

Case Report

Patent Foramen Ovale and Cryptogenic Stroke : A Case Report

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Abstract:

Key Words :
Patent foramen
ovale, cryptogenic
stroke, device
closure.

A 22 years old lady presented to emergency department of a private hospital with weakness and inability to move right side of the body along with aphasia, dizziness and headache since early morning. During process of evaluation and investigation she recovered spontaneously within few hours after conservative management. Magnetic resonance imaging of brain pre and post contrast along with MR angiography showed acute left parietal infarct. ECG excludes atrial fibrillation. Echocardiography later revealed tunnel shaped patent foramen ovale (PFO) with atrial septal aneurysm(ASA). Percutaneous closure of PFO was planned to prevent recurrence of stroke in this young lady.

(Cardiovasc j 2022; 14(2): 180-184)

Background:

Association of cryptogenic stroke with patent foramen ovale (PFO) is well established however there is controversy on whether it is a direct cause, incidental finding or a risk factor. Basic mechanism involved is paradoxical embolism of a thrombus originated from venous clot traverses the PFO if there is right to left shunting of blood or clot may form inside PFO due to atrial arrhythmias or atrial septal aneurysm (ASA).

Introduction:

Patent foramen ovale is a common abnormality, occurring in 20–34% of the adult population.¹ In recent years, role of PFO as a risk factor for ischemic stroke has been established in cases where other causes are absent (cryptogenic stroke).²

PFO is a part of fetal circulation./ In the majority of infants, closure of the foramen ovale occurs soon after birth, as negative intrathoracic pressure associated with the first breaths closes the PFO. In some cases, the primum and secundum atrial septa fail to fuse and closure remains incomplete as a communication. For the majority of people, a PFO will remain undetected or appear only as a chance finding during cardiac investigation.

However, some PFOs may open widely and provide a conduit for material such as thrombi, air or vasoactive peptides to travel from the venous to arterial circulation – a paradoxical embolus. This is associated with cryptogenic stroke, systemic embolus, migraine with aura, and decompression sickness in divers.

Up to 40% of cryptogenic ischaemic strokes are found to have concurrent PFO in one-third of patients.³⁻⁶ A PFO can be diagnosed by transthoracic echocardiography (TTE) with injection of contrast material (agitated saline) . Atrial septal aneurysm (ASA) can also be identified by TTE. In some cases, transesophageal echocardiography (TEE) is required as it is the most sensitive method to detect PFO.² The use of Valsalva maneuver (VM) or cough is helpful to increase right atrial pressure thus make right to left shunt visible. The sensitivity of transcranial doppler (TCD) to detect a PFO is also well established.⁷

PFO is common and might be an incidental finding, therefore PFO closure should be considered in carefully selected individuals only when no other plausible mechanism for stroke has been identified.⁸ Several meta-analyses also have

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confirmed that PFO closure reduces the risk of ischaemic stroke in patients with cryptogenic stroke and PFO.⁹⁻¹¹

Case History:

X, A young lady of 23 years who got married on 27 August 2021 developed dizziness, headache followed by weakness and inability to move right side of the body for several hours in the very next morning of her conjugal life after orgasm. She was unable to talk for couple of hours also. Then she was taken to a hospital and was under conservative treatment and finally she recovered spontaneously after couple of hours. The young lady was evaluated thoroughly by neurologist. Her physical examination revealed no

abnormality in any parameters and neurological examination was normal. Among investigations, her CBC, liver function test, renal function test, Prothrombin time, APTT and Electrolytes were found normal.

Twenty-four hours Holter ECG monitoring did not show paroxysmal atrial fibrillation. Serum C reactive protein <2 mg/L, serum thyroid-stimulating hormone 1.25 mU/L, plasma glucose 5.2 mmol/L, plasma homocysteine 10.1 µmol/L, Lipid profile was normal, anticardiolipin screen negative for IgG, IgM & IgA, antinuclear antibody negative, total creatine kinase 75 U/L, lupus anticoagulant negative, antithrombin III activity normal, protein C activity normal,

Chest X-ray revealed normal findings except right sided rudimentary cervical ribs. ECG findings were normal. Echocardiography revealed a 04 mm tunnel shaped Patent Foramen Ovale (PFO), left to right shunting, restrictive with aneurysmal tissue in the middle of IAS. There was no other left to right shunt lesion, intracardiac mass or vegetation. Her cardiac chamber dimensions and wall motion were normal. She had good biventricular function. There was a Cortico-subcortical T2-FLAIR hyperintense area with restricted diffusion in left parietal region along with no abnormal contrast enhancement on post gadolinium imaging of MRI of the brain indicating small acute left parietal infarct. Her MR angiography of the brain was normal. So, the PFO was considered the culprit for her cryptogenic stroke and decision was taken for transcatheter closure of the PFO. For that she got admitted on 14 September 2021 at Combined Military Hospital



Fig.-1: Patient X after device closure of PFO.



Fig.-2: ECG of patient showing no atrial fibrillation.

