

**Original article****STUDY OF CASES OF PULMONARY EMBOLISM AT A TERTIARY CARE HOSPITAL**

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**Abstract**

**Introduction:** *Pulmonary embolism is an acute cardiovascular disorder having high mortality rate despite of available diagnostic and treatment modalities. Early recognition and provision of early effective treatment brings good outcome with reversal of right ventricular function*

**Aims:** *To study the cases of pulmonary embolism for demographic data, clinical presentation, risk factors and investigation*

**Material and Method:** *Retrospective study done in 61 patients aged 19-80 years admitted at a tertiary care hospital from January to September 2018. All suspected patients of pulmonary embolism who underwent CTPA were included in the study. Patients <15 years, History of pulmonary trauma and Recurrence were excluded.*

**Result:** *Details about demographic data, clinical presentation, diagnostic methods, reports and outcome collected. In our study out of 61, 23 patients had positive in CTPA and 42 patients had D-dimer level >1000 ng/ml. Their main complaints were dyspnea, tachypnea, chest pain and cough. In our study 45 patients could be discharged and 9 patients expired.*

**Conclusion:** *PE is a potentially life threatening condition which is difficult to diagnose clinically but in time diagnostic strategy with CTPA and D-Dimer, helps in early recognition and provision of effective treatment which brings good outcome.*

**Key words-**

*Pulmonary Embolism, CTPA, D-dimer*

# **STUDY OF CASES OF PULMONARY EMBOLISM AT A TERTIARY CARE HOSPITAL**

## **INTRODUCTION:**

Pulmonary embolism is an acute cardiovascular disorder having high mortality rates despite of available diagnostic and treatment modalities. Mostly it is reported in elderly but occurs in adult group also. It is a life threatening condition with right sided heart failure (involves right ventricle). Patients with pulmonary embolism present with varieties of symptoms that often misinterpreted for diagnosis and responsible for high mortality rate. So, Early recognition and provision of early effective treatment brings good outcome with reversal of right ventricular function<sup>(1)</sup>.

## **AIM:**

To study the cases of pulmonary embolism for demographic data, clinical presentation, risk factors & investigations (CTPA, D-dimer)

## **MATERIAL:**

**Type of study-** Retrospective

**Sample size-** 61 patients

**Period of Study-** January to September 2018

**Study place-** Tertiary care hospital

**Study group-** All suspected patients with pulmonary embolism underwent CTPA (CT pulmonary angiography)

**Inclusion criteria-** All suspected patients for PE underwent CTPA

**Exclusion criteria-** Age <15 years, Patients with pulmonary trauma, Recurrence of PE

**Study material-** Case records, CTPA reports

## **METHODOLOGY:**

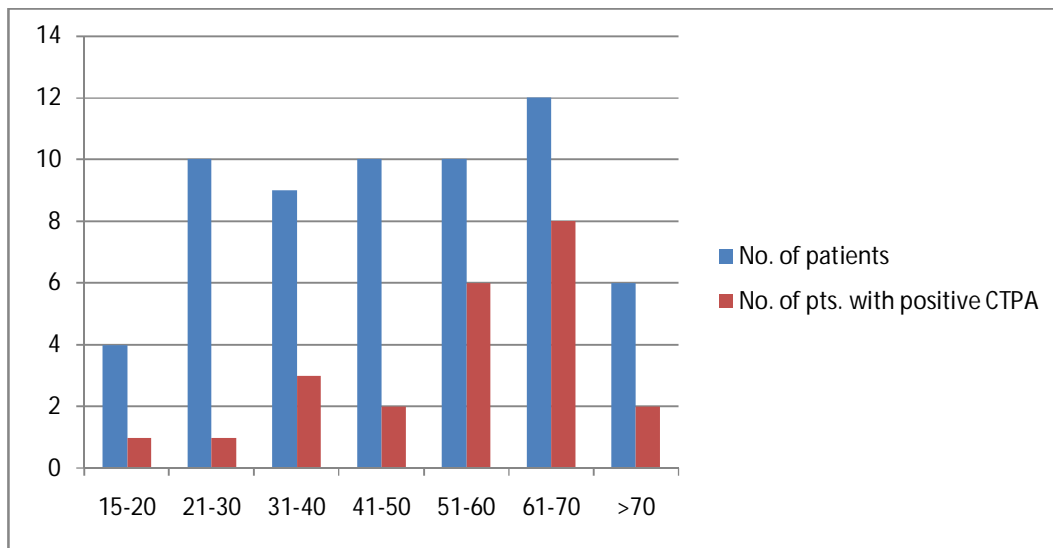
This study was done at tertiary care hospital. First, we inquired about record of CTPA in radiology department and collected patient's name and IR Number. Based on that, we collected case records from record department. Details about demographic data, clinical presentation, diagnostic methods, reports & outcome collected.

