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Beyond the Heart: Enlightening the Link between the Patent Foramen Ovalle and Migraines

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Abstract

BACKGROUND: Cholinergic urticaria (CholU) is a condition characterized by small, highly pruritic wheals triggered by sweating. Treatment with histamine H1-receptor antagonists (H1RAs) is often insufficient.

CASE PRESENTATION: We report the case of a 20-year-old male who developed CholU following a period of physical inactivity with reduced sweating. Symptoms were reproducibly triggered by exercise or emotional stress and were most severe after prolonged inactivity. The patient undertook a self-directed desensitization approach using weekly dry sauna bathing. Over eight weeks, he experienced progressive improvement, with complete resolution of symptoms that was sustained with continued sessions.

CONCLUSION: This case suggests that controlled, repeated sweating may reduce disease activity in selected patients. Sauna bathing may represent a feasible, low-cost, non-pharmacologic adjunct in CholU that warrants further investigation.

Introduction

Migraine is the most common type of headache presented by recurrent throbbing pain, in most cases on just one side of the head, including the eye area. It is differentiated by the presence or absence of an aura. Commonly followed by vomiting, nausea, photophobia and phonophobia; furthermore, episodes last 4 – 72 hours. Even though migraine is mostly comprehended from a neurological perspective, the cardiac conditions have a crucial impact on the occurrence of the migraine as well.

In the past thirty years, the prevalence increased by 58.15%; moreover, the incidence increased by 42.06%. The DALYs also increased by 58.27 %. Female individuals have higher absolute rates of migraine incidence and prevalence. Furthermore, adolescents under the age of 20 have the fastest growth in prevalence and DALYs [1].

The pathophysiological mechanism of the migraine is based on a neurological and vascular factors. It involves interactions between brain, blood vessels and the trigeminal nerve.

Due to low levels of the serotonin, the neuronal excitability increases even to normal stimuli. This happens in the prodrome phase. The following phase is presented by occurrence of aura and includes cortical spreading depression and vasoconstriction due to the Increased serotonergic activity at 5-HT_1 receptors. Cortical spreading depression (CSD) is a slow wave of neuronal hyperactivity followed by a depression of electrical activity that spreads across the cerebral cortex. CSD causes initial activation of the trigeminal nerve, but the headache does not occur until the third phase.

Headache phase is presented by low level of serotonin leading to additional activation of the trigeminal nerve. Moreover, trigeminal nerve releases calcitonin gene-related peptide and substance P leading to vasodilatation of the meningeal blood

vessels and increased sensitivity of the nerves that causes throbbing headache [2]. The postdromal phase is sometimes explained by the persistent activation of the brainstem that causes tiredness [3].

The genetics plays a significant role in the occurrence of the migraines. A recent study shows that 28 genetic loci associated with headache, and 14 of them associated with migraines had missense mutations [4], [5].

In addition, in the mechanism of the migraine a crucial role is assumed by the patent foramen ovale (PFO) [6]. PFO is a remnant of the fetal circulation and plays a significant role in the manifestation of migraines associated with aura. The microemboli and metabolites such as serotonin from the venous system, via the PFO, enter the systemic circulation and irritate trigeminal nerve and brain vasculature, which triggers migraine. The microemboli can lead also to scattered ischemic foci in the brain.

Our study aimed to determine the contribution of PFO in migraine occurrence.

Material and methods

This retrospective, non-randomized, non-controlled study analyzed a cohort of patients with migraine, including both male and female participants. The study included 18 patients with migraine manifestations during 2024. 17 of them are women, and 1 is a man (39 years old). The average age of the female patients is 38 years old; the age ranged from 27 to 53.

Furthermore, we divided the female patients into two subgroups according to their type of migraine. The first subgroup contains 12 patients presented with migraine with visual aura; the other subgroup contains 5 patients with migraine without aura.

Additional examinations have been made like MRI whose findings are unremarkable. However, because of the persistent symptoms, transcranial Doppler was performed. The findings were positive, showing changes in blood flow on a. cerebri media.

To fully establish the shunt, transesophageal echocardiography was conducted. Besides, the transthoracic echocardiography showed thin interatrial septum in some patients.

Results

The results show that 6 of the patients with migraine with aura in the TEE findings have patent foramen ovale, 1 patient has atrial septal defect and 5 of them have no interatrial septal abnormality.

Table1: TEE Findings in Patients with Migraine with Aura

Finding	n	(%)
Patent foramen ovale	6	50
Atrial septal defect	1	8
No interatrial septal abnormality	5	41
Total	12	100

Patent foramen ovale was detected in 50 % of the patients with migraine with aura, while the remaining 50 % have shown no evidence of patent foramen ovale.

