

Case Report: Extensive Pulmonary Thrombectomy for Acute Massive Pulmonary Embolism

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Case Report

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Abstract

Acute massive pulmonary embolism (PE) is a life-threatening condition requiring urgent intervention. This case report describes a 5G-year-old male presenting with acute dyspnea and hemodynamic instability, diagnosed with massive PE. An extensive pulmonary thrombectomy was performed, guided by advanced imaging. The patient's clinical course, imaging findings, surgical details, and postoperative outcomes are discussed, emphasizing the role of timely intervention. A literature review highlights current management strategies for massive PE.

Introduction

Pulmonary embolism is a leading cause of cardiovascular mortality, with massive PE accounting for significant morbidity due to right ventricular (RV) dysfunction and hemodynamic compromise.[1] Surgical pulmonary thrombectomy is reserved for cases refractory to medical therapy or with contraindications to thrombolytics. [2-4] This report details a successful thrombectomy in a patient with massive PE, supported by multimodal imaging and multidisciplinary care.

Case Presentation

A 5G-year-old male with a history of hypertension and recent knee surgery presented to the emergency department with sudden-onset dyspnea, chest pain, and syncope. Vital signs revealed tachycardia (pulse 128 bpm), hypotension (blood pressure 85/50 mmHg), and hypoxemia (SpO₂ 88% on room air). Physical examination showed jugular venous distension and a loud P₂, suggestive

of RV strain.[3] Electrocardiography demonstrated sinus tachycardia, S1Q3T3 pattern, and incomplete right bundle branch block.[5] Laboratory findings included elevated D-dimer (4500 ng/mL), troponin I (0.8 ng/mL), and brain natriuretic peptide (BNP, G50 pg/mL), consistent with acute PE and RV dysfunction. [6-7].

Imaging Findings

- Computed Tomography Pulmonary Angiography (CTPA): CTPA revealed extensive bilateral pulmonary emboli with large saddle emboli at the bifurcation of the main pulmonary artery, extending into the right and left pulmonary arteries (Figure 1). [8] The right pulmonary artery was nearly occluded, with thrombus burden in the lobar and segmental branches. The RV/left ventricular (LV) diameter ratio was 1.4, indicating RV strain. [9-10] No evidence of pulmonary infarction was noted.
- Transthoracic Echocardiography (TTE): TTE confirmed severe RV dilation with a flattened

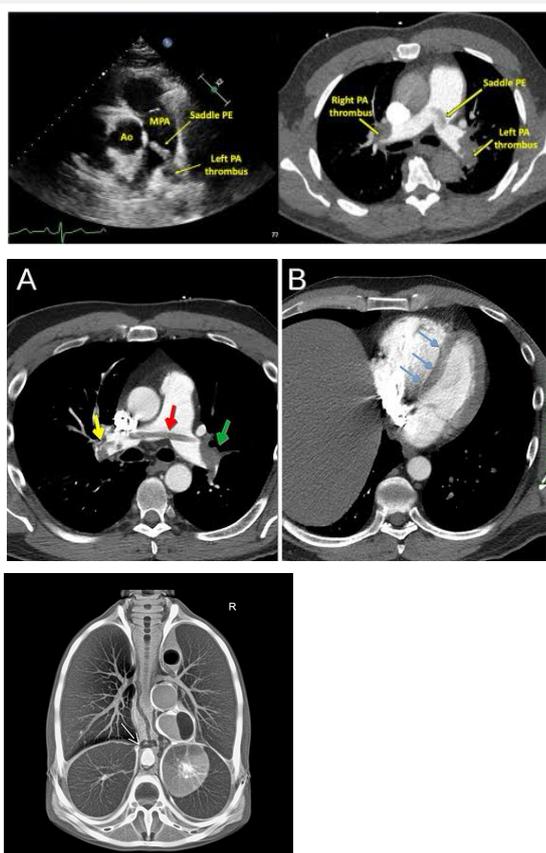


Figure 1: CTPA coronal view demonstrating a saddle embolus at the pulmonary artery bifurcation (arrow) with extension into bilateral pulmonary arteries. Note the dilated RV, indicative of strain.

interventricular septum and elevated pulmonary artery systolic pressure (60 mmHg). McConnell's sign (akinesia of the RV mid-free wall with preserved apical motion) was present, highly specific for acute PE. [11-12] Tricuspid Annular Plane Systolic Excursion (TAPSE) was reduced (12 mm), reflecting impaired RV function.[13]

- Ventilation-Perfusion (V/Q) Scan (Postoperative): A postoperative V/Q scan showed improved perfusion in the right lower lobe but persistent mismatch in the left upper lobe, suggesting residual microthrombi. [14].

