Clinical and etiological profile of Pulmonary Thromboembolism at a Tertiary Care Centre in northern India.

[1]Dr. Muzaffar Nazir, Postgraduate student, Dept. of Medicine, Govt. Medical College, Srinagar.

[2]Dr. Mohd Israr, Postgraduate student, Dept. of Medicine, Govt. Medical College, Srinagar.

[3]Dr. Shahid Ahmad Nengroo, Post graduate student, Dept. Of Medicine, Govt. Medical College, Srinagar.

Corresponding Author: Dr. Shahid Ahmad Nengroo, Post graduate student, Dept. of Medicine, Govt. Medical College, Srinagar.

Abstract

Background: Pulmonary Thromboembolism (PE) is an under - recognized and potentially fatal entity having varied manifestations.

Methods: We conducted a prospective observational study of cases of pulmonary embolism (PE) proven on Computed tomography pulmonary angiography (CTPA) admitted to the department of medicine of our tertiary care center. These cases were analyzed to study the profile with respect to demography, clinical features, and radiological manifestations.

Results: Our study included 50 cases of PE. Our study showed a male preponderance with an increased prevalence of pulmonary embolism after the age of forty years. The risk factors for PE were immobilization (46%) , smoking (30%), and clinical signs of deep venous thrombosis (DVT) (23%). The comorbidities associated were hypertension, diabetes mellitus, and malignancy.

Common presenting symptoms were dyspnoea, cough, chest pain, and hemoptysis.

Common examination findings were tachycardia, desaturation, and signs of DVT. On chest radiography, 27% of our patients had a normal chest radiograph. The abnormal findings included consolidation (16%), pleural effusion (14.3%), and cardiomegaly (14.3%).

Common electrocardiography (ECG) findings were sinus tachycardia (94.3%), Signs of right ventricular dominance, and an S1Q3T3 pattern. DVT was present in 26% of patients. CTPA findings revealed that the right pulmonary artery (21%) was most commonly involved followed by bilateral segmental arteries (14.3%).

Conclusion: PE is commonly associated with high-risk factors like smoking and a history of DVT. Clinical and radiological features are heterogeneous and a high index of suspicion and CTPA is essential for a timely diagnosis.

Keywords: CTPA, DVT, PE.

Introduction

Acute pulmonary thromboembolism (PTE) is a common condition with an increasing incidence that can lead to severe complications and death.[1,2] The global prevalence of PTE ranges from 1.2% to even 8% based on the setting and the underlying etiology. [3-5] A wide range of risk factors can cause PTE, including old age,

immobility, major surgery, malignancies, infections, hormonal changes, hyper coagulability state, and several medications. [3,6-8] Patients also vary in symptoms, and they may present with nonspecific mild symptoms to severe dyspnea.[9]

Although a positive D-dimer test may propound PTE, the definite diagnosis of PTE is mostly made based on imaging modalities. [10] 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 diag nostic plan. [11,12]

Nonetheless, other tools such as trans esophageal echo cardiography and ventilation/ perfusion scan can be used with less sensitivity and specificity. [13-15]

Despite advances in diagnostic and treatment modalities, the burden of PTE is still noticeable. [16-18]

This may result from the multidimensional etiologic and patho physiologic chara cteristics of the condition; therefore, the recognition of the risk factors and their prevalence can help to plan preventive and treatment measures to reduce the burden of PTE. [19] To that end, research data from all countries could help to have a better understanding of the various aspects of PTE. In 1 instance, data from 4 prospective international studies provided a real picture of PTE in the world and its risk factors.[20]

This study showed that age- and sex-standardized inci dence of venous throm boem bolism, as well as the prevalence of cardiovascular risk factors, was sub stantially higher in high-income countries than in middle and low-income ones.[20] Consequently, several socioeconomic factors may play a role as potential risk factors for PTE.

Materials and methods

Study setting

This study was carried out at the inpatient department of medicine in a tertiary care hospital in Jammu Kashmir, India.

Subjects, sample size, and sampling technique

A total of 50 patients of both genders with hepatic cirrhosis were approached. Simple random sampling was performed.

Study design

The research approach employed an observational study design to look for clinical and etiological profiles in patients with pulmonary thromboembolism.

Inclusion and exclusion criteria

Patients with pulmonary embolism of any etiology who were aged between 18-80 years were included in this study.

Data collection procedure

The present study was a prospective observational study conducted at the Department of Medicine of our tertiary care hospital after the Institutional ethics committee's (IEC) permission. The study was conducted during the period– from 1st February 2022 to 31st January 2023, over a period of 12 months. All cases of PE suspected on the basis of clinical presentation and simplified Wells pre-test probability score was evaluated by a Computed tomography Pulmonary angiography (CTPA). Cases confirmed to have a PE were included in the study after obtaining written informed consent. Patients with an absence of PE on CTPA were excluded from the study. Detailed history and clinical examination of each case were done. The demographic data like age and sex, history of comorbidities, and presence of risk factors for VTE in form of history of immobilization, history of DVT, history of smoking, recent surgery, and history of malignancy were noted. Chest radiograph (CXR), electro

cardiograph (ECG), two-dimensional echocardiography (2Decho), and a bilateral lower limb venous Doppler were performed and the findings were noted. CTPA findings were noted.

Data analysis

All data were analyzed using SPSS Statistics version 20. We reported the data as means along with standard error. Qualitative data were analyzed using the chi-square test and quantitative data was analyzed using an independent t-test. A p-value of <0.05 was considered statistically significant. Conclusions were drawn accordingly.

Results and observations

Table 1: Age and gender distribution of pulmonary embolism.

