

Disappearance of S wave in lead I as a marker of Successful thrombolytic Therapy in Acute Pulmonary Embolism

Background:

The hospital mortality in patients with massive pulmonary embolism (PE) is high. ECG abnormalities are seen in 70–80% of patients of acute PE, varying from the typical S1Q3T3 pattern to nonspecific changes. The sensitivity of S1Q3T3 is low but when present, it is highly specific. New onset S wave in lead I and the disappearance of S wave in lead I have been observed following thrombolytic therapy in acute PE. The purpose of the study was to find out the incidence of S wave in massive PE and response to thrombolytic therapy in patients with PE.

Methods:

ECG of patients presented with massive PE and who received thrombolytic therapy during the period Jan 2011 to December 2013 were retrospectively analyzed and compared with patients admitted with DVT with or without PE without thrombolytic therapy. Indications for thrombolytic therapy were patients with echocardiographic evidence of right ventricular dysfunction and elevated cardiac biomarkers. A weight-optimized dosing regimen of tenecteplase, administered as an intravenous bolus. ECG at admission, after 24 hours, and 48 hours were analyzed and compared with patients with DVT with or without PE without RV dysfunction who were not candidate for thrombolytic therapy and treated with anticoagulation.

Results:

All patients who presented with massive PE requiring thrombolytic therapy had sinus tachycardia and an S wave in lead I at the time of presentation compared with other group where S wave was absent in lead I. All patients who received thrombolysis had experienced clinically relevant improvement following thrombolytic therapy. Regression of right ventricular enlargement was documented in seven patients in the thrombolytic group. All these patients showed disappearance of S wave in lead I within 48 hours of thrombolytic therapy. One patient S wave persisted in the ECG and this correlated with persistent high PA pressure in the Echocardiography.

Conclusions:

This observational data support the use S wave in lead I as a marker of right ventricular strain in patients with PE. Presence of S wave in lead I can be used as an ECG marker to decide the need for thrombolysis in combination with echocardiography and cardiac biomarkers. The prompt disappearance of S wave following thrombolytic therapy makes it to be proposed as a marker to assess the response to therapy in acute massive and submassive PE.