Collected data entered in MS excel sheet and analyzed by using SPSS version

## RESULTS:

**Table-1: Age wise distribution**

Age (years)	No. of patients	No. of pts. with positive CTPA
15-20	04	1
21-30	10	1
31-40	09	3
41-50	10	2
51-60	10	6
61-70	12	8
>70	06	2
<b>Total</b>	<b>61</b>	<b>23</b>



Maximum no. of positive CTPA was in the patients with age group of 61-70years.

Maximum age with positive CTPA is 80 years while Minimum age is 19years.

In our study 4 patients found between the age group 15-20 years and all had history of long bone fracture and treated & discharged from hospital. Their clinical presentation was of PE, so suspected and underwent CTPA. Out of these 4 young patients, one had positive CTPA. Dr. Sandeep Rana reported a case of PE in 24 years male patient<sup>(2)</sup>.

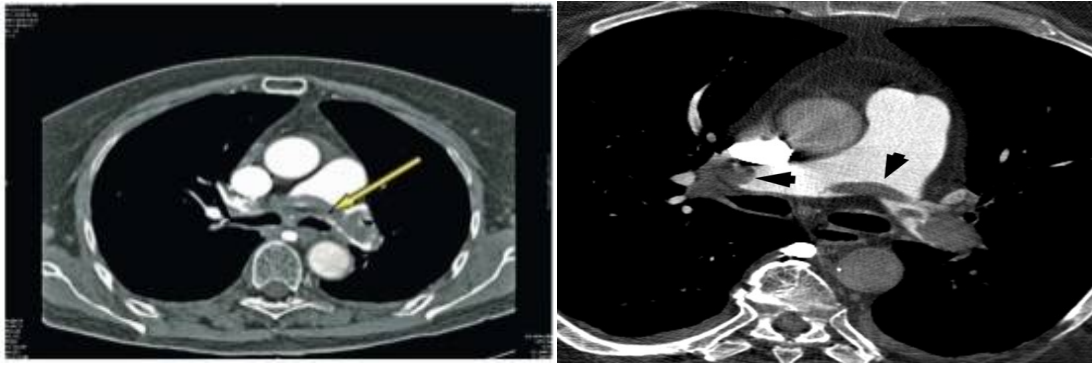
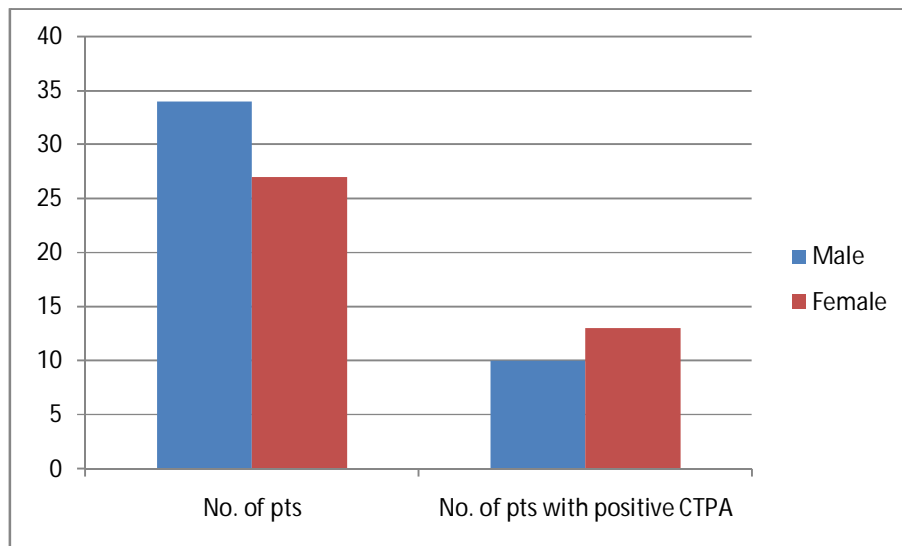


Figure-1, 2 Arrows are suggestive of thrombus in pulmonary arteries (positive CTPA)

CTPA is now most widely used technique for diagnosis of PE. It has a high predictive value with a concordant clinical assessment. But additional testing is necessary when clinical probability is in consistence with imaging results. CTPA has 97% positive predictive value<sup>(3,4)</sup>.

