

Successful thrombolysis of right atrial and ventricular thrombi in a patient with massive pulmonary embolism

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Abstract

Right sided heart thrombi may develop within the right heart chambers or they may be peripheral venous clots that on their way to the lungs, accidentally lodge in a patent foramen ovale, tricuspid chordae or Chiari's network. Type A thrombi have a worm-like shape and are extremely mobile. These pleomorphic thrombi are mainly localized in the right atrium, frequently move back and forth through the tricuspid orifice and may cause cardiovascular collapse when entrapment occurs. Type B thrombi attach to the atrial or ventricular wall indicating that they are probably of local origin. We describe the case of a middle age man (48 years old) with no cardiovascular history and a massive pulmonary embolism where transthoracic echocardiography revealed many type A thrombi in both right atrium and ventricle. He presented with acute dyspnea, diaphoresis and hemodynamical instability. He was treated with thrombolysis and after three hours was greatly improved and the thrombi were disappeared. After ten days of hospitalization he was discharged. Thrombi were originated in the popliteal region of the inferior vena cava of both legs and were totally treated. Hippokratia 2009; 13 (3): 178-180

Key words: pulmonary embolism, right heart thromboemboli, thrombolysis

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Right sided heart thrombi may develop within the right heart chambers or they may be peripheral venous clots that on their way to the lungs, accidentally lodge in a patent foramen ovale, tricuspid chordae or Chiari's network. Type A thrombi have a worm-like shape and are extremely mobile¹. These pleomorphic thrombi are mainly localized in the right atrium, frequently move back and forth through the tricuspid orifice and may cause cardiovascular collapse when entrapment occurs². Type B thrombi attach to the atrial or ventricular wall indicating that they are probably of local origin.

Case Report

A 48 year-old man, with no cardiovascular history, was presented at Emergency Department of General Hospital of Veroia, with acute dyspnea, diaphoresis and hemodynamical instability. His systolic arterial blood pressure was about 80 mmHg. Lung fields were clear. On clinical examina-

tion no signs of deep venous thrombosis were found. On the admission ECG findings of right ventricular overload were observed (Figure 1).

To support a clinical suspicion of pulmonary embolism a transthoracic echocardiography was carried out. Echocardiographic study showed free floating thrombi in the right atrium as well as in the right ven-

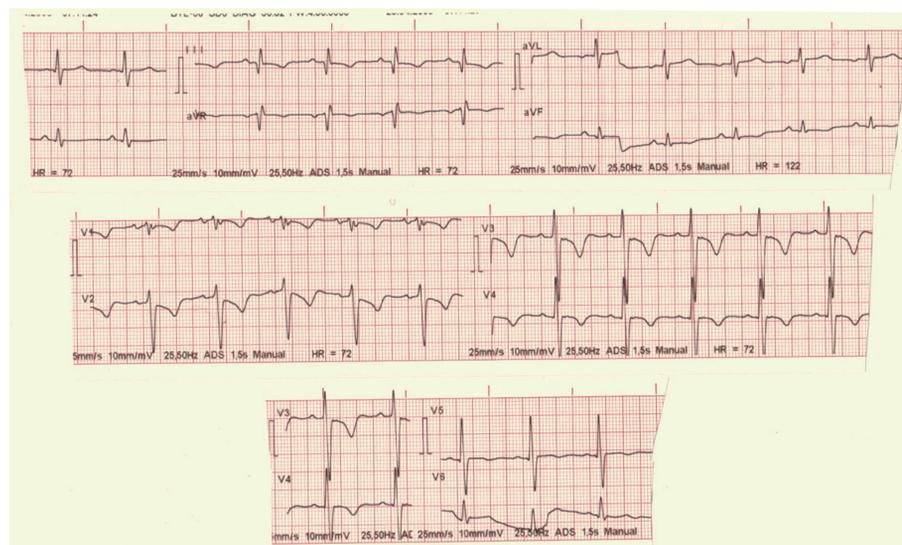


Figure 1: Electrocardiogram (ECG) from a 48 year-old man with acute dyspnea. Characteristic features of RV strain.

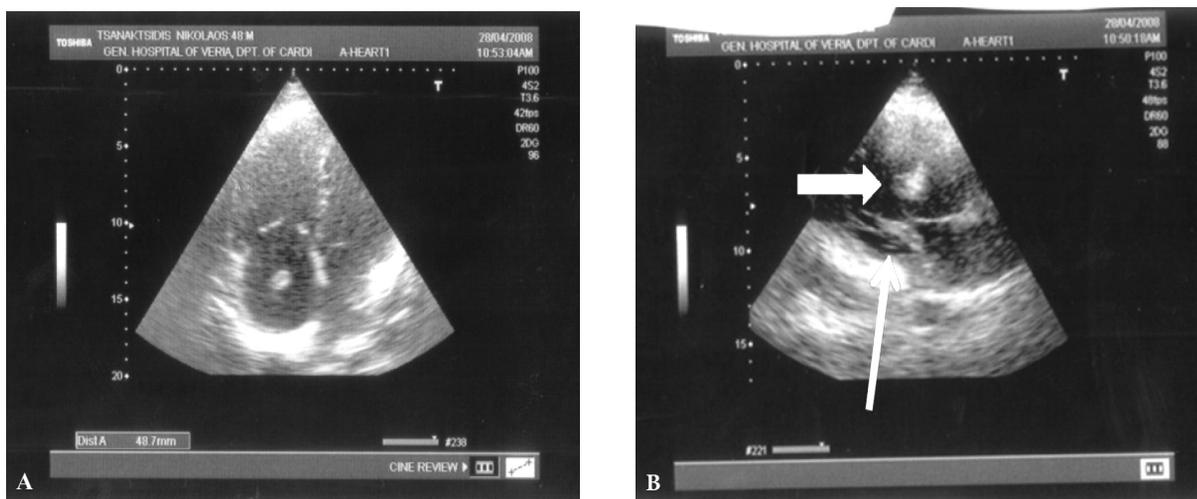


Figure 2: Transthoracic echocardiography in patient with right sided heart thrombi before thrombolysis. (A) Transthoracic four chamber view with thrombi in right atrium. (B) Transthoracic short axis view revealed worm-like thrombi of right ventricle (arrows).

