



# Right Heart Thrombus and Pulmonary Embolism in Patients with Life-Threatening Bleeding: Management of a Complex Condition

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## Abstract

Right heart thrombus (RHT) in transit is an uncommon condition associated with high mortality. Increased use of echocardiography has allowed an easier detection of RHT; however, there is no consensus about the most appropriate management of this critical situation. Therapeutic strategy should be decided according to patient's haemodynamic parameters, clinical data, and bleeding risk. This paper, referring to the most current evidences, underlines the difficulty to establish the best therapeutic strategies in RHT among complex patients as there are no relevant guidelines. In some conditions, multidisciplinary management is the best way to find the most correct therapy despite the bad prognosis.

**Keywords** Right heart thrombus · Pulmonary embolism · Aortic dissection · Intracranial haemorrhage · Echocardiography

## Introduction

Right heart thrombus (RHT) in transit is an uncommon situation, often concomitant with pulmonary embolism (PE), and associated with high mortality [1]. Increased use of echocardiography has allowed an easier detection of RHT; however, the optimal management of this condition remains controversial [2–5]. Herein, presenting a case of 82-year-old Caucasian man with subarachnoid bleeding, floating thrombus in right atrium, massive pulmonary embolism and Stanford B aortic dissection, we analyse the possible management of a difficult condition between thrombosis and bleeding risk. A multidisciplinary discussion was performed, and the most reasonable and less invasive way to treat patient was low molecular weight heparin as anticoagulant dose. This commentary,

referring to the most current evidence and guidelines, underlines the difficulty to establish the best therapeutic strategies in RHT among complex patients as there are no relevant guidelines. In some conditions, multidisciplinary management is the best way to find the most correct therapy despite the bad prognosis.

## Complex Case Analysis

An 82-year-old Caucasian man with Parkinson disease and dementia admitted to hospital emergency room after accidental fall with head injury. On the first presentation, vital signs were normal; brain computer tomography (CT) scans without contrast was performed showing small parafalcine subarachnoid bleeding (Fig. 1). Neurosurgical consultancy excluded surgical urgency, aspirin administration was suspended and prophylactic anticoagulant therapy with subcutaneous low molecular weight heparin was initiated. After few days of hospitalization, transthoracic echocardiography showed floating thrombus in right atrium (Clips 1 and 2). Blood analysis revealed normal blood count, electrolytes and creatinine levels (0.71 mg/dl, normal value 0.6–1.1 mg/dl), high D-dimer level (4710 ng/ml, normal value < 243 ng/ml) and normal levels of high-sensitive troponin T (24.30 pg/ml, normal value < 34.20 pg/ml). Urgent thoracic CT with iodinated contrast showed

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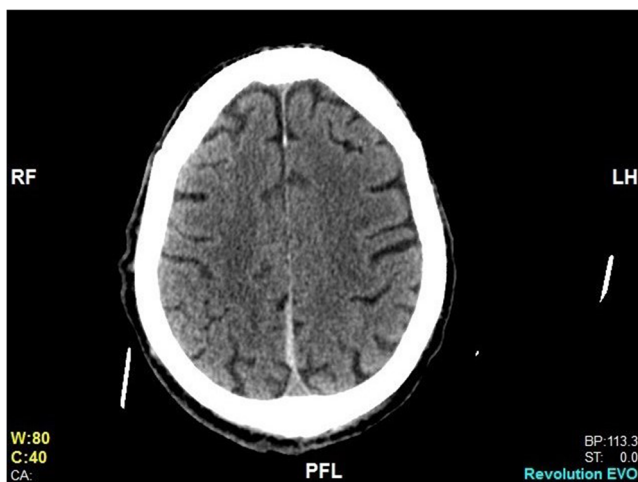
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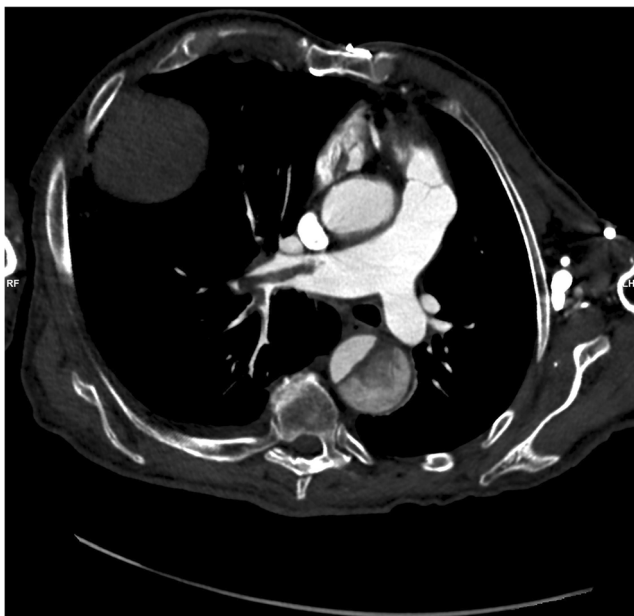
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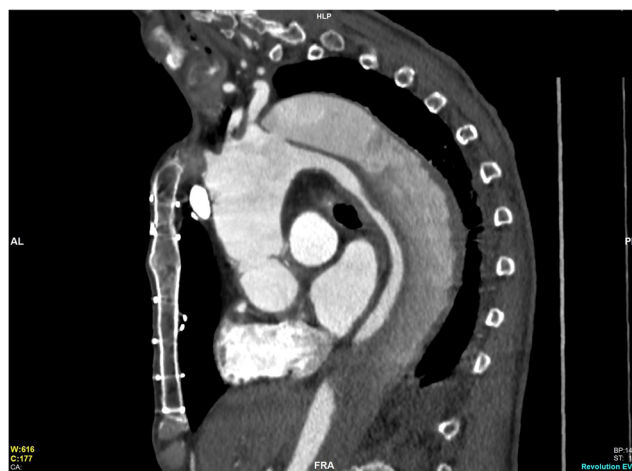