**Table-2: Sex wise distribution**

Sex	No. of pts	No. of pts with positive CTPA
Male	34	10
Female	27	13
<b>Total</b>	<b>61</b>	<b>23</b>



In our study maximum no. of patients with positive CTPA were females (13 patients) compared to male (10 patients)

Study done by Dr Silvy Laporte shown that occurrence of PE was equal in both men and women were equal in number<sup>(5)</sup>.

**Table-3: Clinical presentation**

<b>Clinicalpresentation</b>	<b>No. of patients</b>	<b>Our study (%)</b>	<b>DrMiniati M (%)</b>
Dyspnea	48	78	81
Chest pain	34	55	39
Cough	26	42	04
Tachycardia	18	29	-
Syncope	02	3.27	22
Hemoptysis	01	1.6	05
Arrhythmia (Atrial Fibrillation)	01	1.6	-

According to above table maximum no. of patients were found with Dyspnea(78%) followed by chest pain(55%) and cough(42%)

Dr Miniati M studied in 800 patients and found dyspnea in 290 patients followed by chest pain in140, syncope in 78, hemoptysis in 18 and cough in 14 patients<sup>(6)</sup>.

**Table-4: D-Dimmer level**

<b>D-Dimmer level (normal value &lt;500 ng/ml)</b>	<b>No. of pts.</b>
<500	05
500-1000	14
1000-1600	08
>1600	34
<b>Total</b>	<b>61</b>

If patients present with symptoms suggestive of PE, initial D-Dimmer measurement is help full regarding PE because if D-Dimmer level is >500 ng/ml than there is possibility of PE

and if D-Dimmer level is >1600 ng/ml than there is very high chance for PE. If the level is <500 ng/ml than there is no further investigation are required.

In our study we selected the cases of suspected PE, underwent CTPA and D-Dimmer done. In our study all 23 CTPA positive patients had D-Dimmer >1600 ng/ml. It has overall Diagnostic sensitivity for PE is 94-98% but overall Diagnostic specificity is 50-60 %<sup>(7,8)</sup>.

D-Dimmer level is also high in certain other conditions likes Age>70 years, Pregnancy, Active malignancy, Surgical procedure in previous week, Liver disease, Rheumatic arthritis, Infection and trauma.

**Table-5: PT with INR & APTT reports**

<b>Report</b>	<b>Normal values (Seconds)</b>	<b>Normal (No. of pts)</b>	<b>Abnormal (No. of pts)</b>	<b>Total</b>
PT	10-15	57	4	<b>61</b>
INR	<1.1	60	1	<b>61</b>
APTT	20-35	58	3	<b>61</b>

In our study 8 patients had abnormal PT with INR & APTT. Measurement of PT with INR & APTT reports is required to know whether the patients have liver diseases or not. Significant abnormal level is a contraindication for anticoagulant therapy.

**Table-6 :Etiology**

<b>Etiology</b>	<b>No. of pts</b>	<b>No. of pts with positive CTPA</b>
Long bone fractures	24	11
Hip & Knee replacement surgery	12	04
DVT	09	05
Spinal cord injury	06	01
Major surgery	05	01
Obesity	04	01
Malignancy	01	00
<b>Total</b>	<b>61</b>	<b>23</b>

In our study maximum No. of patients with Positive CTPA belonged to Long bone fracture followed by DVT. Our hospital has a well-established dedicated trauma center, so more no. of trauma patients come from all places. This may be the reason that we got more no. of trauma

cases in our study. We received 42 cases related to trauma, out of that, 16 cases had positive findings for CTPA.

**Table-7: Wells score**

Wells score	No. of pts	No. of pts (positive CTPA)
<4 points(Less possibility)	42	04
>4 points(Most possibility)	19	19
<b>Total</b>	<b>61</b>	<b>23</b>

We noted the findings in history, physical examination and calculated Wells score.

