

IMPENDING PARADOXICAL EMBOLISM IN A PATIENT WITH PULMONARY EMBOLISM (THROMBUS ENTRAPPED WITHIN A PFO)

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Female patient 36 years old, single, Obese, no previous history of medical problems, Presented to with shortness of breath

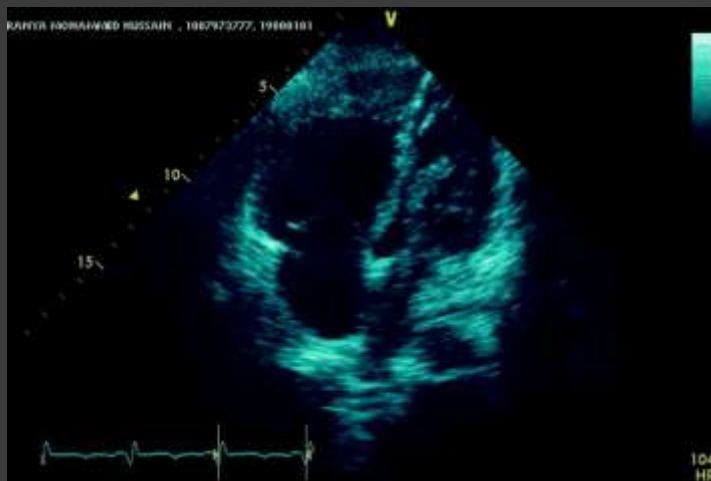
Conscious oriented

C/P BP 100/60, pulse rate 110b/m, SPO₂ 95% room air

CT chest showed pulmonary embolus in main pulmonary artery branches,

Doppler study revealed deep venous thrombosis in right femoral vein.

Transthoracic echocardiography



Transesophageal echocardiography

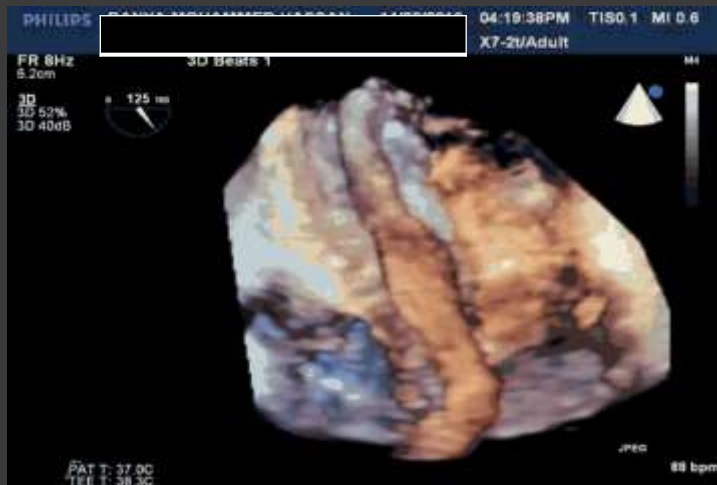
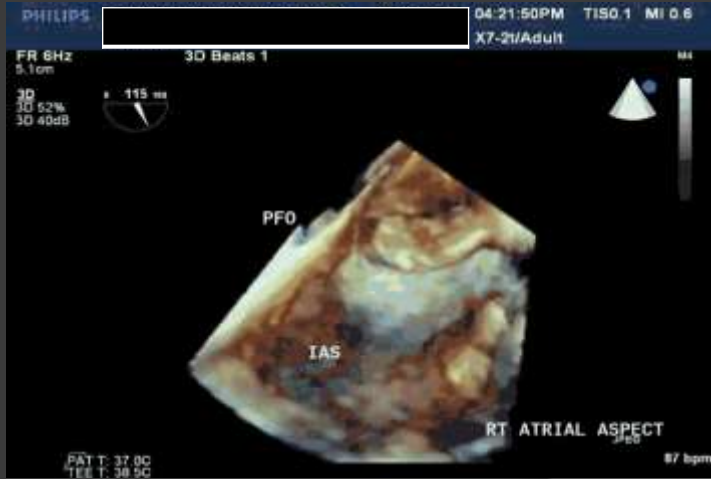


TEE, extension in left side





3D echo from Rt atrial side



3D ECHO from left side



Dilated RV severely impaired RV function, dilated RA and pulmonary arteries, thrombus seen in both atria

