INCIDENTAL FINDINGS ON COMPUTED TOMOGRAPHIC PULMONARY ANGIOGRAPHY IN PATIENTS WITH SUSPECTED PULMONARY EMBOLISM AND NORMAL CHEST RADIOGRAPH

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ABSTRACT

Background: Certain signs and symptoms (even non specific ones) unexplained by other pathology should raise the possibility of pulmonary embolism (PE) and trigger a workup. Computed Tomographic Pulmonary Angiography (CTPA) is the recommended primary imaging tool in patients with suspected pulmonary embolism. This diagnostic tool (CTPA) is far more sensitive than plain chest X-ray in detecting various abnormalities which may easily be missed by plain chest X-ray film.

Objective: The purpose of this sturdy was to assess the detection rate for PE for all patients who underwent CTPA between January 2014 and December 2015 and describe other radiological abnormalities in addition to PE, with particular reference to those not observed on contemporaneous plain CXR.

Methodology: This is a retrospective study. Two hundred and eighty (280) patients who had CTPA (and Chest X-ray) performed during two years period as a part of their workup for suspected pulmonary embolism were included. Radiological diagnoses were cross checked with medical notes, electronic discharge summaries and pathology reports where appropriate.

Results: Two hundred and eighty (280) patients underwent CTPA for suspected PE (Female 57%). Overall, 56 (20%) patients had evidence of PE. Initial CXR was normal in 176 (63%). Of these, 40 (23%) had evidence of PE. Additional diagnostic findings were seen in 20 (11%) patients with a PE and 49 (28 %) with no evidence of PE, accounting for 69 (39%) of all patients with a normal CXR.

Conclusion: One in five CTPA (20%) confirmed the diagnosis of PE. CTPA is far superior to plain chest radiography at providing a diagnosis in patients investigated for PE. It may help find other explanation for the symptoms even when no PE is present. Incidental findings are commonly identified by CTPA despite a normal CXR. Many of these findings are may be clinically relevant and may lead to further investigations including repeat imaging with associated cost implications.

Key words: Pulmonary embolism; Computed Tomographic Pulmonary Angiography (CTPA); Incidental findings

This article may be cited as: Abbas SA, Akber A, Ahmed Z. Incidental findings on Computed Tomographic Pulmonary Angiography in patients with suspected pulmonary embolism and normal chest radiograph. Pak J Chest Med 2017; 23(2): 39-43

INTRODUCTION

Pulmonary embolism is a major cause of morbidity and mortality. The incidence of venous thromboembolism (VTE) varies from 1-1.5 per 1,000 person-years in the United Kingdom.[1] There are about 300,000 cases of pulmonary embolism in United states each year.[2] The data about exact incidence of thromboembolic diseases in Pakistan is not available. The chest radiographic findings may be normal in cases of pulmonary embolism. However, sometimes, radiographic signs may be present and include Westermarck sign (dilatation of pulmonary vessels and a sharp cutoff), atelectasis, small pleural effusion, and an elevated diaphragm. Generally, chest

radiographs cannot be used to conclusively prove or exclude pulmonary embolism.[3] With the development of newer multi-detector CT scanners, the diagnosis of pulmonary emboli has been revolutionized. CTPA is a fast and reliable imaging modality that can exclude presence of pulmonary embolism in patients with suspicious symptoms.[4] The risks of radiation, contrast induced nephropathy and cost should always be considered when requesting a CTPA.[5] Not only the CTPA helps in establishing the diagnosis of PE but also may help identifying other thoracic abnormalities. These abnormalities may be of clinical relevance and provide explanation for patient's symptoms but may also be incidental that can be irrelevant to clinical scenario. These abnormalities or incidental findings, once detected, may necessitate further investigations and treatment.

METHODS

This was a retrospective study conducted at Liaquat National Hospital, Karachi, Pakistan. Data was collected from January 2014 to December 2015. Patients who underwent CTPA were identified through radiology data. Patients' location and the specialty under which they were admitted were recorded. 280 adult patients admitted under various medical, surgical and other disciplines were identified who were suspected to have pulmonary embolism and had CTPA. Patients whose chest X-ray were not performed prior to CTPA at our hospital or were not available were excluded. Formal chest X-ray reports and the reports of CTPA were reviewed. Confirmation of pulmonary embolism or any other additional diagnostic / incidental findings were recorded. These reports were cross checked with medical notes, electronic discharge summaries and pathology reports where appropriate.

