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ORIGINAL ARTICLE

Frequency of Pulmonary Embolism (PE) in Suspected Cases using Computed Tomography Pulmonary Angiography (CTPA).

Ayesha Zafar[1], Hira Bushra[2], Riffat Kamal[3]

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ABSTRACT… Objective: To evaluate the frequency of pulmonary embolism in suspected patients through Computed tomography pulmonary angiography (CTPA). **Study Design:** Descriptive, Cross-sectional study. **Setting:** Department of Radiology, Chaudhary Pervaiz Elahi Institute of Cardiology, Multan. **Period:** 25 October 2019 to 25 October 2020. **Material & Methods:** The study contained 152 patients who were referred to the Department of radiology for diagnosis of PE through computed tomography pulmonary angiography (CTPA). Demographic characteristics of all the included subjects were also noted. Computed tomography pulmonary angiography was done in all subjects and results were analyzed for absence or presence of PE by expert radiologists. **Results:** The mean age of included subjects was 49.36±10.34 years. The number of female patients was 95 while the number of the male was 57. The mean duration of the symptoms was 3.86 ±1.7days. 126 patients (82.89%) did not have pulmonary embolism while 26 (17.11%) were diagnosed with PE. Duration of symptoms, gender, and age stratification was done. The Association of these factors with pulmonary embolism was not found to be significant. **Conclusion:** The study showed that the frequency of PE diagnosed in suspected patients through Computed tomography pulmonary angiography was17.11%.

Key words: Computed Tomography Pulmonary Angiography (CTPA), Pulmonary Embolism.

INTRODUCTION

Thrombi occurring in the veins of lower limbs usually lead to pulmonary embolism (PE). It may sometimes result from thrombi in the right chambers of the heart or the veins of the upper extremity, renal and pelvic areas. When the large thrombi reach the lungs it blocks lobar branches of the bifurcation of a major pulmonary artery, which leads to hemodynamic instability.[1] PE is common and a life-threatening disorder. Most patients die soon (within a few hours) after the occurrence of embolism. Delay in the diagnosis of pulmonary embolism is a common issue and proves harmful.[2] According to a study prevalence of PE was 69.2%.[3] Breathing difficulty, palpitations, and chest pain upon inspiration are common symptoms of pulmonary embolism.[4]

According to current literature, the clinical scoring system is used for determining the clinical presentation of pulmonary embolism before laboratory testing. The presence of PE, before tests, should be estimated using authentic clinical prediction parameters and the same parameters should be used for interpreting test results.[5] Routine laboratory reports, though valuable in another diagnosis, are not no helpful in PE.[6] The invention of diagnostic imaging techniques like Computed tomography pulmonary angiography(CTPA) and V/Q scanning have led to decreased use of electrocardiogram (ECG) for diagnosis of PE.[7] Nowadays gold standard for a confirmed diagnosis of pulmonary embolism is Computed tomography pulmonary angiography.[8] According to research, out of all suspected cases, only 11.1% reach a confirmed diagnosis of PE.[9] Another study states that only 19% of cases had confirmed diagnosis of PE through CTPA.[10]

This study aims to carry out an accurate diagnosis

1. MBBS, Women Medical Officer, CPEIC, Multan.
2. MBBS, FCPS, Assistant Professor, CPEIC, Multan.
3. MBBS, FCPS, Senior Registrar, CPEIC, Multan.

Correspondence Address:
Dr. Ayesha Zafar
CPEIC, Multan.
drayesha1213@yahoo.com

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of patients suspected of PE using CTPA that will help treat these patients and lower morbidity and mortality rates. Additionally, of all suspected patients an accurate number of patients with confirmed PE will also be determined through study results. Moreover, an accurate number of patients that are not suffering from PE but are treated as having so will also be determined.

MATERIAL & METHODS

A Descriptive, Cross-sectional study was conducted in the Department of Radiology, Chaudhary Pervaiz Elahi Institute of Cardiology, Multan from October 2018 to April 2019. The study contained 152 patients who were referred to the Department of radiology for diagnosis of PE through computed tomography pulmonary angiography (CTPA). Both male and female patients aged from 20 to 70 years who gave their consent were included in the study. All the included patients were suspected cases of PE. Mentally retarded patients, those with COPD and cardiac disease, and those admitted in ICU were excluded from the study. The study was conducted after approval from the research review committee (15-104). Computed tomography pulmonary angiography was done in all subjects and results were analyzed for absence or presence of PE by expert radiologists. Demographic characteristics of all the included subjects were also noted. Confidentiality was maintained while conducting the study and the study had no harmful impacts. 128 slices CT scan machine of TOSHIBA Company was used.

Computer software SPSS 20.0 was used for data analysis. For quantitative variables like the period of symptoms and age standard deviation and mean were calculated. For qualitative variables like absence or presence of PE on CTPA and gender percentage and frequency were calculated. A Chi-square test was used and a p-value < 0.05 was considered significant.

