

Hanging On By A (Fibrin) Thread

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Introduction

- Patent foramen ovale (PFO) is a recognized cause of cryptogenic stroke.
- Paradoxical embolism occurs via a right to left shunt as is seen in cases of acute pulmonary HTN due to pulmonary embolism.
- An entrapped embolus straddling a PFO with imminent paradoxical embolism is an exceedingly rare occurrence with significant morbidity and mortality.

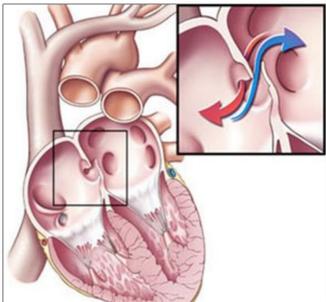


Figure 1: Patent foramen ovale

Case Description

- A 73yo male with PMH of HTN presented to the ED with 1 week of progressive dyspnea, nonproductive cough, and right sided pleuritic chest pain. He was normotensive, afebrile, and new 3L oxygen requirement. Initial work-up significant for:

Diagnostics

D-dimer	>3ug/mL
Troponin T	Undetectable
NT-Pro BNP	2923 pg/mL
EKG	S1Q3T3 consistent with right heart strain
CXR	Clear. No acute cardiopulmonary process
CTA chest	Extensive submassive pulmonary emboli with near occlusion of R main pulmonary artery

- Started on therapeutic enoxaparin for bilateral PEs.

Hospital Day 1:

- TTE identified moderately dilated RV, RVSP 93mmHg, and a 4x1cm linear echogenic mobile mass extending from RA to LA, potentially traversing the atrial septum, and extension into LV during diastole.
- Review of the chest CTA confirmed a long thrombus-in-transit through a PFO.
- CCU, CT surgery and IR were consulted to discuss management. As the risks of systemic thrombolysis or surgical intervention were thought to outweigh the benefit, anticoagulation with apixaban was initiated.

Hospital Day 3:

- Patient with sudden onset of right sided weakness, facial droop, and global aphasia.
- CTA head & neck: large left MCA embolic stroke with occlusion at mid-M1.
- Thrombolytics contraindicated due to recent apixaban. Underwent emergent thrombectomy with complete reperfusion and recovery.

Imaging & Work-up

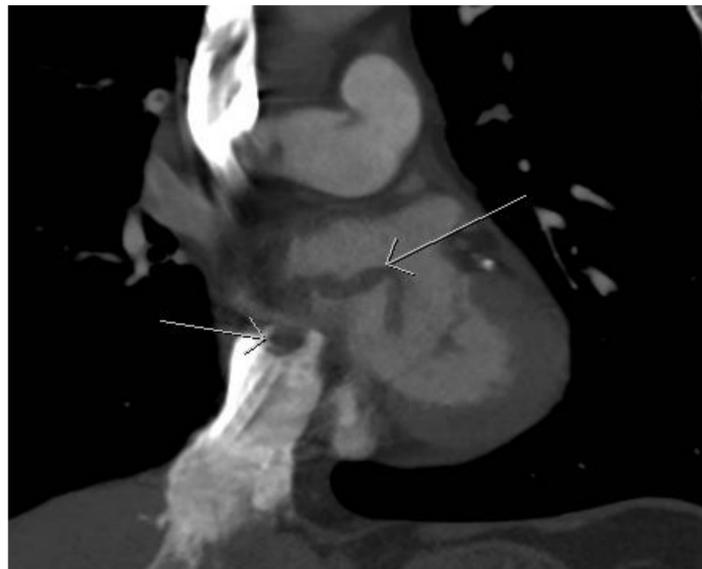


Figure 2: CTA chest with linear thrombus extending from the right to left atria.

