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Case Report

Acute Pulmonary Embolism During the Surgical Removal of a Right-Sided Heart Thrombus

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ABSTRACT

The incidence of acute pulmonary thromboembolism is rare during surgery. It could, however, be coincident with a right-sided heart thrombus (RHT). It is mandatory to remove an RHT as soon as possible to avoid death. We report the case of acute pulmonary thromboembolism during the surgical removal of an RHT in a 48-year-old woman with multiple comorbid medical conditions which was treated successfully with surgical embolectomy. ***(Iranian Heart Journal 2019; 20(1):60-63)***

KEYWORDS: Pulmonary Embolism, Thrombosis, Embolectomy

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Acute pulmonary thromboembolism is a rare catastrophic event during surgery. The third most common cause of death, after heart disease and cancer, [1] acute pulmonary thromboembolism is often asymptomatic and resolves spontaneously in most cases. A right-sided heart thrombus (RHT) is a rare fatal condition, with a mortality rate of as high as 40%, [2,3] which could be coincident with acute pulmonary thromboembolism in between 3% and 23% of patients. There are only a few reports in the literature in this regard. Herein, we present the case of acute pulmonary thromboembolism during the surgical removal of an RHT, which was treated successfully with surgical thrombectomy.

Case Report

A 48-year-old woman was referred to the emergency department for an RHT. The patient was admitted for seizure and shortness of breath to a previous hospital. She had a history of seizure, hypothyroidism, right-sided hemiplegia, and craniotomy for a glioblastoma tumor (1 month earlier). She was treated with phenytoin, prednisolone, and enoxaparin. She had arbitrarily discontinued enoxaparin 20 days previously. A transthoracic echocardiogram (TTE) showed a large blood clot extension from the inferior vena cava to the right atrium and the right ventricle (ejection fraction=50%). Therefore, the patient was transferred to our hospital for an urgent surgical intervention. She was agitated, and her vital signs on arrival to the operating room were as follows: heart rate

of 113 beats/min (regular rhythm), blood pressure of 95/56 mm Hg, respiratory rate of 20 breaths/min, and oxygen saturation (SpO_2) of 63 in room air. Preoxygenation was performed with 100% oxygen, and her SpO_2 rose to 94. She was monitored via standard electrocardiography and pulse oximetry. After the cannulation the left radial artery to monitor the patient's blood pressure, a rapid-sequence induction was commenced with sufentanil (50 µg), etomidate (14 mg), and succinylcholine (100 mg). She was intubated with a cuffed tube. During the insertion of a trilumen catheter in the right subclavian vein, the patient suddenly experienced a fall in her blood pressure (80/50 mm Hg) and SpO_2 (53). A chest tube was inserted in the right hemithorax with a suspicion of pneumothorax, which failed to improve the patient's condition. Therefore, median sternotomy was rapidly performed after prepping and draping of the patient. Systemic heparinization (300 IU/kg) was initiated. The venous drainage was accomplished through a right atrial cannulation with an arterial return via the cannulation of the ascending aorta. Cardiopulmonary bypass (CPB) was commenced, and systemic cooling was continued to reach 25ºC. After establishing CPB, dexamethasone (8 mg), thiopental sodium (3 mg/kg), lidocaine (1 mg/kg), and magnesium sulfate (30 mg/kg) were administrated intravenously according to our institutional protocol.

Once aortic cross-clamping was established, the infusion of an antegrade cold cardioplegic solution into the aortic root was initiated to achieve complete cardiac arrest. After the right atrium was opened, no blood clot was observed in the inferior vena cava, right atrium, and the right ventricle. Thus, the middle of the main pulmonary artery was incised longitudinally, just distal to the pulmonary valve and extending up to the bifurcation of the main pulmonary artery. Multiple blood clots were then removed from the main pulmonary artery, the right pulmonary artery, and the left pulmonary artery by using forceps and suction catheters (Fig.1–3).

Following rewarming, normal sinus rhythm was established. Weaning from CPB was accomplished without any medication.

The operation was uneventful, and the patient was extubated after 8 hours in the open-heart intensive care unit. Eventually, she was discharged from the hospital in a good overall condition.

