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Case report  
*Prikaz slučaja*  
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## FREE-FLOATING RIGHT HEART THROMBUS WITH PULMONARY EMBOLISM – A CASE REPORT

*SLOBODNO FLOTIRAJUĆI TROMB U DESNOM SRCU SA PLUĆNOM EMBOLIJOM – PRIKAZ SLUČAJA*

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### Summary

**Introduction.** Right heart thrombus is uncommon and it is usually detected by echocardiography in patients with venous thromboembolism. Thrombi attached to the atrial or ventricular wall have a good prognosis; however, free-floating “snake-like” thrombi are usually associated with massive, unstable pulmonary embolism and high mortality. **Case Report.** A 43-year-old male patient visited a cardiologist complaining about rapid fatigue and shortness of breath with minimal effort in the last week. An echocardiographic examination confirmed a right heart thrombus and a pulmonary embolism. After the examination, the case was presented to the Heart Team, which made a decision to perform a surgery. After the usual preoperative preparation for emergency surgery, the patient underwent surgery under general endotracheal anesthesia via median sternotomy. **Conclusion.** The right heart thrombus is associated with risks of possible embolization to the pulmonary circulation and potential circulatory collapse. There was a considerable discrepancy between the apparently mild clinical presentation and the alarming echocardiographic finding of a huge free-floating thrombus. Despite the lack of standardized and precise recommendations for the optimal therapeutic strategy, surgical approach seems to be the best option in emergency cases with large free-floating thrombi.

**Key words.** Pulmonary Embolism; Thrombosis; Heart; Echocardiography; Cardiac Surgical Procedures; Diagnosis

### Introduction

Right heart thrombus (RHT) is uncommon and it is usually detected by echocardiography in patients with venous thromboembolism [1]. In contrast to the tumor, a thrombus is irregularly shaped and most commonly has no pedicle [2]. Most of the thrombi are found in the right atrium (RA) [3]. Thrombi that are attached to the atrial or ventricular wall have a good prognosis; however, free-floating “snake-like” thrombi are usually associated with massive, unstable pulmonary embolism (PE) and high mortality [3]. There are no evidence-based guidelines for the treatment of free-floating thrombi in the right heart, so the choice is based

### Sažetak

**Uvod.** Tromb u desnom srcu je redak i obično se otkriva ehokardiografijom kod pacijenata sa venskom tromboembolijom. Trombi pričvršćeni za zid pretkomore ili komore imaju dobru prognozu, međutim, slobodno-flotirajući „zmijoliki“ tromb je obično udružen sa masivnom, nestabilnom plućnom embolijom i sa visokim mortalitetom. **Prikaz slučaja.** Četrdesetogodišnji pacijent se javio kardiologu zbog tegoba u vidu brzog zamaranja i kratkog daha pri minimalnom naporu, koji se javljaju u poslednjih nedelju dana. Ehokardiografskim pregledom potvrđeno je prisustvo trombne mase u desnom srcu i plućne embolije. Nakon pregleda slučaj ovog pacijenta je prezentovan timu za srce, koji je doneo odluku da se pacijent operiše. Nakon uobičajene preoperativne pripreme za hitne operacije, pacijent je operisan u opštoj endotrahealnoj anesteziji, pristupom kroz medijalnu sternotomiju. **Zaključak.** Značaj tromba u desnom srcu leži u mogućoj embolizaciji plućne cirkulacije i potencijalnom cirkulatornom kolapsu. Postojala je znatna nesrazmera između naizgled blage kliničke slike i alarmantnog ehokardiografskog nalaza ogromnog slobodno-flotirajućeg tromba kod našeg pacijenta. Uprkos nedostatku standardizovanih i preciznih preporuka za optimalnu terapijsku strategiju, čini se da je hirurški pristup poželjan za hitne slučajeve sa velikim slobodno-flotirajućim trombom.

**Ključne reči.** plućna embolija; tromboza; srce; ehokardiografija; kardiološke procedure; dijagnoza

mainly on case reports or small case series [3, 4]. Treatment options include anticoagulation therapy, thrombolytic therapy (systemic or local), and surgical embolectomy [5].