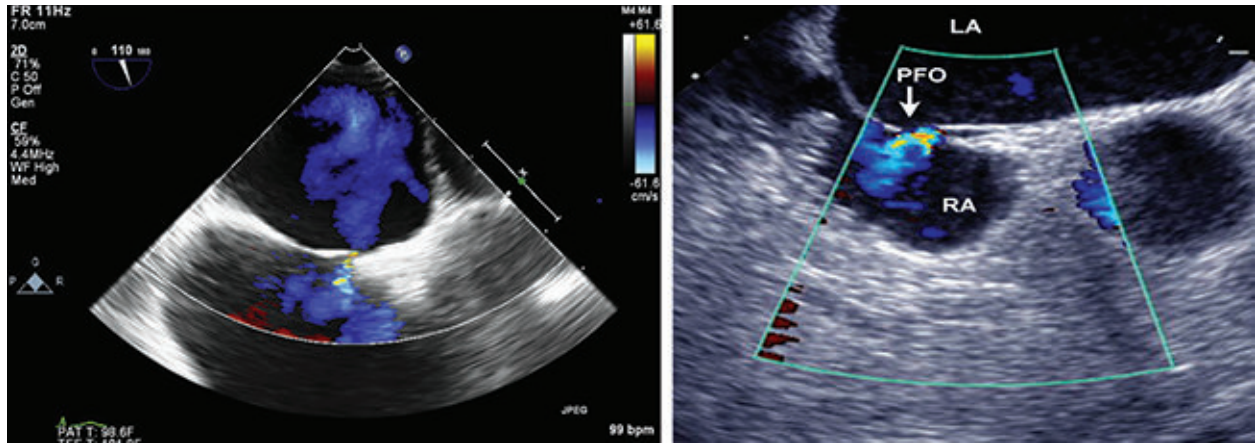


Fig.-3: Echocardiography showing PFO flow of patient X.

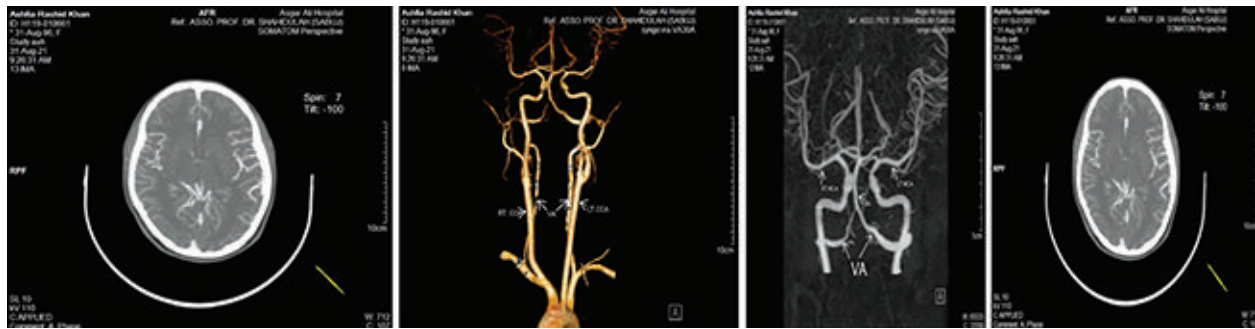


Fig.-4: MRI showed left parietal infarct.