Diagnosis and Management

The patient was diagnosed with massive PE based on clinical presentation, imaging, and hemodynamic instability [15]. Initial management included supplemental oxygen, intravenous heparin (80 IU/kg bolus followed by 18 IU/kg/h infusion), and norepinephrine to stabilize blood pressure. [16-17] Thrombolytic therapy was contraindicated due to recent surgery (within 14 days), increasing bleeding risk. [18-19] After multidisciplinary consultation, urgent surgical pulmonary thrombectomy was planned [20].

Surgical Intervention: The procedure was performed under general anesthesia with Cardiopulmonary Bypass (CPB). A median sternotomy provided access to the pulmonary arteries [21]. Bilateral pulmonary arteriotomies revealed large, organized thrombi extending from the main pulmonary artery to the lobar branches (Figure 2). Thrombi were meticulously extracted using forceps and suction, with particular attention to avoiding endothelial damage. [22-23] The right pulmonary artery required extensive clearance due to near-total occlusion. An intraoperative transesophageal echocardiogram (TEE) confirmed no residual thrombi and improved RV function post-thrombectomy. [24-25] The total CPB time was 120 minutes, with an aortic cross-clamp time of 45 minutes. (Figure-2).

Postoperative Course: The patient was extubated 12 hours post-surgery and weaned off vasopressors by day 2. Intravenous heparin was transitioned to oral apixaban (10 mg twice daily for 7 days, then 5 mg twice daily. [26-27] A repeat TTE on day 5 showed normalized RV size and function (TAPSE 20 mm).[28] The patient was discharged on day 10 with no neurological deficits or bleeding complications. [29] At 3-month follow-up, the patient reported no dyspnea, and a repeat CTPA confirmed patent pulmonary arteries with no residual thrombi. [30-31].

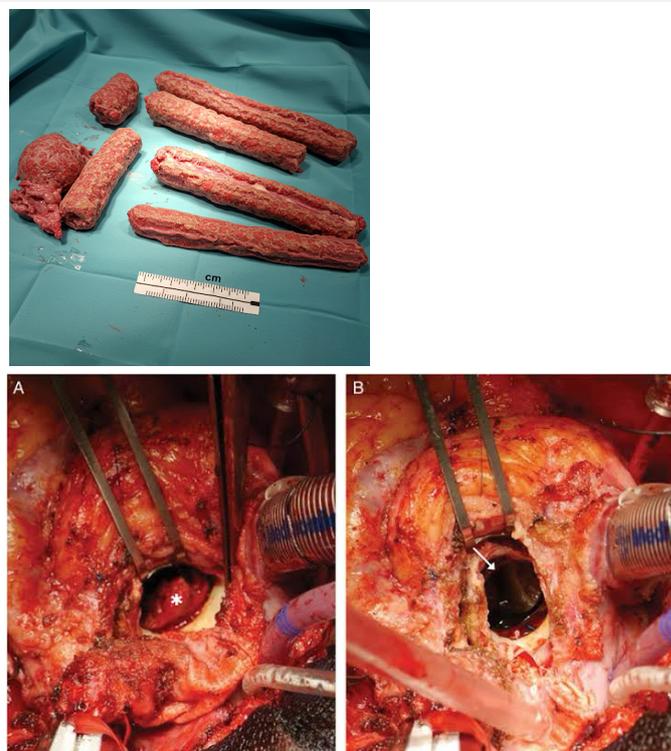


Figure 2: Intraoperative photograph showing extracted thrombi from the pulmonary arteries, measuring approximately 8 cm in length (scale bar included).

Discussion

Massive PE carries a mortality rate of up to 30% if untreated, with surgical thrombectomy offering a viable option for patients with contraindications to thrombolytics. [32-33] The success of this case highlights the importance of rapid diagnosis using CTPA and TTE, which guide therapeutic decisions. [34-35] The RV/LV ratio and McConnell's sign on imaging were critical in stratifying risk and justifying surgery. [36-37] Intraoperative TEE ensured complete thrombus removal, reducing the risk of recurrent embolism. [38-39] The literature supports surgical thrombectomy for massive PE when systemic thrombolysis is contraindicated, with survival rates exceeding 80% in experienced centers. [40-41] However, complications such as bleeding, reperfusion injury, and RV failure remain challenges. [42-43] Adjunct therapies, including inferior vena cava filters, were not used in this case due to the absence of recurrent deep vein thrombosis. [44-45] Long-term anticoagulation with direct oral anticoagulants (DOACs) is now preferred over warfarin for PE management, as evidenced by this patient's regimen. [46-47].

Conclusion

This case underscores the efficacy of pulmonary thrombectomy in managing massive PE with hemodynamic instability. Multimodal imaging, timely surgical intervention, and postoperative anticoagulation were pivotal to the patient's recovery. Further studies are needed to optimize patient selection and refine surgical techniques for this high-risk condition. [48-49].

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