

Floating right heart thrombus and massive pulmonary embolism

Khalid Y. Tohamy, Islam Ali, Mousa Faris and Mousa Akbar

Department of Medicine, Cardiac Care Unit, Al-Sabah Hospital, Ministry of Health, Safat, Kuwait

Correspondence to Khalid Y. Tohamy, Department of Medicine, Cardiac Care Unit, Al-Sabah Hospital, Ministry of Health, P.O. Box 2866, Safat 13159, Kuwait
Tel: + 0096567081015;
e-mail: ky2211@hotmail.com

Received 27 August 2012
Accepted 16 September 2012

Egyptian Journal of Internal Medicine
2012, 24:108–112

Right heart thrombi are a severe form of venous thromboembolic disease and justify diagnosis and treatment in emergency. Free-floating right heart thrombi are a rare phenomenon, generally diagnosed when echocardiography is performed in patients with suspected or proven pulmonary embolism, and have a dismal prognosis if not diagnosed and treated in a timely manner. In our case which presented and treated in December 2010, thrombolytic therapy was the treatment of choice, although other treatment options are available, including anticoagulation and embolectomy.

Keywords:

anticoagulation, embolectomy, pulmonary embolism, thrombi, thrombolytic therapy

Egypt J Intern Med 24:108–112
© 2012 The Egyptian Society of Internal Medicine
1110-7782

Introduction

Right atrial thrombosis is a serious and potentially fatal condition if left untreated. Floating right heart thrombus (FRHT) is a severe presentation of thromboembolic disease and usually coexists with massive pulmonary embolism. Patients with FRHT are more hemodynamically compromised and usually have a higher mortality rate than patients without FRHT.

An echocardiographic finding of FRHT is important because it is identified as a poor prognosis.

Case report

A 53-year-old obese woman known to have bronchial asthma hypertension and diabetes mellitus was admitted to the emergency room with chest pain and progressive shortness of breath over the last 10 days. She has sought medical advice several times and was reassured, without any improvement.

On physical examination, the patient was dyspneic, tachypneic, and pale.

A blood pressure of 90/50 mmHg, heart rate of 128 beats/min, respiratory rate of 35/min, and an O₂ saturation of 86% in room air were measured.

ECG (Fig. 1) showed a sinus tachycardia with incomplete RBBB, and T wave inversion in V1–V3 and S1Q3T3 patterns. Chest radiograph indicated left-side pleural effusion.

Repeated arterial blood gas analysis on room air yielded the following values: pH: 7.48, PO₂: 8.3 mmHg, PCO₂: 3.7 mmHg, and O₂ saturation 93%.

A transthoracic echocardiogram indicated a large free-floating mobile thrombus in the right atrium prolapsing through the tricuspid valve into the right ventricle during diastole (Fig. 2). The right atrium and right ventricle were dilated; the right ventricle showed hypokinesia with abnormal paradoxical septal motion (Fig. 3), and there

was concentric left ventricular hypertrophy, normal left ventricular systolic function, and mild left ventricular diastolic dysfunction.

An echo Doppler study (color and continuous) showed severe tricuspid regurg with severe pulmonary hypertension (right ventricular systolic pressure = 85 mmHg)

Within a few seconds, while performing the echocardiogram, the highly mobile thrombus jumped from the right atrium into the right ventricle.

An immediate decision was taken to provide thrombolytic therapy to the patient and a tissue plasminogen activator was chosen and administered in a coronary care unit with continuous monitoring.

After a few hours, there was a marked clinical improvement in the patient's condition and hemodynamics (no tachypnea, pulse 80/min, blood pressure = 120/80 mmHg, and O₂ saturation 99% in room air).

