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Original Article

Acute pulmonary thromboembolism: Epidemiology, predictors, and long-term outcome – A single center experience

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ABSTRACT

Introduction: Acute pulmonary thromboembolism (PTE) is a life-threatening disease. Mortality in PTE still remains very high in spite of progress in diagnostic tools. Mortality rate is about 30% in patients with unrecognized acute PTE.

Methods: It is a single center observational study of 31 consecutive patients who were hospitalized in the Department of Cardiology at MS Ramaiah Memorial hospital between January 1, 2010 and June 2015. All the patients confirmed with diagnosis of acute PTE by CT scan (either HRCT or CTPA) were included in the study. Following relevant investigations chosen patients were risk stratified as per standard guidelines into massive, sub massive or low risk and treated accordingly. The included patients were followed up for a period of 1 year with 2D-echocardiogram and other relevant investigations for comparison to assess improvement. Mortality due to either acute PTE or other causes was noted in the study.

Results: Of the 31 patients enrolled in our study, 71% (n = 22) of the patients belonged to the age range 20–50 years with those in the age group 31–40 years comprising 39% (n = 12) of the total. Elderly people over 65 years of age comprised only 19% (n = 6) of the total number of patients. Dyslipidemia, prolonged immobilization, deep vein thrombosis, post-operative state, malignancy and post-partum period were the commonly reported risk factors. We thrombolysed a total of 18 (58%) patients with massive and submassive PTE, of which 12 (39%) received tenecteplase and 6 patients received streptokinase (19%). Three (9%) patients required repeat thrombolysis with streptokinase due to failed thrombolytic therapy with tenecteplase.

Conclusions: Our study reported higher incidence of acute PTE in the middle age group population. Prevalence of dyslipidemia was high in this cohort of patients studied although the exact association of it in APE could not be determined. Thrombolytic therapy can be considered for patients with both massive and submassive pulmonary thromboembolism. Repeat thrombolysis can be considered in case one thrombolytic agent failed to give the desirable results.

1. Introduction

Acute pulmonary embolism (PE) is a common and potentially lethal form of venous thromboembolism (VTE) which is commonly encountered in clinical practice. Most patients die of this fatal condition usually within the first 1 h of the event with mortality rate reaching nearly 10% during this period.[1] Mortality rate of diagnosed and treated pulmonary embolism ranges from 3 to 8%, but increases to about 30% in untreated pulmonary embolism.[1] In the United States, acute pulmonary embolism afflicts 500,000–600,000 persons annually and is either a primary or secondary cause of death in 150,000–200,000 of these individuals.[2] The 1-year mortality rate in the PIOPED study was reported as ≈25%, with 2.5% dying from primary cause as pulmonary embolism itself.[3] Other studies have reported that in patients without preexisting cardiac or pulmonary disease, the 1-year mortality rate ranged from 3% to 9%.[4,5] Mortality in APE is mainly reported to be due the associated comorbid conditions like cancer, infections, cardiovascular diseases, and other pulmonary diseases.[6]

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The varied clinical presentation of this condition makes the diagnosis challenging, treatment diverse and results unpredictable with subsequent high morbidity and mortality. The condition is often suspected in patients who present with unexplained dyspnea, tachypnea, or chest pain. Further, a background of high risk predisposing conditions like malignancy, immobilization, recent major surgery, orthopedic surgeries and others warrant an urgent investigation when APE is clinically suspected.

Despite therapeutic and diagnostic advances, the data from developing countries are largely lacking with respect to diagnostic and treatment efficacy and also there is insufficient data of long-term follow-up of those treated.

Our study was conducted to understand the clinical profile of patients with APE and its response to standard guideline based treatment. Further, the patients who were successfully treated were followed up long-term to understand the overall long-term benefit achieved.

2. Methods

It was a single center observational study conducted at MS Ramaiah Memorial hospital. The study began in January 2010 and recruitment of patients concluded on June 2014. However, data collection on long-term follow-up concluded on June 2015, i.e., after 1 year of the last date of recruitment period.

All the patients with clinically suspected APE were assessed with Well's Criteria. Those with likely APE on Well's criteria were investigated further with D-dimer testing and diagnosis of APE was finally confirmed by CT scan (either HRCT or CTPA). Patients who were admitted in our cardiac intensive care following an established diagnosis were only included for the study as it needed close monitoring of treatment response of these patients. Also it enabled us to study the clinical parameters in greater detail at baseline and further helped to enroll them for long-term follow-up. Patients with diagnosis of APE who had already received treatment before reaching the study center, those with previous diagnosis of Acute PTE irrespective of their current treatment status, patients with suspected diagnosis of APE who died before a diagnosis could be established, those who did not consent for CT imaging and patients with non-availability of baseline data or long-term follow-up data were again excluded.

