic
- Non Smoker
- No Known Comorbidities

History of Blunt Trauma to Chest Wall on 29/08/2019

Presented to our Casualty ***6 days later with:***

Chief Complaints:

1. **Breathlessness** since 6 days – MMRC Grade 3, No Orthopnea, No PND
2. **Chest pain** since 6 days – Diffuse, non radiating, No palpitations

- No history of head injury/Seizures/Nose Bleed/Blurring of vision
- No history of fever/cough

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DEPARTMENT OF PULMONARY MEDICINE
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WE HELP YOU BREATH FREE

Clinical Course

ON EXAMINATION

- **Conscious, Oriented** (GCS: 15/15)
- **General Physical Examination:** WNL
- **Local Examination:** Abrasions on the anterior chest wall
- **Vitals:**

  Afebrile

  PR : 112 bpm,regular, good volume, all peripheral pulses well felt

  BP : 110/70 mmHg, Right arm supine position

  RR : 24 cycles/min

  SpO_2: 87% on room air (FiO_2 – 21%)

Clinical Course

ON EXAMINATION

- **R/S:** Tenderness over anterior chest wall with bony crepitus over the right 2^{nd}, 3^{rd}, 4^{th} and 5^{th} ribs

  Bilateral vesicular breath sounds with ***diminished intensity in bilateral Infra scapular & Infra axillary areas***

- **CVS:** S1,S2 heard, no murmur
- **P/A:** Soft, non tender; No organomegaly; Bowel sounds heard
- **CNS:** No focal neurological deficit

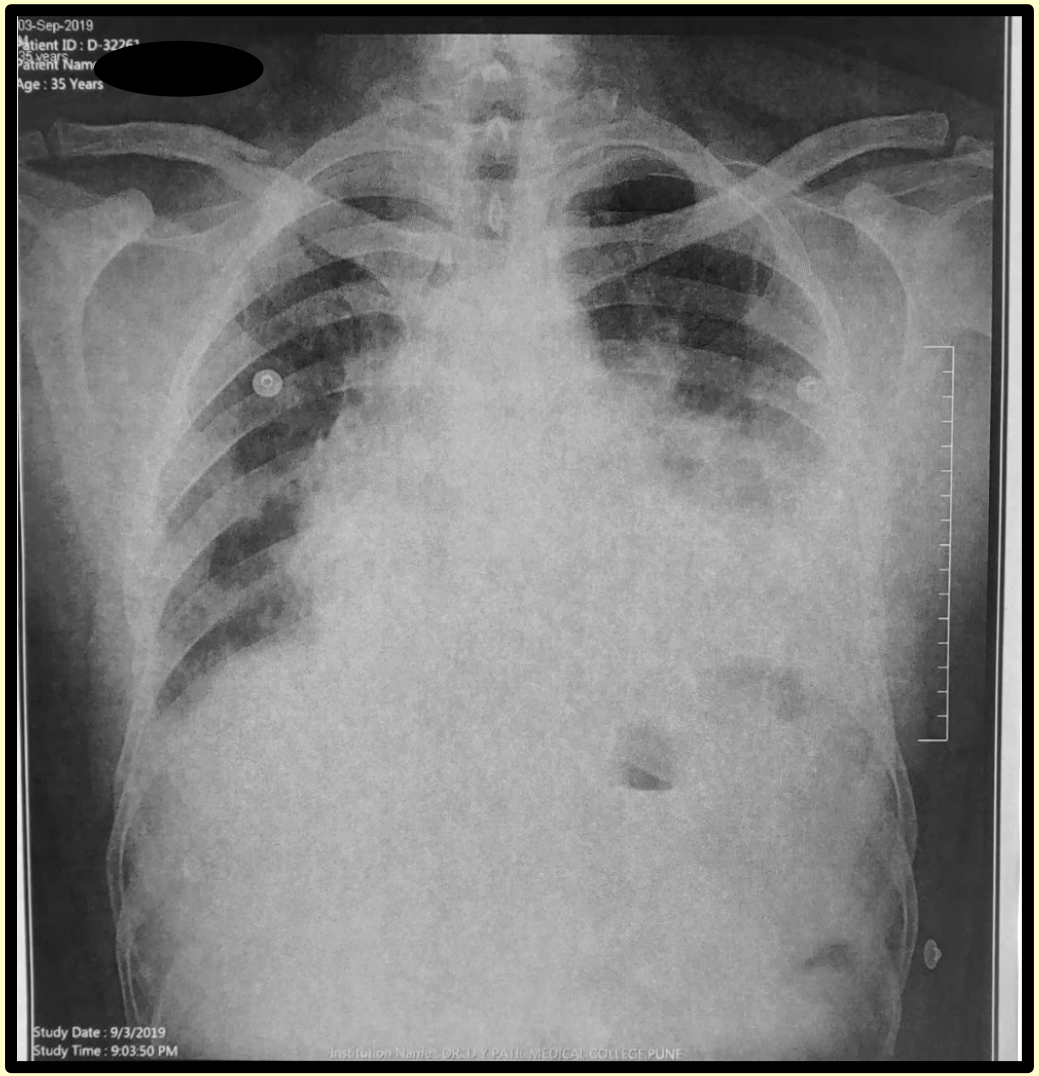
Clinical Course

INVESTIGATIONS

03/09/19

Hb, PCV	10.4, 41.2	*LFT*	WNL
TLC	13800	*Se Na^+*	144
Platelets	6.5 lacs	*Se K^+*	4.1
PBS	Normocytic Normochromic	*INR*	1.13
Blood Urea	27	*Se Creat.*	0.87