Biatrial thrombus snake like extending from RA across a PFO straddling atrial septum, with large extension into LA, mobile dropping into left ventricle during diastole

**WHAT
SHALL
WE DO?**



IV heparin infusion started immediately

Heart team discussed thoroughly thrombolytic therapy versus surgical embolectomy, and clinical condition explained to the patient and the family

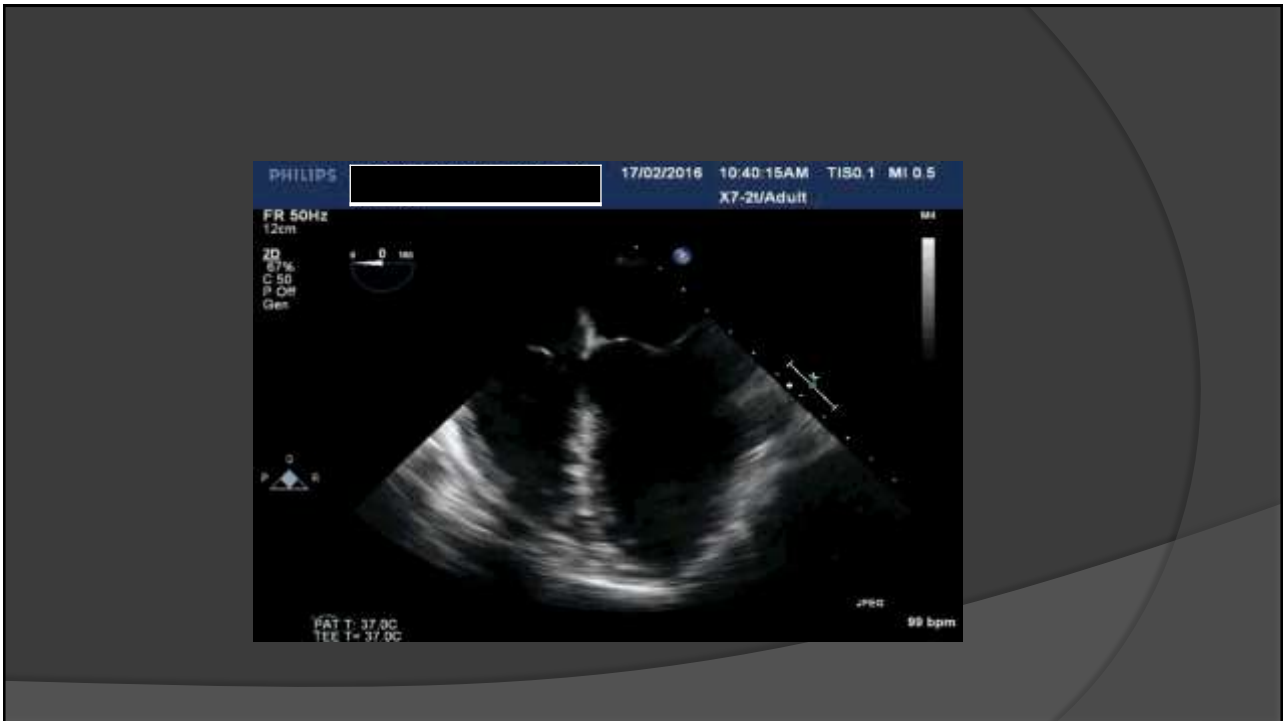
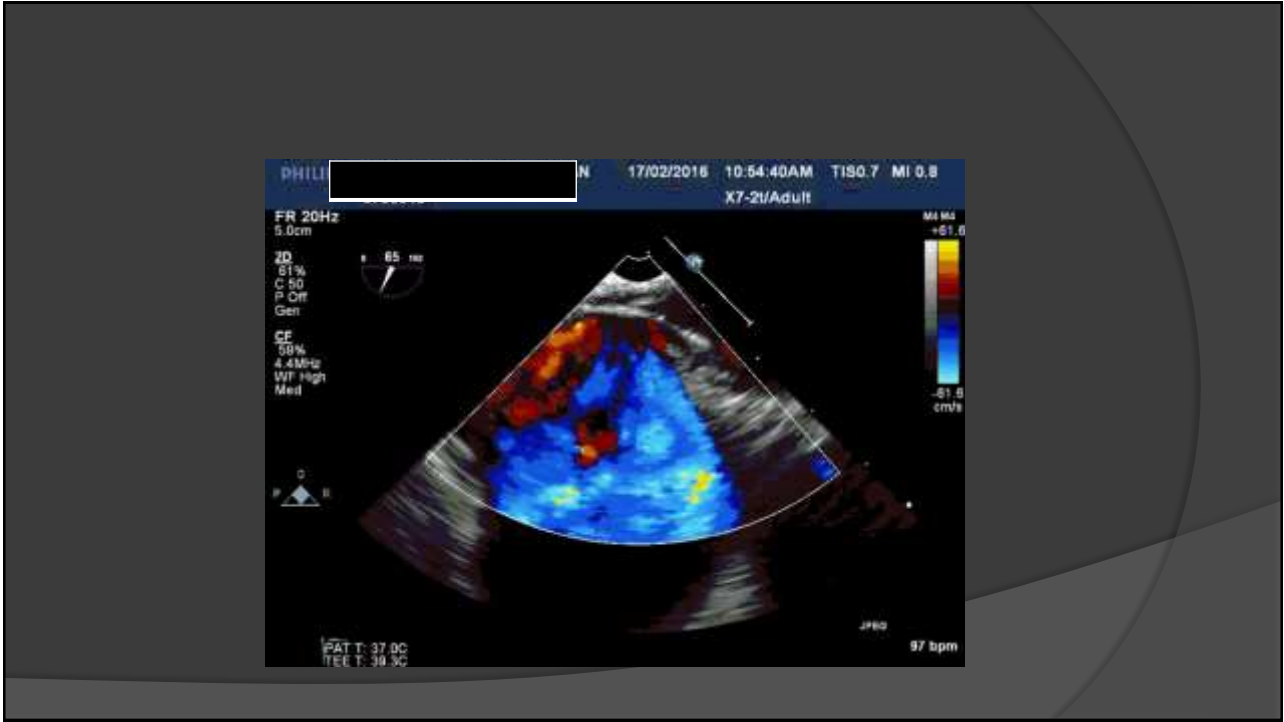
Thrombolytic therapy given, tPA 100mg IV infusion over two hours.

