

Our Local Experience at KFSH&RC Jeddah Branch with SPECT/CT Perfusion Imaging

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Introduction

Pulmonary embolism is the third most common acute cardiovascular disease after myocardial infarction and stroke and results in thousands of deaths each year because it often goes undetected [1]. Diagnostic tests for thromboembolic disease include the D-dimer assay and lower limb ultrasonography, both have high specificity but low sensitivity, ventilation-perfusion scintigraphy and Computed Tomographic Pulmonary Embolism (CTPE) [2]. Planar V/Q scan has inherent limitations related to the overlap of anatomic segments resulting in underestimation of the extent of perfusion loss. The medial basal segment of the right lower lobe is often not visualized on planar scans [3]. Added to these factors is use of probabilistic reporting criteria, and a relatively high indeterminate rate, both caused significant dissatisfaction among referring physicians. It is unsurprising that CT Pulmonary Angiography (CTPA), with its binary reporting approach become the preferred imaging test to assess Pulmonary Embolism (PE) in many institutions (Figure 1A, B & C) [4]. SPECT/CT perfusion imaging can integrate anatomic information with the functional information ones. A potential for a single imaging procedure to yield a high sensitivity and specificity method for the detection of PE. The absence of contrast-related risks, the equal sensitivity and specificity in addition to its lower radiation dose compared to CTPA, are all supporting data for its use to rule out acute and or acute on top of chronic PEs. We aim in our study to assess the trend of using Perfusion SPECT/CT at KFSH&RC Jeddah compared to the standard CTPE. Compared to the 31 scans performed in 2016, 112 studies (361% increase) were completed in 2021.

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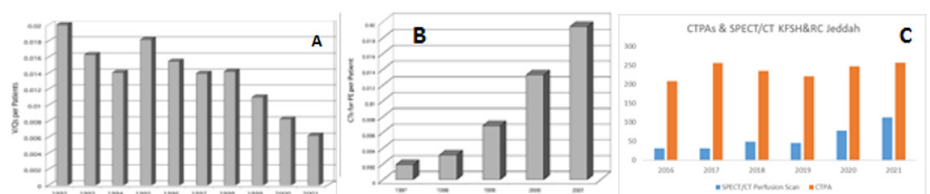


Figure 1: A&B: Trends of requested V/Q scans compared to CTPE at Mass General Hospital.

C: Boston MA compared to KFSH&RC Jeddah.

The beneficial outcome of targeting anticoagulant therapy to PE positive Covid-19 patients and avoiding its unnecessary use for negative patients, drove the attention to the pivotal benefit of perfusion SPECT/CT imaging in diagnosis and follow up of PE in those subcategories of patients. 99 patients with Covid-19 pneumonia and suspicious PE were

evaluated with this emerging technology. 38 patients had -ve PCR results and showed no Covid-19 related pneumonias in their scans. Of the 15 patients with +ve PCR testing and signs of post Covid-19 pneumonic patches, 8 had no PE signs on their perfusion SPECT/CT studies. The remaining 7 patients had +ve criteria for PE in their scans and received therapeutic anticoagulant treatment for an average of 10 days. All of the 15 patients were discharged after showing clinical and serologic improvements of their PE Figure 2 & 3. The precise diagnosis of chronic PE and acute on top of chronic ones did provide another fragile subgroup of patients the additional lifesaving anticoagulant therapy. Of the # patients diagnosed with chronic PEs, # were reported as acute on top of chronic and received additional anticoagulant treatments which improved their symptoms.

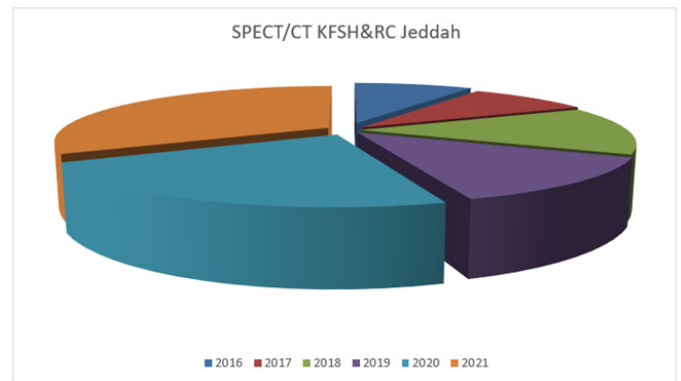


Figure 2:

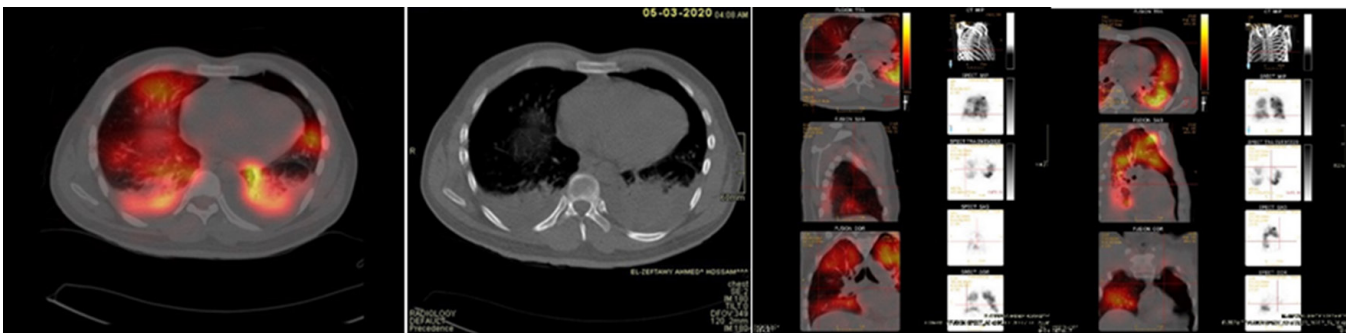


Figure 3: A patient with multiple bilateral mismatching segmental perfusion defects with bilateral pleural effusion, atelectasis and basal pneumonic infiltrates.

Conclusion

Using Perfusion SPECT/CT for diagnosis of PE with the advantage of its binary positive and negative results, avoid the exclusion of patients with pre-existing lung disease. The comparable sensitivity and specificity to CTPE, played a pivotal role in accurately diagnosing and treating post Covid-19 patients. Patients with acute on top of chronic PEs did also receive their lifesaving therapeutic anticoagulants regaining the trust of referring physicians for diagnosis and treatment of their critically ill patients.

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