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RESEARCH ARTICLE

MYOCARDIAL INFARCTION SECONDARY TO PARADOXICAL EMBOLISM THROUGH PATENT FORAMEN OVALE : SURGICAL MANAGEMENT

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Abstract

Patent foramen ovale (PFO) is most often asymptomatic, but it can cause manifestations with varying degrees of severity. Paradoxical embolism, a condition associated with PFO, requires multidisciplinary management. Acute coronary syndrome (ACS) resulting from paradoxical coronary embolism should be suspected in all patients presenting with ACS who have normal coronary arteries on angiography, regardless of age. Our case illustrate a proven paradoxical coronary embolism through a PFO.

Introduction:-

Paradoxical embolism typically presents as an ischemic event and is often linked to abnormalities in the oval foramen and interatrial septum, which cause a right-to-left shunt during transient reversals of the interatrial pressure gradient. Acute myocardial infarction without coronary artery disease occurs in an estimated 1% [1] to 6% [2] of cases. While paradoxical coronary embolism is rare, it is more common in patients under 35 years of age [3].

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We report a case of paradoxical coronary embolism complicated by left ventricular dysfunction in a 35-year-old patient with a patent foramen ovale (PFO).

Case report:

We report the case of a 35-year-old patient with a history of occasional smoking. Who has been reporting stage II NYHA dyspnea associated with atypical chest pain neglected by the patient for 6 months.

On the day of his admission to the ICU; he presented an angina pain radiating to the jaw associated with vomiting and profuse sweating.

The EKG registers in regular sinus rhythm with a frequency of 68 bpm, Q wave of necrosis in inferobasal leads, and negative T waves in apico-septal and lateral leads.

A transthorasic echocardiography was performed showing the appearance of probably ischemic DCM (dilated cardiomyopathy) with a dilated left ventricle (LV) (69/61mm) ; segmental kinetic disorders and alteration of systolic function (FEVG = 37%), interatrial septum aneurysm with no visible shunt at the Doppler.

The transesophageal echocardiography showed interatrial septum aneurysm with a mobile fringed thrombus covering the left atrial side and enclaved in a PFO.(figure 1, figure 2)
A coronary angiography was performed showing healthy coronary arteries.

The patient was put under standard heparin and VKA (vitamin K antagonist) for 21 days, and the echocardiogram checkup showed the persistence of a small moving length.

Faced with the risk of embolization, we decided to operate the patient as soon as possible.
A right atriotomy was performed; the thrombus trapped in the PFO was removed, followed by resection of the interatrial septum aneurysm and closure of the ASD (atrial septal defect) by a simple suture and then we explored the left atrium and auricle which were free (figure 3).
Postoperative course was uneventful; a post-operative echocardiogram was performed on Day 7 showing a dilated LV with systolic dysfunction (LVEF = 33%), no residual inter-atrial shunt. The patient was discharged at Day15 with a treatment based on anti platelet aggregation.

Discussion:

Cohnhein originally reported on paradoxical embolism in 1877 [4]. In rare instances, this embolism might obstruct the coronary arteries as well as the cerebral and peripheral arteries.

10% to 15% of all paradoxical embolisms [5] and 25% of acute coronary events in patients under 35 years of age [6] are caused by paradoxical coronary embolisms, which are extremely uncommon.

According to Johnson's proposal [7], the diagnosis of paradoxical embolism can be:
1) established definitively if an artery embolus is present and a thrombus is observed across an intracardiac defect during echocardiography;
2) presumed, characterized by a right-to-left shunt at some point, venous thrombosis, and/or pulmonary embolus along with systemic arterial embolus in the absence of a left-sided cardiac or proximal arterial cause;
3) Potential—only PFO and an artery embolus were found.

Temporary inversion of the interatrial pressure gradient during the Valsalva maneuver, coughing, or mechanical ventilation [8]can lead to the occurrence of a paradoxical embolism. The development of imaging techniques, particularly transesophageal echocardiography, has facilitated the detection of thrombi lodged in a patent foramen ovale, thereby enabling the diagnosis of an imminent paradoxical embolism.

Crump and colleagues' study [9] looked at patients with a history of acute myocardial infarction and coronary arteries that were angiographically healthy to see if there would be a higher incidence of PFO in this group. When comparing these patients' PFO levels to healthy, age-matched control rates (28% in each group), they did not find any increase.

