CASE REPORT

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A Rare Cause to Consider in Sudden Vision Loss: Patent Foramen Ovale–A Case Report

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ABSTRACT

Patent foramen ovale (PFO) is a congenital septal defect resulting from the failure of closure of the interatrial communication that normally seals after birth. In conditions leading to a sudden increase in intrathoracic or intra-abdominal pressure, right-to-left shunting across the atria may occur, which may lead to cryptogenic stroke in children and young adults without traditional risk factors.

An 18-year-old woman experienced sudden unilateral vision loss 6 months ago, and no pathology was detected during the initial ophthalmological and neurological examination. Subsequent cardiac examination and echocardiography revealed a PFO. The patient, who had no comorbidities, attributed the sudden vision loss to the PFO, and percutaneous closure was performed. In patients presenting with transient sudden visual loss, clinicians should consider PFO in the absence of additional risk factors or when no definitive diagnosis can be established. In cases of cryptogenic stroke where the etiology is difficult to determine, it is crucial to evaluate for and manage a patent foramen ovale (PFO) to prevent recurrent strokes and permanent visual impairment. To the best of our knowledge, this case represents one of the few reported instances of transient visual loss associated with PFO in the literature.

Keywords: Patent foramen ovale, amaurosis fugax, cryptogenic stroke

Introduction

Amaurosis fugax, or transient monocular visual loss, refers to a sudden, temporary, and painless loss of vision in one eye, most commonly due to transient retinal or optic nerve ischemia. Although visual function typically recovers fully, recurrence indicates a substantial risk factor for future stroke and permanent visual impairment. (1) The diagnosis of amaurosis fugax is primarily clinical; however, additional studies are required to identify the underlying etiology. Fundus examination should be performed to rule out retinal causes, whereas carotid Doppler ultrasonography is utilized to evaluate carotid artery stenosis. Magnetic resonance imaging or computed tomography of the brain is recommended to assess for evidence of transient ischemic attacks (TIAs) or stroke. When cardioembolic etiology is suspected, echocardiography is utilized to identify possible cardiac sources of emboli. (2) Moreover, patent foramen ovale (PFO), commonly found in the general population, should be included in the differential diagnosis of TIA.

PFO is a septal defect found in 15%–35% of adults, resulting from incomplete closure of the tunnel-like structure between the septum primum and septum secundum that typically seals postnatally. (3) Sudden increases in intrathoracic or intra-abdominal pressure may result in right-to-left shunting, potentially leading to clinical consequences including myocardial infarction and stroke. Although most individuals with PFO remain asymptomatic throughout their lives, PFO may be implicated in cryptogenic stroke, especially in children and young adults without conventional risk factors for atheroembolic stroke. (4) Given the rarity of cases in the literature describing the association between unilateral acute visual loss and PFO, we deem it important to report our case. (5)

The role of PFO in cryptogenic stroke development involves the promotion of thrombus formation or the passage of thrombi from the venous to arterial circulation through the foramen ovale, thus circumventing pulmonary filtration and potentially resulting in cerebral ischemia. Establishing a direct causal relationship between PFO and stroke is difficult, as existing evidence is predominantly circumstantial. This requires a

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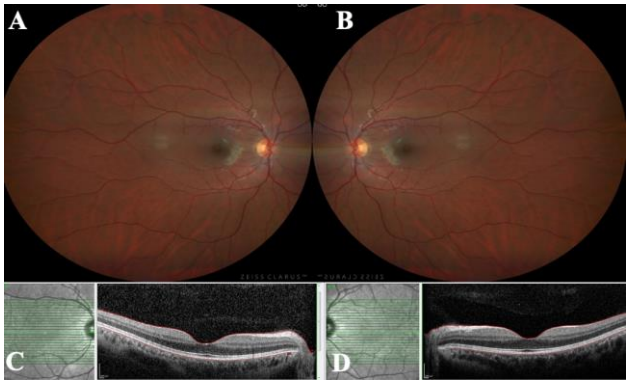


Fig. 1. Color fundus photographs and optical coherence tomography (OCT) images of the patient. (A, B) Color fundus photographs of the right and left eyes demonstrating normal appearance. (C, D) Cross-sectional OCT scans passing through the right and left fovea