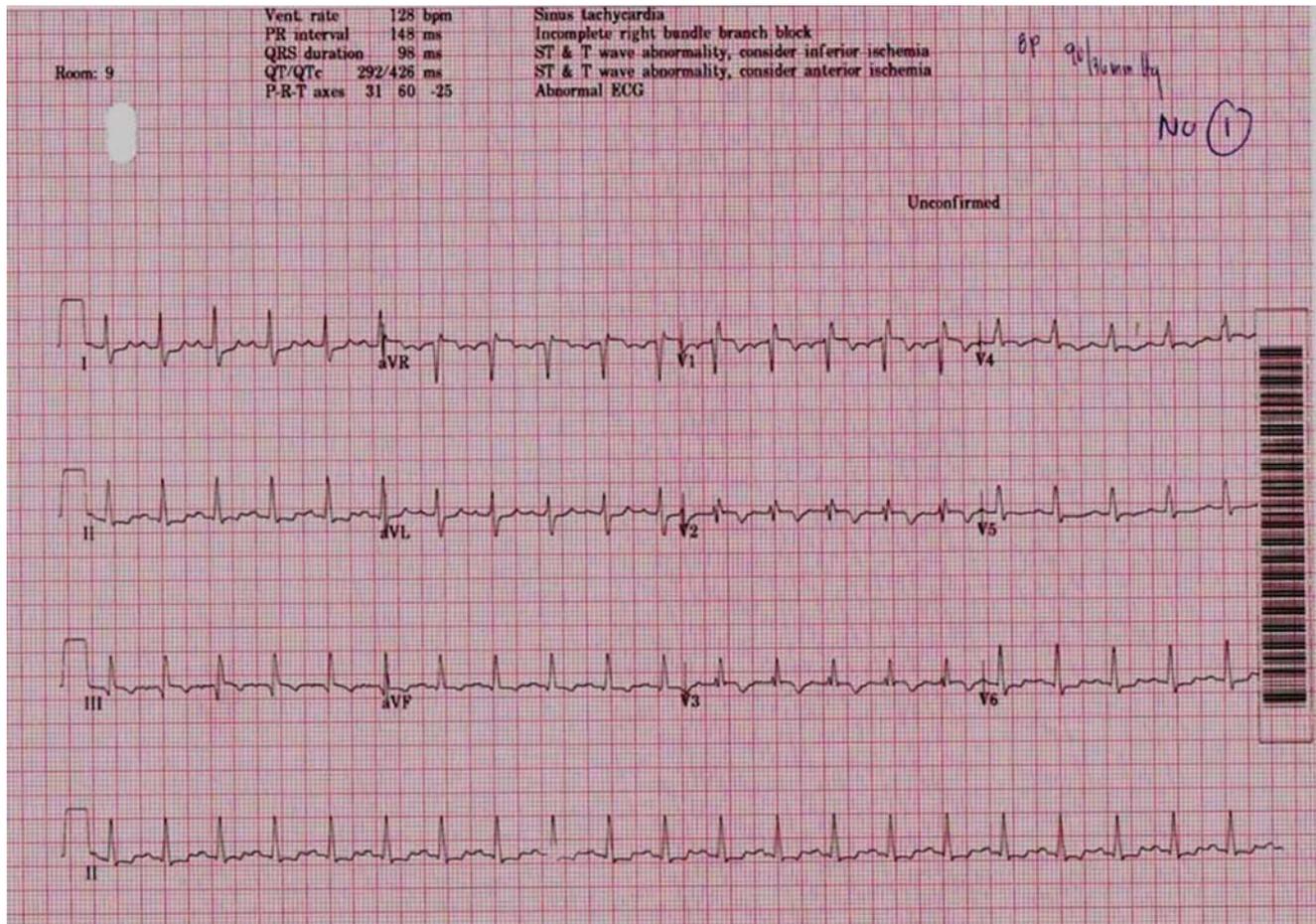
A transthoracic echocardiographic follow-up (Fig. 4) showed that the thrombus had disappeared, with a significant decrease in pulmonary artery pressure: 45 mmHg.