Usually Wells score is calculated to suspect patients with PE but in our study we included patients who already done CTPA and correlated each other.

**Table-8: Treatment**

Treatment	No. of pts
Unfractionated heparin	28
LMWH	25
Newer anti-coagulants (Dabigatran)	01
Fibrinolysis (Alteplase)	02
Cather guided Thrombolysis	00
Surgical embolectomy	00
<b>Total</b>	<b>56</b>

Unfractionated heparin was started in all patients with positive CTPA. Three patients were found with high S.Creatine >2 mg/dl, and there D-dimmer value found between 1000-1600 ng/ml, so treated with unfractionated heparin. LMWH was given in 25 patients whose D-Dimmer was >500 ng/ml.

**Table-9: 2D Echo findings**

2D Echo findings	No. of Pts	No. of pts with positive CTPA
Normal	32	04
Abnormal	29	19
<b>Total</b>	<b>61</b>	<b>23</b>

In suspected patients for PE, evaluation with bed side 2D Echo is helpful. Certain sign suggest that there may be the chance to develop PE. Most important sign is "McConnell's sign".

According to this sign in Echo there is a hypo or akinetic mid and basal right ventricular (RV) free wall associated with seemingly normal or hyperkinetic RV apical wall motion. However the specificity and sensitivity of these sign is 94% and 77% respectively<sup>(9)</sup>.

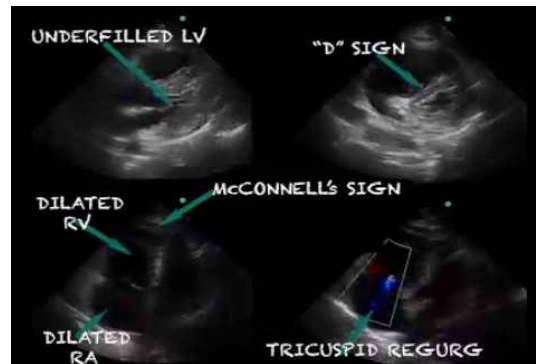


Figure-3 Echocardiography in Pulmonary Embolism patient

**Table-10: Outcome**

<b>Outcome</b>	<b>CTPA Negative ( No. of pts)</b>	<b>CTPA Positive (No. of pts)</b>	<b>Total</b>
Discharged	29	16	<b>45</b>
DAMA	04	03	<b>07</b>
Expired	05	04	<b>09</b>
<b>Total</b>	<b>38</b>	<b>23</b>	<b>61</b>

(DAMA-Discharge against Medical Advice)

Above table-10 shows that 29 patients could be discharged, whose CTPA was negative as compare to 16 patients with positive CTPA. More No. of expired patients with negative CTPA is related to their co-morbid conditions also as PE suspected in such critical patients. The main conditions in our patients were septicemia, Myocardial Infarction, respiratory failure and renal failure. Dr Frederick A. Anderson show 12% case fatality ratio while our study has case fatality is 15 % <sup>(10)</sup>. Dr Federico Lavorini mentioned 25% mortality in untreated cases and 2-8% in treated which correlates with 9% of our study<sup>(11)</sup>

## **DISCUSSION:**

### **Pathophysiology-**

PE occurs when deep venous thrombi detach and embolize to the pulmonary circulation. Larger emboli wedge in the main pulmonary artery, while smaller emboli occlude the peripheral arteries.



Pulmonary infarction occurs in about 10% of patients without underlying cardiopulmonary disease. Obstruction of the pulmonary arteries creates dead space ventilation as alveolar ventilation exceeds pulmonary capillary blood flow. This contributes to ventilation-perfusion mismatch, with vascular occlusion of the arteries increasing pulmonary vascular resistance. In addition, humeral mediators, such as serotonin and thromboxane, are released from activated platelets and may trigger vasoconstriction in unaffected areas of lung. As the pulmonary artery systolic pressure increases, right ventricular after load increases, leading to right ventricular failure. As the right ventricular failure progresses, impairment in left ventricular filling may develop. Rapid progression to myocardial ischemia may occur secondary to inadequate coronary artery filling.

**CLINICAL PRESENTATION-**

Patients of pulmonary embolism present with wide varieties of symptoms so, initial identification of pulmonary embolism is a task. Certain signs & symptoms are described in a following chart. According to it most common symptom is dyspnea follow by chest pain.