Clinical Course



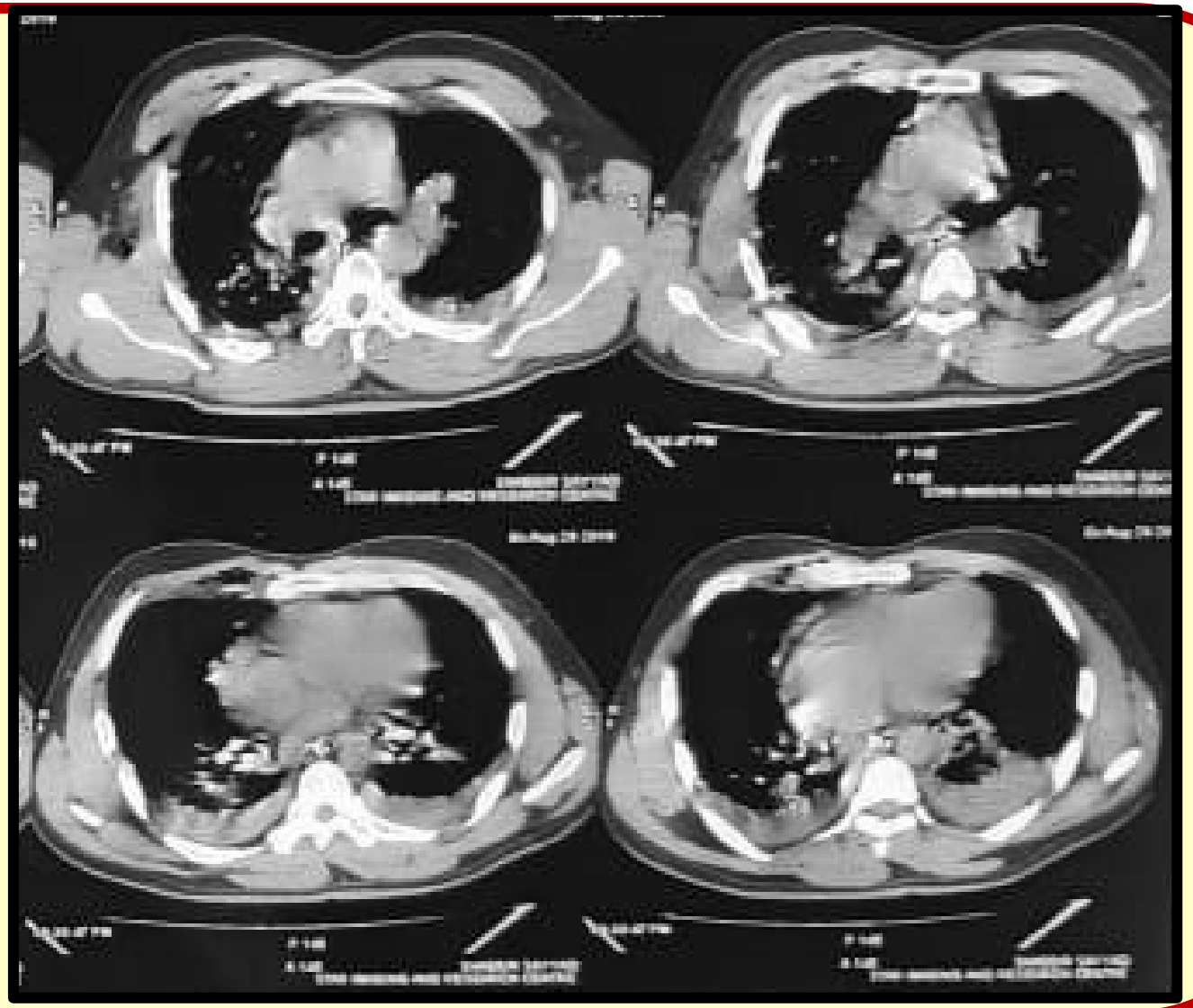
03/09/19 – On Admission

Left Middle & Lower zones homogenous opacity obliterating the left cardiophrenic & costophrenic angles + Obliteration of Right costophrenic angle suggestive of Bilateral Pleural Effusion (Left > Right)

Clinical Course

03/09/19 – On Admission

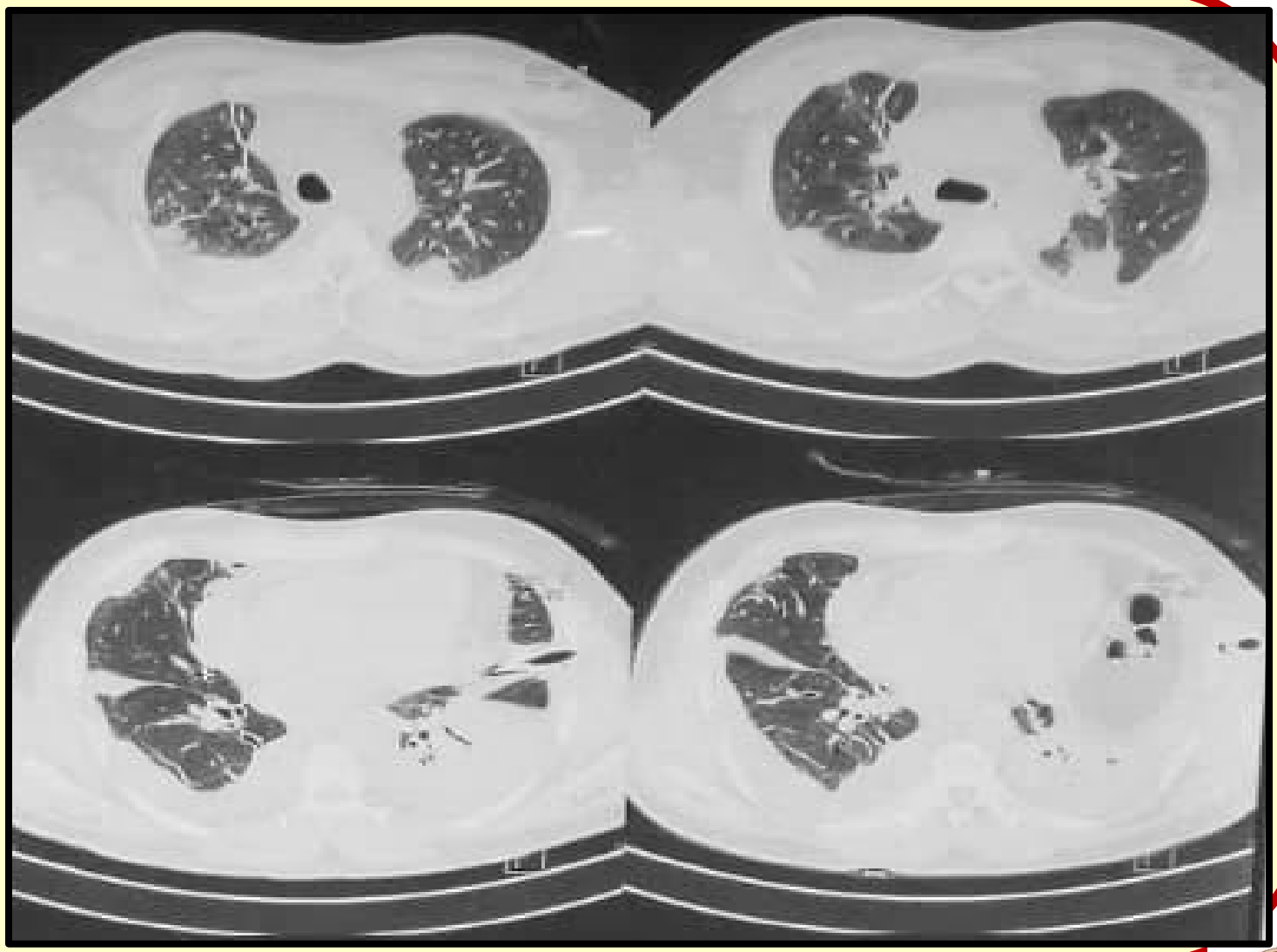
Bilateral Loculated Pleural Effusion (Left > RIght), Right Lower Lobe Consolidation



Clinical Course

03/09/19 – On Admission

Bilateral Loculated Pleural Effusion (Left > Right), Right Lower Lobe Consolidation



Clinical Course

03/09/19 – Diagnostic Thoracocentesis

Appearance	Hemorrhagic (P/f HCT: 60%)	*TLC*	1800
DLC	N 75/L 15	*ADA*	1.42
Se LDH	160 IU/ml	*P/f LDH*	780 IU/ml
Se Protein	6.8 g/dl	*P/f Protein*	7.2 g/dl
Se Glucose	112 mg/dl	*P/f Glucose*	80 mg/dl

Clinical Course

DIAGNOSIS

POST TRAUMATIC BILATERAL HEMOTHORAX

RIGHT CLAVICLE FRACTURE

RIGHT 2^{ND}, 3^{RD}, 4^{TH}, 5^{TH} RIB FRACTURES

ADMITTED IN SICU for Further Management

Clinical Course

MANAGEMENT

- Left Tube Thoracostomy (ICD 24 F) done on 04/09/2019
- Right Tube Thoracostomy (ICD 24 F) done on 05/09/2019

- IV Antibiotics
- Adequate Analgesia
- Oxygen Therapy

Clinical Course

PULMONOLOGIST CONSULTATION

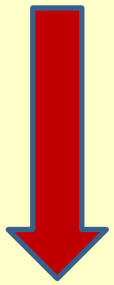
06/09/19

Reference in view of Persistent Bilateral Pleural Effusion

Patient transferred to our side for further management.