RESULTS

280 patients suspected to have pulmonary embolism had CTPA. 160 (57%) were women (Figure 1). Majority of the patients were at the respiratory unit when pulmonary embolism was suspected and CTPA requested (Figure 2). Initial CXR was normal in 176 (63%) and of these, 40 (23%) had evidence of PE (Figure 3). Additional diagnostic/incidental findings were seen in 20 (11%) patients with a PE and 49 (28 %) with no evidence of PE, accounting for 69 (39%) of all patients with a normal CXR (Figures 4). The most common diagnostic/incidental finding was consolidation. Other findings included atelactasis /collapse (13), pathological lymphadenopathy(9), malignancy(2), bronchiectasis (9) and ILD (5) (Figure 5).

DISCUSSION

The classic presentation of acute pulmonary embolism is the abrupt onset of pleuritic chest pain, breathlessness, and hypoxia. Most patients do not present with these classic symptoms. Their symp-

Figure 1. Gender Distribution (N=280)

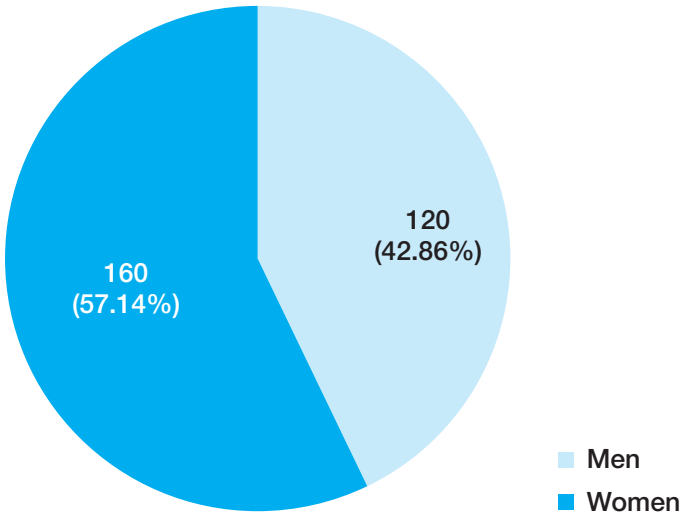


Figure 2. Location of patients in hospital wards at the time of CTPA (n=40)