Spiral computed tomography of the chest indicated evidence of thrombi at both main pulmonary arteries (complete occlusion of the left main pulmonary artery with extension into anterior and posterior branches and incomplete occlusion of the right main pulmonary artery); small infarcts were seen at the right lower lung lobe (Fig. 5).

Bilateral lower limb venous duplex scanning showed loss of patency and compressibility of left popliteal vein, which was distended by low-level echo thrombus indicating acute deep vein thrombosis. The rest of the deep venous system was normal.

The patient had an uneventful smooth hospital course. Follow-up transthoracic echocardiogram showed good right ventricular contractility with no residual thrombus in the right atrium.

Figure 1



ECG showing sinus tachycardia, incomplete RBBB, and an S1Q3T3 pattern.

Screening tests for hypercoagulability were positive for antiphospholipid antibodies.

After a period of subcutaneous low-molecular-weight heparin, the patient was discharged on oral anticoagulation (warfarin), adjusted to maintain INR between two and three times the control. Eighteen months later, the patient was free of symptoms.

Discussion

Currently, two types of thrombi are known. Type A thrombi, which originate in the deep peripheral veins, are extremely mobile. Type B thrombi develop within the heart chambers; they are parietal and immobile [1]. Transthoracic echocardiography is considered the best method for the diagnosis of right atrial thrombosis in an emergency because it allows good visualization of the right heart chambers [2,3].

In patients with a mobile right heart thrombus, the incidence of pulmonary embolism is about 97% and reported mortality is over 44% [4,5].

Investigators have recommended either urgent surgical treatment or thrombolysis of mobile right heart throm-

bus, although prospective data on optimal treatment are lacking.

Several treatment options are available, including anticoagulation, embolectomy, and thrombolysis. The success and survival rates of each approach vary depending on the patient's clinical status [6]. In a study by Chartier *et al.* [7], the mortality rate for patients with right heart thrombi and pulmonary embolism was about 45% and mortality was similar irrespective of the therapeutic approach used (i.e. embolectomy, thrombolysis, or anticoagulation).

Heparin: Although heparin is generally considered to be the safest treatment, its use has historically been associated with many complications, including potentially life-threatening ones, such as thrombocytopenia [8,9].

Embolectomy: Pulmonary embolectomy and complete resection of the right heart thrombus has two drawbacks: it is not readily available in all medical centers and it is sometimes associated with an extremely high mortality rate.