Clinical Course

ICDs (24 F) on Both Sides were NOT functional



ICDs of 32 F were positioned on both sides on 06/09/19 and the fluid was allowed to drain.

Clinical Course

- **Left ICD Cumulative Drain** : 1900 ml

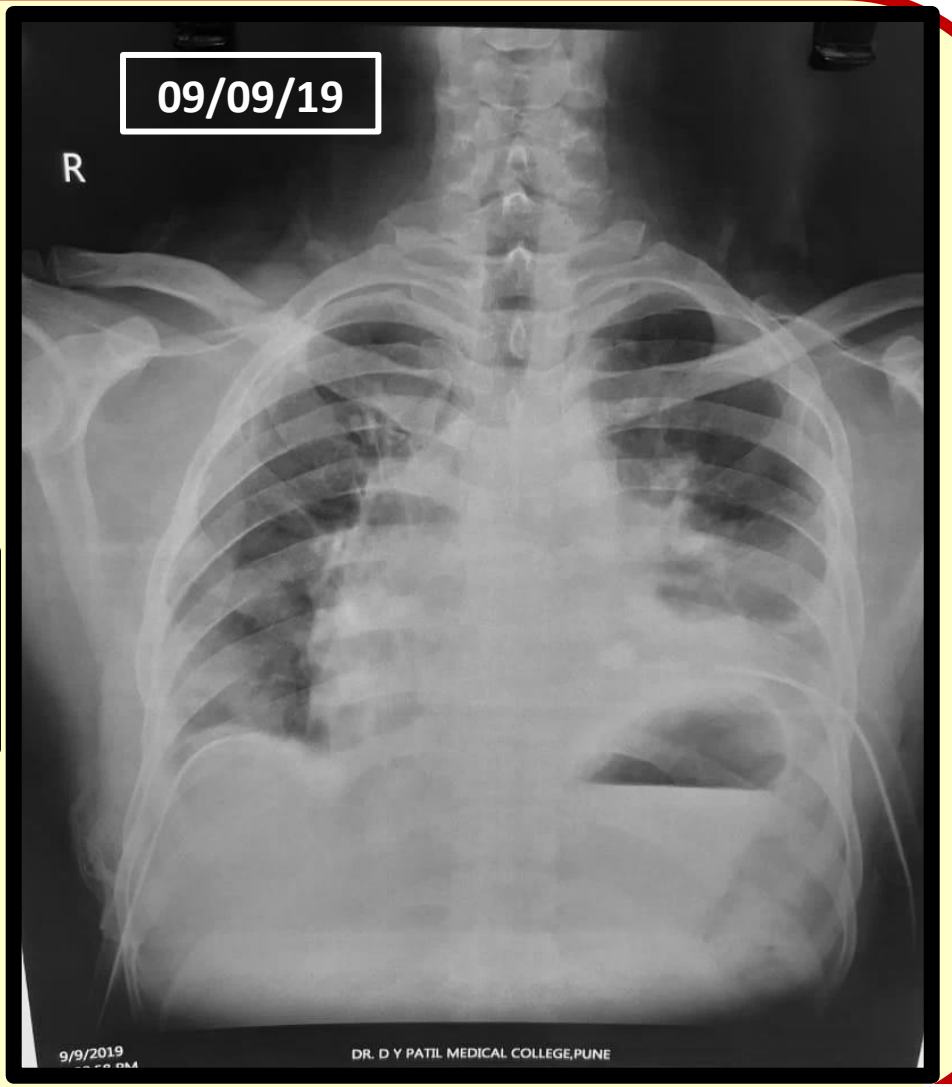
04/09 - 09/09

- **Right ICD Cumulative Drain** : 1600 ml

Drain < 50 ml in the Left ICD for 24 hours

(ICD was in situ & functional)

