

Clinical profile and risk factors of CT pulmonary angiographically confirmed cases of pulmonary embolism

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Abstract

Background: Pulmonary thromboembolism (PTE) is a major health problem with significant mortality and morbidity. PTE implies occlusion of pulmonary arterial circulation by the clot formed elsewhere usually in deep veins in the leg and pelvis. Less than 5% of venous thrombosis occurs in other sites. Pulmonary embolism (PE) is a common clinical disorder with an average annual incidence of one case per 1000 population in the western population. It is responsible for about 5-10% of all in-hospital deaths. **Aims and objectives:** To study the clinical profile and risk factors of CT pulmonary angiographically confirmed cases of pulmonary embolism **Material and Methods:** In the present observational study patients with age 21 years and above with CT pulmonary angiography showing evidence of pulmonary embolism were enrolled in the study. Total 50 cases were selected in the two years of study duration. A detailed history of each patient was taken. Presenting symptoms were enquired in their chronological order of appearance, onset, and progression. History was followed by a detailed clinical examination of all the patients. General examination was done with special emphasis on Level of consciousness, Pulse, Blood pressure, Respiratory rate, Pallor, Cyanosis, Clubbing, Icterus, Jugular venous pressure, Edema and Body mass index. Detailed systemic examination was done in all patients. **Results:** Lobar and segmental location of thrombus (90%) was most common finding on CT Pulmonary angiography. Most common risk factor was age > 40 years (66%), followed by previous history suggestive of DVT (44%) and Smoking /tobacco addiction (42%). Dyspnea (92%) was the most common symptom followed by cough and chest pain (44% each). Tachypnea (92%) and tachycardia (88%) were the common findings on general examination. Loud P2 (52%) was the most common finding on systemic examination followed by signs of DVT (42%) and rales (36%). **Conclusion:** We conclude that Pulmonary embolism was observed in all age groups with a tendency to increased occurrence after the age of forty years. Age more than 40years, previous history suggestive of DVT and Smoking /tobacco addiction were the common risk factors observed. Dyspnea, cough and chest pain were the common presenting symptoms. While tachypnea and tachycardia were the common findings on general examination. Loud P2, signs of DVT and rales were the most common finding on systemic examination.

Key Word: Pulmonary embolism, Clinical profile, risk factors, CT pulmonary angiography.

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Received Date: 17/01/2019 Revised Date: 10/02/2019 Accepted Date: 21/04/2019

DOI: <https://doi.org/10.26611/10211027>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
09 May 2019

INTRODUCTION

Pulmonary thromboembolism (PTE) is a major health problem with significant mortality and morbidity. PTE implies occlusion of pulmonary arterial circulation by the clot formed elsewhere usually in deep veins in the leg and pelvis. Less than 5% of venous thrombosis occurs in other sites. Pulmonary embolism (PE) is a common clinical disorder with an average annual incidence of one case per 1000 population in the western population¹. It is responsible for about 5-10% of all in-hospital deaths.² It is

How to cite this article: Rahul N Mastud, Gurunath P Parale. Clinical profile and risk factors of CT pulmonary angiographically confirmed cases of pulmonary embolism. *MedPulse International Journal of Medicine*. May 2019; 10(2): 79-84.

<https://www.medpulse.in/Medicine/>

an important diagnosis to consider, given the fact, that 10% of symptomatic PE are fatal in the first hour and that a hospital mortality to untreated PE can be reduced from 30% to nearly 8% if treated appropriately.^{1,2} Most of the deaths occur when the diagnosis is delayed or never made. The clinical syndromes of PE and deep venous thrombosis (DVT) are now considered part of a spectrum of dysregulated hemostasis within the venous system designated as venous thromboembolism (VTE).^{3,4} Among cardiovascular diseases, VTE along with stroke and myocardial infarction rank as three big cardiovascular killers.^{5,6} Risk factors for venous thrombosis and, therefore, pulmonary embolism, include advanced age, prolonged immobility, surgery, trauma, malignancy, pregnancy, estrogen therapy, congestive heart failure, and inherited or acquired defects in blood coagulation factors. These risks are cumulative, putting most hospitalized patients, who often have a combination of these factors, at greater risk of having a pulmonary embolism. Pulmonary embolism (PE) is a challenge to clinical practice. Venous Thromboembolism (VTE) mimics other illnesses and PE is known as “THE GREAT MASQUERADER”.⁷ Presence of risk factors for venous thromboembolism associated with signs and symptoms of PE is the initial scenario to raise clinical suspicion.