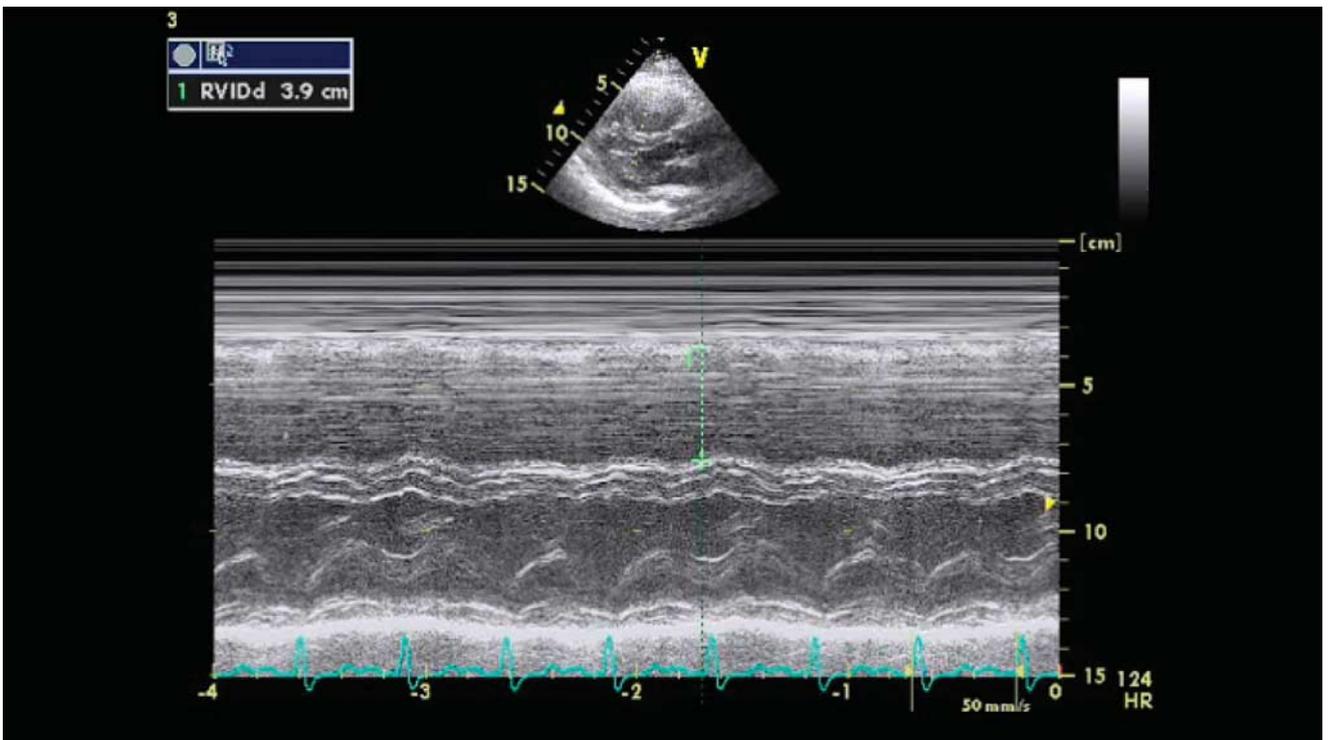
Thrombolysis: Because of the limitations of anticoagulation and embolectomy for right atrial thrombosis, thrombolysis is considered by some to be the treatment of choice.

Figure 2



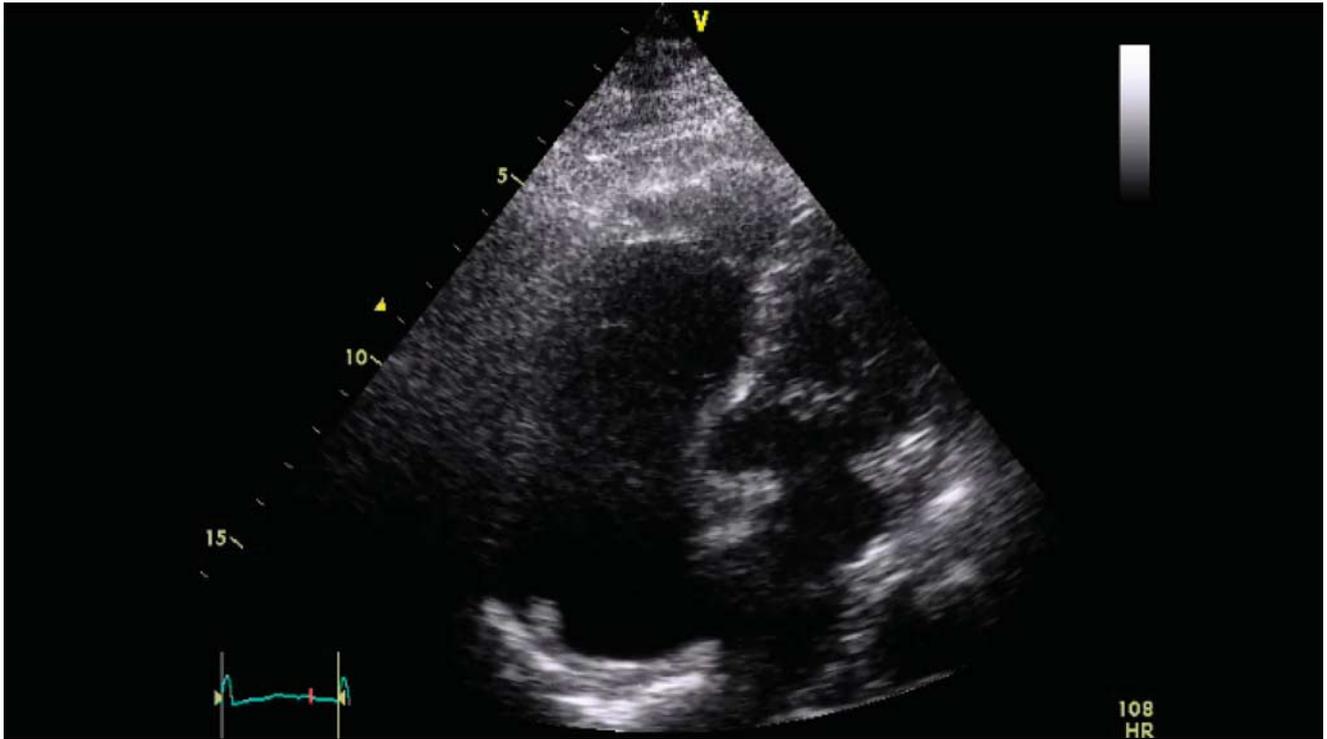
Two-dimensional echocardiography showing right ventricular inflow and right atrium with a floating thrombus projecting from the inferior vena cava opening toward the right atrium.