No major complication, apart from cutaneous hematoma, that resolved within few days (from previous attempt of venous insertion).

Follow up study

After thrombolytic therapy



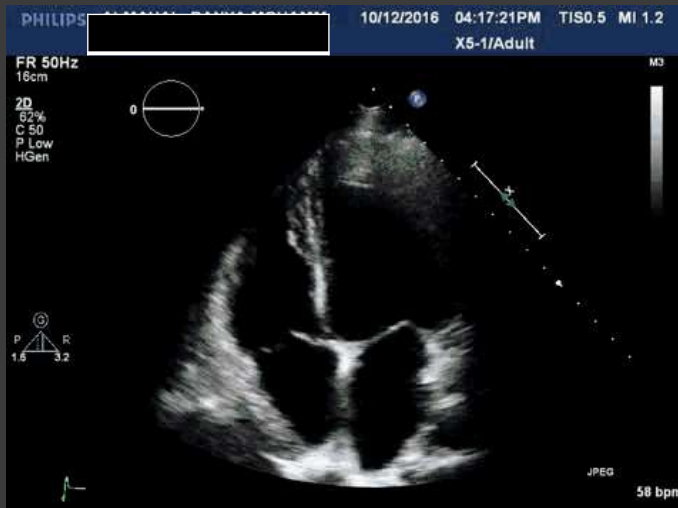




TTE 45 days later



TTE 9 months later



Follow up echocardiography, disappearance of most of thrombus, apart from small residuals in right atrial appendage and right pulmonary artery, with partial recovery of right ventricular function

Follow up after 45 days, TTE showed complete recovery of RV function

DISCUSSION

PFO with a massive PE increases the risk of death (RR 2.4), ischemic stroke (RR 5.9), peripheral arterial embolism (RR 15), and a complicated hospital course (RR 5.2).

Circulation April 26, 2011 Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, Scientific Statement American Heart Association

Patients with a PFO and PE are more likely to have a paradoxical embolism and increased risk of silent brain infarct (33%) compared with those without a PFO (2%).