MATERIAL AND METHODS

The present observational study was conducted with the aim to study the clinical profile and risk factors of CT pulmonary angiographically confirmed cases of pulmonary embolism. Patients with age 21 years and above with CT pulmonary angiography showing evidence of pulmonary embolism were enrolled in the study. Total 50 cases were selected in the two years of study duration. A detailed history of each patient was taken. Presenting symptoms were enquired in their chronological order of appearance, onset, and progression. Significant past medical history was noted in details. Family history, drug history and personal history were noted. History was followed by a detailed clinical examination of all the patients. General examination was done with special emphasis on Level of consciousness, Pulse, Blood pressure, Respiratory rate, Pallor, Cyanosis, Clubbing, Icterus, Jugular venous pressure, Edema and Body mass index. Detailed systemic examination was done in all patients. All the patients in the study were subjected to the following investigations Complete hemogram, blood sugar level, serum electrolytes, lipid profile, renal function tests, liver function tests, arterial blood gas analysis (ABG), electrocardiography (ECG), 2 D echocardiography with Doppler, chest X Ray, venous Doppler of lower limbs, CT pulmonary angiography.

RESULTS

Table 1: Distribution according to location of thrombus on CT Pulmonary Angiography

Location	No. Of patients	Percentage
Main pulmonary artery	06	12%
Right branch of main pulmonary artery	12	24%
Left branch of main pulmonary artery	03	06%
Both branches of main pulmonary artery	23	46%
Lobar and segmental branches	45	90%

It was observed that lobar and segmental location of thrombus (90%) was most common finding on CT Pulmonary angiography and was followed by thrombus at Right branch of main pulmonary artery (24%) and Main pulmonary artery (12%)

Table 2: Distribution according to Age and sex of patients with pulmonary embolism

Age group (years)	Male (%)	Female (%)	Percentage
21 – 30	04 (8%)	03 (6%)	14%
31 – 40	06 (12%)	04 (8%)	20%
41 – 50	09 (18%)	04 (8%)	26%
51 – 60	05 (10%)	02(4%)	14%
61 – 70	07 (14%)	02(4%)	18%
71 – 80	02 (4%)	02 (4%)	08%
Total	33 (66%)	17 (34%)	100%

Out of fifty patients 07 (14%) were of age group 21 to 30 years. 10 (20%) were in 31- 40 years age group, 13 patients (26%) were in 41 – 50 years age group, 07 patients (14%) were in 51 – 60 years age group, 09 patients (18%) were in 61 –70 years age group, 04 patients (08%) were in 71 – 80 years age group.

Table 3: Distribution of patients according to Risk factors and comorbidities

Risk factor/ Comorbidity	No. of Patients	Percentage
Age > 40 years	33	66%
Bed rest > 72 hrs	02	04%
Previous history s/o DVT	22	44%
COPD	04	08%
CCF	03	06%
Smoking /tobacco	21	42%
Obesity (BMI >30)	03	06%
Hypertension	10	20%
Diabetes mellitus	07	14%
Surgery	02	04%
Hyperlipidemia	09	18%
Pregnancy/ postpartum	01	02%
OC pills	01	02%
Hip/ lower limb fracture	01	02%
Idiopathic	05	10%

In present study most common risk factor was age > 40 Years (66%). followed by previous history suggestive of DVT (44%) and Smoking /tobacco addiction (42%).

