VOLUME - 13, ISSUE - 02, FEBRUARY - 2024 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Internal Medicine

ROLE OF IMAGING IN DIAGNOSIS OF PULMONARY EMBOLISM

Dr Abhishek Choudhury MD Medicine, DM Critical Care Medicine, Consultant Paras HMRI Hospital, Bailey Road, Patna- 800014, Bihar

Dr Anjani Kumar MD Pediatrics and Neonatology, Consultant, Ruban hospital for Women and children, Patna- 800001, Bihar

ABSTRACT Acute pulmonary embolism may occur rapidly and unpredictably and may be difficult to diagnose. Early detection and treatment can reduce the risk of death, and appropriate primary prophylaxis is usually effective. The current diagnostic measures for acute pulmonary embolism consist of autopsy results, clinical data, laboratory testing, and imaging studies. Clinical and laboratory diagnosis of pulmonary embolism remains arduous and the issues regarding the imaging diagnosis are many. The purpose of this article was to review the role of imaging in diagnosis of pulmonary embolism.

KEYWORDS : pulmonary, embolism, imaging, diagnosis

INTRODUCTION

Pulmonary embolism, most commonly originating from deep venous thrombosis of the legs, ranges from asymptomatic, incidentally discovered emboli to massive embolism causing immediate death.[1] Pulmonary embolism (PE) is estimated to result in approximately 100,000 annual deaths in the United States with 30-day and 1-year mortality of approximately 4% and 13%, respectively.[2,3]

History

It was Von Virchow[4] in 1846 who first described the connection between venous thrombosis and pulmonary embolic disease, even using the term "embolis."

The first radiographic description of pulmonary embolism is that of Wharton and Pierson[5] of a chest radiograph in 1922. Since that time, virtually all areas of radiology, most notably chest radiography, angiography, nuclear scintigraphy and more recently, CT(computed tomography) imaging has participated in the diagnosis of pulmonary embolic disease. Currently, the most commonly used first-choice imaging examination in patients with suspected PE is CT Pulmonary Angiography (CTPA) as thrombi in the vessels can be visualized directly on CTPA.[6]

Clinical and Laboratory Investigations

If Pulmonary embolism is suspected, a careful assessment based on the history, physical examination, and known risk factors is necessary. Additional studies, including electrocardiography, chest radiography, and arterial blood gas analysis, should also be considered. Electrocardiographic abnormalities, including unexplained tachycardia, are common in acute pulmonary embolism but non-specific.[1] For acute pulmonary embolism, V/Q(ventilation/perfusion) lung scintigraphy is based on some autopsy and follow-up data. Considerable questions have arisen regarding the V/Q scan relative to the angiogram. V/Q imaging has therefore been used as the diagnostic imaging screening tool for the patient suspected of having pulmonary embolism.[7]

Imaging

The impact of radiology on pulmonary thromboembolic disease has been immense, mostly because of nonspecific clinical and laboratory findings. Chest radiography is performed in almost all patients suspected of pulmonary embolism and almost always has abnormal findings. Ninety-two percent of patients with acute pulmonary embolism had abnormal findings on chest radiographs in a subset of the PIOPED study.[8] Contrast-enhanced CT arteriography has advantages over ventilation–perfusion scanning, including speed, characterization of nonvascular structures, and detection of venous thrombosis. In a recent large, prospective trial conducted with outpatients with suspected acute pulmonary embolism, the investigators reported an excellent outcome when anticoagulation therapy was not initiated after a negative finding on multidetector CT arteriography which was the sole imaging study.[7] Nonetheless, it is necessary to consider additional imaging in cases of high clinical suspicion, even if CT arteriography is negative. Like CT, pulmonary angiography appears to have excellent reproducibility for larger, more centrally located thrombi but not necessarily those at the subsegmental level. The CTPA can be a part of triple-rule-out (TRO) imaging technique where a cost-effective evaluation of the coronary arteries, aorta, pulmonary arteries and adjacent intrathoracic structures for the patient with acute chest pain can be accomplished. TRO CT is most appropriate for the patient who is presumed to be at low-to-intermediate risk for acute coronary syndrome and whose symptoms may also be caused by acute abnormal conditions of the aorta or pulmonary artery.[9] Ventilation–perfusion scanning is most likely to be diagnostic in the absence of cardiopulmonary disease.[1] Echocardiography may reveal findings that strongly support hemodynamically significant pulmonary embolism.[8]

