Pulmonary embolism prevalence in syncope patients brought to the emergency room by ambulance

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ABSTRACT

Aim: Cohort studies have shown that syncope is one in four of the initial symptoms of acute pulmonary embolism. However, one in six patients who visit the emergency room for their first syncopal attack has acute pulmonary embolism. Additionally, the etiological relationship between acute pulmonary embolism and the possible prognostic impact of syncope on the early clinical course of a patient with acute pulmonary embolism remains unclear. Our research sought to detect the presence of pulmonary embolism and its contributing factors in syncope patients who were admitted to the emergency room.

Material and Method: The study comprised 215 individuals who had syncope and were transported by ambulance to the emergency department between January 2020 and January 2021. The age bracket for inclusion was 18 to 75, and the presence of solitary syncope, regardless of its cause, was required. Additionally, there had to be no clinical signs of shock or hypotension, and/or absence of right ventricular dysfunction at presentation.

Results: A total of 215 patients were included in the study. The mean age was 57 years and 64% of the patients were female. Pulmonary CT angiography was performed in 37 of the patients. Ventilation-perfusion examination was performed on 2 patients. Pulmonary embolism was confirmed in 14 patients, including a lower segment pulmonary embolism. Pulmonary embolism was diagnosed in 7 of 17 patients with no history of active cancer and a previous history of thromboembolism. The prevalence of pulmonary embolism was similar as predicted by the Wells score or Pulmonary Embolism Rule–Out Criteria in patients with low and moderate clinical probability.

Conclusion: The results of this study confirm that pulmonary embolism is rarely found in patients admitted to the emergency department with syncope. Although pulmonary embolism should be considered as a differential diagnosis, it does not need to be evaluated in all patients. Otherwise, assessment can lead to false positive results and overtreatment, thereby increasing adverse events and healthcare costs.

Keywords: Pulmonary embolism, syncope, prevalence

INTRODUCTION

In a study conducted by Dr. Luzzatto in 1880 on more than 160 patient with acute pulmonary embolism (PE), the significance of syncope as a clinical manifestation of acute pulmonary embolism was highlighted (1). Based on cohort studies, syncope is the first symptom of acute Pulmonary Embolism in up to a quarter of all cases (2-4). However, in one of six patients presenting to the emergency department for the first episode of syncope without any other definable source, syncope was diagnosed with acute PE. To describe syncope in PE, numerous pathophysiological mechanisms have been suggested; these include arrhythmias, decreased cerebral perfusion due to a sudden decrease in cardiac output, or a vasovagal reflex (5). However, the etiological link between syncope and acute PE, and specifically the possible prognostic impact of syncope on the early clinical course of a patient with acute PE, mostly remains unclear.

Recent guidelines highlight the role of syncope in risk stratification of acute PE to tailor initial management, including initial parenteral anticoagulation, hemodynamic monitoring, admission and hospitalization, and reperfusion therapy (6). Syncope is included in only two of the 20 risk assessment models currently available despite a number of studies suggesting that syncope may be related to a higher complication and mortality risk in the acute phase of PE (7). Our study’s objective was to identify the presence of pulmonary embolism and its contributing factors in syncope patients presenting to the emergency department.

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MATERIAL AND METHOD

The study was carried out with the permission of Health Sciences University Ankara Training and Research Hospital ethics committee (Date: 06.04.2022, Decision No: E-22-90). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

A total of 215 patients admitted to the emergency department by ambulance with syncope between January 2020 and January 2021 were included in the study. Age requirements for inclusion were 18 to 75 years old, the existence of solitary syncope, independent of the cause, the lack of clinical indications of shock or hypotension, and/or the absence of right ventricular dysfunction at presentation were also part of the inclusion criteria.

The PERC and Wells scoring systems were used to determine the clinical probability of PE upon admission. D-dimer and troponin blood tests, electrocardiography, echocardiography, chest x-ray, lower extremity venous ultrasonography and computed tomography (CT) angiography were among the further investigations. While thrombus presence in the main pulmonary artery and/or its main branches was considered massive PE, embolization of lobe or segmental pulmonary artery branches was considered sub-massive.

