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Role of Half Dose Tenecteplase in Submassive Pulmonary Embolism: Analysis of A Case Report

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Abstract

Background: Initial assessment of acute Pulmonary Embolism (PE) is essential in risk stratification into low-risk and high-risk (massive) Pulmonary embolism as per the hemodynamic stability. Patients with submassive PE who are likely to progress for hemodynamic instability should receive anticoagulation and should be monitored.

Method: This is a descriptive case report of a 45-year-old female who presented with history of nonproductive cough for 2 weeks, associated with retrosternal chest pain and shortness of breath. On physical exam her vitals were: temp 38.1 degrees Celsius, BP 160/106mmhg, SPO_2 84% on room air, pulse 113b/min, R/R 26 cycles/min. She had distended neck veins with vigorous pulsation seen JVP 10mmhg. On auscultation there was reduced air entry and a systolic murmur in left sternal border, D dimer >6000ng/dl (0-500ng/dl), cardiac troponin 0.6ng/ml. Computerized tomography pulmonary angiogram (CTPA) revealed bilateral pulmonary emboli in the right and left pulmonary arteries and an echo suggestive of severe pulmonary arterial hypertension with a peak value of > 70mmhg with preserved left ventricular ejection fraction (LVEF) 57%.

Results: Successful thrombolysis was achieved with half dose Tenecteplase. There was no bleeding during and after Tenecteplase administration. The patient was discharged on the 4th day in stable condition.

Discussion: Half-dose thrombolysis with Tenecteplase has shown to improve pulmonary perfusion resulting in improved clinical symptoms and a short hospital stay with minimal chance for bleeding issues. Patients with sub massive PE at highest risk for progression to hemodynamic instability should receive anticoagulation and be monitored for clinical deterioration.

Conclusion: Low-dose Tenecteplase is therefore a safe and efficacious treatment option for sub massive PE as denoted. However, larger randomized controlled trials are needed to establish low-dose Tenecteplase as an accepted treatment modality.

Keywords: Thrombolysis; Pulmonary embolism; PE.

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INTRODUCTION

Background

Prognosis from PE depends on the degree of obstruction and hemodynamic compromise. Those with massive PE may be at imminent risk of death with an estimated mortality of 25 to 65% and those with sub massive PE have a mortality of 3 to 15%, while those with low-risk PE and normal heart function have <1% mortality with anticoagulation. Recurrence for Veno Thrombo Embolism (VTE) is increased in those with associated congenital or acquired risk factors. There are potential long-term consequences of PE especially, functional impairment especially for those with recurrent PE.[1]

The prevalence of VTE in Africa, and associated mortality are high following surgery, and in pregnant and postpartum women. At least one-quarter of patients who are at risk for VTE in Africa are not receiving prophylaxis. These results are generated from studies with small sample size, highlighting an urgent need for well-designed studies with larger sample size to evaluate the true burden of VTE in Africa.[2] The first step in the management of acute PE is risk stratification. High-risk patients are usually treated with thrombolysis and low-risk patients with anticoagulation.

Retrospective study at Kenyatta National Hospital (KNH), Nairobi, Kenya. Records of patients seen between January 2005 and December 2009 were examined for mode of diagnosis, comorbidities, age, gender, treatment and outcome. All the patients were treated with anticoagulants and thrombolytics with only one having embolectomy. Ninety two patients (71.9%) recovered, 18.8% of them with corpulmonale, while 28.1% died. It affects individuals below 40 years without a gender bias, and carries high morbidity and mortality. Associated comorbidities are venous thrombosis, lifestyle conditions and communicable diseases.[3]

If an imminent risk of hemodynamic instability or cardiac arrest occurs, thrombolytics should be administered if no contraindications exist. Mortality benefit and risk of bleeding must be considered when deciding to administer thrombolytic therapy in massive or sub massive PE.[4]

The objective of this case study is to determine the role of thrombolysis and use of half dose Tenecteplase in treatment of SPE.

