



Study of clinical profile, immediate and short-term outcome of patients with intermediate risk acute pulmonary thromboembolism

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ABSTRACT

Background: Acute pulmonary thromboembolism (PTE) is a relatively common and potentially fatal disease with an annual incidence rate of about 104–183 per 100,000 person-years and 30-day mortality of around 10%. Present study was aimed to study clinical profile, immediate and short term outcome of patients with intermediate risk acute pulmonary thromboembolism. **Material and Methods:** Present study was retrospective, descriptive study, conducted patients of either gender, admitted with acute intermediate-risk PTE confirmed, with CTPA & echocardiography. **Results:** In present study, 57 patients with study criteria were included. Majority were male (78.95 %), from age group of 60-69 years (47.37 %) & 50-59 years (26.32 %) age group. In present study, commonly observed symptoms and signs were dyspnoea (75.44 %), chest pain 42.11 %), cough (33.33 %). Common risk factors were cardiovascular (38.6 %), smoker (36.84 %), diabetes (35.09 %), immobilization (22.81 %), surgery (< 3 months) (14.04 %), malignancy (14.04 %). Chest x-ray findings were consolidation (12.28 %), pleural effusion (10.53 %), consolidation and pleural effusion (3.51 %) & normal findings (71.93 %). While common echocardiography findings were pulmonary artery hypertension (71.93 %), RA/RV dysfunction (61.4 %), Thrombus within the heart (5.26 %) & normal ECHO (5.79 %). Patients received treatment of pulmonary embolism as combination of warfarin (68.42 %), low-molecular-weight heparins (38.6 %), unfractionated heparin (36.84 %), thrombolytic therapy (22.81 %), elastic compression bandage (12.28 %) & new oral anticoagulants (8.77 %). During study period mortality at 3 months follow up was noted among 6 patients (10.53 %). **Conclusion:** Patients with intermediate risk PE had a moderate risk of mortality, when received early recognition, laboratory/radiological investigations & aggressive therapy.

Keywords: intermediate risk, pulmonary embolism, early recognition, PTCA, thrombolysis

INTRODUCTION

Acute pulmonary thromboembolism (PTE) is a relatively common and potentially fatal disease with an annual incidence rate of about 104–183 per 100,000 person-years and 30-day mortality of around 10%.^{1,2} Most of the deaths occur when the diagnosis is delayed or never made. Despite diagnostic advances, delays in pulmonary embolism diagnosis are common and represent an important issue.³

A wide range of risk factors can cause PTE, including old age, immobility, major surgery, malignancies, infections, hormonal changes, hypercoagulability state, and several medications.^{4,5} Patients also vary in symptoms, and they may present with nonspecific mild symptoms to severe dyspnea.⁵ Although a positive D-dimer test may propound PTE, the definite diagnosis of PTE is mostly made based on imaging modalities.⁶ Currently, computed tomography angiography of pulmonary arteries (CTA) is considered the gold-standard diagnostic imaging for PTE, and its combination with D-dimer is the most-preferred diagnostic plan.^{7,8}

According to the guidelines set out by the American College of Cardiology (ACC) and the European Society of Cardiology (ESC), therapeutic management of patients with PE included anti-coagulation, intravenous and catheter-directed thrombolysis (CBT), and surgical embolectomy.^{8,9} Present study was aimed to study clinical profile, immediate and short term outcome of patients with intermediate risk acute pulmonary thromboembolism.

MATERIAL AND METHODS

Present study was retrospective, descriptive study, conducted in Department of Critical Care Medicine, D.Y. Patil Medical College, Pimpri Pune, India. Study duration was of 2 years (January 2021 to December 2022). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of either gender, admitted with acute intermediate-risk PTE confirmed, with CTPA & echocardiography were considered for present study

Exclusion criteria

- Patients with known significant bleeding risk and coagulation disorders,
- Hemodynamically unstable patients
- Patients on thrombolytic agents for the last 4 days
- Patients with normal troponin T/I levels.

Information about the patient demographics, risk factors, clinical examination, laboratory investigations, and treatment(s) given were recorded on a preformed proforma. Patients with PTE were classified as

1. High Risk - if the patient had shock or persistent hypotension (defined as systolic blood pressure less than 90mmHg or a drop at least 40mmHg for at least 15 min).
2. Intermediate risk - if there was evidence of right ventricular dysfunction and/or myocardial injury in absence of hypotension;
3. Low risk - if the patient was having none of the above features

Patient's clinical vitals, ECG findings, echocardiography findings, cardiac troponin-T levels were recorded at the time of admission, along with treatments underwent which is either thrombolysis or anticoagulation with unfractionated heparin (UFH), low-molecular-weight heparin (LMWH), Vitamin K antagonists, or novel oral anticoagulants (NOAC).

In-hospital conditions, including ventilator support and hemodynamic status, were noted, and immediate outcomes of recovery or worsening of hemodynamic status at discharge were also noted. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study, 57 patients with study criteria were included. Majority were male (78.95 %), from age group of 60-69 years (47.37 %) & 50-59 years (26.32 %) age group.

Table 1- General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
30-39	2	3.51
40-49	8	14.04
50-59	15	26.32
60-69	27	47.37
70-79	5	8.77
Mean age (mean \pm SD)	56.32 \pm 11.23	
Gender		
Male	45	78.95
Female	12	21.05

In present study, commonly observed symptoms and signs were dyspnoea (75.44 %), chest pain 42.11 %), cough (33.33 %), other symptoms (28.07 %), tachycardia (24.56 %), while less common were lower-limb pain (15.79 %), altered consciousness (14.04 %), anxiety (10.53 %), cyanosis (3.51 %), asymptomatic (3.51 %), syncope (1.75 %) & cardiorespiratory arrest (1.75 %).

Table 2: Symptoms and signs

	No. of patients	Percentage
Dyspnoea	43	75.44
Chest pain	24	42.11
Cough	19	33.33
Other symptoms	16	28.07
Tachycardia	14	24.56
Lower-limb pain	9	15.79
Altered consciousness	8	14.04
Anxiety	6	10.53
Cyanosis	2	3.51
Asymptomatic	2	3.51
Syncope	1	1.75
Cardiorespiratory arrest	1	1.75

Section A-Research paper

In present study, risk factors were cardiovascular (38.6 %), smoker (36.84 %), diabetes (35.09 %), immobilization (22.81 %), surgery (< 3 months) (14.04 %), malignancy (14.04 %), heart failure (10.53 %), COPD (10.53 %), air travel (3.51 %), chronic liver disease (3.51 %), chronic renal failure (3.51 %) & HIV (1.75 %).

Table 3: Risk factors.

Risk Factors	No. of patients	Percentage
Cardiovascular	22	38.6
Smoker	21	36.84
Diabetes	20	35.09
Immobilization	13	22.81
Surgery (< 3 months)	8	14.04
Malignancy	8	14.04
Heart Failure	6	10.53
COPD	6	10.53
Air travel	2	3.51
Chronic liver disease	2	3.51
Chronic renal failure	2	3.51
HIV	1	1.75

Chest x-ray findings were consolidation (12.28 %), pleural effusion (10.53 %), consolidation and pleural effusion (3.51 %) & normal findings (71.93 %). While common echocardiography findings were pulmonary artery hypertension (71.93 %), RA/RV dysfunction (61.4 %), Thrombus within the heart (5.26 %) & normal ECHO (5.79 %).

Table 4: Chest x-ray and echocardiography findings

Number Percentage	No. of patients	Percentage
Chest x-ray		
Consolidation	7	12.28
Pleural effusion	6	10.53
Consolidation and pleural effusion	2	3.51
Normal	41	71.93
Echocardiography		
Pulmonary artery hypertension	41	71.93
RA/RV dysfunction	35	61.4
Thrombus within the heart	3	5.26
Normal	9	15.79

Patients received treatment of pulmonary embolism as combination of warfarin (68.42 %), low-molecular-weight heparins (38.6 %), unfractionated heparin (36.84 %), thrombolytic therapy (22.81 %), elastic compression bandage (12.28 %) & new oral anticoagulants (8.77 %). During study period mortality at 3 months follow up was noted among 6 patients (10.53 %).