Patients were divided into two groups: those with and without pulmonary embolism. Syncope is defined as a sudden, transient loss of consciousness followed by a complete, spontaneous recovery. Windows SPSS 22.0 was used to conduct the statistical analysis. With the aid of contingency tables, non-parametric statistical methods were used to analyze the data for qualitative variables. The Chi-Square Test was used to assess the data’s relevance. In order to assess the significance of the differences between quantitative variables, parametric statistics were used. The level of significance was set as p<0.05.

RESULTS

The study included a total of 215 patients. The patients were 64% female and had an average age of 57. 37 of the patients had pulmonary CT angiography. Two patients had ventilation perfusion tests done. 24 of the patients underwent echocardiography. Right ventricular dysfunction was detected by echocardiography in 2 patients. 22 of the patients had positive D-Dimer tests, while 18 had positive troponin testing.

14 patients were diagnosed with pulmonary embolism, (prevalence 6.8%, 95% CI: 1.1-4.3%), including a lowersegment pulmonary embolism (Table 1). Among 17 patients with no history of active cancer and previous history of thromboembolism, pulmonary embolism was diagnosed in 7 patients. (41% prevalence, 95% CI: 3-52%). In Table 2, the prevalence of pulmonary embolism based on clinical probability scores (PERC, Wells) is shown. Pulmonary embolism was observed in 3 of 114 PERC-negative patients (prevalence 2.1%, 95% CI: 0.1-3.6%).

Pulmonary embolism prevalence was similar among patients who had low and intermediate clinical probability estimated by Wells score or PERC (2.1% vs. 2.5%, mean difference 0.35% [95% CI: -4 to 5%], respectively) (Table 2).

DISCUSSION

In the US, APE directly results in 100,000 deaths yearly (8). Chest discomfort, dyspnea, and hemoptysis are the traditional symptoms of PE. Atypically, however, it can also manifest as abdomen pain, convulsions, cardiac arrhythmias, and most frequently as new-onset atrial fibrillation (9). APE’s atypical presentation is syncope and it may be present in 10% of the patients.8 In our study, pulmonary embolism prevalence in patients presenting with syncope was 6.8%, which was lower than those reported in the literature.

A literature review defines three possible mechanisms of syncope in APE. Firstly, APE can cause sudden right heart failure, which reduces left ventricular filling and ultimately results in hypotension, decreased cerebral perfusion, and low cardiac output. Secondly, PE can cause cardiac arrhythmias that can lead to an episode of syncope. Furthermore, occlusion of the pulmonary artery by embolism may cause vagal-induced syncope by stimulating ventricular mechanoreceptors that increase vagal response (10).

In APE, syncope is generally considered as a poor prognostic factor. Many studies have demonstrated that syncope is associated with higher mortality in APE (11,12). The 3-month mortality rate of patients who had syncope in the International Cooperative Pulmonary Embolism Registry was 26.8%, while
the overall mortality rate was 17% (13). In our study, patients who experienced syncope had a higher rate of death. Despite being high, it was not statistically significant; yet, we believe that these findings are clinically significant.

Studies in the literature have shown that syncope in patients with APE is related to an increased prevalence of central embolism, RVD and troponin positivity (14). However, our study did not show any association between these variables and syncope. Several criteria for the diagnosis of RVD on echocardiogram or RV dilatation on CT scan have been reported in the literature. Studies have suggested that central pulmonary embolism may cause sudden right ventricular pathology as described above and may cause decreased cerebral perfusion leading to syncope. According to the findings of our study, syncope may result from the vasovagal reflex.

Six of the participants in a recent study of people who had their first episode of syncope were all confirmed to have APE (15). These figures are striking. Therefore, clinicians should consider the diagnosis of APE in every patient who has syncope based on a probability calculation with the Wells score (16). Given that syncope may be relatively common in patients admitted to hospital, it is important to know that mortality may increase, as shown in our study. More comprehensive studies are needed to assess this association of higher mortality in APE patients admitted with syncope.

CONCLUSION

The findings of this study support the finding that patients with syncope reporting to the emergency department rarely have PE. Although in every patient PE should be considered as a differential diagnosis, this is not necessarily true for every patient. Otherwise, assessment can lead to false positive results and overtreatment, thus increasing adverse events and health expenses.

We recommend that emergency physicians move to a standard diagnostic strategy for pulmonary embolism in patients who have isolated syncope until larger studies focusing specifically on these patients are reported.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Health Sciences University Ankara Training and Research Hospital ethics committee (Date: 06.04.2022, Decision No: E-22-90).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES


