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Original Research Article

Clinical profile of patients of acute pulmonary thromboembolism

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ABSTRACT

Background: Pulmonary embolism is a common and potentially life threatening condition. Most patients who succumb to pulmonary embolism do so within the first few hours of the event. The aim of the study was to observe the clinical profile, management and outcome in patients of pulmonary embolism.
Methods: A prospective observational study was conducted in the Department of Medicine in a Tertiary care hospital in Western Maharashtra for a period of two years. 55 patients with confirmed diagnosis on CTPA (Computed tomography pulmonary angiography) were included in our study. A detailed history, examination and investigations like D dimer were done in all cases.
Results: Mean age of the study cases was 44.98 years with 40% of the cases between 31-50 years of age. Overall male predominance was seen (83.6%). Most common associated co-morbidity was diabetes (32.7%). The commonest risk factor seen in the present study was history of smoking (29.1%). Dyspnoea was the most common presenting complaint (72.7%). Commonest presenting sign was tachycardia (43.6%). In present study, mortality rate among cases of pulmonary embolism was observed as 3.6%..
Conclusions: Mean age of the study cases was 44.98 years with 40% of the cases between 31-50 years of age. Overall male predominance was seen (83.6%). Most common associated co-morbidity was diabetes (32.7%). The commonest risk factor seen in the present study was history of smoking (29.1%). Dyspnoea was the most common presenting complaint (72.7%). Commonest presenting sign was tachycardia (43.6%). In present study, mortality rate among cases of pulmonary embolism was observed as 3.6%.

Keywords: Anticoagulation, CTPA, Pulmonary embolism, Thrombolysis, 2D ECHO

INTRODUCTION

Pulmonary embolism (PE) is known as "the great Masquerader". Diagnosis is difficult because symptoms ,signs and investigations needed to support the diagnosis are relatively nonspecific .It is said to be responsible for as many as 15 % of all in-hospital deaths. The average annual incidence is one case per1000 population.[1] Many 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.[2] Pulmonary embolism is present in 60–80% of patients with DVT and more than half these patients are asymptomatic.[3] Early diagnosis and

aggressive management is the key to successful outcome. 10% of symptomatic PE are fatal in the first hour and that hospital mortality to untreated PE can be reduced from 30% to nearly 8% if treated appropriately.[4] The need for present study in hospitalized patient has increased because of increase in number of incidences of pulmonary embolism in hospitalized patients. This is accompanied by high morbidity among hospitalized patients with pulmonary embolism.[1] Another reason is that the exact incidence of PE in India remains unknown because non-uniform reporting of incidence of pulmonary embolism.[5-10]

The PIOPED trials gave various clinical syndromes of patients with mild to massive PE which helped in diagnosing acute PE .Massive pulmonary embolism accounts for 5-10% of cases. Breathlessness, syncope, hypotension and cyanosis are characteristic features of massive pulmonary embolism. The most important advance regarding PE over last decades has been the realisation that PE is not a disease, rather PE is a complication of venous thromboembolism.[11]

Despite rapid advances in diagnosis and management of PE, it is still underreported from India and there are very few Asian studies hence this study was under taken.

METHODS

The prospective study included all patients who were admitted and diagnosed with Acute PE for a period of two years from Oct 2016-Sept 2018 in the Department of Medicine in a Tertiary care hospital in Western Maharashtra.

Inclusion criteria

- Either gender with age of >18 years
- Demonstration of thrombus in the pulmonary arteries by Echo or CT or pulmonary angiography.

Exclusion criteria

- Age <18 years
- Patients without demonstrable clot in pulmonary arteries.

Details were collected from patient files of age, gender, symptoms, signs, general and systemic examination, co-morbidities, risk factors, laboratory investigations and treatment given for PE and their outcomes were noted down in every case. Haemogram, random blood sugar, renal function tests, D-Dimer test, ECG, Chest X-Ray, 2 D Echo were done in all cases. Investigations like plasma fibrinogen levels, urinary protein: creatinine Ratio (UPCR), HbA1c were done whenever indicated. Only confirmed diagnosis of Acute PE based on CTPA were included.

Statistical analysis

The quantitative data was represented as their mean±SD. Categorical and nominal data was expressed in percentage. All analysis was carried out by using SPSS software version 21.

RESULTS

There were 55 patients who newly diagnosed to have pulmonary acute PE and confirmed by CTPA were included in this study. Their mean age was 44.98 years. Among patients 83.6% were males and 16.4% were females.