Here, we present a patient with a free-floating “snake-like” RHT associated with PE, who was successfully treated by surgery.

### Case Report

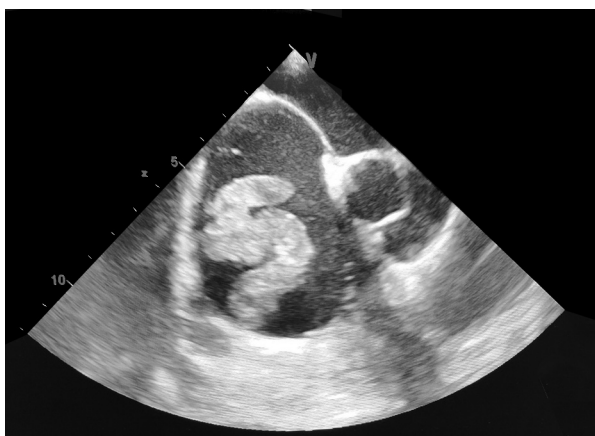
A 43-year-old male patient visited a cardiologist in a private practice complaining about rapid fatigue and shortness of breath with minimal exertion in the last week. After an echocardiographic examination,

**Abbreviations**

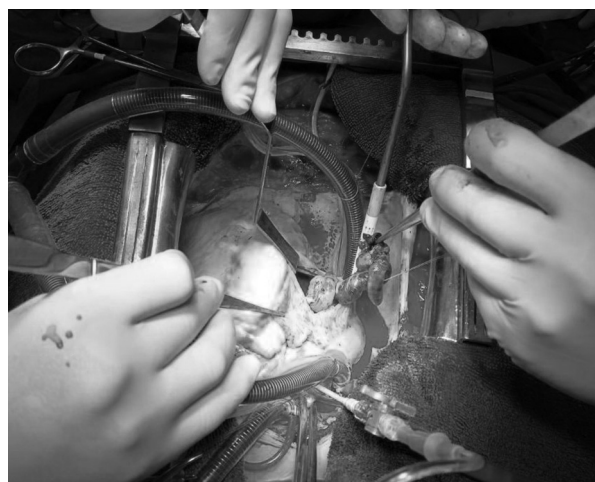
RHT	– right heart thrombus
RA	– right atrium
PE	– pulmonary embolism
RV	– right ventricle
CPB	– cardiopulmonary bypass

which revealed a RA thrombus, he was immediately referred to the Institute of Pulmonary Diseases, Department of Pulmonary Thromboembolism. The echocardiography was repeated revealing a left ventricle with regular endocavitary dimensions, regular systolic function (ejection fraction 65%), and concentric thickening of the left ventricular walls. Direct and indirect signs of PE were observed. The right ventricle (RV) was enlarged. In the RA, with a transition to the RV, a floating hyperechoic mass with heterogeneous echo density, 27 x 35 mm in diameter was observed, prolapsing into the RV in diastole. A moderate degree of tricuspid regurgitation was registered, with a RV systolic pressure of 60 - 65 mmHg. A right leg venous ulcer was a risk factor for embolism, so he spent 10 days in bed without immobilization. Four years ago, he underwent vein surgery on the right leg. Since then, the leg was occasionally swelling and lesions appeared on the skin. His brother had a pulmonary thromboembolism. Among the comorbidities, he reported chronic obstructive pulmonary disease (used no de-obstructive therapy) and smoking.