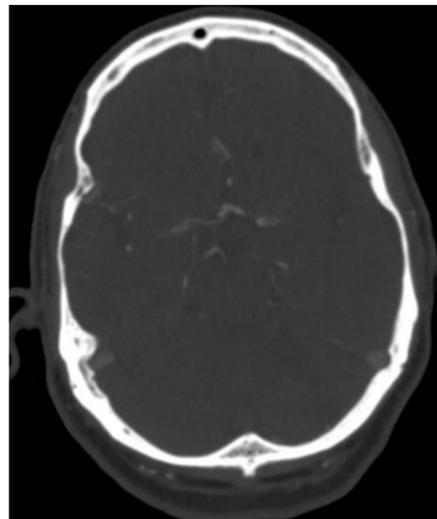


Figure 3: CTA head with occlusion of left MCA at proximal M1

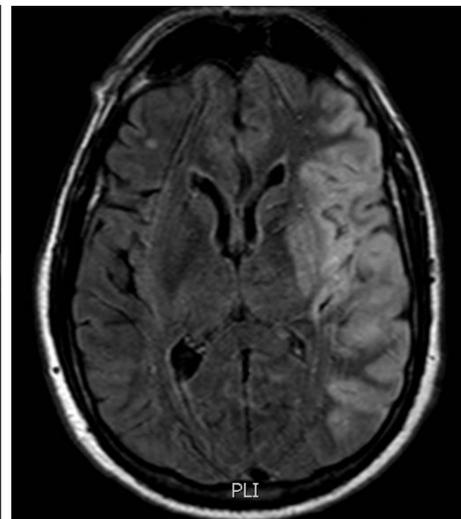


Figure 4: MRI brain with large left MCA territory stroke

Hypercoagulopathy Work-up

Duplex Ultrasound	Chronic left tibial DVT & Acute DVT extending from right popliteal to femoral vein
CT chest/abdomen/pelvis	No malignancy identified
APLA labs	Lupus anticoagulant, anti-B2 glycoprotein Ab, anticardiolipin Ab – all negative

Discussion

- A PFO is identified in 60% of cases of cryptogenic stroke. There has been much debate regarding the benefit of PFO closure to prevent recurrent embolic events. As of 2011, AHA/ASA guidelines state there is insufficient data to recommend PFO closure in the setting of stroke.
- A 2015 Cochrane review found that transcatheter device closure (TDC) failed to show significant benefit in reducing risk of recurrent stroke compared to medical therapy with anticoagulants +/- antiplatelets.
- However, recent studies such as the 2018 DEFENSE-PFO, suggests TDC may be indicated for high-risk PFOs and decrease embolic stroke recurrence.
- Intracardiac thrombus-in-transit straddling a PFO is associated with a high mortality with 62.5% of these deaths occur within the first 24 hours.

Discussion (cont.)

- Systemic thrombolysis is linked to the highest mortality while surgical thrombectomy tends to prevent further embolic events and allow PFO repair.
- Anticoagulation with a vitamin K antagonist or DOAC is an acceptable alternative if the patient has high surgical risk, however, this runs the danger of continued thrombus fragmentation and systemic embolization as illustrated in this case.

Interventions	30-day Mortality
Surgical Thrombectomy	10.8%
Anticoagulation	25.6%
Systemic Thrombolysis	26.3%

- Surgical thrombectomy may be the safer option and decrease the risk of further embolic phenomenon in cases with large, structurally unstable inter-atrial thrombi.

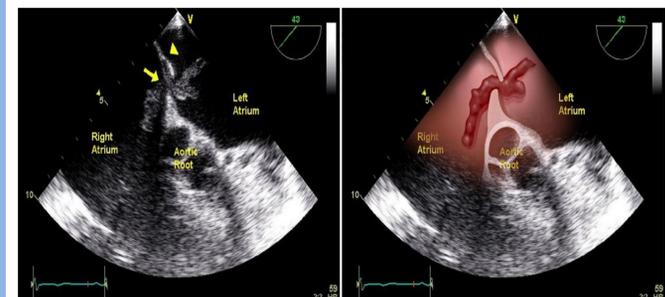


Figure 5: Example TTE depicting thrombus-in-transit.

Take Home Points

- An inter-atrial thrombus-in-transit is an extremely rare event and there is no consensus on the optimal treatment strategy.
- Interventions should be individualized based on the patient's clinical presentation, hemodynamics, comorbidities, and surgical risk.
- Surgical thrombectomy has the lowest 30-day mortality risk.
- Although the current guidelines do not support PFO closure to prevent recurrent strokes, new studies suggest TDC may be beneficial in high-risk PFOs to decrease embolic stroke especially with improved devices and technique.

References

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