Figure 1. Intraoperative view of the clots retrieved from the main pulmonary artery

Figure 2. Intraoperative view of the clots retrieved from the left pulmonary artery

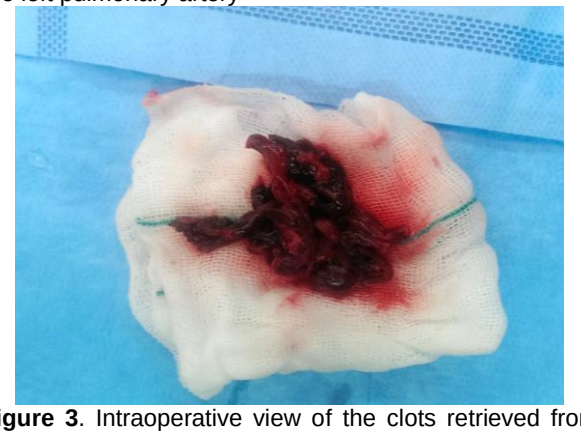

Figure 3. Intraoperative view of the clots retrieved from the right pulmonary artery

DISCUSSION

Acute pulmonary thromboembolism following an RHT during surgery is quite rare, and there are only a few reports in the literature in this regard. One of the most serious complications of an RHT, it may be associated with deep vein thrombosis; atrial fibrillation; cardiomyopathy (impaired or incomplete emptying of blood in the right side of the heart); Shaldon catheters; pacemaker leads; prosthetic tricuspid valves; central venous catheters (intravascular foreign bodies causing endocardial injury), the antiphospholipid syndrome; Behcet's disease; and protein C, protein S, and antithrombin III deficiencies (certain coagulation abnormalities).[2]

The first choice for detecting clots in the cardiac chamber is TTE, which is easily available and can be done at the bedside. It, however, has reduced image quality in some patients and the inability to visualize all the cardiac chambers. Therefore, transesophageal echocardiography (TEE) is deemed a better tool for detecting clots when TTE is suboptimal or nondiagnostic. TEE, albeit invasive, provides excellent visualization of the attachment, extent, and morphology of the inferior vena cava and an RHT. It is also used for evaluating residual clots after surgical embolectomy. [4-6]

The classification system of the European Working Group on Echocardiography for right-heart thrombus types is as follows: Type A thrombi represent elongated, serpiginous, highly mobile clots (deep vein thrombosis and pulmonary embolism), Type B thrombi are non-mobile and ovoid in shape (develop in situ in association with underlying cardiac anomalies), and Type C thrombi appear highly mobile and morphologically resemble cardiac myxomas. [2]

The optimal management of intracardiac thrombi is controversial. Therefore, they should be managed on an individual basis (extent of the intracardiac thrombus, the number and size of clots and their mobility and morphology, co-morbid conditions, pre-existing pulmonary embolisms, and the patient's cardiopulmonary reserve). [7]

Anticoagulation, thrombolysis, and embolectomy are various treatment approaches for an RHT with a pulmonary embolism. Anticoagulant therapy may not protect patients with large and mobile clots from the risk of major pulmonary embolisms or obstructions to the right-heart flow. [8]

At present, the most common treatment for patients with mobile right heart thrombi and acute pulmonary embolisms is thrombolysis. However, it may mediate the fragmentation of the embolus. [3]

Surgical embolectomy alongside the exploration of the right chambers through median sternotomy with the use of CPB is the standard management. It is usually performed via a longitudinal incision in the main pulmonary artery 1 to 2 cm downstream to the valve, which allows the removal of the clots by using forceps and suction catheters. [1,9] In our patient, acute pulmonary thromboembolism, fortunately, occurred during surgery for the extraction of an intracardiac thrombus. As a result, despite the patient's condition (a previous history of seizure, hypothyroidism, right-sided hemiplegia, and craniotomy), the pulmonary thromboembolism was managed successfully through median sternotomy with the use of CPB.

In conclusion, acute pulmonary thrombo-embolism is a rare complication during the surgical removal of an RHT with favorable early and long-term outcomes when recognized timely and managed properly. Furthermore, surgical embolectomy with the use of CPB is still an excellent approach to the treatment of this complication.

Conflict of Interest

The authors have no conflict of interest.

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Authors' Contribution

Masoud Tarbiat and Gholamreza Safarpoor managed the patient during the procedure. Masoud Tarbiat, Abbas Sedighinejad, and Vali Imantalab prepared the manuscript.

Study supervision: Gholamreza Safarpoor

The name of the institution where the work was done is Farshchian Hospital in Hamadan.

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