Circulation April 26, 2011 Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, Scientific Statement American Heart Association

Screening PE patients for PFO (a bubble study) increases the detection of impending paradoxical embolism (ie, biatrial thrombus entrapped within a PFO)

Circulation April 26, 2011 Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, Scientific Statement American Heart Association

For those patients, aggressive therapeutic options, e.g. catheter-based techniques, surgical embolectomy (particularly if intracardiac thrombus is identified), and antithrombotic therapy.

Circulation April 26, 2011 Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, Scientific Statement American Heart Association

Optimal treatment for patients with impending paradoxical embolism remains unclear

Surgical thrombectomy may result in the lowest rate of stroke

Thrombolysis may be associated with the highest mortality compared with surgery or medical treatment with heparin

In 2008 Fauveau E conducted PubMed search for articles published between 1985, when the first TSFO was reported, and 2007 (93 case) compared medical vs surgical treatment:

Arch Cardiovasc Dis. 2008 Oct;101(10):637-44. Surgical or medical treatment for thrombus straddling the patent foramen ovale: impending paradoxical embolism? Report of four clinical cases and literature review

Thrombectomy most frequently chosen treatment in the published literature and justified in the prevention of paradoxical embolism

Heparin used as a second option in patients with frequent comorbidities and strokes

Arch Cardiovasc Dis. 2008 Oct;101(10):637-44. Surgical or medical treatment for thrombus straddling the patent foramen ovale: impending paradoxical embolism? Report of four clinical cases and literature review

**Thrombolysis reserved for patients with an unstable status,
who cannot wait for Surgery,
and linked to the highest mortality, explained by the severity
of the patient's initial presentation**

Arch Cardiovasc Dis. 2008 Oct;101(10):637-44. Surgical or medical treatment for thrombus straddling the patent foramen ovale: impending paradoxical embolism? Report of four clinical cases and literature review

IN 2010 Myers et al, studied 154 cases,

Thirty-day mortality was 18.4%

**Surgical thromboembolectomy had a nonsignificant improved survival
& significant reduced systemic embolism, compared with
anticoagulation**

**Thrombolysis, on the other hand, had the opposite effect, although
not significant**

AHA Scientific Statement

Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, and Chronic Thromboembolic Pulmonary Hypertension

A Scientific Statement From the American Heart Association

Michael R. Jaff, DO, Co-Chair; M. Sean McMurtry, MD, PhD, Co-Chair;
 Stephen L. Archer, MD, FAHA; Mary Cushman, MD, MSc, FAHA; Neil Goldenberg, MD, PhD;
 Samuel Z. Goldhaber, MD; J. Stephen Jenkins, MD; Jeffrey A. Kline, MD;
 Andrew D. Michaels, MD, MAS, FAHA; Patricia Thistlethwaite, MD, PhD; Suresh Vedantham, MD;
 R. James White, MD, PhD; Brenda K. Zierler, PhD, RN, RVT; on behalf of the American Heart
 Association Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation, Council on
 Peripheral Vascular Disease, and Council on Arteriosclerosis, Thrombosis and Vascular Biology

Venous thromboembolism (VTE) is responsible for the hospitalization of >250 000 Americans annually and represents a significant risk for morbidity and mortality.¹ Despite the publication of evidence-based clinical practice guidelines to aid in the management of VTE in its acute and

Methods

A writing group was established with representation from the Council on Peripheral Vascular Disease and Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation of the American Heart Association and vetted by

Recommendations on PFO in the Face of a PE

Circulation April 26, 2011, p1788

1. For patients with massive or submassive PE, screening for PFO with an echocardiogram with agitated saline bubble study or transcranial Doppler study for risk stratification may be considered (*Class IIb; C*).

Recommendations on PFO in the Face of a PE

Circulation April 26, 2011, p1788

2. For patients with any type of PE found to have impending paradoxical embolism (thrombus entrapped within a PFO), surgical embolectomy may be considered (*Class IIb; C*).

Important questions remain currently unanswered

1. **How** PFO presence should change management of DVT and PE,
2. **When** to consider PFO closure in pts with concomitant paradoxical embolism & PE
3. **How** to stage the timing of IVC filter placement and PFO closure in patients with paradoxical embolism and PE.



THANK YOU