**Fig. 1** Brain computer tomography (CT) scans without contrast was performed showing small parafalcine subarachnoid bleeding

massive pulmonary embolism (Fig. 2) and Stanford B aortic dissection (Fig. 3). A multidisciplinary case discussion was performed with the participation of internists, cardiologists, vascular surgeon and interventional radiologists. Due to the serious and complex clinical conditions, any type of emergency surgery such as surgical embolectomy was excluded. Fibrinolytic therapy was not an option as patient had aortic dissection and recent intracranial haemorrhage. Given the difficult management of continuous monitoring of partial thromboplastin time in a low-intensity ward, the use of intravenous heparin as an anticoagulant was avoided. The most reasonable and least invasive way to treat the patient was to increase the dose of low molecular weight heparin from 4000 international units (IU) every 24 h to 4000 IU every 12 h. Unfortunately,



**Fig. 2** Urgent thoracic CT with iodinated contrast showing massive pulmonary embolism



**Fig. 3** Urgent thoracic CT with iodinated contrast showing Stanford B aortic dissection

the patient developed respiratory insufficiency and cardiogenic shock and passed 5 days later.

## Discussion and Perspectives

The simultaneous presence of RHT and PE is recognized as a crucial emergency [1], and the mortality rate is higher compared to that of PE alone. Echocardiographic studies in PE patients show that the incidence of RHT is 7 to 18% [6]. RHT mortality is about 28%, raising up to almost 100% in untreated patients [1]. Though some authors consider floating RHT as an in-transit pulmonary embolism, there is no consensus about the most appropriate management of this critical situation [2–5]. Therapeutic strategy should be decided according to patient's haemodynamic parameters, clinical data and bleeding risk [5]. Treatment options include anticoagulation, thrombolysis, percutaneous retrieval technique or surgical embolectomy. The latter one is primarily used in haemodynamically unstable patients [6]. Although thrombolysis shows better outcomes than anticoagulation, it is also associated with several absolute contraindications, first of all intracranial haemorrhage—like in the case of our patient [7, 8].

In this commentary, referring to the most current evidence and guidelines, we analyse a possible complex condition where it is not easy to find the correct therapeutic strategy. We highlight the difficulty to establish the best therapeutic strategies in the right heart thrombus among complex patients in the lack of relevant guidelines. In some conditions, multidisciplinary management is the best way to find the most appropriate therapy despite the poor prognosis.

We certify that the submission is original work and is not under review at any other publication.

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**Data Availability** Not applicable.

## Declarations

**Ethics Approval and Consent to Participate** Not applicable.

**Consent for Publication** Written informed consent was obtained by relatives of the patients for publication of this case report and accompanying images.

**Competing Interests** The authors declare no competing interests.

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