USG Thorax done on 09/09/19

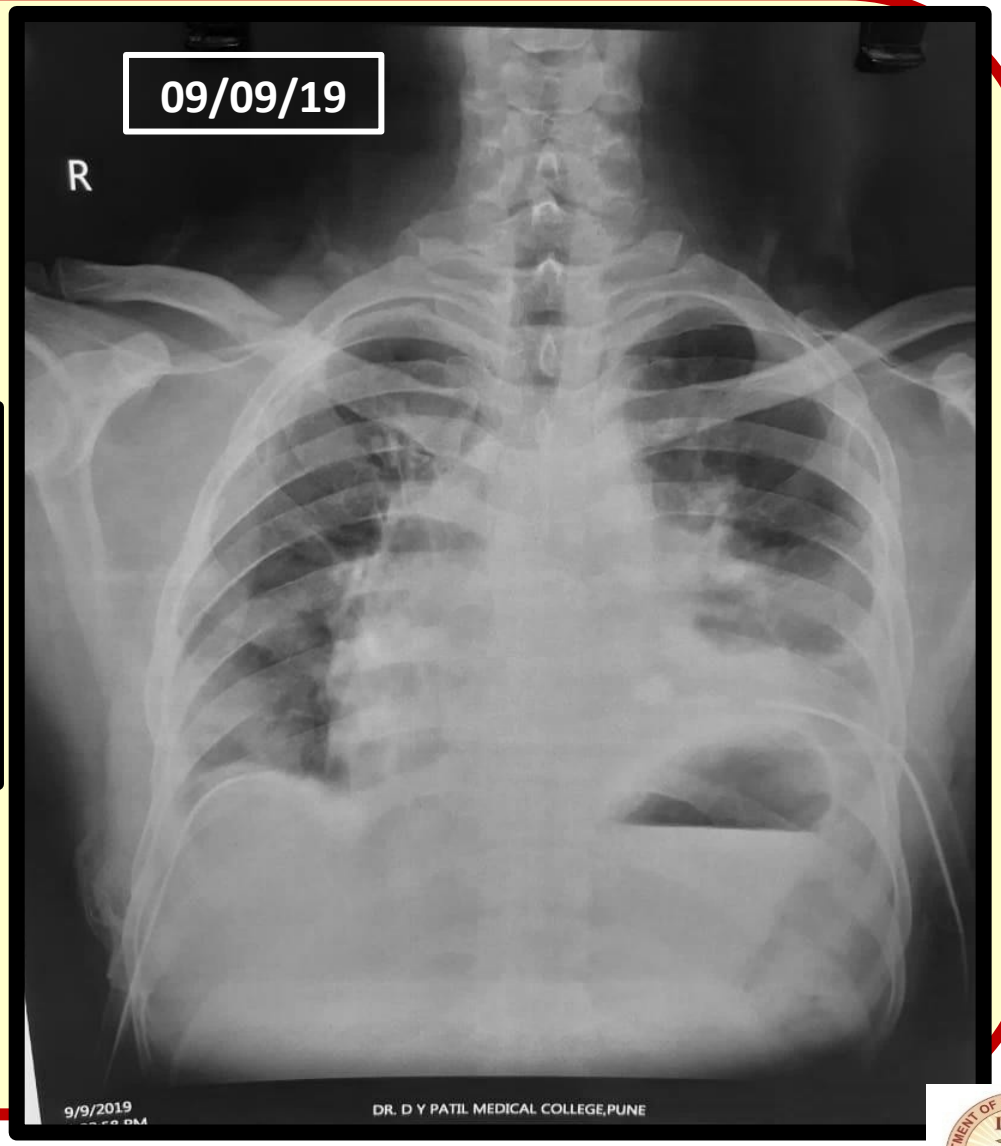


Clinical Course

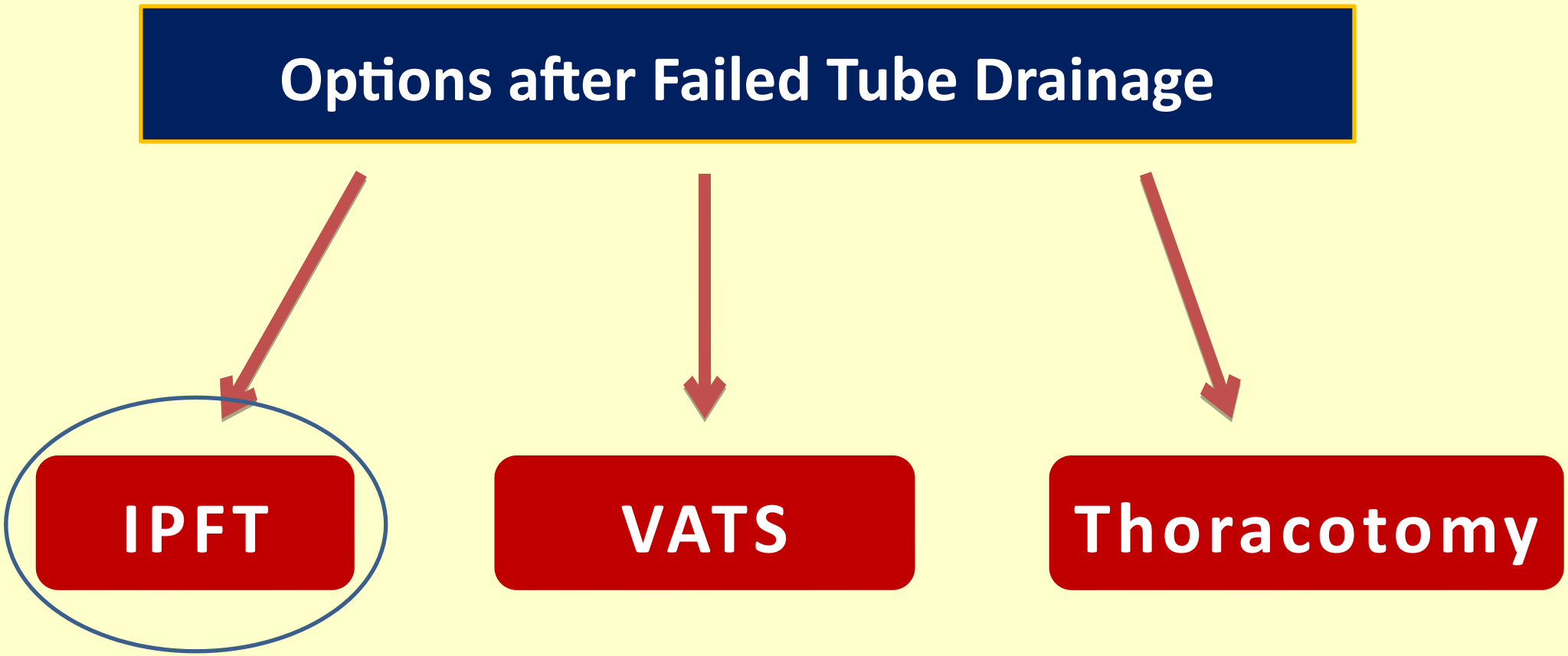
USG Thorax done on 09/09/19

- **Left Moderate** Pleural effusion with **multiple internal septations with loculations**
- Right Minimal Pleural effusion

LEFT LOCULATED HEMOTHORAX



Clinical Course



IPFT : Intrapleural Fibrinolytic Therapy

VATS : Video Assisted Thoracoscopic Surgery

Clinical Course

Intra Pleural Fibrinolytic Therapy (IPFT) Protocol

1. 1 Lakh IU of Urokinase was instilled in the Left ICD after ensuring that the ICD was patent & functional.
2. Left ICD was *clamped for 2 hours* & patient vitals monitored at regular intervals with adequate analgesia (if required)given.
3. ICD was unclamped after 2 hours & amount drained was noted
4. The same procedure was *repeated after 4 hours* for a total of 3 doses, completing 1 cycle of IPFT.