**Table-11: Signs and symptoms**

Symptoms	Signs
Dyspnea, Chest pain, Cough, Hemoptysis	Tachypnea, Tachycardia, Rales
Seizure, Syncope, Abdominal pain,	Fourth heart sound, Atrial fibrillation
Productive cough, Wheezing, Altered sensorium	Hypo/Hyperthermia, Chest Wall tenderness

**RISK FACTORS-**

**Table-12: Risk factors for PE**

<u>Weak</u>	<u>Medium</u>	<u>High</u>
Hyperhomocystenaemia	Central venous line	Insufficiency of anticoagulant
Immobility(air travel >8hours)	Chemotherapy	Elevated level of factor VIII
Bed rest(>3days)	Congestive Heart failure	Fracture of long bone
Increasing age >40 years	Hormonal replacement therapy	Hip & Knee replacement surgery
Laparoscopic surgery	Malignancy	Major general surgery
Obesity	Pregnancy/postpartum	Major trauma
Pregnancy/antepartum	Previous VTE	Spinal cord injury <sup>(1)</sup>

## DIAGNOSTIC METHODS-

There are certain guide lines published by professional societies, including American College of Physicians/American Academy of Family Physicians <sup>(12)</sup>, American College of Emergency Physicians (ACEP) and the European Society of Cardiology. According to these guidelines pretest probability (including history, physical examination and laboratory results) is identified. It also includes clinical decision tool like original Wells criteria, Revised Geneva Score and Simplified Geneva score to determine whether individual patients require additional testing on the basis of risk stratification <sup>(13)</sup>.

Clinical decision depends on experience and familiar with pathophysiology and presentation of Pulmonary Embolism in ED.

**Table-13: Wells scoreCriteria**

Criteria	Points
Clinical signs & symptoms of DVT	3
Pulmonary embolism most likely diagnosis	3
Tachycardia(>100/min)	1.5
Immobilization/Surgery in previous 4Weeks	1.5
Prior DVT/PE	1.5
Hemoptysis	1
Active malignancy (Treated with in 6 month)	1

If <4 points- PE less possibility, >4 points- PE most possibility

**Table-14: Pulmonary Embolism Rule Out Criteria (PERC)**

Clinical characteristics	Meet criteria	Does not meet criteria
Age <50 years	0	1
Initial heart rate<100 BPM	0	1
Initial SpO <sub>2</sub> >94% on room air	0	1
No unilateral leg swelling	0	1
No hemoptysis	0	1
No surgery or trauma within 4 week	0	1
No H/O venous thromboembolism	0	1

No estrogen use	0	1
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**Note** – All criteria must be present to rule out PE

### **TREATMENT:-**

If anticoagulation treatment is started in the emergency room along with supportive care of hypoxemia and hemodynamic instability, mortality decreases <sup>(14,15)</sup>. Haemodynamically unstable patients may benefit from fibrinolytic therapy, however, significant bleeding occurs in 13% of patients. The use of bolus thrombolytics during cardiopulmonary arrest may have some benefit when PE is strongly suspected <sup>(16)</sup>. Mechanical thrombolysis with catheter-directed embolectomy and fibrinolytic therapy can also be used. Systemic heparin, either in the form of unfractionated heparin or low-molecular-weight heparin (LMWH) is the mainstay of treatment. LMWH is advantageous in ease of administration, monitoring, lower potential for heparin-induced thrombocytopenia. However, it is not an appropriate choice for patients with renal failure or for patients at significant risk of bleeding, because of its longer half-life and lack of reversibility. Newer options for anticoagulation include direct thrombin inhibitors like dabigatran, factor Xa inhibition such as Rivaroxaban also can be use. These newer anti-coagulant agents show good results in certain studies with lower chance of bleeding <sup>(15, 17)</sup>. If patients continue to have Pulmonary Embolism despite therapeutic anticoagulation, permanent or temporary inferior vena cava filters (IVCF) may be used.

### **CONCLUSION:**

PE is a potentially life threatening condition which is difficult to diagnose clinically but in time diagnostic strategy with CTPA and D-Dimmer helps in early recognition and provision of effective treatment, which brings good outcome.

### **LIMITATION OF STUDY:**

The No. of cases was low. Our study was retrospective and data collected from case records so, we got findings whatever is written in case records.

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