MATERIALS & METHODS

45 year old female came in as referral from a peripheral facility with a 3-week history of a nonproductive cough associated with progressive worsening difficulty in breathing for the last 3 days with easy fatigability and night sweats. She reported retrosternal chest pain radiating to the back worsen by activity relieved by rest. No paroxysmal nocturnal dyspnea reported. She had been admitted on 4th of May 2022 in a peripheral facility treated for pneumonia and discharged on 11th of May 2022. She had a history of treatment for pulmonary tuberculosis in 2014 and acknowledges use of Norplan (Levonorgestrel releasing birth control) 8 years ago, discontinued due to elevated blood pressure which normalized thereafter.

Vitals: temp 38.1 degrees Celsius, BP 160/106 mmhg, SPO_2 84% on room air, pulse 113b/min, R/R 26 cycles/min, weight 104kg and a BMI 34 with regular and palpable peripheral pulse, distended neck veins with vigorous pulsation and JVP 10mmhg. There was reduced air entry with vesicular breath sounds.Cardiac evaluation showed systolic murmur in left sternal border, S1,S2 heard well.

Hemogram showed leukocytosis of 15.6, CRP 15.7ng/dl, D dimer >6000ng/dl (0-500ng/dl), cardiac troponin 0.6ng/ml, PCR covid neg.ECG shows sinus tachycardia of 110b/min, left axis deviation and T wave inversion on V2 and V3 suggestive right ventricular ischemia. Bilateral doppler ultrasound of the lower limbs shows bilateral femoral vein emboli. Echo showed mildly enlarged right ventricle (RV), dilated right atrium (RA), severe tricuspid regurgitation (TR), severe pulmonary arterial pressure (PAP) 70 mmhg, dilated and non-collapsing inferior venacava (IVC) and moderate right sided pleural effusion. CT Pulmonary Angiogram (CTPA) revealed bilateral pulmonary emboli with filling defect of right and left pulmonary artery.

Provisional Diagnosis of sub massive pulmonary embolism, deep venous thrombosis, systemic hypertension. Patient was admitted in ICU and shared decision was reached to thrombolysis the patient with half dose Tenecteplase 50mg slow infusion for 30min. Patient tolerated the procedure well.

She was discharged on: Rivaroxaban 15mg BD for 14/7 then 20mg OD 30/7, Nebivolol 5mg OD and Aldactone 25mg OD.

At the time of discharge: Patient was asymptomatic with BP 135/86, pulse 89 b/min, spo2 96% at room air.