Figure 3



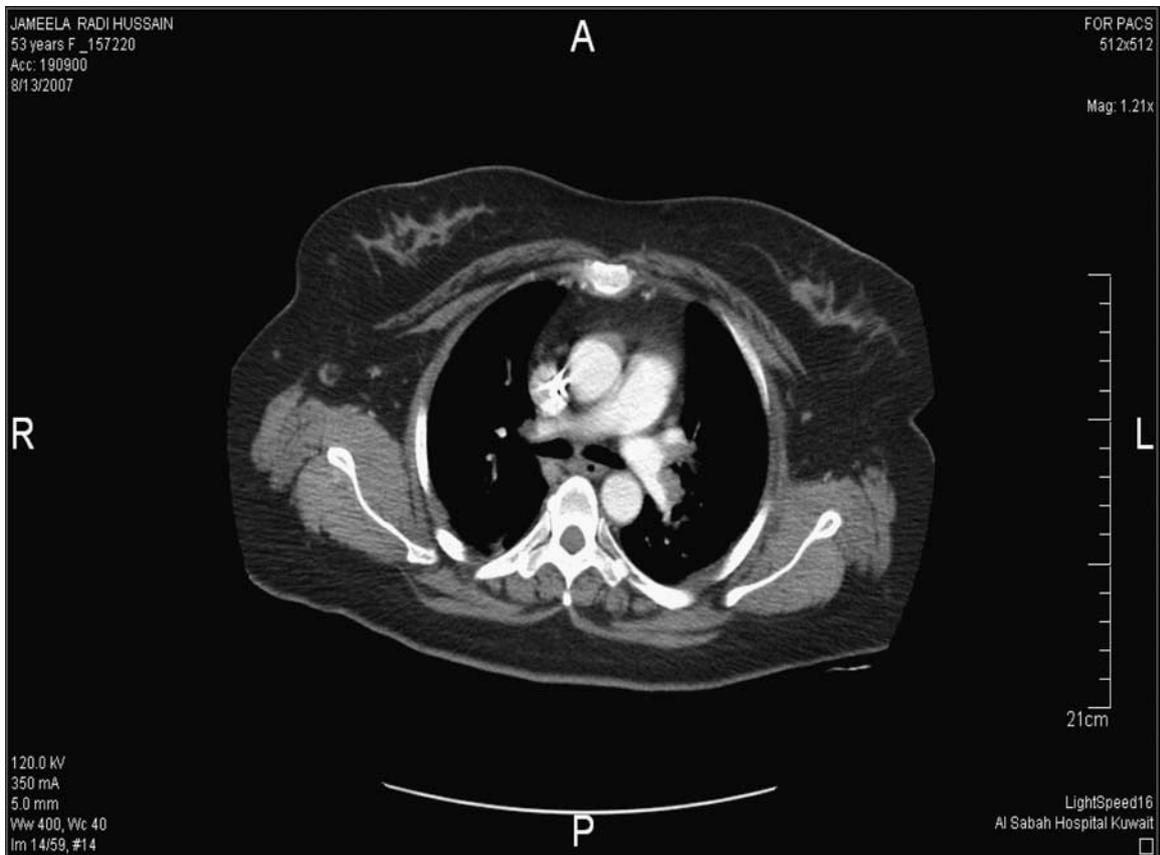
M-mode echocardiography showing a dilated, hypocontractile right ventricle with an almost flattened inter-ventricular septum.