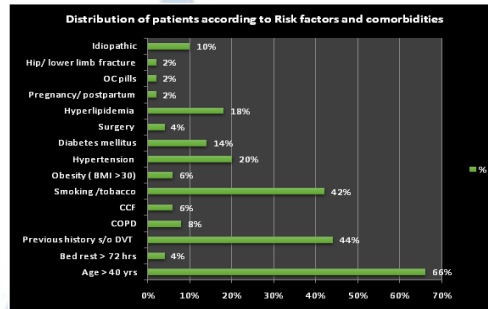


Table 4: Distribution of patients according to clinical features

	No. of Patients	Percentage	
Presenting symptoms	Dyspnea	46	92 %
	Chest pain	22	44 %
	Cough	22	44 %
	Giddiness	09	18 %
	Hemoptysis	08	16 %
	Syncope	09	18 %
	Calf pain	17	34 %
	Fever	06	12 %
	Tachycardia	44	88%
	Tachypnea	46	92%
General examination findings	Hypertension (BP > 140/90 mm of Hg)	10	20%
	Hypotension (BP < 90 mm Hg systolic)	06	12%
	Raised JVP	13	26%
	Pallor	07	14%
	Loud P2	26	52%
	Right ventricular lift	06	12%
Systemic examination findings	Murmur of tricuspid regurgitation	10	20%
	Left parasternal S3	04	08%
	Rales	18	36%
	Ronchi /wheeze	07	14%
	Decreased breath sounds	10	20%
	Signs of DVT	21	42%

In present study dyspnea (92%) was the most common symptom followed by cough and chest pain (44% each). It was observed that tachypnea(92%) and tachycardia (88%) were the common findings on general examination. Loud P2 (52%) was the most common finding on systemic examination followed by signs of DVT (42%) and rales(36%).

Table 5: Distribution of patients according to Blood investigations findings

Investigation	No. Of patients	Percentage
Hb < 10 gm%	07	14%
Deranged KFTs	03	06%
Deranged LFTs	02	04%
Hyperlipidemia	09	18%
ABG showing e/o hypoxemia	45	90%
Hyperglycemia	08	16%

Hypoxemia on arterial blood gas analysis was the most common abnormality on blood investigation in present study followed by hyperlipidemia

DISCUSSION

The present study was conducted in the tertiary care hospital at Solapur with the aim to study the clinical profile of patients with pulmonary embolism. For this purpose we studied the clinical presentation, abnormalities on various investigations, and electrocardiographic changes in CT angiographically proven fifty cases of pulmonary embolism. It was observed that lobar and segmental location of thrombus (90%) was most common finding on CT Pulmonary angiography and was followed by thrombus at Right branch of main pulmonary artery (24%) and Main pulmonary artery (12%). Pulmonary embolism was observed in all age groups with a tendency to increased occurrence after the age of forty years. The mean age observed in the present study was 48 years which was lower than those reported by ICOPER⁸ (62.3 years), MAPPET⁹ (63.5 years) and JASPER¹⁰(60 years) in their studies. Most studies show a tendency towards even distribution by gender. In our study we observed a higher prevalence of the male gender (66%), which was also reported in the MAPPET⁹ study (59%). Risk factors more frequently observed in the literature were assessed. There are predisposing conditions not covered in the study because of lack of resources and the cost involved. Analysis of risk factors identified age over 40 years (66%) and previous history suggestive of DVT (44%) as the most prevalent, corroborating epidemiological data in literature.¹¹ The emergence of endothelial degenerative changes associated with presence of diseases that predispose to thrombus formation, are more frequently seen in patients over 40 years of age this explains the high prevalence of this risk factor. With the increasing life expectancy of the population, age should become an increasingly prevalent risk factor. The endothelial changes caused by a first episode of deep vein thrombosis (DVT) predispose to disease recurrence. Previous occurrence of DVT had been reported in 44% of our cases, which is higher than 25% in ICOPER⁸ and 29% in

