



Role of Closure of Patent Foramen Ovale in Children with Cryptogenic Stroke: Incidence, Evidence and Guidelines

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Case Report

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Abstract

Patent foramen ovale (PFO) is post-natal persistence of interatrial communication and have shown to have association with various clinical manifestations including transient ischemic attack and strokes. The diagnosis of PFO requires transthoracic and transesophageal Echocardiogram. Closure of PFO with percutaneous device closure can prevent recurrence of strokes in selected patients with cryptogenic stroke and it has been included in recent guidelines also. In this mini review, we will discuss couple of cases of PFO closures followed by discussion upon recent guidelines on the same.

Keywords: Patent Foramen Ovale; Congenital Heart Defect; Stroke; Migraine; Device Closure

Abbreviations

PFO: Patent Foramen Ovale; TIA: Transient Ischemic Attack; ASD: Atrial Septal Defect; TOE: Trans Esophageal ECHO; TTE: Trans Thoracic ECHO.

Introduction

Patent foramen ovale (PFO) is persistent interatrial shunt with autopsy prevalence of as high as 27% [1]. PFO have been shown to be associated with migraine, decompression sickness, platypnea-orthopnea syndrome and even transient Ischemic Attack (TIA) or stroke. In cases involving brain infarction of indeterminate cause in young people, PFO has been confirmed in 40% of the cases [2]. We report 2 cases of cryptogenic strokes which were diagnosed with PFO during further evaluation.

Case Study

Case no. 1

An 8 year old girl had history of transient weakness of right half of body without loss of consciousness and each episode was lasting for about 30 minutes. She had 4 such episodes in last 2 years. Further workup showed normal brain MRI and electroencephalogram (EEG) but, echocardiogram showed small (4mm) Fossa ovalis atrial septal defect (ASD) with left to right shunt (Figure 1) and no other cardiac anomaly. She was started on Aspirin at antiplatelet doses in view of frequent episodes of TIA. She underwent device closure of ASD in April 2023 and is on follow up. At 1year after the procedure, she is asymptomatic and off Aspirin.

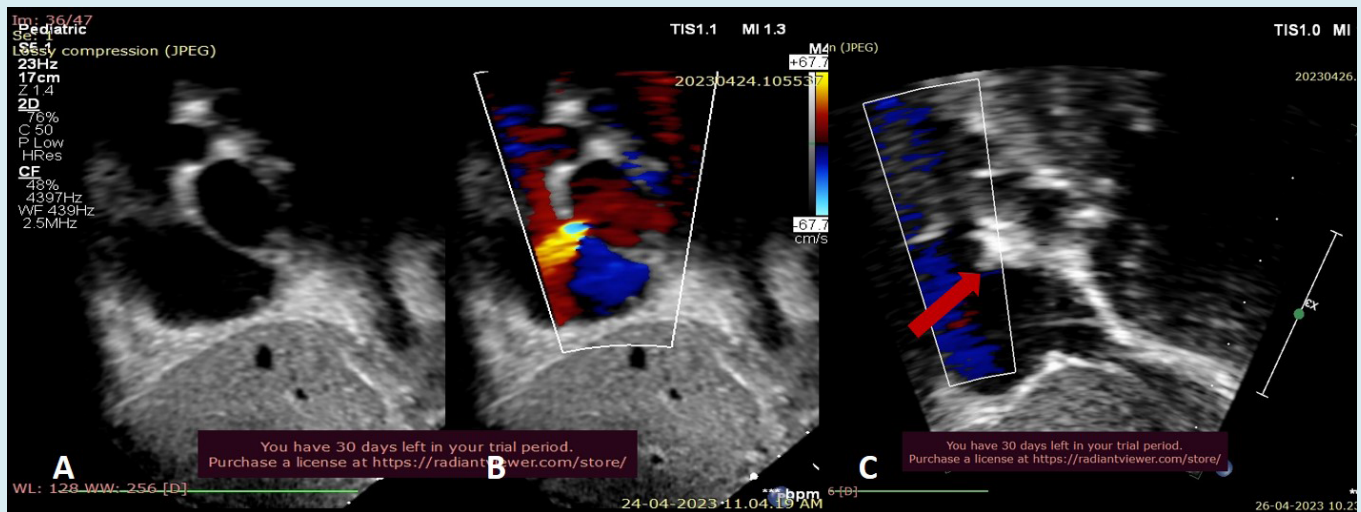


Figure 1: (A): 2D Echocardiogram done in subcoastal bi-caval view with colour interrogation; (B): showing small Atrial Septal defect shunting from left atrium to right atrium; (C): Subcoastal view in the same child after device closure showing device in situ and no residual shunt (red arrow).

Case no. 2

13year old boy had an episode of TIA in the form of right sided hemiparesis and heaviness in tongue. The episode lasted for 10 minutes with spontaneous recovery. He underwent MRI brain which was inconclusive and sleep and awake EEG was normal. Echocardiogram was suggestive of 5mm fossa ovalis atrial septal defect with no other cardiac structural defect. He was started on tab Aspirin and subsequently underwent successful ASD device closure. He is on follow up for 9 months after the procedure and there are no further episode of TIA.

Discussion

PFO is a remnant of normal fetal circulation, causing apparently no symptoms in infancy and can persist into adult life. The majority of the adults with PFO remain asymptomatic but transient episodes of right or left shunting across PFO exposes them to potential risks of cryptogenic stroke, acute embolic limb ischemia, migraine, decompression sickness and platypnea-orthopnea syndrome [3]. For the diagnosis of PFO, is highly specific but less sensitive and trans esophageal ECHO (TOE) is gold standard. In multi-centric Child-PFO study by Miton N, et al. [4] 41 children had underwent PFO closure out of which 31 were for TIA/stroke and none of their patients had delayed complications or recurrence of stroke during median follow up of 568 days [4]. 3 landmark trials RESPECT, REDUCE and CLOSE were major turning points after which PFO closure has been recommended by multiple guidelines like European Society of Cardiology published in Eurointervention (2018) and American Heart Association

published in 2021 [3,5]. 2021 AHA guidelines recommend PFO closure in patients with non-lacunar cryptogenic ischemic stroke after multidisciplinary team discussion [5].

Some of the clues of PFO being possible etiology for paradoxical embolic events include stroke at high altitude or during decompression, event that occurs shortly after Valsalva maneuver, the presence of atrial septal aneurysm or, large PFO with significant shunt and these patients should be considered for PFO closure after multidisciplinary team discussion.

Conclusions

The majority of the patients with PFO remain asymptomatic but few may develop critical and at times fatal symptoms. Patients with stroke require multidisciplinary team approach involving Pediatricians, Cardiologists, Neurologists etc, and about 50% of patients with cryptogenic stroke can have PFO. TOE is gold standard for the diagnosis of PFO and PFO closure can help in reducing risk of recurrent stroke in patients with cryptogenic stroke.

Conflicting Interest: None

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