Clinical Course

LEFT

Intra Pleural Fibrinolytic Therapy (IPFT) 1st Cycle (3 doses) - 09/09/19

↓

Drain Post IPFT (Left ICD): 1,100 ml

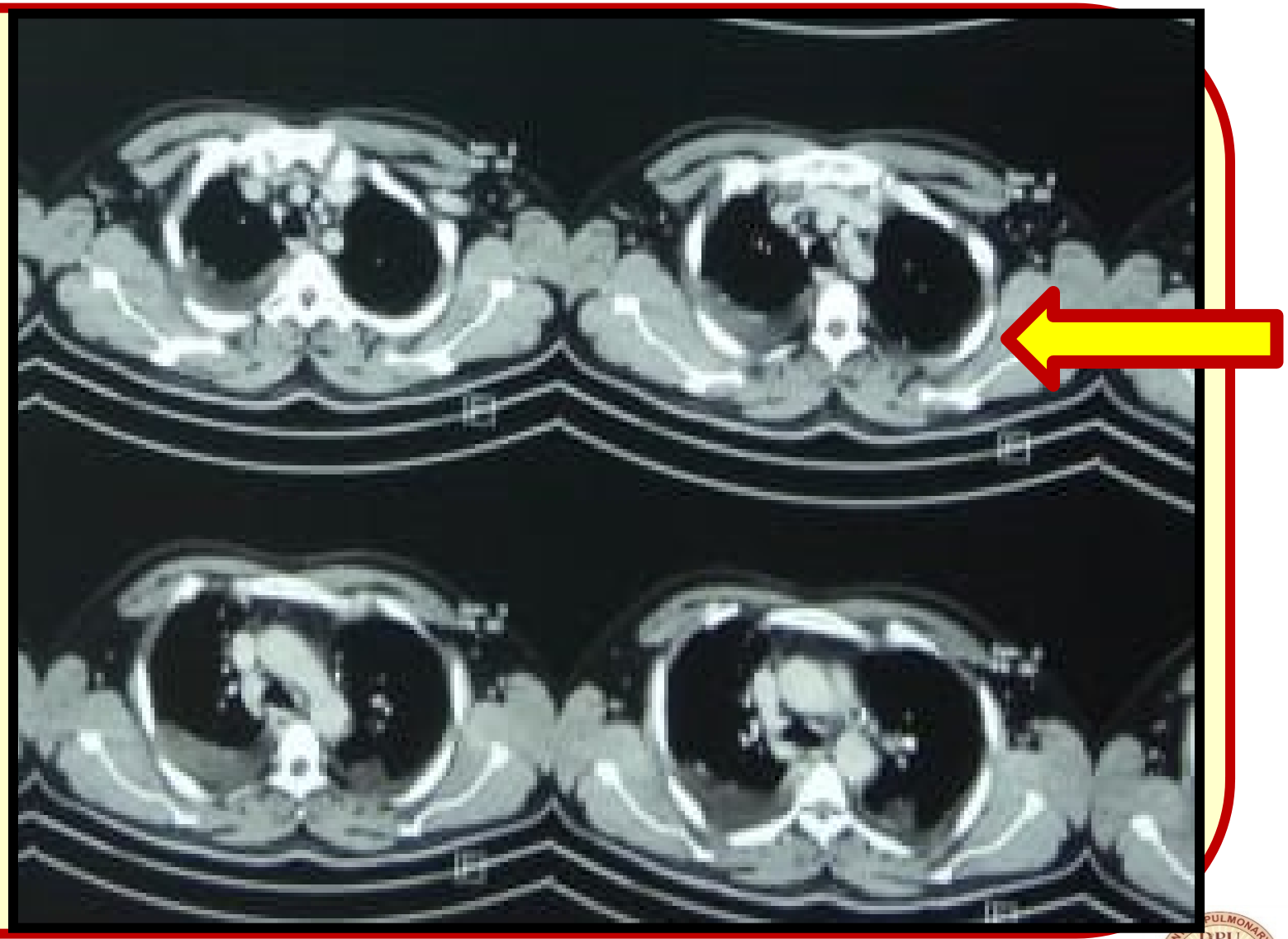
↓

CECT THORAX Done on 14/09/2019

Clinical Course

14/09/19
POST IPFT

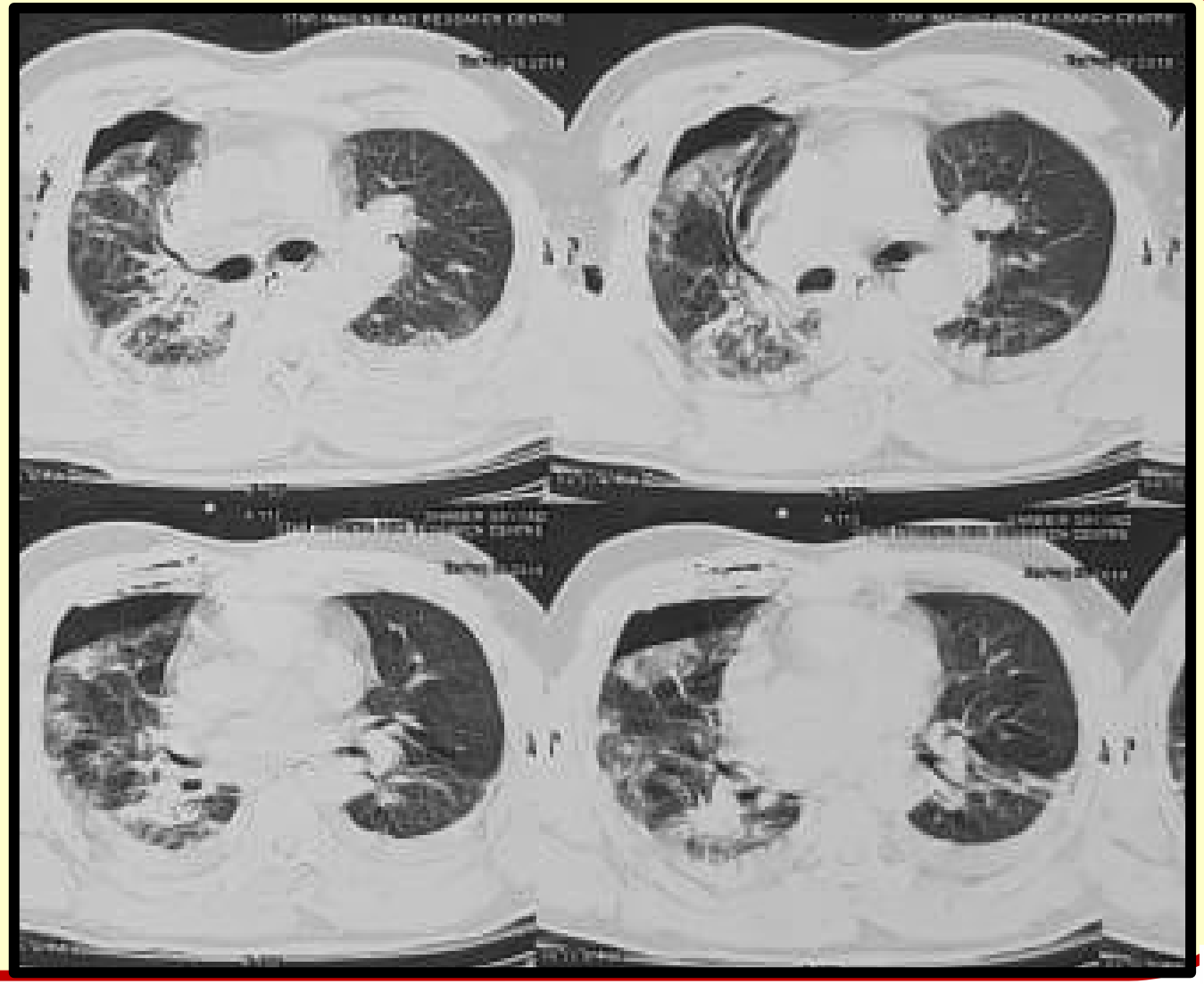
Left Minimal Pleural Effusion, Right Mild Hydro pneumothorax with surgical emphysema, Atelectasis with patchy areas of consolidation in Bilateral Lower Lobes



Clinical Course

14/09/19
POST IPFT

Left Minimal Pleural Effusion, Right Mild Hydro pneumothorax with surgical emphysema, Atelectasis with patchy areas of consolidation in Bilateral Lower Lobes,