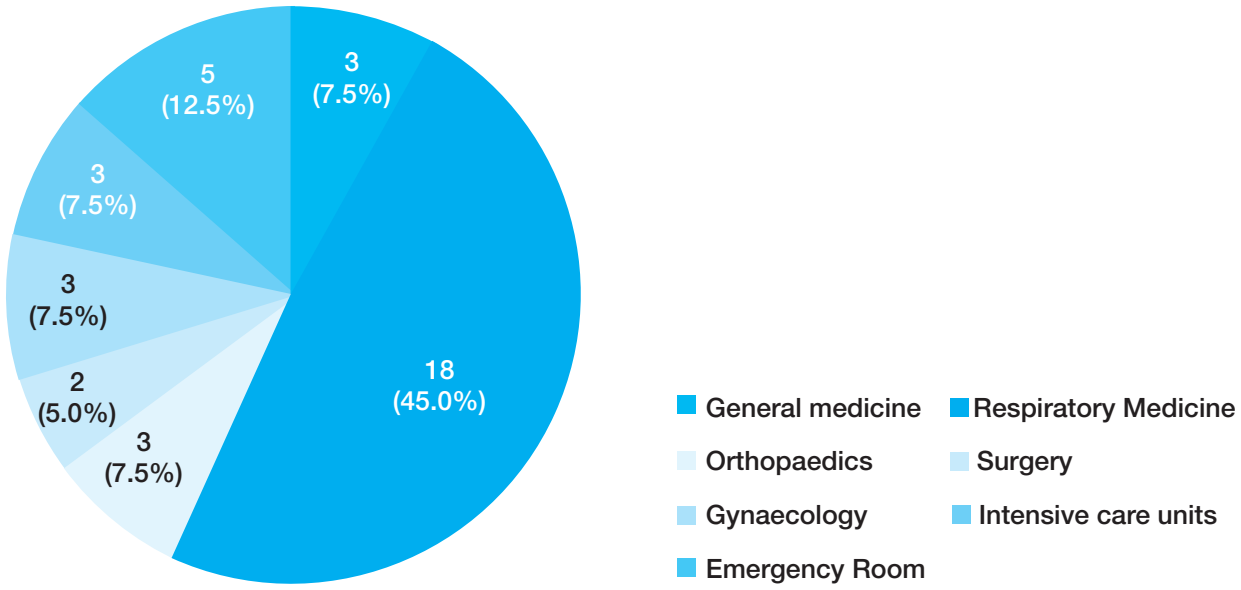


Figure 3. Findings of Chest x-ray

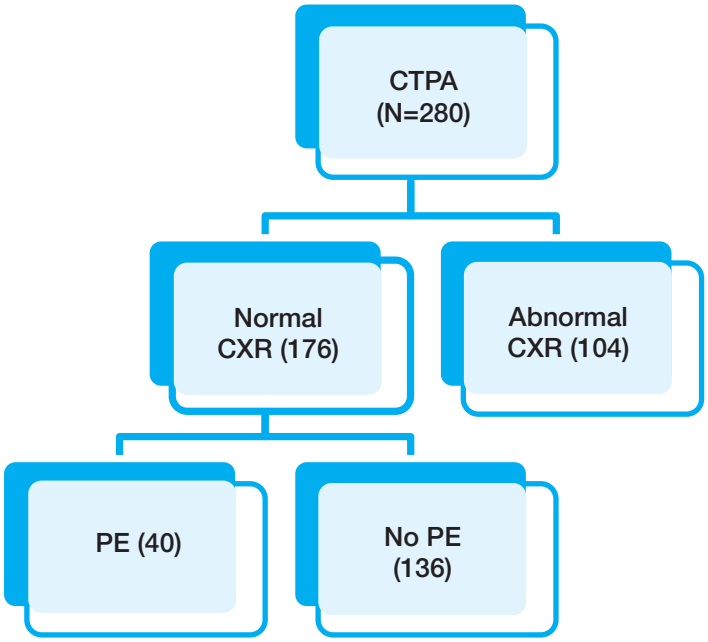


Figure 4. Additional Diagnostic/ incidental findings on CTPA

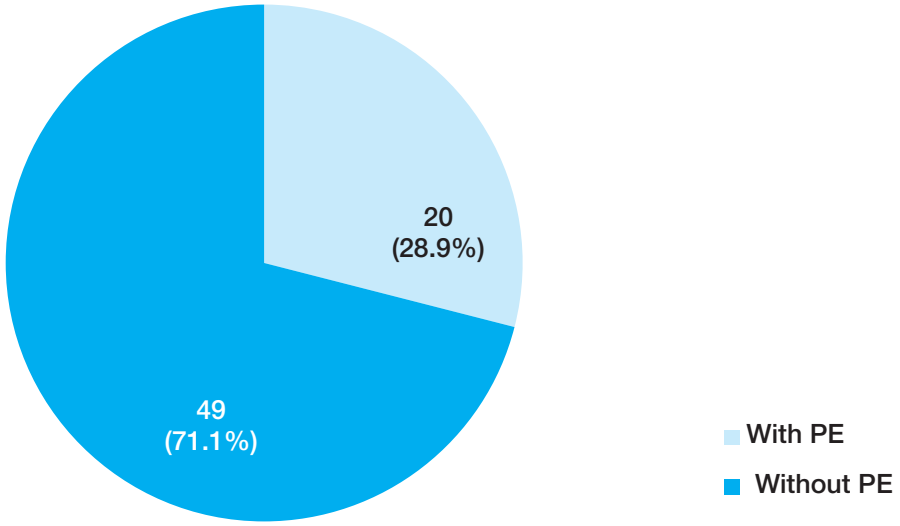
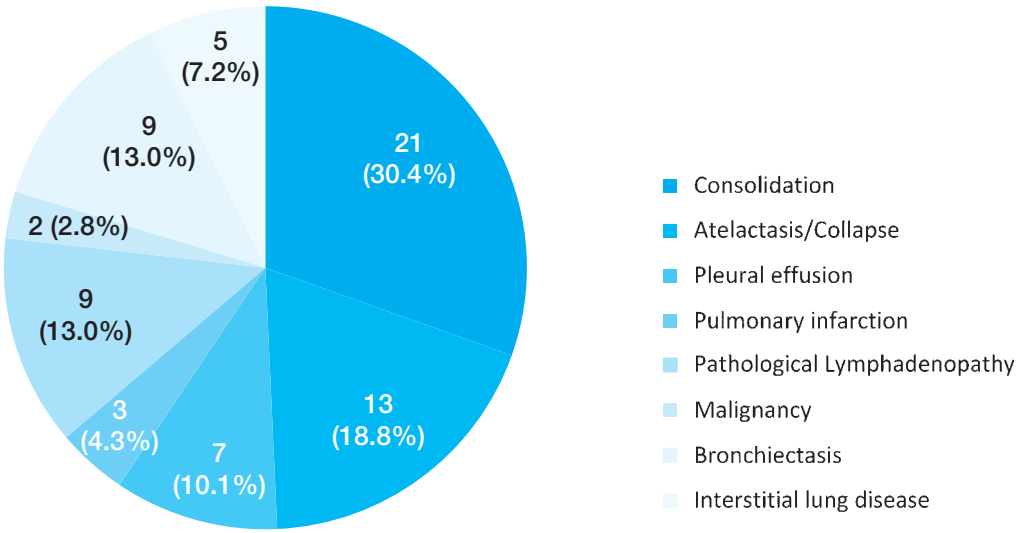