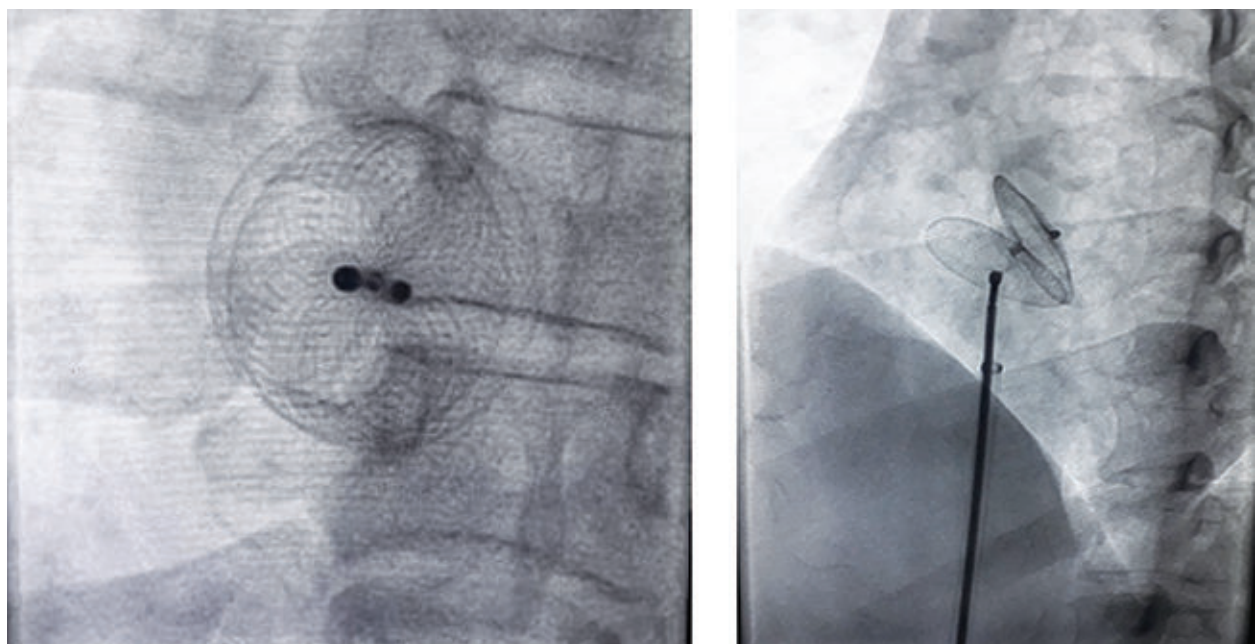


Fig.-5: Fluoroscopy showing PFO device in position

Dhaka and her PFO was closed with a 30 mm Cera™ PFO Occluder on 15 September 2021. She was then discharged on next day with advice to continue aspirin and clopidogrel.

Procedure:

After venous access a 6 Fr venous sheath was introduced over guide wire. PFO was crossed with the help of 0.035 X 260 cm Terumo® wire and 6 Fr GL catheter. Terumo wire was forwarded to let upper pulmonary vein (LUPV) and GL catheter followed up to LUPV. The Terumo wire exchanged with 0.035 X 260 cm super stiff exchange wire which was forwarded through the GL Catheter. The catheter was withdrawn. Patient was heparinized. A 10 Fr ASD delivery system was forwarded over the super stiff exchange wire. The exchange wire was taken out along with the dilator of the delivery system. Then an 18 X 25 mm Cera™ PFO occluder from Lifetech scientific, Schenzen loaded in to the delivery system forwarded through the ASD sheath and LA disc was released within the LA. The whole delivery system was pulled up to IAS but during tug test, the device dislodged to RA. After that a 30 mm Cera™ PFO occluder was deployed in the PFO under fluoroscopy guidance. After confirming the position of the device by TTE and fluoroscopy, the PFO occluder was released from delivery cable. Immediately after the device release, the patient developed transient atrial ectopics which was resolved spontaneously and ECG became normal. The patient was hemodynamically stable throughout the procedure. The patient received two doses of heparin, 50 unit/kg four hours apart. She was discharged next day with oral aspirin and clopidogrel with the advice to remain under follow up by both cardiologist and neurologist at 1,3,12,18,24 month of procedure and yearly thereafter.

Discussion:

Many recent data indicate that closure of PFO reduces the risk of recurrent stroke in carefully selected cases of cryptogenic stroke.¹² Benefit of closure is more in cases associated with large right to left shunt and ASA.

Approximately one third of ischemic stroke in USA are cryptogenic. In 1988, Lichat et al reported the correlation of PFO and stroke as he found 60 cases age less than 55 years had PFO in TEE who had

otherwise normal cardiac examination. Report since then showed prevalence of PFO in 30% to 40% cases of cryptogenic stroke.¹³

Surgical closure has been replaced by percutaneous closure with various devices as it is less hazardous. Food and drug administration (FDA) approves the procedure in cases where recurrence is common in spite of adequate anticoagulation.¹⁴ Several trials are going on till today on transvenous closure.¹⁵ Clinical introduction of Amplatzer PFO occlude (APO) (Abbott structural, Santa Clara, CA) with two opposing disc and thin waist make the closure convenient by sealing PFO.¹⁶ Other devices are also coming up with superior designs. In our centre, we are using Occlutech, Sweden and Lifetech, Shenzen Cera™ PFO occlude since 2012.

In our patient we used Cera™ PFO occluder from Lifetech. In our case, stroke was related to orgasm. A study reported on four women found PFO and no other obvious causes of their stroke after orgasm and paradoxical embolism was considered as cause.¹⁷ If PFO predispose stroke in such cases, they do so by allowing venous clot to enter into arterial circulation by paradoxical embolism when pressure of right side of heart is increased like with Valsalva maneuver. These persons are prone to venous thrombosis. Some of these cases has thrombophilia.¹⁸

So cryptogenic stroke cases need thorough work up by Neurologist, Cardiologist, Hematologist, Radiologist and multidisciplinary approach of management should be followed to decide management. Lifelong need for anticoagulation should be considered in some cases.

Conclusion:

The decision to close PFO with device can be considered for the prevention of recurrent cryptogenic stroke in younger patients aged >60 years after a thorough evaluation and discussion of pros and cons including benefits and potential risks (including but not limited to atrial fibrillation) of the procedure. The annual risk of stroke from PFO is relatively less than other mechanism, but cumulative risk in young individual who had prior stroke is substantial and benefit of closure has great impact. Thorough work up is indicated to exclude other causes of stroke as PFO is a common finding in one fourth of adult population.

Conflict of Interest - None.

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