Out of 55 patients 22 were smokers, 11 had history of immobilisation, 5 had malignancy, 5 had COPD, 4 had recent surgery, 3 had history of air travel, 3 had heart failure and 2 were HIV positive (Table 1). Dyspnoea was the most common symptom seen in 65.45%, 20% had lower limb swelling, syncope in 9.09%, 9.09 % had chest pain, cough was seen in 10.09% and haemoptysis occurred in 5.45% cases (Table 2).

Table 1: Distribution of cases as per risk factors.

Risk Factors	N-55	100%
Immobilization	11	20%
Surgery (< 3 months)	4	7.27%
Smoker	22	40.0%
Heart Failure	3	5.45%
Malignancy	5	9.09%
HIV	2	3.63%
Air travel	3	5.45%
COPD	5	9.09%

Table 2: Distribution of Cases as per Symptoms.

Symptoms	N-55	100%
Dyspnoea	36	65.45
Syncope	5	9.09
Cough	6	10.90
Chest pain	5	9.09
Haemoptysis	3	5.45

Our observation on ECG findings were sinus tachycardia 40%, RV strain pattern (6%), S1Q3T3(3%) (Figure 1), RBBB (7%), atrial fibrillation (1%) (Figure 2). All except 20% patients had normal Chest X-ray. 21 out of 23 patients showed evidence of Deep vein thrombosis on Venous Doppler of lower limbs. 2D Echo was done to screen every patient and 85 patients had PH, mild in 45%, moderate in 25% and severe in 15% cases. Thrombus was visualised in 61 patients in pulmonary arteries and in 5 patients in right ventricle. CTPA was done in all patients15 had thrombus located in main and 46 in lobar arteries and 39 had thrombus in subsegmental arteries (Figures 3). Massive PE was diagnosed 7 patients, submassive in 21 patients and minor in 72 patients.

Regarding treatment 19 cases underwent thrombolysis, 17 with streptokinase and two with recombinant tissue plasminogen activator. In 30 cases intravenous unfractionated heparin was given. IVC filters were inserted in two patients (Table 3).

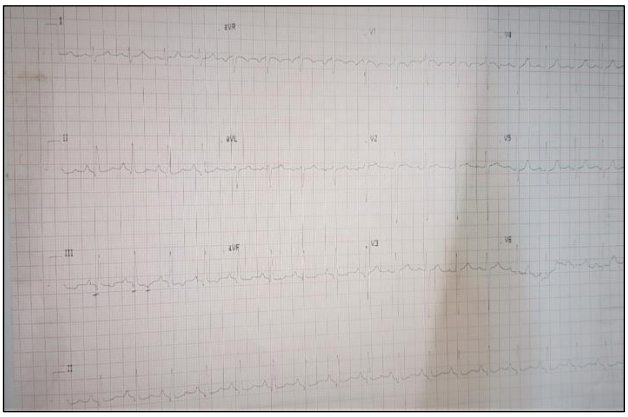

Figure 1: ECG-Showed-sinus tachycardia with s1q3t3.

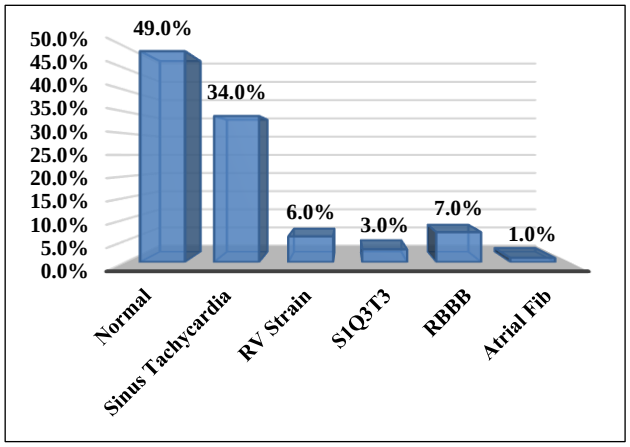

Figure 2: Distribution of cases as per ECG findings.

