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S1Q3T3, Pulmonary Embolism Diagnosed Primarily from ECG Results in a Patient with Dysphagia and Low Wells Score

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DESCRIPTION

A 68-year-old man with a history of Chronic Obstructive Pulmonary Disease (COPD) and insulin-dependent diabetes was admitted after experiencing 10 days of shortness of breath, coughing, and gradual weight loss over the past six months. During his hospital stay, he developed difficulty swallowing both solids and liquids, which had led him to stop taking regular medications. Initially, the doctors didn't suspect a Pulmonary Embolism (PE) because of his low-risk profile. However, as his condition worsened and his Electrocardiogram (ECG) showed a rare pattern called S1Q3T3, further tests were conducted. A Computed Tomography Pulmonary Angiogram (CTPA) revealed a large blood clot in his lungs, causing strain on his heart. He was started on anticoagulation therapy and began to recover. This case highlights the importance of the S1Q3T3 ECG pattern in diagnosing PE, especially in patients who may not show typical signs or have a low pre-test probability. It also underscores the crucial role of early detection and prompt treatment, as untreated PE can be life-threatening.

Pulmonary Embolism (PE)

Pulmonary embolism is the pathology where a thrombus that originates outside of the pulmonary vascular system blocks and disrupts the blood flow in the pulmonary artery or its subsequent branches [1]. In the 19th century, Rudolph Virchow coined the 'Virchow Triad' which identified the risk factors that can contribute towards thrombosis formation-endothelial damage of vasculature, Hypercoagulability and blood flow stasis.

S1Q3T3 phenomenon

Leading S wave in lead I, Q wave in lead III, inverted T waves in lead III. Electrocardiographic changes indicative of RV strainsuch as inversion of T waves in leads V1-V4, a QR pattern in V1, a S1Q3T3 pattern, and incomplete or complete right bundle branch block-are usually found in more severe cases of PE; in milder cases, the only abnormality may be sinus tachycardia, present in 40% of patients [2]. Finally, atrial arrhythmias, most frequently atrial fibrillation, may be associated with acute PE.

Wells score

An applied clinical decision rule in the diagnostics of patients with suspected pulmonary embolism, when meaning of pre-test probability it is the clinical judgement and prior to imaging tests [3]. When judging post-test probability it is after an imaging modality.

Mortality rate of untreated PE

Analysis of untreated or missed pulmonary embolism in ambulatory patients reveals mortality and recurrence rates of less than 5% [4]. And Pulmonary Embolism (PE) has an incidence range from 39 to 115 per 100,000 population annually, it is a prevalent and dangerous diagnosis especially in patients in long hospital stays or in patients with high pre-test probability/wells score [5].

This case study is of man in his late 60s, with a background of lung disease, diabetes, and a family history of cancer, was admitted after experiencing shortness of breath, a cough, and significant weight loss for the past 10 days. He also had difficulty swallowing and wasn't taking any regular medications. Initially, cancer was suspected due to his family history and symptoms, but his condition worsened with low oxygen levels/high respiration rate/fast heart rate, leading to additional tests.

The pathognomonic sign of 'S1Q3T3' was present on his ECG leading to further booking of a Computed Tomopgraphy Pulmonary Angiogram (CT-PA) that showed a large saddle pulmonary embolism, a blood clot in his lungs. After receiving treatment with blood thinners, he is now recovering and awaiting further follow-up for his swallowing problems and ongoing care.

This case study is to show that largely pulmonary embolisms present with a low pre-test probability and to highlight that clinical examination and ECG is a helpful and vital modality to

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further investigate for pulmonary embolism with a CT-PA. The study highlights the importance of promptly identifying PE, administering timely treatment, and the role of ECG in diagnosing PE, even in patients with a low risk. Also of note knowledge of the predisposing factors for VTE is important in determining the clinical probability of the disease, which increases with the number of predisposing factors present; however, in 40% of patients with PE, no predisposing factors are found [6,7].

PE is a comprehensively studied thrombotic event with high mortality, relevant guidelines are present both nationwide and locally within each trust [2]. In summary it is important to appropriately diagnose and use the current tools; PERC score and WELLs SCORE, to aid in diagnosis if a PE is truly a viable diagnosis. It is important to book a CTPA as soon as possible with anticoagulation cover as soon as able as per literature; CTPA has both high sensitivity and specificity. The undertaken PIOPED II trial demonstrated a sensitivity of 83% and specificity of 96%. In association with clinical probability after examination, the positive predictive value was as high as 96% when there was high/low clinical probability and 92% when there was intermediate clinical examination probability [8].

In conclusion while the S1Q3T3 pattern is uncommon in practice, appearing in only 15-25% of people ultimately diagnosed with Pulmonary Embolism (PE), it's still a valuable tool in helping diagnose PE, especially in patients where a blood clot is not initially considered likely [9].

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