Table 5. Treatment of pulmonary embolism

Treatment	No. of patients	Percentage
Warfarin	39	68.42
Low-molecular-weight heparins	22	38.6

Unfractionated heparin	21	36.84
Thrombolytic therapy	13	22.81
Elastic compression bandage	7	12.28
New oral anticoagulants	5	8.77

DISCUSSION

The classic presentation of acute PTE, i.e., rapid onset of pleuritic chest pain, dyspnoea, and hypoxia, is hardly seen. The diagnosis of PE is usually suspected by the presence of common symptoms (including breathing difficulties, chest pain on inspiration and palpitations) and clinical signs including low blood oxygen saturation, tachypnea and tachycardia.^{10,11}

Spiral computed tomography (CT) is the most widely used and preferred method for the diagnosis of APE.¹⁰ Electrocardiography (ECG) typically has poor sensitivity and specificity in the diagnosis of PE. However, if ECG, which can be performed in the emergency room during initial medical contact, can be used to diagnose PE, it would allow for the early initiation of therapy and an improved prognosis for patients with PE.¹¹

Echocardiography has progressively achieved a prominent role in the diagnosis and clinical assessment of patients with PE. Patients with echocardiographic RV dysfunction are known to be at risk of subsequent clinical worsening and PE-related death and may benefit from more aggressive therapeutic strategies, including thrombolytic treatment.¹²

In study by Mathiyalagan P et al.,¹³ 55 patients, 29 (52.73%) were diagnosed with intermediate high-risk PTE and 26 (47.27%) with intermediate low-risk PTE. They were normotensive and most of them had a simplified pulmonary embolism severity index (sPESI) score <2. Typical ECG pattern S1Q3T3 along with echo patterns and elevated cardiac troponin levels were observed in most of the patients. Patients treated with thrombolytic agents showed a reduction in hemodynamic decompensation as opposed to patients treated with anticoagulants who had clinical signs of right heart failure (RHF) on follow-up after 3 months.

Sheikh AR et al.,¹⁴ studied 150 patients, mean age was 52.3 ± 15.56 years. Most common underlying risk factors were immobilization (33.3%), chronic lung disease (22.7%), malignancy (15.3%), and trauma to lower extremities (14.7%). The most common symptom prompting evaluation for PTE in our study patients was dyspnoea (94%), pleuritic chest pain (38%), and cough (33.3%). 50 patients (33.3%) had hemodynamic instability at presentation. Among 150 patients, in hospital mortality was 9.3%.

Lolly M et al.,¹⁵ studied 53 patients with a mean age of 47.2 years with 91% being males. Majority of the patients had atleast 1 risk factor for embolisation(58.5%) with smoking being the most important risk factor. Dyspnea (71.7%) and syncope (17.0%) were the predominant symptoms. 39.6% patients had tachycardia and 22.6% had hypotension. 45 patients (84.9%) had pulmonary arterial hypertension, 31 patients (58.4%) had evidence of RA/RV dysfunction and 3 patients (5.7%) had evidence of thrombus in heart. 32(60.3%) patients underwent anticoagulation with unfractionated heparin, 10(18.7%) patients were thrombolysed and 6(11.3%) patients underwent embolectomy. 5 patients underwent both thrombolysis and anticoagulation, with the mortality rate being only 7.5%.

A large, randomized trial, PEITHO – Pulmonary Embolism International Thrombolysis Trial has shown that fibrinolytic therapy decreased hemodynamic decompensation, while increasing the risk of major hemorrhage and stroke when compared with anticoagulation alone in patients with high-risk sub-massive PE without any effect on mortality. Therefore, bleeding risk associated with thrombolytic therapy is an important factor that warrants consideration in patients with PE.¹⁶

The most important conceptual advance regarding pulmonary embolism over the last several decades has been the realization that pulmonary embolism is not a disease; rather, pulmonary embolism is a complication of venous thromboembolism. Pulmonary embolism is present in 60-80% of patients with DVT and more than half these patients are asymptomatic.¹¹

PE can present with various clinical syndromes, ranging from being asymptomatic to shock or sudden death. Previous studies found that antemortem PE diagnosis was rarely suspected among patients who died of PE.¹⁷ A high index of suspicion based on various clinical and laboratory characteristics should be maintained to diagnose PE and reduce the likelihood of inadvertently discarding the diagnosis.¹⁸

CONCLUSION

Patients with intermediate risk pulmonary embolism present with variety of clinical symptoms, signs and investigations. Patients with intermediate risk PE had a moderate risk of mortality, when received early recognition, laboratory/radiological investigations & aggressive therapy.

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Section A-Research paper

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