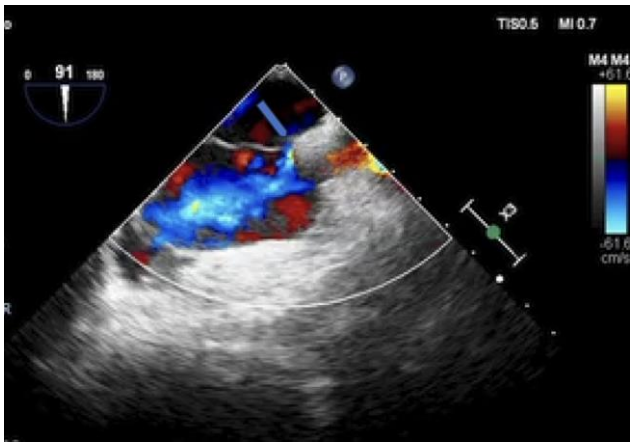


Fig. 2. Bicaval view on transesophageal echocardiography. Color Doppler demonstrates flow across the patent foramen ovale (PFO) from the left atrium to the right atrium (blue arrow). (Philips EPIQ CVx system, Philips Healthcare®, Andover, MA, USA)

comprehensive diagnostic assessment when attempting to associate TIAs with PFO. The Risk of Paradoxical Embolism (RoPE) score is commonly employed to evaluate the risk of a causal association between stroke and PFO. The score includes the lack of vascular risk factors, including hypertension, diabetes, previous stroke or TIA, and smoking, together with age and the presence of a cortical infarct on imaging. Within this 0–10 point scale, patients with scores of 0–3 have a 0% probability of stroke being attributable to PFO and a 20% risk of recurrent stroke/TIA within 2 years. Conversely, individuals with scores of 9–10 demonstrate an 88% probability of stroke being PFO-related and a 2% risk of recurrence within 2 years. (6)

Case Report

An 18-year-old female patient experienced a sudden episode of painless unilateral visual loss six months before presentation. The episode developed abruptly while she was in a seated position, lasted approximately 20 minutes, and resolved spontaneously without residual visual impairment. Because her vision recovered completely, she did not seek immediate medical attention. Three months later, she experienced a second episode of transient monocular visual loss with similar characteristics. Following this recurrent event, she presented to the ophthalmology outpatient clinic for further evaluation. Visual acuity was 1.0 in both eyes. Direct and consensual light reflexes were present bilaterally, and no relative afferent pupillary defect was observed. Intraocular pressure was within normal limits in both eyes. Anterior segment examination revealed no pathology. Fundus examination showed normal optic discs, central and peripheral retina in both eyes. Visual field testing revealed no bilateral scotomas. Optical coherence tomography demonstrated normal retinal layers. (Figure 1)

During the initial examination, no pathological findings were observed. Considering amaurosis fugax, the patient was referred for etiological evaluation to neurology and cardiology outpatient clinics. Neurological examination revealed no abnormalities, and the patient subsequently presented to cardiology. Cranial magnetic resonance imaging showed no evidence of acute ischemic infarction or other intracranial pathology. Physical examination showed stable vital signs, with a blood pressure of 110/70 mmHg. She had no known medical conditions, no relevant family history, and was not on any medications; she reported occasional cigarette use.

Laboratory investigations including complete blood count, electrolyte levels, coagulation tests, C-reactive protein, lipid profile, homocysteine, anticardiolipin antibodies, and carotid Doppler were all within normal limits. Electrocardiography demonstrated normal sinus rhythm without abnormalities. Transthoracic echocardiography (TTE, Philips EPIQ CVx system, Philips Healthcare®, Andover, MA, USA) revealed a left ventricular ejection fraction of 65%, normal valvular function, and evidence of interatrial shunting with agitated saline. A transesophageal echocardiography (TEE, Philips EPIQ CVx system, Philips Healthcare®, Andover, MA, USA) was subsequently planned. TEE identified a 3 mm

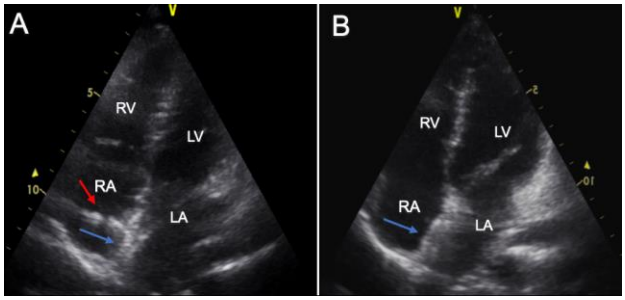


Fig. 3. Transthoracic echocardiography (TTE) images obtained during and after PFO closure. (A) TTE image during the procedure showing the device prior to deployment in the PFO. (B) Post-procedural image demonstrating the deployed PFO closure device. (RV, right ventricle; RA, right atrium; LV, left ventricle; LA, left atrium; red arrow, delivery system; blue arrow, PFO closure device). (TTE, Philips EPIQ CVx system, Philips Healthcare®, Andover, MA, USA)

long, tunnel-type, simple patent foramen ovale (Figure 2).