Age group	Male	Female	Total
20-30	0	0	0
31-40	2	3	5
41-50	5	5	10
51-60	16	9	25
61-70	3	3	6
71-80	3	1	4
Total	29	21	50

Table 2: Risk factors for pulmonary embolism.

Sr. No.	Risk Factor	Number	Percentage
1	smoking	24	48%
2	Surgery	10	20%
3	immobilization	17	34%
4	Signs of DVT	13	26%
5	Malignancy	3	6%

Table 3: Clinical features of pulmonary embolism.

Sr. no.	Clinical features	No. of patients	Percentage
1	Dyspnea	30	60%
2	Chest pain	19	38%
3	Hemoptysis	13	26%
4	Syncope	7	14%
5	Tachycardia	37	74%
6	Signs of DVT	19	37%
7	Cough	26	52%
8	Hypoxia	27	54%
9	SBP<90	16	32%

Table 4: ECG findings in patients of pulmonary embolism.

Sr. no.	ECG	Number of patients	Percentage
1	Sinus tachycardia	35	70%
2	S1q3t3	15	30%
3	Right axis	9	18%
4	RBBB	6	12%
5	P Pulmonale	8	16%
6	T Inversion	10	20%
7	Normal	4	8%

Table 5: Two-dimensional Echocardiography findings of pulmonary embolism.

Sr. no.	2D Echo Finding	Number of patients	Percentage
1	Dilated RA/RV	32	64%
2	Right Heart Strain	22	44%
3	Normal	8	16%

Table 6: Venous doppler of lower limbs of patients.

Sr. no.	Lower limb doppler	Number	Percentage
1	Bilateral DVT	1	2%
2	Left lower limb	11	22%
3	Right lower limb	7	14%
4	Normal venous doppler	31	62%

Table 6: Computed tomographic pulmonary angiography patterns of pulmonary vessel involvement.

Sr. no.	CTPA Thrombus	Number	Percentage
1	Bilateral PE	35	70%
2	Right PA	5	10%
3	Left PA	10	20%
4	Main pulmonary trunk	15	30%
5	Segmental	10	20%
6	Subsegmental	10	20%
7	Normal	0	0%

Discussion

Acute pulmonary embolism is associated with a significant mortality rate – as high as 30% if untreated, whereas the death rate of diagnosed and treated pulmonary embolism is 8%. Up to 10% of acute PE patients die suddenly.[21]

This prospective observational study gives insight into the clinical profile of 50 hospitalized patients with a confirmed diagnosis of acute pulmonary embolism based on CT pulmonary angiography. The mean age was 54.2 years, and the greater percentage of males (n=29, 58%) than females (n=21, 42%), which is consistent with another study carried out in Chennai.[29] In that study, the mean age of the patient population was 52.1 years, 62.8% were males and 37.2% were females. A further study carried out in Karnataka showed a mean age of 47.2 ± 13 years, with most cases in men.[22] The majority of the studies done in the Western world show a higher incidence of acute PE among those aged above 60-65 years[23, 24.] Risk factors for venous thromboembolic disease and pulmonary embolism are well characterized in the literature. Risk factors are present in almost 96% of patients with confirmed venous thromboembolic disease.[25] In the present study it was found that smoking was a major risk factor, present in 48% of the patients. Other studies[26] have also shown smoking to be the major risk factor for acute pulmonary embolism, found in 41.5% of patients. The landmark study PIOPED II[27] also depicted smoking as one of the major risk factors. The most common clinical presentation of patients in this study was dyspnoea (60%) followed by, cough (52%), chest pain (38%), and hemoptysis (26%). This is consistent with other studies carried out in India which show the most common clinical presentation to be dyspnoea (100%), followed by chest pain (52%), syncope (30%), and cough (40%).[28] Another study also showed dyspnoea to be the predominant symptom (71.7%), followed by syncope (17.0%), cough (15.1%), chest pain (7.6%), and hemoptysis (3.8%).[26] This suggests that finding solitary dyspnoea in a patient provides a strong suspicion of pulmonary embolism.

In addition to clinical symptoms, the ECG is also essential in directing the physician toward the diagnosis. The most common finding was sinus tachycardia, followed by S1Q3T3, ST-T changes, RAD, and incomplete RBBB. Other ECG studies have found sinus tachycardia, RV strain pattern, S1Q3T3 pattern, and RBBB,[29] ST-T depression in 80% of patients, and low voltage in patients with pulmonary embolism.

In our study right atrium and right ventricular dilatation were present in 64 % of patients and 44 % patients had RV strain. CT pulmonary angiography findings show that 40 % of patients had a dilated main pulmonary artery; 10 % had right pulmonary artery thrombus; 20 % had left pulmonary artery thrombus; and 40 % of patients had thrombus seen in segmental and subsegmental vessels. Previous studies have shown 83 % of patients with thrombus located in the main and lobar arteries and 16.7 % had thrombus in sub-segmental vessels; MPA thrombus in 40 % of patients, thrombus in MPA branches in 40 % of patients and segmental and subsegmental occlusion 20 % of patients, with 19 (38%) showing evidence of DVT in venous Doppler.

Conclusion

Pulmonary embolism is a common but often overlooked cause of mortality and morbidity in patients hospitalized not only with respiratory symptoms but also for other surgical or medical illnesses in our center.

The identification of risk factors was crucial to prevent the recurrence or progression of VTE to PE. The common risk factors observed like smoking and immobilization were to a great extent modifiable. Chest radiography and ECG were common tools available for screening but could be normal in a huge proportion of patients. A high degree of clinical suspicion with the rational application of diagnostic tools based on the pre-test probability scores was vital for a definitive diagnosis.

Early clinic-radiological recognition and timely CTPA and 2 D echo helped improve diagnostics and further therapeutics in this potentially fatal condition at our center.

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