PULMONARY EMBOLISM IN TRANSIT THROUGH PATENT FORAMEN OVALE: A CASE REPORT

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Purpose: To increase medical knowledge, treatment, and patient presentation of a Pulmonary Embolism In-Transit

Abstract

A 30-year-old female presented to the emergency room with acute onset shortness of breath and associated diaphoresis. Past medical history included polycystic ovarian syndrome, oral contraceptive use, and obesity with a BMI of 50. Her presenting vital signs included a blood pressure of 109/79, a heart rate of 109, a respiratory rate of 22, and 95% oxygen saturation on room air. A D-Dimer test was elevated at >20 µg/mL suggesting a pulmonary embolism, which was confirmed by a CT of the chest. An echocardiogram was performed showing an ejection fraction of 60%, mild right ventricular dysfunction and dilatation, and mobile echodensity in the right atrium extending from the atrial septum, generating concern for a patent foramen ovale (PFO). Cardiology was subsequently consulted for catheter guided thrombectomy. Catheter directed thrombectomy was deemed unsafe after TEE findings confirmed TTE findings, therefore, the patient was transferred emergently to the operating room. Upon induction of general anesthesia, the patient became hypotensive and profoundly hypoxic despite endotracheal intubation and FiO2 of 100%. An intraoperative transesophageal echocardiogram (TEE) revealed the pulmonary embolism-in-transit was no longer present at the interatrial septum and severe right heart dysfunction was now present. Emergency bilateral pulmonary embolectomy was performed to remove the clot. Additionally, pericardial patch augmentation of the main pulmonary artery and closure of the PFO were performed. The patient responded well and was discharged a few days later.

Introduction

- 600,000 patients diagnosed with pulmonary emboli annually in the United States.[6]
- The mortality rate of pulmonary embolism is 17.4% after diagnosis.[6]
- Catheter-directed embolectomy is utilized for submassive pulmonary emboli, while surgical embolectomy is reserved for massive pulmonary emboli. A PFO presents in about 24% of the population at autopsy. [5]
- The opening between the right and left atrium that shunts blood in the fetal heart should close at birth with the increase in pulmonary pressure upon birth; the persistence of this ductal opening constitutes a PFO.
- The incidence of pulmonary embolism along with a concurrent PFO, as seen in this patient presentation, represents a small portion of the population, with a high associated mortality rate due to severe right heart dysfunction, potential for cardiopulmonary collapse, and potential for arterial systemic embolization.

Diagnosis

Secondary to an elevated D-Dimer, a PFO, notable CT and echocardiograms findings, and a transition of submassive to massive pulmonary embolism, the patient was diagnosed with:

Pulmonary Embolism In-Transit

Case Report

Patient Presents to ER

- Patient presented with tachypnea and shortness of breath.
- D-Dimer elevation.
- CT of the chest showed submassive pulmonary embolism.
- Initial echo showed biatrial thrombus through the PFO.

Table 1. CT of Thrombus in Pulmonary Artery.

Cath Lab

- Patient was taken to cath lab for catheter-guided thrombectomy.
- Catheter-guided thrombectomy was deemed unsafe due to results of TEE performed in cath lab.
- Therefore, patient was transferred to the operating room for surgical embolectomy.

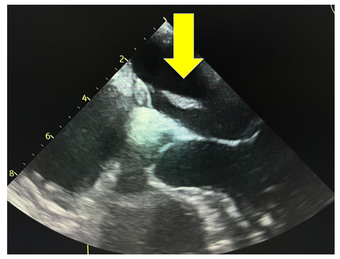

Table 2. Echo with Biatrial Thrombus through Patent Foramen Ovale

Hemodynamic Collapse

- Upon induction of anesthesia and endotracheal intubation in operating room, the patient became hypotensive and hypoxic.
- Patient diagnosis progressed from submassive to massive pulmonary embolism in consequence to hemodynamic/cardiogenic instability.

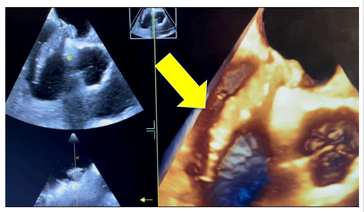

Table 3. 3-D Echo with Thrombus Extending from Right Atrium into PFO

Intraoperative

- Repeat intraoperative TEE showed absence of embolism at PFO with transit into the pulmonary arteries.
- Surgical embolectomy was implemented for emergent treatment.

Table 4. Results of surgical pulmonary embolectomy

Treatment

- **Emergent Consultation of Cardiothoracic Surgery**
- **Emergent Sternotomy**
- **Bilateral Pulmonary Embolectomy**
- **Pericardial Patch Augmentation**
- **Oversewing of Patent Foramen Ovale**

Conclusions

- In reflection of this patient case presentation, it is shown that in hemodynamically unstable patients, surgical embolectomy can be indicated as first-line therapy in acute pulmonary embolism for decreased patient mortality.
- In recommendation to practicing clinicians dealing with acute pulmonary emboli, surgical embolectomy should be considered in earlier stages instead of as a salvage measure to prophylactically avoid hemodynamic collapse.
- Induction of positive pressure ventilation should be used with caution in patients with a PFO and pulmonary embolism to mitigate risk of an embolism in-transit.

Acknowledgements and References