Figure 5. Distribution of additional / incidental findings on CTP (n= 69)



toms may vary from sudden catastrophic hemodynamic collapse to gradually progressive dyspnoea. Atypical symptoms include seizures, syncope, abdominal pain, productive cough, wheezing, decreasing level of consciousness, new onset of atrial fibrillation, hemoptysis and delirium.[6] The diagnosis of pulmonary embolism should be suspected in patients with respiratory symptoms unexplained by an alternative diagnosis, particularly in high risk individuals. CTPA is the main diagnostic tool used these days to diagnose PE.[7] Patients with good quality negative CTPA do not need further investigation or treatment for PE.[8]

In our study we found that in 20 percent of the patients suspected to have PE, CTPA confirmed the diagnosis. Similar rate of detection of PE was noticed in another study by den Exter PI et al where 748 out of 3728

consecutive patients suspected to have PE underwent CTPA.[9] In another study where patients were selected from emergency room only, of the 6838 CT pulmonary angiographic examinations performed 686 (10.0%) were positive for PE.[10]

We found in our study that X-rays were normal in 176 (63%) patients out of those 40 (23%) had PE. The literature suggests that the chest X-ray is neither sensitive nor specific in diagnosing pulmonary embolism and is used to assess for other differentials such as pneumonia and pneumothorax. Chest X ray may be entirely normal in PE.[11] The signs to look for PE on a plain film include Westermarck sign (dilatation of pulmonary vessels and a sharp cutoff), Hampton hump (peripheral wedge of airspace opacity), atelectasis, small pleural effusion, and an elevated diaphragm. These signs may be difficult to find and their absence does not exclude PE.[12]

This study showed that 69 (39%) patients who had normal chest X-rays showed additional/incidental findings when CTPA was performed. This included 20 (50%) of those with PE. Not in all cases those additional findings provided an alternative diagnosis (explain patients symptoms). This was also observed in a study by van ESJ et al where they concluded that value of CTPA outside of excluding thromboembolic disease has been overestimated.[13] In our study we found that consolidation, collapse and atelactasis accounted mostly for the findings which were not evident on chest x-ray. We also diagnosed 5 cases of interstitial lung disease, 9 bronchiectasis, 9 pathological lymphyadenopathies and 2 cases of malignancies. In a study by Ferreira EV et al, atelactasis, pulmonary nodules, pleural effusion and consolidation were common incidental findings in patients who had CTPA.[14]

Conclusion:

In summary, CTPA remains the modality of choice for the detection of pulmonary embolism and is superior to plain chest radiograph. A normal chest X- ray does not exclude PE. Many additional diagnostic/incidental finding may be detected on CTPA. Some of them may provide and explanation for patients' symptoms (alternative diagnosis) and some may be unrelated but may necessitate further investigation or treatment.

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