A total of 38 patients with suspected PTE were identified during the study period. Out of this, two patients did not consent for enrollment. Five patients were critically ill with significant co-morbidities (mainly renal dysfunction) which made them unsuitable for CTPA and were treated on the basis of clinical suspicion only. After satisfying the necessary criteria we were able to recruit 31 patients during the study period. A detailed record of clinical profile of all the patients included in the study was done. Baseline record of following investigations were made in common in all patients: complete hemogram, renal function tests, serum electrolyte assay, liver function tests, fasting lipid profile, thyroid profile, coagulation profile, ECG, 2D-echocardiogram, ultrasonography of abdomen and chest X-ray. Additional investigations were done as deemed necessary for identification of etiology and/or complications in specific group of patients. Chosen patients were risk stratified as per standard guidelines into massive, sub massive or low risk and treated as per current guidelines. The included patients were followed up for a period of 1 year with 2D-echocardiogram and other relevant investigations for comparison to assess improvement. Mortality due to either acute PTE or other causes was noted in the study.

Statistical analysis was done and continuous variables were presented as mean, and ordinal variables as percentages.

Table 1
Age distribution of patients.

Age group	Number of patients	Percentage (%)
20–30	05	16
31–40	12	39
41–50	05	16
51–60	03	10
>60	06	19
Total	31	100

3. Results

Of the 31 patients enrolled in our study, 71% (n = 22) of the patients belonged to the age range 20–50 years (Table 1). 39% (n = 12) of the total belonged to age range 31–40 years. Elderly over 65 years of age comprised 19% (n = 6) of the total. Sex difference was also noticed with APE being observed to be more common among male patients (58%) (Fig. 1).

Dyslipidemia, prolonged immobilization, deep vein thrombosis, post-operative state, malignancy and post-partum period were the commonly reported risk factors in our study population (Fig. 2). Dyslipidemia was identified in 42% (n = 13) of our patients although the clinical significance of dyslipidemia as a risk factor is yet to be clearly established. 35% (n = 11) of the patients reported prolonged immobilization prior to the event with over 50% (n = 6) of them being the elderly over 65 years of age. The reasons for prolonged immobilization were mainly recent long travels, serious illnesses, and musculoskeletal causes with the latter being more commonly reported among the elderly.

Dyspnea was the most common symptom reported at presentation in all the 31 patients. Additionally reported symptoms included palpitations (71%, n = 22) syncope (32%, n = 10) and chest pain (29%, n = 9) (Fig. 3). The most common clinical sign was tachycardia (58%, n = 18) and tachypnea (32%, n = 10). Patients with dyspnea on clinical assessment had NYHA Class II or more symptoms at presentation. Following treatment when these patients were reassessed for NYHA functional class at the end of
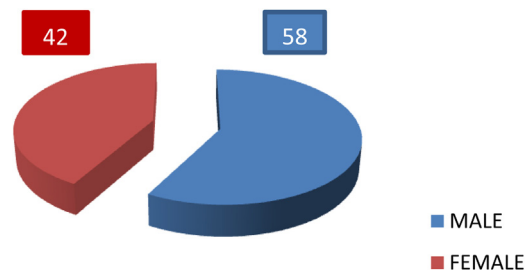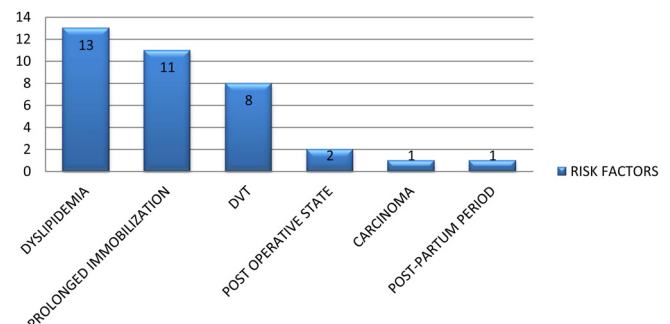

Fig. 1. Sex disribution.

Fig. 2. Risk factors for APE.