The patient was re-evaluated by the ophthalmology, neurology, and cardiology teams to assess the indication for PFO closure. Although no ocular pathology was detected, the history of recurrent unilateral transient visual loss was considered highly suggestive of recurrent transient ischemic attacks. The Risk of Paradoxical Embolism (RoPE) score, used to estimate the likelihood of a causal relationship between PFO and cryptogenic ischemic events, was calculated as 8 based on the patient's age, absence of hypertension, diabetes mellitus, previous stroke or transient ischemic attack, smoking status, and cortical infarction status on cranial imaging. In the absence of an alternative identifiable etiology, the recurrent ischemic nature of the events together with the presence of a PFO supported the diagnosis of PFO-associated TIA, and percutaneous PFO closure was recommended. PFO closure was successfully performed under TTE guidance using a 20 mm Amplatzer Occluder device without complications (Figure 3). Follow-up echocardiography revealed no residual contrast passage. Post-procedure, the patient was started on acetylsalicylic acid 100 mg once daily and clopidogrel 75 mg once daily. During 1 year of follow-up after percutaneous PFO closure, the patient remained asymptomatic, with no recurrent episodes of transient visual loss, transient ischemic attack, or other neurological events. Follow-up transthoracic echocardiography demonstrated a well-positioned occluder device without residual interatrial shunting.

Discussion

The present case report describes the clinical features, diagnosis, and management of an 18-year-old female patient who experienced sudden unilateral visual loss associated with cryptogenic stroke linked to a PFO. The patient's presentation was atypical considering her age, absence of conventional cardiovascular risk factors, and lack of significant family history. Pediatric stroke is rare, with an estimated incidence ranging from 2.5 to 13 per 100,000 person-years.[7] This case highlights the importance of investigating potential etiologies of cryptogenic stroke, including congenital cardiac defects such as PFO, even in patients presenting with amaurosis fugax and lacking obvious predisposing factors.

The association between PFO and cryptogenic stroke remains a matter of debate. Studies have shown that 40–50% of individuals with cryptogenic stroke may have a PFO.[8] While a significant association between PFO and stroke has been demonstrated in adults over 55 years of age, the relationship is less clearly established in younger populations.[9,10] A meta-analysis conducted by Alsheikh-Ali et al.[11] reported that approximately one-third of PFOs identified in patients with cryptogenic stroke were likely incidental and unrelated to stroke. Despite this finding, the contribution of PFO to stroke pathogenesis—particularly in the pediatric population—remains an active area of investigation with important implications for clinical management. The present case report further supports the need for comprehensive cardiac evaluation in young patients presenting with transient visual loss thought to be related to cryptogenic stroke.

Key risk factors for PFO-associated stroke include young age, PFO size, the degree of right-to-left shunting, PFO morphology, and the presence of an atrial septal aneurysm. Additional factors such as coagulation disorders and other atrial anomalies (e.g., right atrial septal pouch, Eustachian valve, or Chiari network) may further increase the risk of embolic events, either independently or synergistically.[12] RoPE score is commonly used to estimate the likelihood that a stroke is attributable to PFO. The RoPE score incorporates the absence of vascular risk factors such as hypertension, diabetes, prior stroke or TIA, non-smoking status, age group, and the presence of cortical infarction on imaging. Based on a 0–10 point scale, patients with a score of 0–3 have a 0% probability of stroke being attributable to PFO and a 20% risk

of stroke/TIA recurrence at 2 years, whereas patients with a score of 9–10 have an 88% probability of PFO-related stroke and only a 2% risk of recurrence within 2 years.[6] In the present case, the patient's RoPE score was calculated as 8, indicating an 84% probability that the stroke was attributable to PFO.

The management of PFO in patients with cryptogenic stroke remains a subject of debate. Antithrombotic treatment options include antiplatelet agents (e.g., aspirin and clopidogrel) and anticoagulants (warfarin, heparin, and oral anticoagulants), with no significant difference in efficacy observed in the absence of atrial fibrillation.[13] However, the recurrence rate of neurological events is higher with medical therapy (5.0 events per 100 person-years) compared to PFO closure (0.8 events per 100 person-years), highlighting the superiority of closure, particularly in patients under 60 years of age. A history of transient ischemic attack is considered one of the indications for closure in patients with PFO.[14] In the present case, following multidisciplinary discussions, PFO closure was determined to be beneficial in preventing future strokes, and the patient was started on dual antiplatelet therapy with aspirin and clopidogrel after the procedure.

In conclusion, this case report highlights the critical role of PFO as a potential cause of cryptogenic stroke presenting with acute unilateral visual loss in an otherwise young and healthy individual. In patients with transient ischemic attacks, clinical findings may resolve over time, making diagnosis challenging. Therefore, in patients presenting with acute unilateral visual loss suspected to be secondary to an embolic event, evaluation for PFO should be considered. To the best of our knowledge, reports describing transient monocular visual loss associated with patent foramen ovale remain exceedingly rare. The present case adds to the limited literature and highlights the importance of considering PFO in the differential diagnosis of cryptogenic transient visual loss, particularly in young patients without conventional vascular risk factors.

Abbreviations

PFO: Patent foramen ovale

RoPE: The Risk of Paradoxical Embolism

TIA: Transient ischemic attack

TEE: Transesophageal echocardiography

TTE: Transthoracic echocardiography

Ethics Committee Approval: This is a single case report, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Patient consent was obtained and is available upon request.

Conflict of Interest: The authors declare no conflict of interest.

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