Clinical Course

RIGHT

Intra Pleural Fibrinolytic Therapy (IPFT) 1st Cycle (3 doses) - 14/09/19

Drain Post IPFT (Right ICD): 750 ml

Left ICD Removed on 20/09/2019

Right ICD Removed on 21/09/2019

Patient discharged in a satisfactory condition on 07/10/2019

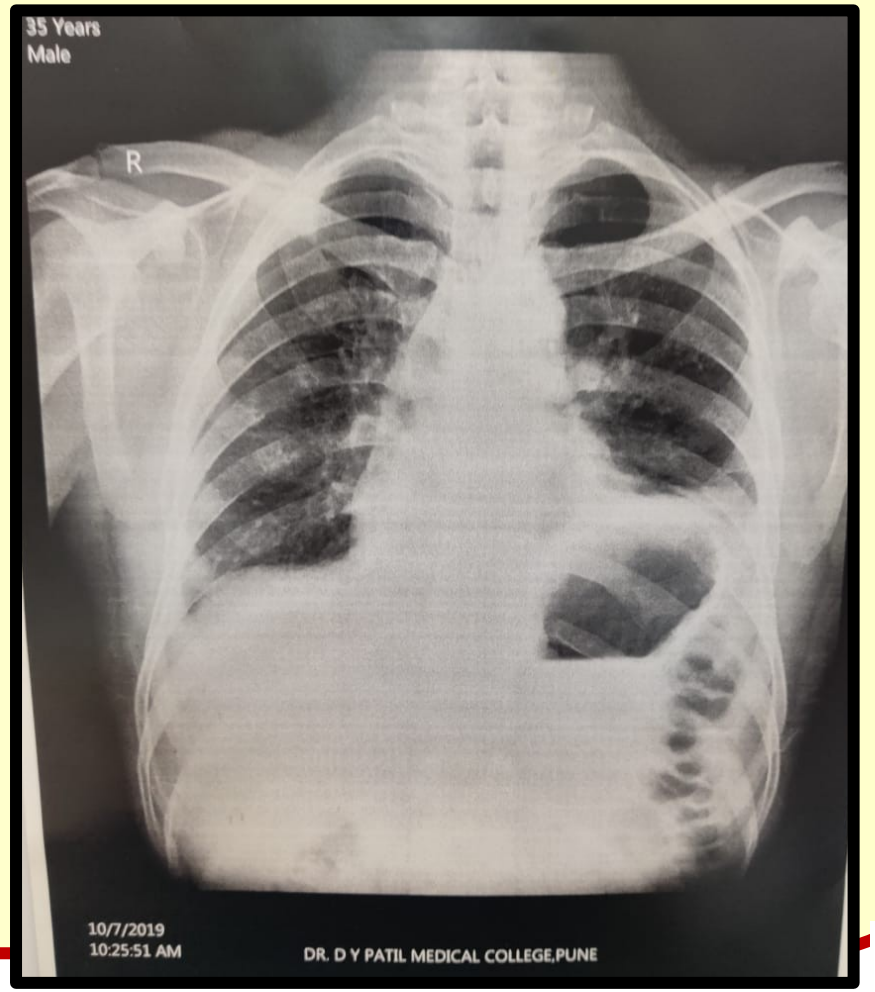
Clinical Course

09/09/19

PRE IPFT

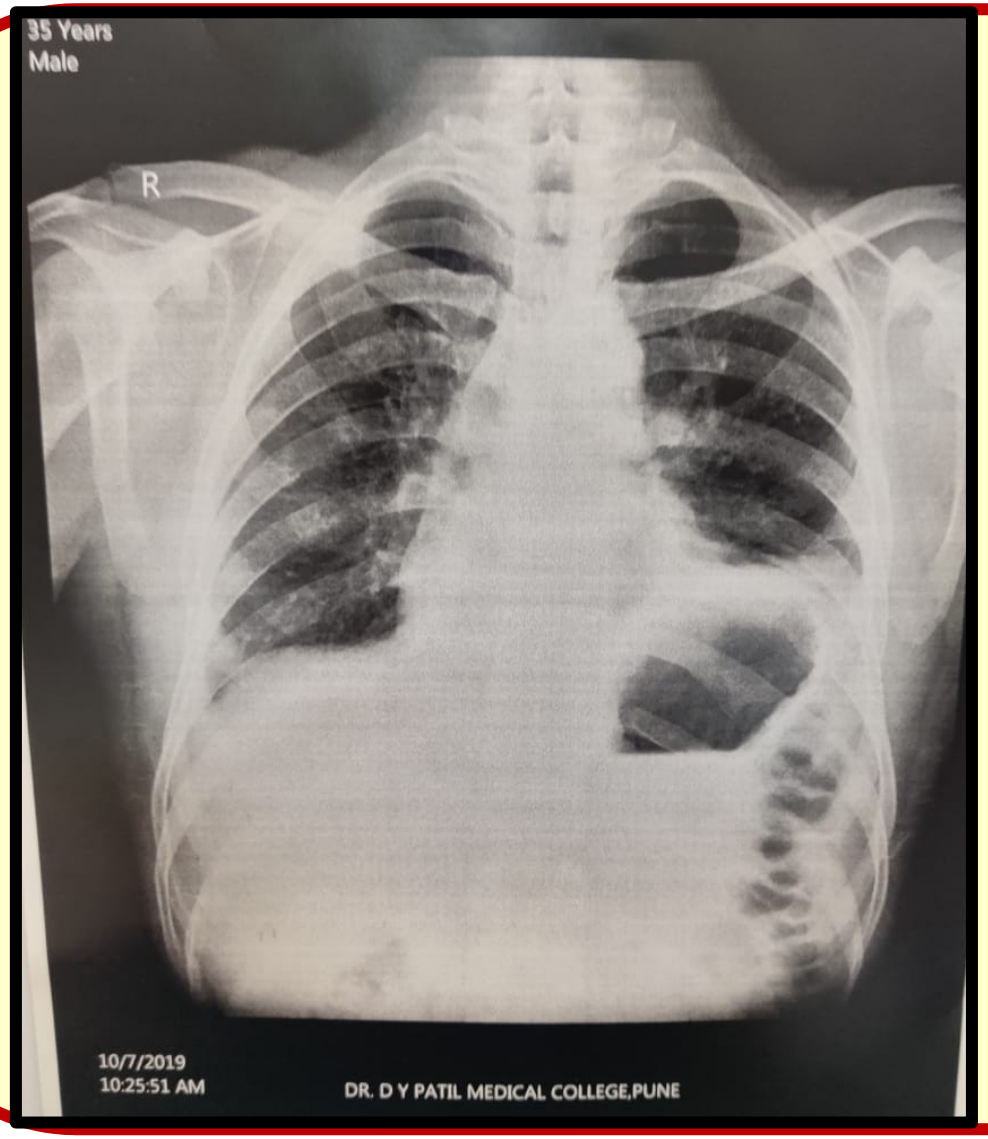
07/10/19

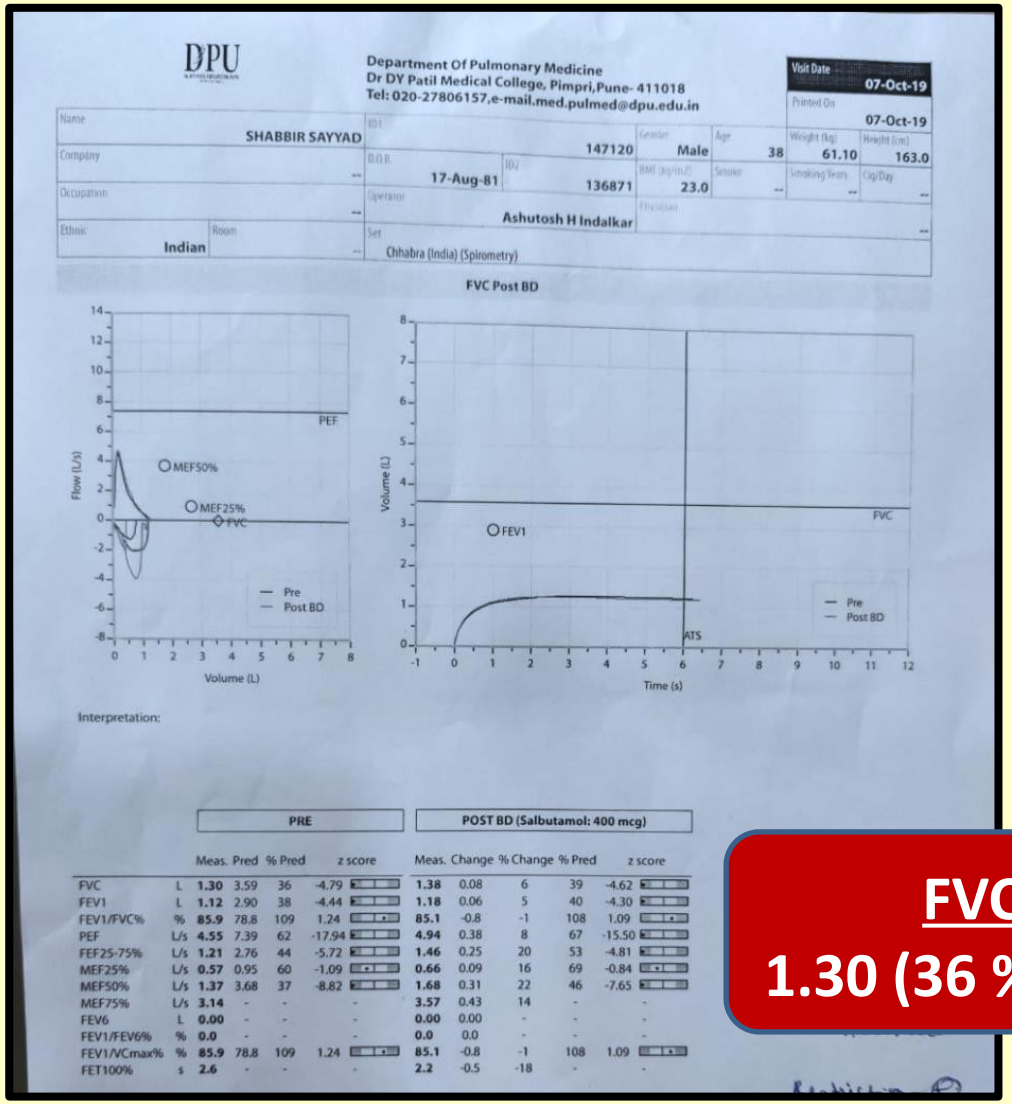
POST IPFT



ON DISCHARGE

