



DIAGNOSTIC ACCURACY OF MULTIDETECTOR COMPUTED TOMOGRAPHY IN PULMONARY EMBOLISM

Dr. Anantha Krishnan

Assistant Professor, Department of Radiodiagnosis, Saraswathi Institute of Medical Sciences, NH - 24, Anwarpur, Pilkhuwa, Distt. Hapur (U.P.) – 245304

Corresponding author: Dr. Anantha Krishnan,

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ABSTRACT:

Pulmonary embolism is one of the most severe and potentially fatal emergencies that demands fine and timely identification. MDCT has become one of the main techniques in the diagnosis of PE because of the high spatial resolution and short scan time. This paper aims to assess the sensitivity and specificity of MDCT in diagnosing pulmonary embolism while comparing it with gold standards such as pulmonary angiography. Included in the study was 200 patients in whom a suspected PE was considered. Serial MDCT achieved sensitivity of 93% and specificity of 97% for diagnosing PE. Moreover, it revealed other findings like infarcts and pleural effusion when present through MDCT. Drawbacks were absent in detecting subsegmental emboli and in patients contraindicated for contrast use. These conclusions emphasise the role of MDCT in diagnosing PE and identify further potential for clinical evaluation and other imaging modalities that might help combat the issues inherent in more complex or emergent circumstances.

Keywords: MDCT, PE, diagnostic performance, PA, sensitivity, specificity

INTRODUCTION:

Pulmonary embolism (PE) is a frequent, potentially lethal disorder, defined as the occlusion of pulmonary arteries, usually by thrombi which have formed in deepest veins of the lower extremities (1). The sign is to stress that early and accurate diagnosis is indispensable if morbidity and mortality rates are to be decreased. Previous diagnostic procedures such as V/Q and pulmonary angiography bear certain limitations of sensitivity, specificity and the ability to be done in emergent settings as well (2).

The availability of multifunctional computed tomography scan also known as MDCT has brought a big change in the diagnosis of PE. MDCT is a fast technique without the requirement for radiation exposure, and offers detailed anatomical demonstrations superior to conventional radiographs for direct visualization

of emboli in the pulmonary artery (3). Several studies have confirmed diagnostic effectiveness of MDCT, which is now considered the gold standard first-line imaging for the diagnostic of PE (4). However, there is still debate about when the test fails to identify subsegmental emboli and in low-risk patients (5).

This study aims to assess the diagnostic accuracy of MDCT for PE by comparing its performance against pulmonary angiography and clinical outcomes. Understanding its strengths and limitations is essential for optimizing its use in clinical practice.

Aim

To assess the performance of multidetector computed tomography for the diagnosis of pulmonary embolism.

Objectives

1. To assess the overall accuracy of MDCT for diagnosing pulmonary embolism and, therefore, identify whether the method has high sensitivity and specificity for use in diagnosis.
2. To evaluate the drawbacks and additional observations of MDCT in diagnosing PE.

Materials and Methods

A retrospective study was conducted on 200 patients with suspected PE admitted to a tertiary care center over two years. All patients underwent MDCT pulmonary angiography (MDCT-PA) using a 64-slice scanner. The reference standard was pulmonary angiography or clinical follow-up for confirmation.

Inclusion Criteria:

- Patients aged ≥ 18 years with clinical suspicion of PE.
- Patients who underwent MDCT-PA and reference standard imaging.

Exclusion Criteria:

- Contraindications to contrast media.
- Pregnant patients.
- Patients with incomplete medical records.

Sensitivity, specificity, PPV, and NPV of MDCT were determined for diagnosis of acute appendicitis.

Results

Table 1: Diagnostic Accuracy of MDCT in Pulmonary Embolism

Parameter	Value (%)
Sensitivity	93
Specificity	97
Positive Predictive Value (PPV)	96
Negative Predictive Value (NPV)	94

Table 2: Ancillary Findings Detected by MDCT

Finding	Frequency (n=200)	Percentage (%)
Pulmonary infarctions	40	20
Pleural effusion	36	18
Atelectasis	28	14

Discussion

This study demonstrates the high diagnostic sensitivity of MDCT in indicating pulmonary embolism, which was 93%, and the high diagnostic specificity, which was 97%. These findings are following other prior studies proving the efficiency of MDCT over V/Q scan in identifying PE especially in the central and segmental ones (6).

MDCT has the advantage of being a non-invasive imaging technique that can be done rather rapidly or quickly; this makes MDCT an extremely valuable tool in the emergency medicine. Advantages of the MDCT are its ability to make high resolution image that can directly visualize thrombi involve pulmonary arteries, which facilitates early diagnosis and effective

intervention (7). Other signs, including pulmonary infarctions and pleural effusions, were also well delineated, thereby providing complementary data on the pathophysiologic process (8).

However, MDCT can be very useful diagnosing patients with PE, although there is the drawback in its sensitivity in diagnosing subsegmental emboli. False negatives present the risk for failure of PE recognition, for which diligent clinical integration, and follow-up imaging must be employed if MDCT results are negative, but clinical suspicion for PE remains elevated (9). However, contrast media entails risk in patients with compromised renal function or patients with an allergic disposition (10).

However, MDCT still remains the best modality used in diagnosing PE in most clinical settings.

Use in diagnostic protocols together with clinical risk assessment tools further appraises the diagnostic worth of the biomarker and improves on patient outcomes as in the case of the Wells score (11). Current limitations in CT imaging may be solved in the near future by integrating more advanced technologies in the system, for instance, dual energy imaging (12).

Conclusion

Recently described MDCT is described as a safe, effective imaging technique for pulmonary embolism with sensitivity and specificity greater than 90%. A hierarchical high-speed imaging capacity and the inclusion of incidental observations are the reasons why this modality is preferred in the emergencies. On the other hand, MDCT cannot detect subsegmental emboli and has drawbacks of contrast media and train-dependent accuracy; therefore, findings must be interpreted in conjunction with clinical evaluation and other imaging. It is quite likely that future developments in technologies will promote its application as a diagnostic tool in managing PE.

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