After the examination, the patient was presented to the Heart Team, which made a decision to perform a surgery. Upon admission to the Clinic of Cardiac Surgery, the patient was hemodynamically and rhythmically stable with cardiac compensation. Transesophageal echocardiography confirmed a free-floating “snake-like” thrombus in the right heart (**Figure 1**). After the usual preoperative preparation for emergency surgery, the patient underwent surgery under general endotracheal anesthesia via median sternotomy. After total heparinization, arterial cannulation of the ascending aorta, cannulation of the right heart (bi-



**Figure 1.** Transesophageal echocardiography showing a free-floating “snake-like” thrombus in the right heart  
*Slika 1. Transezofagealna ehokardiografija – slobodno flotirajući “zmijoliki” tromb u desnom srcu*



**Figure 2.** The surgical view of the thrombus after opening the right atrium

*Slika 2. Hirurški prikaz tromba posle otvaranja desne pretkomore*

caval dual lumen cannulation), cardiopulmonary bypass (CPB) was started. The thrombus mass was removed from the RA (**Figures 2 and 3**) through the RA. No thrombus mass was registered in the RV cavity. Total aortic cross-clamp time was 13 minutes, with a total CPB time of 28 minutes. The postoperative course was uneventful. The control echocardiography showed a normal finding, without thrombotic masses.



**Figure 3.** Thrombus after extraction from the right heart  
*Slika 3. Tromb nakon ekstrakcije iz desnog srca*

**Discussion**

While thrombus formation inside the left heart chambers has been fairly well explored and is relatively more common, right heart thrombus is often under-diagnosed and can be much more challenging for management. Although thrombi from the left

heart can frequently lead to dramatic and lethal consequences [6–9], the right heart thrombi are mainly associated with possible embolization to the pulmonary circulation and potential circulatory collapse.

According to the European Working Group on Echocardiography [10], three distinct patterns of thrombi can be located inside the right heart. Type A thrombi are referred to as thrombi-in-transit; they occur in the setting of venous thromboembolism and are usually only temporarily located inside the right heart chambers, in transit from systemic veins to pulmonary circulation, thus ending up forming PE. They are highly mobile and free-floating with typical snake-like shape, which is the shape of the peripheral vein at their origin. Type B thrombi are developed in situ inside right heart chambers; they are not mobile and are usually associated with underlying structural abnormalities of the heart. Type C thrombi are the least frequent; they are also mobile and resemble cardiac myxomas.

Free-floating right heart thrombus is an extreme medical emergency, with mortality close to 100% in untreated patients and about 27% in treated patients [11]. Considering the clinical presentation and echocardiographic features in our patient, the thrombus could most likely be classified as type A, i.e. thrombus in the setting of acute PE. Across the literature, the prevalence of right heart thrombi ranges from 4 - 18% in patients with acute PE [12–14]. Predisposing factors for their confinement inside the right heart chambers include prominent Eustachian valves, tricuspid regurgitation, reduced cardiac output and pulmonary hypertension [15].

The main complaint in our patient was shortness of breath, which is reported as the most common symptom of free right heart thrombus [4, 16]. Dyspnea develops in this setting most probably due to embolization of small thrombotic particles disintegrating from the main thrombus and passing into the peripheral branch-

es of pulmonary arteries. Other less common symptoms include chest pain, syncope and palpitations [4], which were not present in our patient. In fact, in our patient there was a considerable disproportion between the seemingly mild clinical presentation and alarming echocardiographic finding of a huge free-floating thrombus. Such inconsistency has already been reported [17], although a more dramatic clinical presentation is more frequently observed in similar cases [1, 18, 19].

Treatment options for right heart thrombus include anticoagulation therapy, thrombolytic therapy (systemic or local), and surgical embolectomy [5]. Due to the lack of prospective randomized clinical trials, the clear consensus on the optimal management approach remains missing. Echocardiography is considered as sufficient and reliable for diagnosis, so immediate treatment can be started without further delay for additional investigations (i.e. computerized tomography, lung scintigraphy, pulmonary angiography) [5, 16]. In the presented case, after a short initial anticoagulation therapy with unfractionated heparin infusion, surgical embolectomy was selected as the preferred management option.

## Conclusion

The right heart thrombus is associated with risks of possible embolization to the pulmonary circulation and potential circulatory collapse. There was a considerable disproportion between the seemingly mild clinical presentation and alarming echocardiographic finding of a huge free-floating thrombus in our patient. Despite the lack of standardized and precise recommendations for the optimal therapeutic strategy, surgical approach seems to be the preferred choice for emergency cases with large free-floating thrombi.

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