

Management of Patient by a Pulmonary Embolism Response Team in the Emergency Department

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What is known on this subject?

The treatment of pulmonary embolism (PE) remain one of the great challenges of emergency medicine. The management of patient with PE requires a multidisciplinary approach. A detailed treatment algorithm should be developed with the collaboration of emergency medicine, cardiology, interventional radiology, and thoracic surgery experts.

What this case report adds?

We believe that establishing Pulmonary Embolism Response Team is essential in terms of beginning the most appropriate treatment faster and reducing mortality.

ABSTRACT

Pulmonary embolism (PE) occurs when the pulmonary arterial system is blocked by a thrombus. Mortality is attributed to the right ventricle failure due to the increased pressure load. In this case, patient was successfully treated with catheter-mediated local thrombolytic therapy by a Pulmonary Embolism Response Team (PERT). A 70-year-old male patient was transferred to our emergency department for further evaluation and treatment, with a prediagnosed PE. Consultant physicians (PERT) of cardiology, pulmonology, interventional radiology, and thoracic surgery were called to the emergency department and evaluated the patient. After a deliberate discussion, PERT members reached a consensus on catheter-mediated thrombolytic therapy for the patient. The patient had no symptoms or complaints over that one-month period. We believe that establishing a PERT is essential in terms of beginning the most appropriate treatment faster and reducing the mortality.

Keywords: Pulmonary embolism, Pulmonary Embolism Response Team, emergency medicine, catheter-mediated thrombolytic therapy



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Introduction

Pulmonary embolism (PE) occurs when the pulmonary arterial system is blocked by a thrombus. Deep vein thrombi are frequently involved in the etiology. PE has a wide presentation and is among the main causes of the mortality. Mortality is attributed to the right ventricle failure due to the increased pressure load. The clinical management of the patients with PE has been rapidly changing over the years. In the absence of hemodynamic instability at presentation, the clinical management plan should be done according to the initial assessment. If the probability of the PE is high in clinical evaluation or the patient has a high PE risk score, CT pulmonary angiogram is recommended as soon as possible (1). When a massive PE is proved, thrombolytic therapy is administered if there is no contraindication. Contraindications for thrombolytic therapy include active bleeding, hemorrhagic or cryptogenic stroke, central nervous system tumors, history of ischemic stroke in the last six months, and major trauma/surgical intervention/head trauma in the last three weeks (2).

The treatment of PE remains one of the great challenges of emergency medicine. The management of the patient with PE requires a multidisciplinary approach. A detailed treatment algorithm should be developed with the collaboration of emergency medicine, cardiology, interventional radiology, and thoracic surgery experts. Hereby, we presented a case who was diagnosed with a massive PE in which systemic fibrinolytic therapy was contraindicated. In this case, patient was successfully treated with a catheter-mediated local thrombolytic therapy by a Pulmonary Embolism Response Team (PERT).

Case Reports

A 70-year-old male patient was transferred to our emergency department for further evaluation, and treatment with a prediagnosis of PE. Upon arrival, it was documented that he was admitted to the previous healthcare facility with the shortness of breath and receiving radiotherapy for his brain tumor for a month. In the initial assessment, the patient was awake, cooperative, and oriented. Glasgow Coma scale was 15/15. Vital signs recorded as following: BP: 90/50 mmHg, pulse: 90/min, SpO₂: 92%, RR: 26/min. In the physical examination, the full review of systems was normal except for tachypnea. Lab results showed increased troponin which is 129 ng/L and high D-dimer level. Other tests were found to be normal (Table 1). In CT pulmonary angiogram, the thrombus located in the bilateral pulmonary arteries was seen (Figure 1). Thereupon, PERT was alerted. Consultant physicians

Table 1. Lab results

WBC	10.29 10 ⁹ /L	INR	1.04
Potassium	3.93 mmol/L	aPTT	24.6 sc
Sodium	141 mmol/L	D-dimer	7.71 µg/mL
Troponin T	129 ng/L	pH	7.35
Creatinine	1.18 mg/dL	pCO ₂	43.0 mmHg