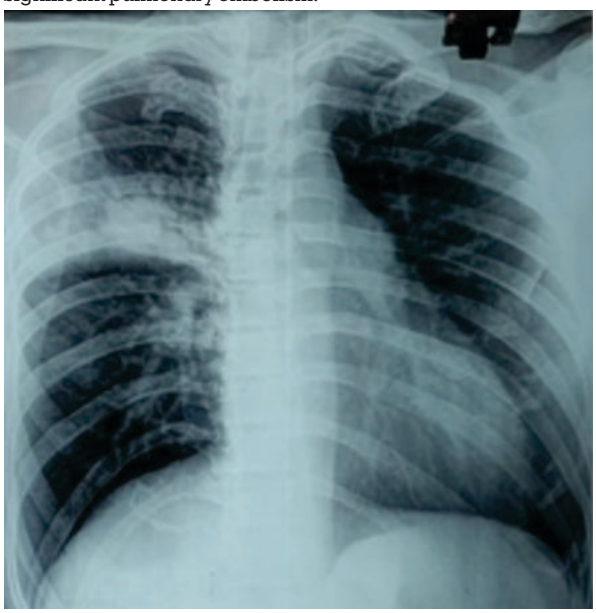

Fig 1: Hampton's Hump- Wedge Shaped Opacity Representing Pulmonary Infarction Distal To Pulmonary Embolus

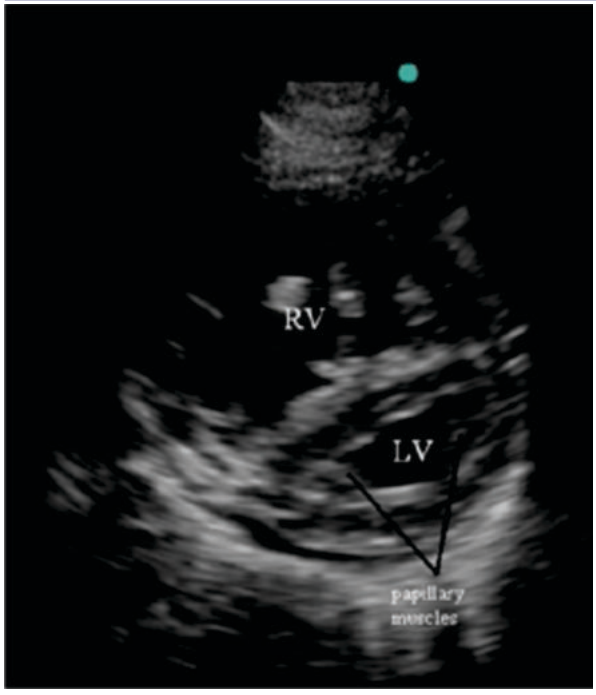

Fig 2: Echocardiographic Sign Of Rv Strain In The Parasternal Short View. Note The Characteristic D- Shaped Of The Left Ventricle(LV) In Cross Section

CONCLUSION

Chest radiography, echocardiography and CT pulmonary angiography are the imaging modalities commonly used for diagnosing pulmonary embolism. Echocardiography is an effective bedside tool to asses biventricular function, right heart dysfunction and regional wall motion abnormality in critically ill patients in the intensive care unit. Chest Xray helps to assess cardiac size, pulmonary oedema, pneumonia, pleural effusion, pneumothorax. For most patients with suspected PE, CTPA is the first-choice diagnostic imaging modality because it is sensitive and specific for the diagnosis of PE, especially when incorporated into diagnostic algorithms. If contraindications to CTPA are present but can be readily resolved (eg, premedication for a contrast allergy) and alternate imaging such as V/Q scanning is not feasible, CTPA may be performed after a short delay (eg- 8 to 12 hours) with consideration for empiric anticoagulation while waiting.

REFERENCES

1. Victor F. Tapson, M.D Acute Pulmonary Embolism N Engl J Med 2008;358:1037-52.
2. Horlander KT, Mannino DM, Leeper KV. Pulmonary embolism mortality in the United States, 1979-1998: an analysis using multiple-cause mortality data. Arch Intern Med. 2003;163(14):1711–1717.
3. Alotaibi GS, Wu C, Senthilselvan A, McMurtry MS. Secular trends in incidence and mortality of acute venous thromboembolism: the AB-VTE population-based study. Am J Med. 2016;129(8):879.e19–879.e25.
4. von Virchow R. Weitere Untersuchungen ueber die Verstopfung der Lungenarterien und ihre Folge. Traube's beitraege exp path u physiol, 1846;2:21–31
5. carton LR, Pierson JW. Minor forms of pulmonary embolism after abdominal operations. JAMA 1922;79:1904–1910
6. Mayo J, Thakur Y. Pulmonary CT angiography as first-line imaging for PE: image quality and radiation dose considerations. AJR Am J Roentgenol 2013;200(3):522-8.
7. Tony P. Smith Pulmonary Embolism: What's Wrong with This Diagnosis? AJR:174, June 2000
8. Goldhaber SZ, Haire WD, Feldstein ML, et al. Alteplase versus heparin in acute pulmonary embolism: randomised trial assessing right-ventricular function and pulmonary perfusion. Lancet 1993; 341:507-11
9. Junho An , 1 Yoojin Nam , 1 Hyoun Cho , 2 Jeonga Chang , 1 Duk-Kyung Kim , 3 and Kyung Soo Lee 1Acute Pulmonary Embolism and Chronic Thromboembolic Pulmonary Hypertension: Clinical and Serial CT Pulmonary Angiographic Features J Korean Med Sci. 2022 Mar 14;37(10)