tricle (Figure 2A and 2B). Chest computed tomography with contrast provided a definite diagnosis with a large thrombus burden apparent in the bifurcation of the pulmonary artery (Figure 3).

Patient was treated with thrombolysis (rt-PA 100 mg as a continuous infusion over 2 hours) and after three hours was clinically greatly improved. Serial ECHO studies demonstrated complete dissolution of the right sided thrombi (Figure 4). Five days later a venous ultrasonography demonstrated that the thrombi were originated in the popliteal region of both legs. A second follow-up ultrasonography of the legs one month later showed that they were totally eliminated. Antithrombin-III, protein-C, protein S deficiencies, heparin induced thrombocytopenia and cardiolipin antibodies were excluded. After ten days of hospitalization the patient was discharged.

Discussion

This case illustrates the association of pulmonary embolism with right sided heart thrombi. Patients with type A thrombi have a very poor short term prognosis with early mortality of 44%, with severe and often fatal pulmonary embolism (PE) mainly because these highly mobile, poorly fixed clots are at high risk for embolisation¹. Patients with type B thrombi seem to be a low risk group with thrombus related mortality of 4%¹. There is no consensus regarding the optimal treatment for patients with right sided heart thrombi. In a former meta-analysis of these thromboembolic complications estimated probability of survival in patients receiving heparin, thrombolytic agents, embolectomy, or none of the above was 70%, 62%, 62% and 19%, respectively³.

Pulmonary embolism causing hemodynamic insta-



Figure 3: Chest CT scanning detects a large thrombus in the bifurcation of the pulmonary artery (arrow).



Figure 4: Transthoracic ECHO on day 4th of thrombolysis without any further thrombus formation.

bility is termed massive. Massive pulmonary embolism with hemodynamic instability (e.g. hypotension and cardiogenic shock) is associated with a poor prognosis and high mortality rate (>50%)⁴. The presence of right heart thromboemboli, complicating pulmonary thromboemboli carries with it an increased mortality rate compared to pulmonary thromboemboli alone, but there is no optimal medical treatment for this difficult clinical situation⁵.

The most widely accepted indication for thrombolytic therapy is proven pulmonary embolism with cardiogenic shock. Therapy is also considered when a patient presents with systemic hypotension without shock⁶. The use of thrombolysis in submassive embolism - that is, pulmonary embolism causing right ventricular dilatation and hypokinesis without systemic hypotension - is debated^{6,7}. Clinical trials have not been sufficiently large to provide definitive data on the survival benefit in such cases. When t-PA is administered with heparin, as compared with the use of heparin alone, escalation of therapy is less likely to be needed⁸. Streptokinase, urokinase, and recombinant tissue plasminogen activator (t-PA) have been studied extensively; the more rapidly infused t-PA has been the most widely used thrombolytic agent. Thrombolytic therapy may also be considered in patients with severely compromised oxygenation or a massive embolic burden indentified by imaging studied-even without hemodynamic instability or in patients with extensive venous thrombosis that accompanies non massive embolism. However, the evidence base supporting these indications is inadequate, and individualized care is necessary.

The most devastating complication of thrombolytic therapy is intracranial hemorrhage, although it has been reported in less than 1% of patients in clinical trials and in about 3% of patients in a large registry⁹. Other complications⁹ include retroperitoneal and gastrointestinal hemorrhage and bleeding from surgical wounds or sites of recent invasive procedures. Potential contraindications⁹ for thrombolytic therapy include previous intracranial or ophthalmic surgery or disease, clinically significant active or recent bleeding or risk of bleeding, and recent surgery (within 1 to 2 weeks, depending on the procedure). Absolute contraindications⁹ are intracranial abnormalities. Consideration of the severity of the pulmonary embolism and the perceived risk of bleeding should contribute to the decision to use thrombolytic therapy.

Pulmonary embolectomy may be successful in patients with proven massive pulmonary embolism and hemodynamic instability or in those in whom thrombolytic therapy has failed or is contraindicated⁹⁻¹¹. However the condition of these patients is very compromised, and the risk of death may be high with this approach¹². Surgery is sometimes considered when there are right heart thrombi,

with or without paradoxical embolism, but no data from randomized trials are available to support this approach; thrombolysis is commonly considered in such cases¹³.

Conclusion

Our case report illustrates that there is an association of pulmonary embolism with right sided heart thrombi. Echocardiography was extremely useful in diagnosing right sided heart thrombi and monitoring the efficacy of thrombolysis. It is also a significant tool in decision-making of patients with PE, especially in borderline cases when there is not a definite indication for thrombolysis. A well-designed prospective, randomized trial is needed to determine the optimal treatment of right heart thromboemboli.

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