WBC: White blood cell, INR: International normalized ratio, aPTT: Activated partial thromboplastin time



Figure 1. CT pulmonary angiogram

CT: Computed tomography

in cardiology, pulmonology, interventional radiology, and thoracic surgery were called to the ER and evaluated the patient. In the echocardiography, the right ventricle was dilated, and its functions were reduced. After a detailed evaluation, the patient was diagnosed with a massive PE. However, thrombolytic therapy was contraindicated due to the patient's intracranial tumor. After a deliberate discussion, PERT members reached a consensus on catheter-mediated thrombolytic therapy for the patient.

After reaching the pulmonary arteries through a catheter introduced to the right femoral vein, the thrombolytic agent was administered to the right and left main pulmonary arteries. During the procedure, a total of 10 mL of tissue plasminogen activator (tPa) was injected in both pulmonary arteries. Afterwards, pig tail catheter was placed in the left main pulmonary artery due to a high thrombus load (Figure 2), and continuous infusion of 1 mL/hour tPa treatment for 15 hours started. During the procedure vital parameters remained stable; BP: 110/70/mmHg, HR: 85 bpm, SpO₂: 94%. The patient tolerated the procedure well without any complications. Throughout the following 24 hours, the patient



Figure 2. Pig tail catheter was placed in the left main pulmonary artery

was monitored in the intensive care unit. Then, transferred to the pulmonology department as his clinical status started to improve. After the successful in-hospital treatment, medical treatment and outpatient clinic follow-ups were planned. Telephonic follow-ups were made once a week for a month. The patient had no symptoms or complaints over that one-month period.

Discussion

There are several treatment strategies for PE in the literature. In a massive PE, systemic thrombolytic therapy is recommended as the first-line treatment (3). However, as in our case, there is a limited number of clinical studies in the medical literature recommending other treatment options, that could be selected for patients whom systemic thrombolytic therapy is contraindicated. Lately, catheter-mediated thrombolytic therapy has been suggested when favorable outcome is not able to be reached with a systemic thrombolytic therapy or if there is any type of contraindications for a systemic therapy (4). Our case is a PE case with an intracranial tumor who received catheter-mediated thrombolytic therapy.

In a prospective observational study conducted by Kuo et al. (5), no major complications, hemorrhagic stroke, and major hemorrhage followed by a catheter-mediated thrombolytic therapy was reported in 101 patients with PE. They stated

that catheter-mediated thrombolytic treatment could be used safely in PE.

In a multicenter study conducted by Bloomer et al. (6), a catheter-mediated thrombolytic therapy was shown to be safer, like the study of Kou et al. (5). Also, Bloomer et al. (6) recommended catheter-mediated thrombolytic therapy for fewer side effects and higher treatment efficiency.

Since there are several treatment options in PE, the treatment algorithm is quite complex, and it is challenging to decide which treatment is the best. Current guidelines recommend building a “PERT” in the centers where PE treatment is delivered (7). In addition, it is stated that PERT should involve a wide variety of the specialties such as: Emergency medicine, critical care, cardiology, internal medicine, and the radiology (8). In the current literature, it is shown that PE managed with PERT results in the reduced time to diagnosis, time to anticoagulant therapy, the length of the hospital stays, and the mortality rate (9,10). In this case, we successfully treated our patient with PE with the collaboration of PERT members.

Patients diagnosed with PE requires immediate medical attention in the emergency department. To deliver a maximum value to the patients with PE, we believe that establishing the PERT is essential in terms of beginning the most appropriate treatment faster and reducing the mortality.

Ethics

Informed Consent: Patient consent was obtained for the article to be published.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: K.Ş., K.S., Ö.K., Concept: K.Ş., M.K., R.G., Design: K.Ş., R.G., Data Collection or Processing: K.Ş., K.S., Literature Search: K.Ş., R.G., Writing: K.Ş., B.A.

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