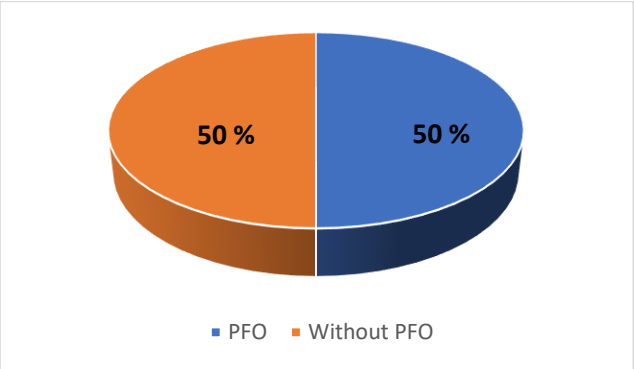


Figure 1: Distribution of patent foramen ovale (PFO) in patients with migraine with aura

Atrial septal defect was detected in 8 % of the patients with migraine with aura, while the remaining 92 % have shown no evidence of atrial septal defect.

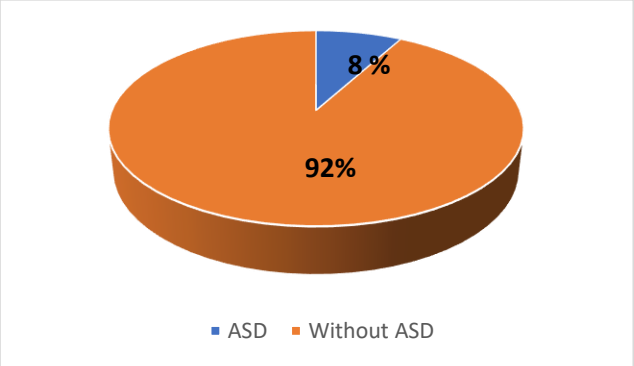


Figure 2: Distribution of atrial septal defect (ASD) in patients with migraine with aura

Discussion

This cohort study shows that there is a high prevalence of patent foramen ovale in patients presented with migraine with aura, approximately in the 50 % of them the TEE findings were positive. This suggests that interatrial shunts may be common in this subgroup of migraine patients.

Additionally, considering all the cardiac anomalies, 58 % of the patients were presented with them. Our results indicate a potential association

between migraine with aura and underlying cardiac anomalies.

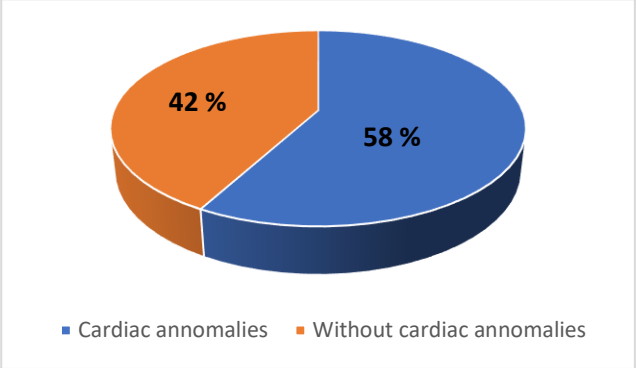


Figure 3: Prevalence of cardiac anomalies in patients with migraine with aura

Therapeutic options for patients with migraine include Triptans, which are given in acute phase. In selected cases, calcitonin gene related peptide inhibitors and SSRIs are used as a preventive therapy or when the patent foramen ovale has reduced diameter or when triptans are not effective.

In patients with confirmed PFO, additional therapeutic strategies may include antiplatelet therapy, and last but not least a patent foramen ovale closure which is associated with a significant reduction in the symptoms [7].

Because of the strong cardiological bond in patients presented by neurological symptoms, an interdisciplinary approach is needed in order to set the correct diagnosis and effective treatment.

Conclusion

This study implies a relatively high prevalence of cardiac anomalies, such as patent foramen ovale and atrial septal defect, in patients with migraine with aura. Because of the potential association between interatrial shunts and pathophysiology of the migraine, it is essential that we consider cardiological background in the diagnostic process of the migraines. Moreover, patent foramen ovale screening has clinical value in patients with common and therapy resistant migraines with aura.

Nevertheless, further studies involving larger patient groups are necessary to confirm this correlation and to evaluate the potential benefit of PFO closure in this cases.

Understanding the link between migraine with aura and cardiac abnormalities may open new perspectives in diagnosis and management.

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