MAPPET.⁹ These observations indicate possible benefit of continued use of elastic stockings for such patients. A hip or lower limb fracture was documented in 2% of the sample, which is lower than other studies JaSPER¹⁰(9%) and MAPPET⁹(11%). Similar differences are also observed in the history of abdominal or pelvic surgery, with prevalence of 4% in our sample and 36%in JaSPER¹⁰ and 27% in MAPPET.⁹ This difference can be explained by the characteristics of hospitals involved in each of the studies. Congestive heart failure (CHF) and chronic obstructive pulmonary disease was present respectively in 6% and 8% of our patients and in 11% and 12% in the ICOPER⁸ study. Prevalence of 2% in patients with pregnancy/ postpartum period is similar to those observed in ICOPER⁸ (2.5%) and MAPPET⁹ (1.4%). While the use of estrogen was 2% in present study it was found to be higher in ICOPER⁸ (12.3%). Difference in use of estrogen suggests greater use of hormone replacement therapy in the United States and Europe, where the ICOPER⁸ was carried out. Tobacco use (smoking / chewing) was reported by 42% of patients and quitting should be encouraged as it is one of the few risk factors considered modifiable. As a comorbidity we found hypertension in 20% and diabetes mellitus in 14% of our patients and hyperlipidemia was observed in 18% of the patients. All of these factors may play a contributory role by increasing the endothelial dysfunction. In the present patients, dyspnea was present in 92%, a bit higher to the result of Stein *et al*¹² that demonstrated presence of dyspnea in 78% and Hoellerich *et al*¹³ in 74%.Dyspnea is one of the diagnostic challenges in emergency rooms. LV decompensation, pulmonary embolism and inflammatory lung diseases are the first few differential diagnoses. The sudden onset of dyspnea is the feature that alerts the physician on diagnosis of PE, although the symptoms may appear gradually or aggravating chronic cardiopulmonary conditions. This is probably because more number of submassive embolism cases and lesser number of minor

PE cases as compared to other studies. Pleuritic chest pain is more correlated with the PE, but angina pain may occur in patients with ischemia of the right ventricle (RV). In this study a prevalence of 44% of chest pain was found, similar to the findings of ICOPER⁷⁹ (49%) and JaSPER¹⁰ (46%). Cough was present in approximately 44% of our patients, with a comparable prevalence in the two studies of Stein *et al.* that documented it in 37% and 55% of patients.^{12,14} In the present study on general examination we found tachycardia (pulse rate >100 /min) in 88% of our patients and tachypnea (respiratory rate >20) in 92% of our patients. which was little higher with the MAPPET⁹ study which found the prevalence of tachycardia in 71% patients and a study by Stein *et al*¹² which found prevalence of tachypnea to be 70% Hypertension (BP >140/90) was found in 20% of patients in the present study. This was because of pre-existing hypertension and more prevalence of elderly subjects (age >40) in present study. Clinical signs of hemodynamic instability (hypotension BP < 90 mm Hg systolic) were present in 12% of study patients. In ICOPER⁸, only 5% had hypotension, while MAPPET⁹ and JaSPER¹⁰ showed higher prevalence (34% and 36% respectively) than our observations. Notwithstanding these differences there is agreement that this is a greater severity subgroup giving rise to greater morbidity and mortality. Raised JVP was found in 26% patients which is higher as compared to 13 % found in study by Stein *et al*¹². This might be due to more number of cases with right ventricular dysfunction as compared with other study. Pallor was present in 14% of our patients this is because higher prevalence of anaemia in India as compared to western population. The examination of cardiovascular system revealed accentuation of pulmonic component of second heart sound as the most prevalent finding on auscultation with a prevalence of 52% in the present study. A study by Stein *et al*¹² reported this finding in 15% cases this difference might be due to more number of minor PE cases in study by Stein *et al*¹². A right ventricular S3 was found in 8% of our patients. A right ventricular lift (left parasternal heave) was present in 08% in our study, this finding was reported in 5% of patients in study by Stein *et al*¹². Signs of deep venous thrombosis (Edema, erythema, tenderness, or palpable cord Homans sign, Moses sign) in 42% of our patients. It is similar to prevalence of 47% found in study by Stein *et al*¹². In the present study we found evidence of low PaO₂ (hypoxemia PaO₂ < 80 mm of Hg while breathing room air) on arterial blood gas analysis in 90% of our patients which is higher as compared to the results of study by Stein *et al*¹² based on PIOPED II data. This low arterial PaO₂ is attributed to the ventilation perfusion mismatch created due to the effect of thrombus in pulmonary circulation.

CONCLUSION

Thus we conclude that Pulmonary embolism was observed in all age groups with a tendency to increased occurrence after the age of forty years. Age more than 40 years, previous history suggestive of DVT and Smoking /tobacco addiction were the common risk factors observed. Dyspnea, cough and chest pain were the common presenting symptoms. While tachypnea and tachycardia were the common findings on general examination. Loud P2, signs of DVT and rales were the most common finding on systemic examination.

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Source of Support: None Declared
Conflict of Interest: None Declared