Figure 4



Two-dimensional echocardiography showing complete disappearance of right atrium thrombus; however, right atrium and right ventricle are still dilated.

Figure 5



Computed tomographic scan of chest with contrast; there is complete occlusion of the left main pulmonary artery, and extends to the anterior and posterior branches, with incomplete occlusion of the right main pulmonary artery.

Thrombolysis has the advantage of acting in the intracavitary thrombus, on the pulmonary pole, and at least partially on deep vein thrombosis, which is usually seen in association [10]. The potential risks are the migration of fragments following clot lysis in patients with an unstable hemodynamic condition or a recurrence of embolism following partial dissolution of the venous thrombus [11].

Preterm infants and newborn children with right atrial and intracardiac thrombosis have been treated successfully with thrombolytic therapy, without any complications [9,11]. Thrombolytics have also been used safely in patients with right atrial thrombosis related to central venous catheters [12]. Even in patients with heparin-induced thrombocytopenia, thrombolysis can be used to destroy the clot in the right atrium [8,9].

Thrombolytic therapy is not without risk, however, it may cause the right atrial thrombus or its fragments to become dislodged and then to move into the pulmonary arteries [13]. Several cases of pulmonary embolism possibly linked to thrombus fragmentation have been reported, but there were no fatalities in patients who were hemodynamically stable at the onset of treatment [14].

The choice of the optimal treatment for patients with pulmonary embolism presenting with mobile clots in the right side of heart is still open to debate. Whether more aggressive therapy, such as thrombolysis or embolectomy, can improve prognosis remains to be determined [15,16].

Several studies have suggested that thrombolytic therapy has advantages in treating such patients. Early diagnosis and emergency therapy are important in treating patients with free right heart thrombus in the emergency department and they might have fatal outcomes when treated only with heparin [17,18].

Conclusion

This case report showed the value of echocardiography to visualize and evaluate a life-threatening right heart thrombus in a patient with pulmonary embolism.

Although the most appropriate therapeutic approach for the management of right heart thrombi remains to be determined, our data suggest that thrombolytic therapy with r-tPA is effective, readily available, and represents an alternative to surgery.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