RESULTS

The mean age of included subjects was 49.36±10.34 years. The maximum age was 70 years while the minimum was 20 years. The mean duration of the symptoms was 3.86 ±1.7days. The maximum duration was 7 days while the minimum was 1 day (Table-I). The number of female patients was 95 while the number of the male was 57. 126 patients (82.89%) did not have pulmonary embolism while 26 (17.11%) were diagnosed with PE.

Age stratification was done, 11 patients (16.40%) from age bracket 20 to 50 years had PE and in 56 patients (83.6%) it was not found. 15 patients (17.6%) from age bracket 51 to 70 years had PE and in 70 patients (82.4%) it was not found. For this difference p-value was 0.842, which was statistically insignificant (Table-II).

Gender stratification was also performed, PE was found in 8 male patients (14%) and was absent in 57 patients (86 %). While in female patients, it was present in 18 patients (18.9%) and absent in 77 patients (81.1%). For this difference p-value was 0.436, which was statistically insignificant (Table-III).

Duration of symptoms was also stratified, in cases with 1 to 3 days duration PE was found in 15 patients (19.7%) and was absent in 61 patients (80.3%). In cases with 4 to 7 days duration, PE was found in 11 patients (14.5%) and was absent in 65 patients (85.5%). For this difference p-value was 0.389, which was statistically insignificant (Table-IV).

	Mean	S.D	Maximum	Minimum
Age (years)	49.36	10.34	70	20
Duration of symptoms (days)	3.86	1.7	7	1

Table-I. Descriptive statistics of age and duration of symptoms

	Age Groups		
Pulmonary Embolism	**20-50 Years**	**51-70 Years**	**P-Value**
Yes	11 (16.4%)	15(17.6%)	0.84
No	56 (83.6%)	70 (82.4%)	

Table-II. Age stratification

	Gender		
Pulmonary Embolism	Female	Male	P-Value
Yes	18(18.9%)	8(14%)	0.44
No	77(81.1%)	57(86%)	

Table-III. Gender stratification

	Duration of Symptoms		
Pulmonary Embolism	1-3 days	4 -7 days	P-Value
Yes	15(19.7%)	11(14.5%)	0.39
No	61(80.3%)	65(85.5%)	

Table-IV. Stratification of the duration of symptoms.

DISCUSSION

Following the rapid progress in computed tomography pulmonary angiography technology, it has become the gold standard for diagnosing PE and is considered a stand-alone test for ruling out PE.[11] Comprehensive research has been conducted on the authenticity of CTPA, without venous compression ultrasonography (CUS) of the lower limb, for safely excluding PE.[12] A study including 3000 subjects showed the high negative indicative value of CTPA to rule out pulmonary embolism of 98%. In the case where the clinical probability of PE was high but CTPA was negative, other imaging techniques were warranted but were rarely used in practice.[13]

PIOPEDII (Prospective Investigation of Pulmonary Embolism Diagnosis II) was a study carried on the diagnosis of PE on the basis of pulmonary and clinical angiography tests. According to this study percentages of low, intermediate, and high clinical cases were 58%, 96%, and 92% respectively.[14] Patients with intermediate and low clinical probability had CT angiography. The decision to carry out CT angiography is based on the doctor's decision after considering different clinical criteria.

Results of our study show that of all cases who were PE suspects, 17.11% of patients had PE. This frequency may vary across various hospitals, and according to different studies, this difference ranges from 14 % - 22%.[15] These studies show that central arteries, whose prognosis is worse as compared to segmental or peripheral arteries, are involved in less than a quarter of cases of pulmonary embolism. Isolated segmental PE cases were not observed in our study, unlike other studies which reported 5% -16% prevalence.[16] As mentioned in previous literature, the most common symptom according to our study was dyspnoea, no hemoptysis, or chest pain.[17]

According to a study, CTPA should be done if the prevalence of PE is 10%.[18] Overusing CTPA for the diagnosis of PE is not a cost benefit. As it exposes people to carcinogenic radiations, contrast-induced nephropathy, and false positive results. Unnecessary imaging can be avoided by adhering to the recommendations of PIOPED11 researchers. This is possible through more research by specialists in this field and accurate risk assessment particularly in teaching hospitals where less experienced physicians opt for unnecessary imaging because of fear of disease outcome.

CONCLUSION

The study showed that the frequency of PE diagnosed in suspected patients through Computed tomography pulmonary angiography was17.11%. Results show the overuse of CTPA for diagnosing PE. Therefore, the clinical probability of PE should be determined through different predictive models before going for CTPA. Through this risk of exposing patients to radiations can be reduced, as these radiations are associated with acute renal failure and breast carcinoma. This will also result in a decreased workload on the staff of the radiology department.

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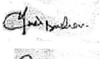
AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Ayesha Zafar	Review, Data collection & Analysis.	
2	Hira Bushra	Proof reading, Conception & Data analysis.	
3	Riffat Kamal	Manuscript writing, Editing & Data collection.