A Case of Successful Thrombolysis in Pulmonary Embolism with Tenecteplase during Peripartum Period

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Tenecteplase is a recognized thrombolytic therapy for myocardial infarction. It is also increasingly used in massive and submassive pulmonary embolism. Thus far, there had been 22 patients with pulmonary embolism treated with tenecteplase. However, none of the patients was treated during peripartum period. We report its use in a 35-year-old multiparous woman who was referred at 4 hours post partum with cardiogenic shock. She was clinically suspected to have acute pulmonary embolism, and this was confirmed by computed tomography of the pulmonary artery. She was successfully thrombolysed with tenecteplase but suffered bleeding complication. She was resuscitated and remained stable until discharge 1 week later. A repeat computed tomography of the pulmonary artery at day 4 post-thrombolysis showed a significant reduction in the thrombus load. This case illustrates the potential benefit and efficacy of tenecteplase in acute pulmonary embolism in peri-partum women.

Key Words: Peripartum • Pulmonary embolism • Tenecteplase • Thrombolysis

INTRODUCTION

Tenecteplase is a newer thrombolytic agent derived from tissue-type plasminogen activator (tPA) for the treatment of patients with acute myocardial infarction. Its clinical efficacy has been proven in three myocardial infarction clinical trials; TIMI 10B, ASSENT-2 and ASSENT-3.¹² The use of tenecteplase in acute pulmonary embolism is relatively new. Although it is not a widely recognized treatment of this condition, there were several published case series in favour of its use for pulmonary embolism. Its feasibility for use in the emergency department with simple administration regime has made it an attractive alternative to the older thrombolytic therapy, which requires more complex regime and dosing frequency. Most of the patients in the published case series had good clinical outcome, but use of tenecteplase in peripartum women has never been reported. We report a case of post-partum acute pulmonary embolism successfully treated with tenecteplase.

CASE REPORT

A 35-year-old lady developed cardiogenic shock in the immediate post partum period. Her antenatal history was unremarkable, and she had had four previous uneventful spontaneous vaginal deliveries with one miscarriage. She had no known medical illness. Her last child birth was one and a half year before. Her father suffered from hypertension but apart from that, there was no significant family history. She had no history of long distance travel. She was not on oral contraceptive pills or any traditional medicine. She was referred to us at 4
hours post partum for cardiogenic shock. She had delivered a healthy baby girl at 8:15 am on the same day. The estimated blood loss from the delivery was about 150 ml. She had suddenly become restless at about 12:30 pm. This was followed by a brief episode of tonic clonic fits which lasted for ten seconds. On examination, the patient appeared lethargic and restless. The genital tract did not show any signs of active bleeding. Her Glasgow coma scale was 12/15 (E4, M5, V3). She was tachypnoeic and had polyhidrosis. She was centrally cyanosed and her peripheries were cold and clammy. Her blood pressure was 63/31 mmHg. Her pulse rate was 135 bpm, and peripheral pulses were weak and feeble. The jugular venous pressure was not elevated. There was no calf swelling or tenderness. Other systemic examinations were unremarkable. There were no stigmata of connective tissue disease. The patient was stabilized with fluid resuscitation and inotropic support and given supplemental oxygen therapy. A bedside echocardiography examination showed good left ventricular contraction, with LVEF 70%. The right atrium and ventricle were dilated. Mild tricuspid regurgitation was noted. An electrocardiogram showed sinus tachycardia with right ventricular strain pattern. The patient’s arterial blood gas on high flow mask 15 L/min showed metabolic acidosis with respiratory compensation (pH 7.35, PaO₂ 98 mmHg, PaCO₂ 28 mmHg, HCO₃ 15.7 mmol/L). Her coagulation profile was normal. Fibrinogen degradation product was elevated at more than 3 mg/L (normal range < 0.2 mg/L). An urgent computed tomography of the pulmonary artery showed massive pulmonary embolism with minimal bilateral pleural effusion (Figure 1). After considering the risks and benefits, the patient was counseled for thrombolysis. The only thrombolytic agents available in our hospital were streptokinase and tenecteplase which were used for thrombolysis in acute myocardial infarction. Tenecteplase was chosen because of its efficacy, shorter half-life and ease of administration with single-bolus injection. Intravenous tenecteplase at 6000 u slow bolus was instituted according to the patient’s body weight. She was also given ergotamine to expedite uterine contraction and therefore minimize further bleeding from the urogenital tract. Unfortunately, after about 1 hour of thrombolysis, she developed post-partum hemorrhage, with estimated blood loss of 2.5 L. She was hypotensive, with blood pressure of 72/41 mmHg and heart rate of 132 bpm. She was successfully resuscitated with fluid initially and followed by blood products (4 units of whole blood, 1 unit of packed cells, 2 units of fresh frozen plasma and 4 units of cryoprecipitate). Anticoagulation with warfarin was started 24 hours later when her hemodynamic status stabilized. Compression ultrasonography of the lower limbs did not show any deep venous thrombosis. A repeat computed tomography of the pulmonary artery at day four of admission showed good resolution of the thrombus (Figure 2). The patient remained well and was discharged on day seven of admission with international normalized ratio of 1.9. She was continued on warfarin for 6 months. At her last follow-up, she remained well and the anticoagulant was stopped. Thrombophilic screening was performed, and the results were normal.
DISCUSSION

Pulmonary embolism represents a major health care problem. If it is left untreated, it is associated with a mortality of approximately 30%. During its immediate course, pulmonary embolism may be fatal, with a cumulative three month mortality of 17.5%. Pulmonary embolism can be classified clinically as massive or submassive. Massive pulmonary embolism constitutes a subgroup of patients with shock or hypotension which is not caused by new onset arrhythmia, hypovolaemia or sepsis. The subgroup with right ventricular dysfunction but hemodynamically stable is classified as submassive. There is growing evidence that the prognosis of this subgroup of patients may differ from that for those with pulmonary embolism but intact right ventricular function. Thrombolysis is generally indicated in patients with massive pulmonary embolism, and most contraindications of this treatment are not absolute. During the episode of acute pulmonary embolism, the increase in right ventricular afterload induces right ventricular failure, systemic hypotension and shock. All these features are associated with dismal prognosis. Thrombolytic therapy has beneficial effect on these parameters by reducing mean pulmonary artery pressure and mean right ventricular end-diastolic area and therefore increasing cardiac output. These results obtained from thrombolysis have been translated into better survival benefit in patients with massive pulmonary embolism. The usage of alteplase in conjunction with heparin improved the clinical outcome of patients and averted clinical deterioration which otherwise would require treatment escalation during hospitalization. Compared to alteplase, third-generation plasminogen activators like tenecteplase demonstrate longer half-life, greater fibrin specificity, more lytic capability and increased resistance to plasminogen activator inhibitor.

Tenecteplase is a mutant form of alteplase. It is a plasminogen activating enzyme that is synthesized by a recombinant technique. Tenecteplase differs from alteplase by three strategic amino acid alterations. The half life was prolonged by a substitution of threonine for asparagines in the kringle domain. Substitution of glutamine for asparagines on kringle one results in increased fibrin binding and leads to less fibrinogenolysis and less coagulopathy induced by thrombin inhibition.

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acute pulmonary embolism. However, further prospective study is needed to evaluate the efficacy and immediate safety of this drug in patients with massive pulmonary embolism. This case report supports the potential use of tenecteplase in the treatment of acute pulmonary embolism in the post-partum period.

REFERENCES