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The use of transthorasic echocardiography, which is less sensitive to PFO identification than transesophageal echocardiography, was a significant weakness of this investigation.

In a recent retrospective analysis of 4848 patients, Kleber et al. [10] identified an incidence of 0.45% of suspected paradoxical coronary embolism causing acute MI. In a prospective investigation of 1654 patients with acute MI, they found an incidence of 0.67%.
Treatment options for paradoxical coronary embolism include surgical thrombectomy, oral anticoagulation, thrombolysis alone or in conjunction with inferior vena cava filter implantation (which may be explored in patients with recurrent pulmonary embolism or chronic anticoagulation contraindication). PFO closure by surgery is linked to better outcomes [11], [12], whereas PFO closure by percutaneous means has not been investigated in instances of paradoxical coronary embolism [13].

In summary, although PFO is a usually silent malformation, patients with this pathology should be monitored regularly to avoid potentially serious complications, as in the case of our patient who presented a paradoxical coronary embolism complicated by severe LV dysfunction.
Thus, these patients must be carefully evaluated to select the most appropriate treatment and follow-up protocol.

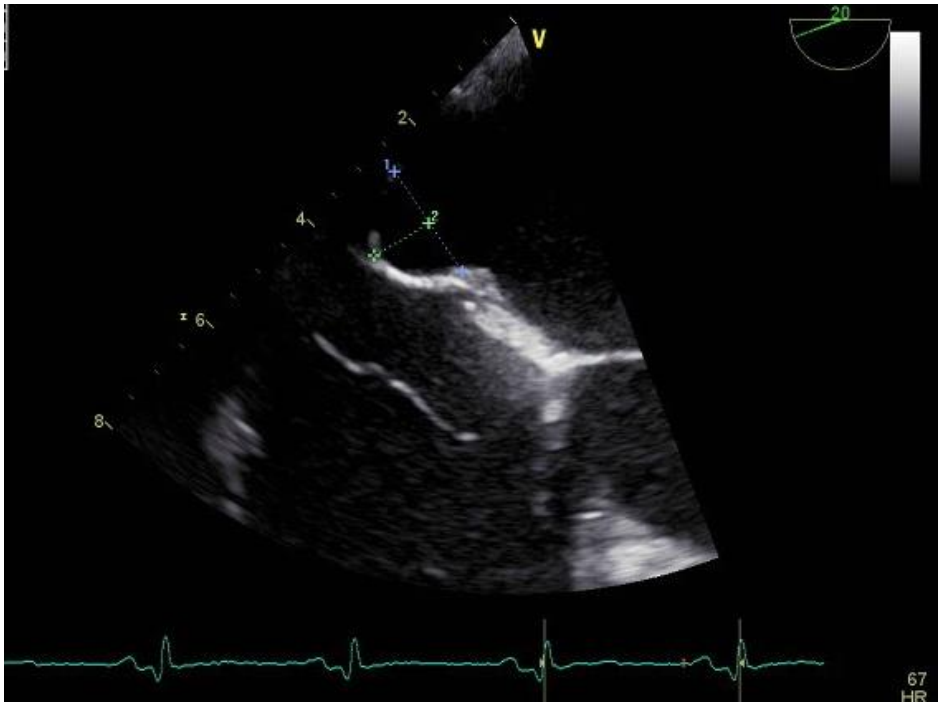

Figure 1:- Transesophageal Echocardiography four-cavity cross-section centered on the interatrial septum showing an AIS aneurysm (10×19 mm) with dehiscence between septum primum and septum secondum.