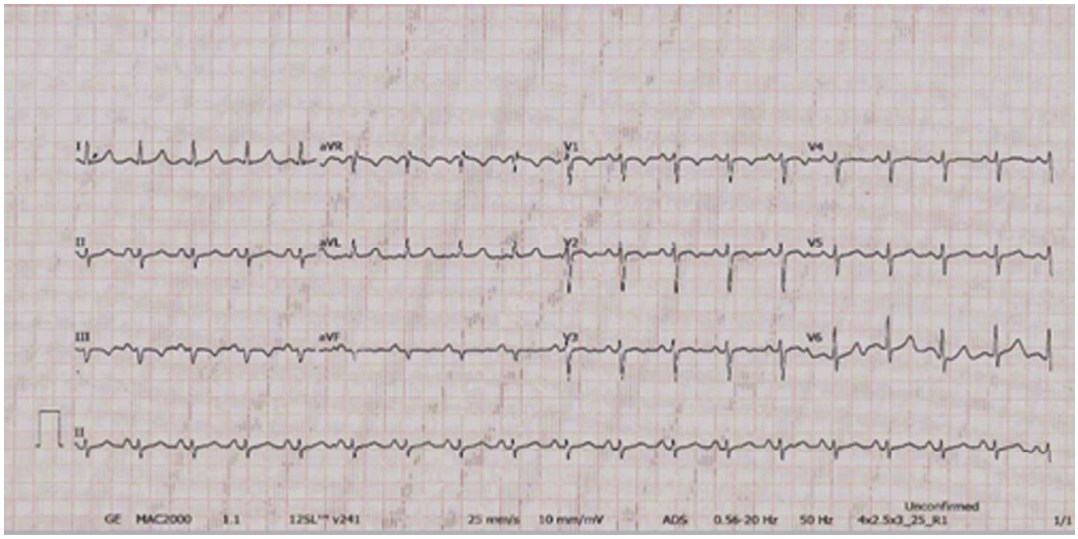

Fig. 1: ECG for PE thrombolysis

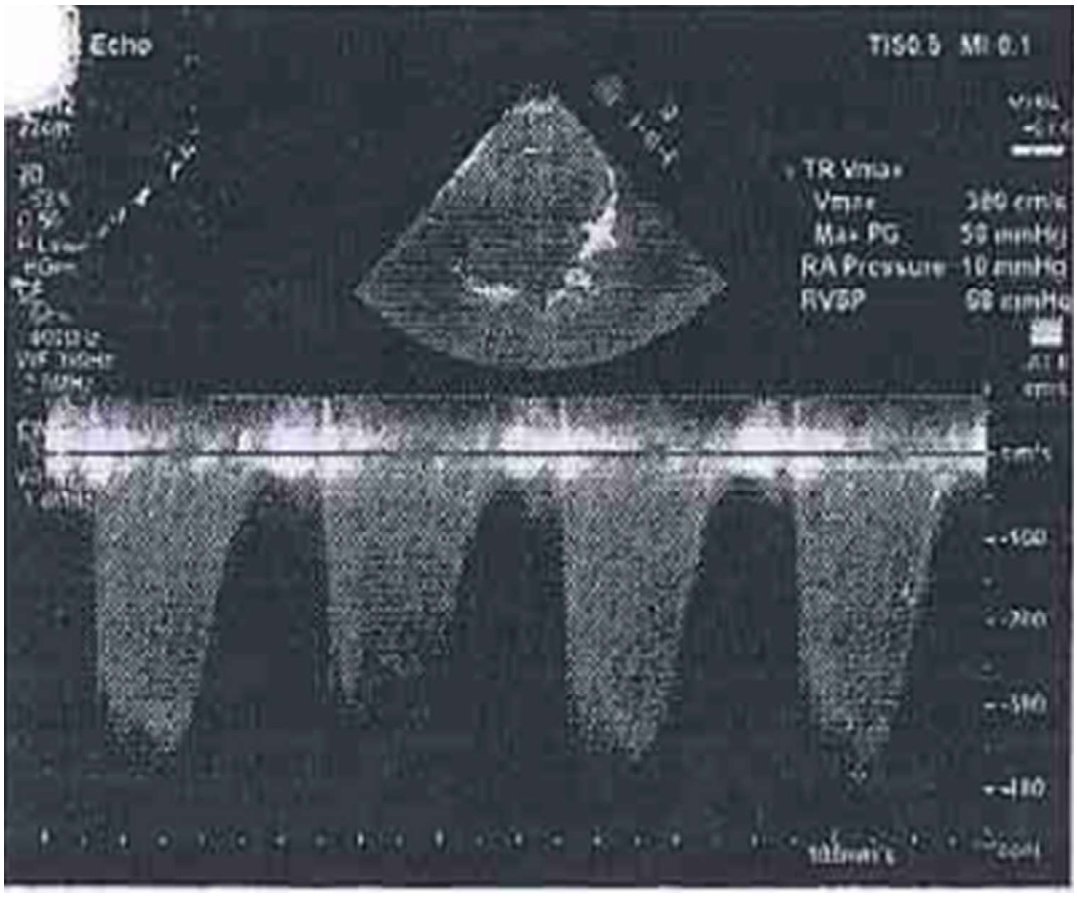

Fig. 2: Echo cardiogram

(Severe pulmonary hypertension PAP 70 mmhg)

