Impact of simplified clinical probability assessment using modified Well's criteria for pulmonary embolism to stratify and reduce the negative CT pulmonary angiogram

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Aims and objectives

Various clinical scoring systems have been designed to aid the clinicians in the early diagnosis of PE; the most recently updated versions are Well's Score, Revised Geneva Score[1] and Pulmonary Embolism Rule out Criteria (PERC)[2]; however, the precise stratification of the patients is still controversial considering the higher rate of negative CT pulmonary angiogram (CTPA) [3]. An alternate simplified approach have been in practice in the recent times using the Modified Well's criteria [4, 5].

We assessed the utility of simplified clinical probability assessment using Modified Well's criteria and compared it with traditional clinical probability assessment in addition to D-dimer and PERC rule as an adjunct to clinical scoring system to assess the stratification of the patients with suspected pulmonary embolism for CTPA.

Methods and materials

This prospective cohort study was carried out in Medical Imaging Department, IABFH, NGHA, Dammam, Saudi Arabia, between Jan 2014 to September 2015. We included 87 patients of either gender above 20 years of age. The patient with the clinical suspicion of pulmonary embolism underwent CTPA after categorizing the patient as a PE likely (score >4.0) or PE unlikely (score ≤4.0) in addition to low risk (score <2.0), intermediate risk (score 2.0 to 6.0) and high risk (score >6.0) categories traditionally. PERC rule and D-dimer (normal less than 0.5 mg/L FEU) were also included in pretest clinical probability.

Results

Among 87 patients, 51 (58.6%) were females and 36 (41.4%) were males with mean age of 42 years +/- . According to the simplified assessment, 48 (55%) patients were found to have PE likely. Traditional assessment categorized 19 as low risk, 64 as intermediate risk and 4 high risk patients for PE. CTPA was positive for PE in 15 patients (17.2%), out of which 13 patients were categorized as PE likely by simplified pretest assessment with sensitivity and specificity of , and 1 patient as low risk, 9 patients as intermediate risk and 3 patients as high risk according to traditional assessment with sensitivity and specificity of . Only 3 patients fulfilled all 8 criteria of PERC (3.4%). D-dimer was high in 75 patients (86.2%), all of which were found in the PE likely category; however, significantly higher values of D-dimer values (mean 6.8 mg/L FEU +/- 3.5 SD) were observed in PE patients with positive CTPA.
Fig. 1: Axial section of CTPA of a 77 years bedridden female presented with shortness of breath and tachypnea. She had DVT diagnosed on the ultrasound in the same visit. Her Well's score was 7.5 suggesting high probability of pulmonary embolism (immobilization = 1.5; suspected DVT = 3, alternate diagnosis less likely = 3). D-dimer was also very high up to 10.1 mg/L FEU (normal up to 0.5 mg/L FEU). PERC criteria was not fulfilled due to age above 50 years. CTPA demonstrated bilateral pulmonary embolism involving the main pulmonary arteries (red arrows) with subsequent extension of the emboli in the segmental and subsegmental branches.

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Fig. 2: Axial and coronal-oblique sections of CTPA of a 70 years male presented with shortness of breath and tachypnea. No obvious cause other than pulmonary embolism was suspected clinically. His Well’s score was 4.5 suggesting moderate probability of pulmonary embolism (tachycardia = 1.5, alternate diagnosis other than PE = 3). D-dimer was strikingly high up to 11.87 mg/L FEU (normal up to 0.5 mg/L FEU). PERC criteria was not fulfilled due to age, heart rate and oxygen saturation up to 93 %. CTPA demonstrated bilateral pulmonary thromboembolism commencing from the right and left main pulmonary arteries and extending into the upper and lower segmental as well as some of the sub-segmental branches associated with features of right ventricular strain.

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Fig. 3: Axial and coronal-oblique (left pulmonary trunk) sections of CTPA of a 30 years female presented with left sided pleuritic chest pain and shortness of breath. She had spontaneous vaginal delivery 2 months back. Her Well’s score was 3 suggesting low probability of pulmonary embolism (tachycardia = 1.5, immobilization for more than 3 days = 1.5). D-dimer was mildly high up to 2.05 mg/L FEU (normal up to 0.5 mg/L
FEU). PERC criteria was not fulfilled due to tachycardia. CTPA demonstrated pulmonary thromboembolism with a filling defect in the segmental branch of left lower lobe pulmonary artery.

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Conclusion

Simplified clinical probability assessment using Modified Well's Score with D-dimer as an adjunct is an easy and alternative approach to traditional probability assessment in order to reduce the negative CTPA for clinically suspected pulmonary embolism.

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References

1. Skinner S. Pulmonary embolism: Assessment and imaging. Australian Family Physician, Sep 2013: 42 (9); 628-32.