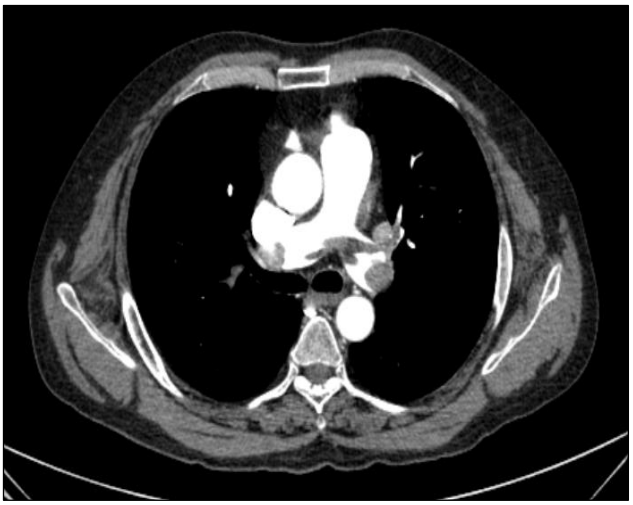

Figure 3: CTPA image showed Multiple filling defects seen in right and left main pulmonary artery and descending branches bilaterally.

The treatment outcome was good with a recurrence despite adequate anticoagulation in 3 patients and mortality of 3.6%.

DISCUSSION

This prospective study gives a better perception of the clinical profile of 55 hospitalised cases in Western Maharashtra with confirmed diagnosis of acute PE on CTPA. Mean age was 44.98 years with 40% of the cases between 31-50 years of age. Our cohort of 34.6% cases were over 50 years of age. Overall male predominance was seen with 83.6% males to 16.4% females.

In a similar study by Lolly M et al, the mean age of the cohort was 47.2±13 years with 91% being males.[12] Mean age in the study by Bharadwaj et al. was 45.8±15.2 years with 66.7% males to 33.3% females.[13]

Every patient of acute PE had at least one risk factor the most common being a history of smoking (40%) followed by history of immobilization (20%), COPD (9.09%), malignancy (9.09%), surgery (7.27%), heart failure (5.45%), air travel (5.45%) and HIV (3.63%).

Lolly M et al, found that more than half of the patients (58.5%) had at least one risk factor for PE indicating the importance to look for a risk factor in each and every patient with acute PE.[12] Smoking was the major risk factor for acute PE and was found in 22 (41.5%) of the patients. Other studies have also found varied risk factors for acute PE with smoking being most common . In the absence of cardiopulmonary disease, smoking was one of the major risk factor found in approximately 43% of the patients, in a study conducted by PIOPED which is similar to our study findings.[14] Klok et al, study had 61% patients with confirmed history of smoking at the time of diagnosis of PE.[15] In another meta-analysis done by Cheng et al, smokers had 17% more likely risk of developing PE.[16]

In our study dyspnoea was the predominant symptom (65.45%), cough (10.09%), syncope (9.09%), chest pain (9.09%) and haemoptysis (5.45%). Common presenting signs were tachycardia (43.6%), hypotension (21.8%) and lower limb swelling (20%).

Dyspnoea was also the predominant symptom in most of the similar studies. Lolly M et al, noted dyspnoea to be the predominant symptom (71.7%) in the study cohort.[12] Bhardwaj R et al, in their study observed dyspnoea in (89%), syncope in (7.4%), chest pain in (3.7%) and haemoptysis in (3.7%)cases.[13] Moreover, it was found that dyspnoea was the sole symptom in over half of the study patients. This confirms an important fact that the finding of isolated dyspnoea in a patient provides a strong suspicion for PE.

In present study, Well's clinical probability score predicted intermediate to high risk in 62% of the PE

cases. This results are similar to Posadas-Martínez ML et al, who concluded that Wells Score is accurate to predict the probability of PE in hospitalized patients. [17] A total of 66% cases with intermediate to high clinical probability score developed pulmonary embolism. Wang JH et al, in their study also observed that mean Wells score for patients diagnosed with PE was 5.3, whereas the mean score for the remaining patients was 4.9.[18]

The negative predictive value of D-dimer testing is high and a normal D-dimer level renders acute PE or DVT unlikely. In present study, positive D-dimer assay was seen in 96.4% cases, signifying high risk for development of pulmonary embolism. Youssf AR et al, confirmed PE in 22 cases by CTPA, 20 cases of PE (91%) had positive D-dimer and 2 cases (9%) had negative D-dimer test. This study found a positive prediction value of D-dimer to be 67.7%.[19] Whereas Chopra et al, had a positive predictive value of only 4.7%.[20] Perrier A et al, in another similar study observed that 99% of the cases with positive D dimer (using a cut off of 500 μg/L) developed PE.[21] D-dimer alone cannot exclude or confirm the presence of PE. The combination of D-dimer and the clinical probability score could improve diagnostic accuracy in patients with suspected PE.