07/10/2010





DPU

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Visit Date 07-Oct-19
Printed On 07-Oct-19

Name	SHABBIR SAYYAD	ID1	147120	Gender	Male	Age	38
Company	--	D.O.B.	17-Aug-81	ID2	136871	BMI (kg/m2)	23.0
Occupation	--	Operator	Ashutosh H Indalkar	Smoker	--	Smoking Years	--
Ethnic	Indian	Room	--	Set	Chhabra (India) (Spirometry)	Cig/Day	--

Weight (kg) 61.10 Height (cm) 163.0

FVC Post BD

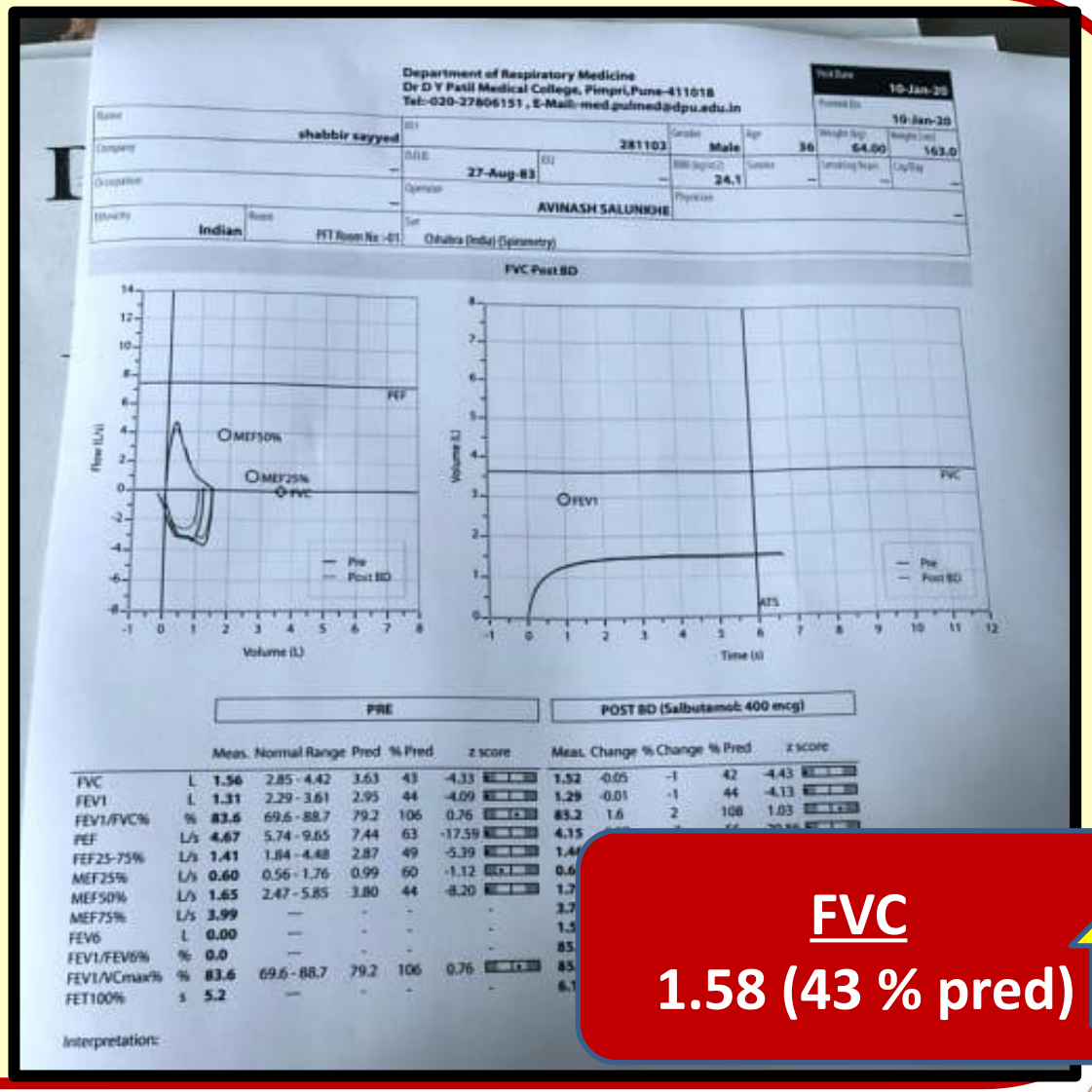
Interpretation:

		PRE				POST BD (Salbutamol: 400 mcg)				
		Meas.	Pred	% Pred	z score	Meas.	Change	% Change	% Pred	z score
FVC	L	1.30	3.59	36	-4.79	1.38	0.08	6	39	-4.62
FEV1	L	1.12	2.90	38	-4.44	1.18	0.06	5	40	-4.30
FEV1/FVC%	%	85.9	78.8	109	1.24	85.1	-0.8	-1	108	1.09
PEF	L/s	4.55	7.39	62	-17.94	4.94	0.38	8	67	-15.50
FEF25-75%	L/s	1.21	2.76	44	-5.72	1.46	0.25	20	53	-4.81
MEF25%	L/s	0.57	0.95	60	-1.09	0.66	0.09	16	69	-0.84
MEF50%	L/s	1.37	3.68	37	-8.82	1.68	0.31	22	46	-7.65
MEF75%	L/s	3.14	-	-	-	3.57	0.43	14	-	-
FEV6	L	0.00	-	-	-	0.00	0.00	-	-	-
FEV1/FEV6%	%	0.0	-	-	-	0.0	0.0	-	-	-
FEV1/VCmax%	%	85.9	78.8	109	1.24	85.1	-0.8	-1	108	1.09
FET100%	s	2.6	-	-	-	2.2	-0.5	-18	-	-

FVC
1.30 (36 % pred)

FOLLOW UP

10/01/2020



FVC
1.58 (43 % pred)

Discussion

Hemothorax may occur as a result of thoracic trauma or following diagnostic or therapeutic pleural aspiration. [a]

Traditional Initial Treatment is Closed tube Thoracostomy Drainage. [a]

Early removal of blood from pleural cavity is essential to prevent coagulation & fibrin deposition within the pleural cavity. [a]

[a] Ilhan Inci, Cemal Ozcelik, Refik Ulku, Adnan Tuna, Nesimi Eren. Intrapleural Fibrinolytic Treatment of Traumatic Clotted hemothorax. *Chest* 1998;114:160-165.

Discussion

RATIONALE OF IPFT

Failed pleural space drainage in spite of tube being properly positioned & patent in *HAEMOTHORAX*, CPE, empyema, tubercular effusions, malignant effusions

Fibrin adhesions → Loculations

Fibrinolytics → Adhesiolysis → Facilitates Drainage

EARLY USE

Discussion

IPFT was **First** used in 1949 by Tillet & Sherry

Present Status

In developing countries like ours,
IPFT is a cost effective option in all types of loculated pleural collections of any etiology & must be offered as a first option even when VATS is available.

Discussion

INDIAN STUDIES

Intrapleural Streptokinase in Complicated Parapneumonic Effusions and Empyema

M.S. Barthwal, R.B. Deoskar, K.E. Rajan and R.S. Chatterjee[1]

Utility of Intrapleural Streptokinase in Management of Chronic Empyemas

SH Talib,* GR Verma, M Arshad ,*** BO Tayade,**** A Rafeeque,****

A study of empyema thoracis and role of intrapleural streptokinase in its management

Amit Banga[1], GC Khilnani*[1], SK Sharma[1], AB Dey[1], Naveet Wig[1] and Namrata Banga[2]

Original Article

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

M.S. Barthwal[1], V. Marwah[2], M. Chopra[3], Y. Garg[2], R. Tyagi[4], K. Kishore[5], A. Vijay[6], V. Dutta[7], C.D.S. Katoch[3], S. Singh[5] and D. Bhattacharya[1]

Department of Pulmonary Medicine, Military Hospital (Cardiothoracic Centre), Armed Forces Medical College[1], Pune; Army Hospital (R&R)[2], New Delhi; Military Hospital[3], Ranchi; Indian Naval Hospital[4], Mumbai; Command Hospital[5], Lucknow; Command Hospital[6], Chandimandir and Base Hospital[7], Delhi Cantt, India

Total No of cases – 200

Age:- >12-186, <12-14

Types of loculated effusions-

CPE – 106 (53%)

Clotted Haemothorax - 12 (6%)

Empyema – 23 (11.5%)

Fibrinolytic Agent – STK/UK

No of doses- 3-6

Dosage-

STK - 2,50,000 IU 8th hrly (1 cycle)
UK - 100,000 IU 8th hrly (1 cycle)

Primary end points- Net drainage & radiological resolution

Indian J Chest Dis Allied Sci 2016; 58:17-20

Original Article

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SIGNIFICANT RESPONSE

CPE- 88 (80%)

Tubercular- 37 (62.7%)

Empyema- 14 (60.8%)

Traumatic hemothorax – 11(91.6%)

Overall response – 74%

No significant side effects

Indian J Chest Dis Allied Sci 2016; 58:17-20

IPFT IN HEMOTHORAX

Authors	Patient Group	Key Result
Jerjes-Sanchez et al, 1993-1995 Prospective Study	48 patients with loculated haemothorax	Success rate - 92% Surgical intervention in 4 cases.
Kimbrell et al., 2003-2005 Prospective Study	25 patients over a 16 month period with traumatic haemothorax	13 treated with urokinase. 11 SK, 1 with UK for 3 days then SK. Average use of IT 3.4 ± 1.4 days. IT effectively evacuated UDTH in 23 (92%) patients. 16 complete, 5 partial resolution – 84% 2 required surgical intervention
Skeete et al., (1999-2003) Retrospective study	41 patients. tPA used. Loculated traumatic haemothorax (14%), loculated pleural effusion (52%), empyema (29%). Loculated haemothorax (5%)	TPA was successful in avoiding surgery in 78% patients!

IPFT IN HEMOTHORAX

Interactive CardioVascular and Thoracic Surgery 8 (2009) 129-133

Best evidence topic - Thoracic general

Establishing a role for intra-pleural fibrinolysis in managing traumatic haemothoraces

Ian Hunt[a,*], Chrish Thakar[b], Rachel Southon[c], Eric L.R. Bédard[a]

[a]Division of Thoracic Surgery, Department of Surgery, University of Alberta, Edmonton, Alberta, Canada

7. Clinical bottom line

Fibrinolytic agents appear to have a role in treating retained haemothorax with significant clinical and radiological improvement demonstrated in most of the studies reviewed. Its use appeared to be reserved following 'failure' of chest drainage alone so was typically administrated over a week following the original injury. Few papers examined directly choice of agent, influence of timing and length of treatment.

Review Article: IPFT in Loculated Pleural Effusions

72 Journal of The Association of Physicians of India ▪ Vol. 67 ▪ December 2019

REVIEW ARTICLE

Intrapleural Fibrinolytic Therapy in Loculated Pleural Effusions - An Update

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.

Background

Tillet and Sherry[3] were the first ones to use fibrinolytic agents in 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

Clinical Pearls

Early diagnosis of Hemothorax

Prompt institution of Tube Thoracostomy

Early (2-3 wks) use of IPFT makes it more effective & should be the First Line of Management

If no significant response after maximum 6 doses (2 Cycles), then consider Thoracotomy/VATS

Thank You