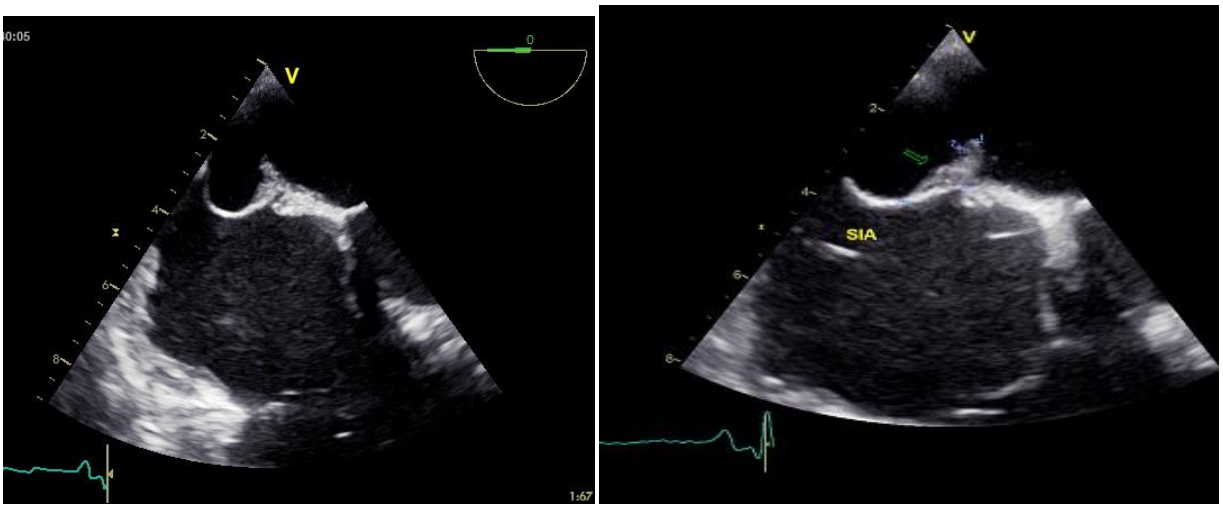

Figure 2:- Transesophageal Echocardiography Images showing a thrombus with moving bangs lining the inter atrial septum on its left atrial side and faded on a very likely PFO

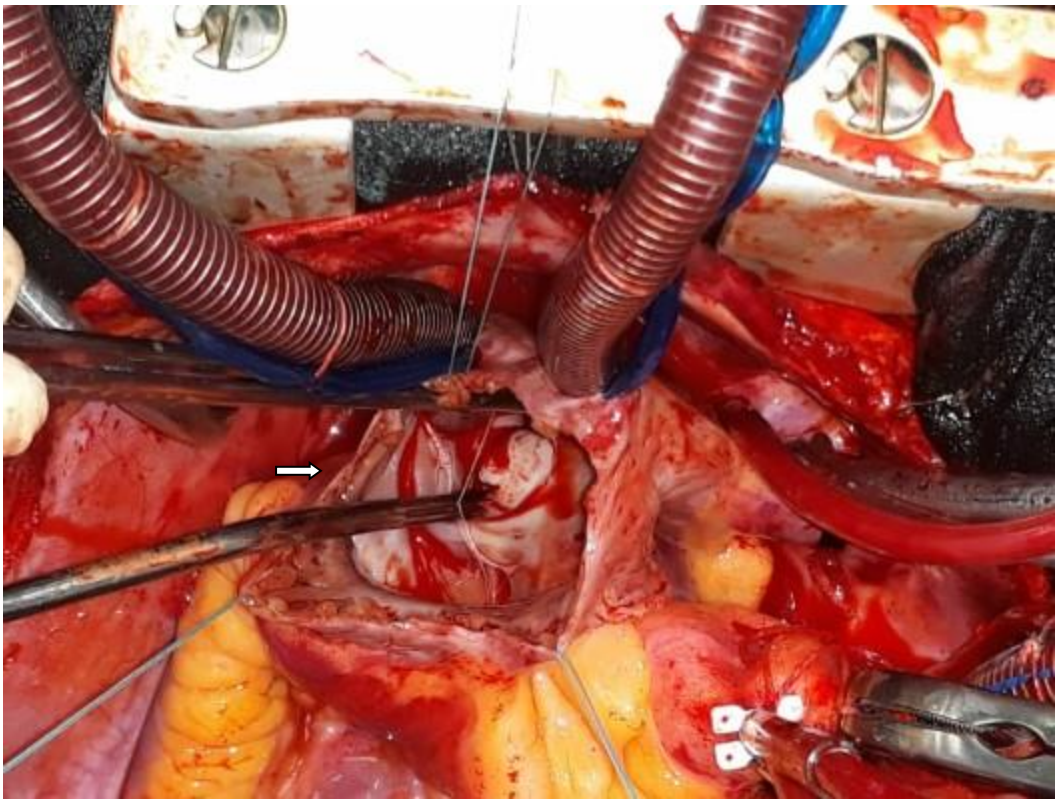

Figure 3:- Surgical view after patent foramen oval closure.

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