Normal chest x-ray was observed in 80% cases while consolidation, effusion and both were seen in 10.9%, 7.3% and 1.8% cases respectively. It could suggest that a patient with a predominant respiratory symptoms but a normal chest X-ray could provide a differential of acute PE. The numerous Chest X-ray findings are neither sensitive nor specific. Similar to present study, Lolly M et al, observed that a total of 81.1% of the patients had a normal chest X-ray.[12] In a study by Eliott, the incidence of a normal X-ray in a confirmed case PE was in ranges from 24% to 80%.[22]

Normal ECG was reported in our study in 11% cases while sinus tachycardia was observed in 54.5% cases. RV Strain was seen in 10.9% cases, S1Q3T3 pattern (i.e. the presence of an S wave in lead I, a Q wave in lead III, and an inverted T wave in lead III) was seen in 23.6% cases while Right bundle branch block was seen in 18.2% cases.

In a similar study by Bhardwaj et al, sinus tachycardia was seen in all the cases with pulmonary embolism. Other findings include: RV Strain was seen in 3.7% cases, S1Q3T3 pattern in 25.9% cases while right bundle branch block was seen in 3% cases. Normal ECG findings were seen in 14.8% cases.[13]

Transthoracic echocardiography (TTE) was done in all the patients in our study, pulmonary arterial hypertension (PAH) was noticed in 81.8% cases and RV dysfunction in 70.9% cases. Mild to moderate pulmonary arterial hypertension (PAH) was seen in 47.3% and 23.6% cases respectively while 10.9% cases had severe PAH . Lolly M et al, noticed that 84.9% cases had PAH while 58.4% had RA/ RV dysfunction.[12] Similar findings were found in a study done by Agarwal et al, where PAH was noted in (70%) and RV dysfunction in (44%) cases.[4]

In present study, massive pulmonary embolism was seen in 5.5% cases while sub-massive and minor embolism were seen in 25.5% and 69.1% cases. Thrombus was located in major arteries in 12.7% cases while in lobar arteries in 49.1% cases. A total of 38.2% thrombi were located in sub-segmental Arteries.

Although systemic fibrinolysis is not worth the risk in all patients with acute PE , it is recommended as standard, first-line treatment in patients with massive PE . In an overview of the 5 randomized controlled trials that included patients with massive PE, fibrinolysis reduced the risk of death or recurrent PE by 55%.[23]

Although thrombolytics are accepted as the standard of care for patients with hemodynamic instability, a great deal of controversy remains about the benefits of thrombolytic therapy for patients who present with acute PE, are hemodynamically stable, but have echocardiographic or other evidence of RV failure or strain have a twofold increased risk of death compared to those patients who had normal RV wall motion.[24] Another series of 162 consecutive patients presenting with acute PE reported that 31% had concomitant RV dysfunction that was associated with a 5% mortality rate compared to a 0% mortality rate in those with preserved RV function.[25]

In present study, thrombolysis was done in all patients with massive pulmonary embolism. Thrombolysis was performed in 19 (34.5%) cases with either streptokinase (17 cases) or tissue plasminogen activator (2 cases). In 30 cases intravenous unfractionated heparin was given . IVC filters were inserted in two patients. Though currently FDA has approved tissue plasminogen activator , due to low cost of streptokinase it was used more.

Bhardwaj et al. thrombolized all (81.5%) patients with intermediate to high risk pulmonary embolism, with streptokinase, and got good results. Lolly M et al, in their study also thrombolized 18.7% cases, while 11.3% patients underwent embolectomy.[12]

In present study too, parenteral anticoagulants were given in all cases during acute phase over first 5-10 days along with vitamin K agonists. After the acute phase, all surviving cases were prescribed to take oral anticoagulants (dabigatran or rivaroxaban)) for a minimum period of 3 months as per ACCP and British guidelines.

By the end of 1 year follow up, recurrence was seen in 5.7% cases who survived the initial episode. In present study, mortality rate among cases of pulmonary embolism was observed as 3.6%.

In a similar study by Bhardwaj et al, mortality rate was 3.7% and Lolly M et al, showed a mortality rate of 7.5%.[12,13]

Limitation include it was single center study and in majority of patient's thrombophilia profile could not to be done, the reason being financial weakness.

CONCLUSION

In conclusion PE in wide clinical spectrum from asymptomatic disease to life threatening massive PE and shock. The key to diagnosis is high index of suspicion and prompt appropriate investigation. Dyspnoea is a strong pointer and patient usually has one risk factor, smoking was found to be an important one in this study. Availability of CTPA is likely to improve diagnosis, TTE still remaining an important tool. Early diagnosis and appropriate therapy improves outcome.

The main strength of this prospective study was confirmed cases based on CTPA were included with a reasonably good number of cases.

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