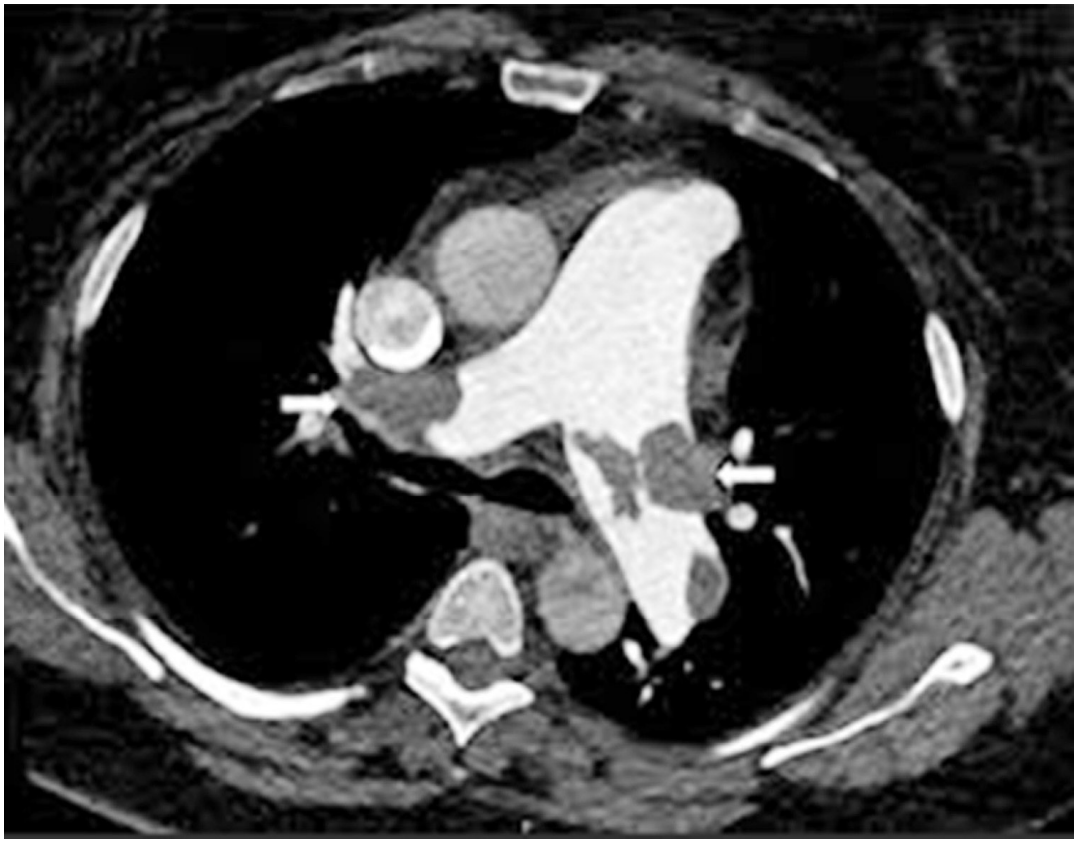

Fig. 3: Computerized Tomography Pulmonary Angiogram

(Image shows bilateral pulmonary emboli)

RESULTS

Provisional diagnosis of sub massive pulmonary embolism, deep venous thrombosis, systemic hypertension. Patient was admitted in ICU and a shared decision was reached to thrombolyse the patient with half dose Tenecteplase 50mg slow infusion for 30 mins. Patient tolerated the procedure well.

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DISCUSSION

Zhang *et al.* indicated that Tenecteplase would be suitable for high-risk PE patients because it could be beneficial for 30-day survival rate without increasing hemorrhagic incidents. However, Tenecteplase is not recommended for patients with intermediate risk PE because of high bleeding risk.[5] Based on the results in this study, these patients should be carefully evaluated and closely monitored for clinical deterioration, and Tenecteplase could be beneficial when hemodynamic instability occurs.

Trial by Yilmaz,E Setal on half-dose Recombinant tissue Plasminogen (rtPA) treatment in sub massive PE prevented death/hemodynamic decompensation in the first 7-day and 30-day period compared with Low Molecular Weight Heparin treatment without increasing the risk of bleeding.[6] This provides good evidence that low dose thrombolytic agents dissolve clot more rapidly than heparin, hence should be considered safe and effective option in clinical treatment.

WengC., WangX., *et al* in UK showed rapid dissolution of intravascular thrombosis and improved short-term and long-term dyspnea, compared to patients in the anticoagulation therapy group. However, the study found out no significant differences in mortality or in the incidences of recurrent PE between the two treatment groups. Additionally, low-dose UK treatment did not increase the risk of major or minor bleeding events, compared to anticoagulation therapy.[7]

Both studies, provide a basis and demonstrate the potential for low dose Tenecteplase in PE studies with the advantage of rapid resolution of symptoms and similar mortality compared to the use of anticoagulation therapy.

CONCLUSION

Half dose thrombolysis is safe and effective in the treatment of sub massive PE, with rapid improvement of clinical outcome and short hospital stay. However, larger, randomized controlled trials are needed to establish low-dose Tenecteplase as an accepted treatment modality.

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