References

- Mularek-Kubzdela T, Grygier M, Grajek M, Cieslinski A. Right atrial thrombosis: a difficult diagnostic and therapeutic problem [in Polish]. *Przegl Lek* 1997; 54:515–519.
- Colletta M, Paoloni P, Ciliberti D, De Castro U, Capone P. Right atrial thrombosis and pulmonary embolism: role of echocardiography [in Italian]. *Minerva Cardioangiol* 1997; 45:439–442.
- Valenzuela Garcia LF, Gallego Garcia de Vinuesa P, Rodriguez Revuelta M, Calvo Jambriña R, Pavon R, Moreno Alba R, *et al*. Right atrial thrombus in transit: echocardiographic diagnosis preceding a pulmonary embolism by 72hours [in Spanish]. *Rev Esp Cardiol* 1999; 52:59–62.
- Chartier L, Béra J, Delomez M, Asseman P, Beregi JP, Bauchart JJ, *et al*. Free-floating thrombi in the right heart: diagnosis, management, and prognostic indexes in 38 consecutive patients. *Circulation* 1999; 99:2779–2783.
- Torbicki A, Galie N, Covezzoli A, Rossi E, Goldhaber S. Right heart thrombi in pulmonary embolism: results from the international cooperative pulmonary embolism registry. *J Am Coll Cardiol* 2003; 41:2245–2251.
- Shah CP, Thakur RK, Ip JH, Xie B, Guiraudon GM. Management of mobile right atrial thrombi: a therapeutic dilemma. *J Card Surg* 1996; 11:428–431.
- Chartier L, Bera J, Delomez M, Asseman P, Beregi JP, Bauchart JJ, *et al*. Free-floating thrombi in the right heart: diagnosis, management, and prognostic indexes in 38 consecutive patients. *Circulation* 1999; 99:2779–2783.
- Janssens U, Breithardt OA, Greinacher A. Successful thrombolysis of right atrial and ventricle thrombi encircling a temporary pacemaker lead in a patient with heparin-induced thrombocytopenia type II. *Pacing Clin Electrophysiol* 1999; 22 (Pt1): 678–681.
- Olbrich K, Wiersbitzky M, Wacke W, Eichler P, Zinke H, Schwöck M, *et al*. Atypical heparin-induced thrombocytopenia complicated by intracardiac thrombus, effectively treated with ultra-low-dose rt-PA lysis and recombinant hirudin. *Blood Coagul Fibrinolysis* 1998; 9:273–277.
- Cracowski JL, Tremel F, Baguet JP, Mallion JM. Thrombolysis of mobile right atrial thrombi following severe pulmonary embolism. *Clin Cardiol* 1999; 22:151–154.
- Aspesberro F, Beghetti M, Obensli I, Ozsahin H, Humbert J, Rimensberger PC. Local low-dose urokinase treatment of acquired intracardiac thrombi in preterm infants. *Eur J Pediatr* 1999; 158:698–701.
- Dufour C, Molinari A, Tasso L, De Caro E, Rimini A, Mori PG. Lysis of a right atrial thrombus of more than a week's duration by high dose urokinase in a one-year-old child. *Haematologica* 1997; 82:357–359.
- Nani R, Novello P, Decastello M, Cavarzerani A, Sarpellon M. Right atrial thrombosis with concomitant thrombus attached to a central venous catheter. Clinical case [in Italian]. *Minerva Anesthesiol* 1997; 63:209–212.
- Lepper W, Janssens U, Klues HG, Hanrath P. Successful lysis of mobile right heart and pulmonary artery thrombi: diagnosis and monitoring by transesophageal echocardiography [letter]. *Eur Heart J* 1996; 17:1603–1604.
- Torbicki A, Galie N, Covezzoli A, Rossi E, De Rosa M, Goldhaber SZ. ICOPER study group. Right heart thrombi in pulmonary embolism: results from the International Cooperative Pulmonary Embolism Registry. *J Am Coll Cardiol* 2003; 41:2245–2251.
- Ferrari E, Benhamou M, Berthier F, Boudouy M. Mobile thrombi of the right heart in pulmonary embolism: delayed disappearance after thrombolytic treatment. *Chest* 2005; 127:1051–1053.
- Huang SL, Chien CH, Chang YC. A floating thrombus of the right ventricle in severe massive pulmonary embolism. *Am J Emerg Med* 2008; 26:e1–e2.
- Torbicki A, Perrier A, Konstantinides S, Anagnelli G, Galie N, Pruszczyk P. Guidelines on the diagnosis and management of acute pulmonary embolism: the task force for the diagnosis and management of acute pulmonary embolism of the European Society of cardiology (ESC). *Eur Heart J* 2008; 29:2276–2315.