



## High-Resolution Computerized Tomography Findings in Pulmonary Embolism – a cross sectional study

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### Abstract

**Objective:**

Evaluate computerized tomography (CT) findings in patients with pulmonary embolism (PE)

**Methods:**

A cross – sectional study, carried out in 60 patients diagnosed with PE, all the study subjects were evaluated by high resolution CT scan (HRCT) of the lungs (collimation, 1 mm/edge-enhancement algorithm), Philips Briliance 64 machine was used to obtain CT images.

**Results:**

HRCT demonstrated that 46.7% showed a ground glass opacity, 26.7% had thickened interlobular septa, 16.7% had patchy distribution resulting, 8.3% had nodular pattern, and 10% had Clear lung fields.

**Conclusion:**

Half of the cases with pulmonary embolism had ground – glass opacities in HRCT, while a quarter of them had Thickened interlobular septa, additionally it is possible that cases pulmonary embolism to be without any finding in HRCT.

**Keywords:** high resolution, lung, embolism, ground glass opacities

### Introduction

Pulmonary embolus (PE) refers to obstruction of the pulmonary artery or one of its branches by material (eg, thrombus, tumor, air, or fat) that originated elsewhere in the body. The pathogenesis of PE is like that which underlies the generation of thrombus (ie, Virchow's triad). Virchow's triad consists of venous stasis, endothelial injury, and a hypercoagulable state, additionally, risk factors for PE alone are similar to those for venous thromboembolism (VTE) in general (Stein *et al.*, 2007, Zoller *et al.*, 2012, Fadhil *et al.*, 2018).

Imaging plays a pivotal role in the diagnosis and management of these patients. While multi-detector computed tomography (CT) pulmonary angiography (CTPA) is the most commonly used modality in the workup of suspected PE, it is not the only available modality and may not always be the most appropriate study despite its commonality (Wiener *et al.*, 2013).

The introduction of spiral computed tomography (CT) in the early 1990s has made it possible to image the entire chest in a short period of time and analysis of

the pulmonary arteries during the peak of contrast enhancement (Silva and Müller, 2004). Several studies have shown a high sensitivity and specificity for spiral CT in the diagnosis of PTE (Mayo *et al.*, 1997, van Strijen *et al.*, 2003, Qanadli *et al.*, 2000). The aim of the current work to evaluate CT findings in patients with EP.

## Patients and Methods

### Study sample

A cross – sectional study, carried out in 60 patients diagnosed with PE.

### Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee of Ibn Al Bittar cardiac surgical center (Code: 0183) and

with the 1964 Helsinki declaration and its later amendments.

### Informed consent

Informed written consent was obtained from all individual participants included in the study

### Study protocol

All the study subjects were evaluated by high resolution CT scan (HRCT) of the lungs (collimation, 1 mm/edge-enhancement algorithm), Philips Brilliance 64 machine was used to obtain CT images.

## Results

HRCT demonstrated that 46.7% showed a ground glass opacity, 26.7% had thickened interlobular septa, 16.7% had patchy distribution resulting, 8.3% had nodular pattern, and 10% had Clear lung fields, as illustrated in table 2.

**Table 1: demographical data**

| Variables              | Value      |
|------------------------|------------|
| Age (years), mean ± SD | 53.2 ± 7.4 |
| Gender, n (%)          |            |
| Female                 | 43 (71.7%) |
| Male                   | 17 (28.3%) |

**Table 2: HRCT findings**

| Variables   | Value      |
|---|------------|
| Ground – glass opacities                            | 28 (46.7%) |
| Thickened interlobular septa                        | 16 (26.7%) |
| Patchy distribution resulting geographic appearance | 10 (16.7%) |
| Nodular pattern                                     | 5 (8.3%)   |
| Clear lung fields                                   | 6 (10%)    |
| Data presented n (%)                                |            |

## Discussion

The clinical presentation of acute PE is variable. Up to two-thirds of patients may be asymptomatic, or sudden death may be the first presentation. Common clinical presentations of acute PE include chest pain, tachycardia, hypotension, dyspnea, cough, and hemoptysis. Massive PE presents with hypotension, shock, or cardiac arrest. electrocardiography (EKG) changes of S1Q3 pattern, S1Q3T3 pattern, notched S wave in lead V1, inverted T waves, and right bundle branch block may be seen in patients with right heart strain (Zhan *et al.*, 2014).

Mild PE may remain undetected; chest radiographic findings may be entirely normal as in the 10% of our patients, while in more severe cases diffuse alveolar opacities may be seen. With the widespread availability of CT, more subtle findings may be recognized that may contribute to an earlier recognition of PF in the proper clinical setting. The main finding was the presence of ground-glass opacities (46.7%), which reflects less severe parenchymal involvement.

About 26.7% of our cases had thickened interlobular septa, which is highly suggestive of pulmonary edema. Nodular opacities were demonstrated in five of our patients. Although we lack pathologic correlation, these nodules most probably represent areas of edema, hemorrhage, and atelectasis.

### Conclusion

Half of the cases with pulmonary embolism had ground – glass opacities in HRCT, while a quarter of them had Thickened interlobular septa, additionally it is possible that cases pulmonary embolism to be without any finding in HRCT.

### Conflict of Interest statement

None

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