

Role of Autonomic Function Test In Migraineur Associated With Patent Foramen Ovale

Radhi F. Shlash*

Faculty of Medicine/ University of Al-Qadisiyah/Iraq, 58001

Abstract

Background: Numerous researchers have stated an essentially greater occurrence of patent foramen ovale (PFO) in sufferers by a migraine with aura. Additionally; numerous references suggested a concomitant development of migraine signs next PFO cessation. Certain researcher require accentuated a great level of vasoactive substance pushed to the left current through consuming PFO will cause migraine assaults. The pushing of vasoactive substances toward the leftward circulates sooner or later has its effect on the autonomic feature.

Aim: have a look at the autonomic alterations in migraineur all through the ictal section to confirm if PFO eliciting migraine assaults.

Patients and Methods: The study blanketed one hundred and twelve sufferers; meet with the global headache Society standards version 2 aimed at main sporadic migraine, inside organization of age twenty to forty years of whatever gender. Altogether individuals experienced chest Echocardiography. The self-assessment feature exam (Expiratory-inspiratory (E: I ratio), status toward mendacity ratio (S/L ratio), thirty to fifteen ratio, hand Grip test and Valsalva ratio turned into completed within a branch of neurology under optimum laboratory environments.

Results: of one hundred and twelve migraine sufferers, thirty-four (30.4%) persons possess PFO (MPFO) plus seventy-eight (69.6%) not possesses PFO (MN). Migraine sufferers having charisma had been twenty-eight/ one hundred and twelve (25%), MPFO possesses an air of secrecy eighteen/thirty-four (52.9%) oppose ten/seventy-eight (12.8%) MN individuals, an air of secrecy remains appreciably better in MPFO P amount <0.05. The implied values for E: I ratio, S/L ratio, thirty to fifteen ratio, Valsalva ratio and hand Grip test diastolic blood pressure is 1.17, 1.18, 1.19, 1.32, 9.4 mmHg respectively in MPFO compared to 1.43, 1.35, 1.23, 1.41, 15.8 mmHg in MN respectively. All previous tests are significantly impaired in MPFO P value < 0.05. The study showed that patients with MPFO had a significantly higher association with aura and markedly impaired AFT during the ictal stage compared to MN.

Conclusion: Patients with MPFO have more aura incidence and markedly deranged autonomic function; accordingly we can suggest that PFO is a trigger factor for a migraine or making migraines more vulnerable to external triggers and results seem to suggest that PFO and aura have causal relation rather than comorbid association. The results affirm the responsibility of PFO in the pathophysiology of migraine trigger.

Keywords: patent foramen ovale (PFO), Autonomic Function Test, migraine, aura,

INTRODUCTION

A migraine defined as major, long-lasting-discontinuous neurovascular headache upset categorized by periodic extreme headache followed by loss of functions of the autonomic nervous system besides in particular person, temporary neurologic signs recognized as sick headache aura [1, 2]. It's a second most common cause of a headache, the periodic occurrence of disease range approximately from eleven percentage in male to twenty percentage in girl individual, and the mean reaches sixteen percentage[3]. Apathophysiology of a migraine is multipart and stay ambiguous, but, hereditary and environmental factor plays a significant role in migraine pathology. Hereditary consequences, along with autosomal abundant inheritance and imperfect penetrance [4] with coexistent inheritance have been mentioned [5]. The dominant hypothesis concerning the migraine pathogenesis is a genetic nervousness of some complexes of the brain that, once elicited with the aid of precise internal or external factors, ends in a series of activities which lead to a headache, similarly to a multitude of other symptoms [6].

The brain of the hemicrania is particularly delicate to environmental and physical stimuli; a sick headache prone patient does not familiarize easily to sensual stimuli. This sensitivity is amplified in females during the menstrual cycle. Cephalalgia can be initiated or amplified by various triggers [7]. Several researchers investigated a reliable

amelioration of migraine signs and subsequent patent foramen ovale block in a patient who had suffered a stroke [8-13]. The higher occurrence of the right to left shunt (RLS) besides PFO and gloriole were observed in patients with a migraine without aureole and manage content material [10,14,17]. At the present time, it is not clear whether or not this affiliation is incidental or a casual courting. despite the fact that some source has emphasized its title role within the pathophysiology of charisma [15]. PFO does now not appear to have an effect on the medical manifestations of a migraine with aura [18] and the degree of RLS fails to correlate with the severity of the clinical presentation of the disorderliness [19], several recent studies link the presence of a RLS by PFO as a trigger of migraine attacks [4, 6, 13, 18, 20]. The prevalence of PFO in autopsy studies in general population about 15-35%, [twenty-one to twenty-three] and seems to decline by age [21]. Transesophageal echocardiography reports established the prevalence of twenty-four percentages, which is comparable to dissection studies [24]. Recent studies have noted that Transthoracic echocardiography possesses the same precision in the recognition of right to left atrial shunt [25-27] also it is known that (once the resolution of the image is fine). Transthoracic echocardiography more reliable and detectable in the recognition of patent foramen ovale [28, 29].

PFO is more not unusual in migraineurs with aura than in the widespread population and it's far discovered in about 40% - 60% of humans who have a migraine with aura in comparison to 20% -30% of people inside the fashionable populace [8]. Despite the fact that a migraine with out aura has been studied less drastically, it does no longer appear to be associated with a growth in the superiority of PFO [14]. but, it is unclear if there's a causal dating or without a doubt a co-life of these conditions. PFO bills for ninety-five% of all proper-to-left shunts [30]. It can be assumed that blood streaming beginning from right to left atrium, crossing from the normal filtering activity of the lungs, permits for paradoxical emboli and/or higher concentrations of vasoactive retailers such as atrial natriuretic peptide, platelet elements, amines, and vasodilators (such as nitric oxide (NO), serotonin and bradykinins) or other migraine triggering substances to approach the brain and elicit migraine assaults [12]. Thrombocytes normally produce serotonin and is usually oxidized by pulmonary monoamine oxidase (MAO) enzyme. Thrombocytosis (elevated circulating platelets levels) has been revealed in migraine patients [31] accompanied with the existence of a patent foramen ovale, serotonin is pushed away from the lungs and is assumed to elicit a migraine [32]. Some other assumed mechanism in the existence of a patent foramen ovale that influence towards a migraine is hypoxia or thrombosis which endorsing subclinical ischemic heart diseases and inconsistent embolism [33-35]. Temporary hypoxemia due to shifting of the bloodstream by the patent foramen ovale triggers brain microinfarcts resulting in irritation besides a bent for a migraine [32,36]. Latent and strain deoxygenation associated with a left to right way throughout a patent foramen ovale had been established within nonappearance of pulmonary emboli [37].

In 1930 Harold Wolf reported on the autonomic nervous system involvement in a migraine headache.[38] Autonomic symptoms can occur during the pain phase[39,40] as different types of autonomic dysregulation[41, 42], or during normal daily activity between the attacks in which patient may have sympathetic instability and parasympathetic hypofunction [43,44].The right-to-left shunts have a role in triggering migraine assaults [12]. Movement of vasoactive agents to the left ultimately requires its impact on the autonomic feature. Hence we intend to look at the characteristic features of the autonomic nervous system in migraine patients at an ictal level in order to determine if a patent foramen ovale is played a major role in triggering a migraine.

PATIENTS AND METHODS

The current study was performed in the Department of Neurology in Al-Diwainyah teaching hospital in association with the Department of Medicine, between October 2013 and April 2015. The study includes individuals agreed to the global headache Society standards version 2 on behalf of Principal intermittent migraine attending outpatient neurology clinic, home approved to contribute in this study, of each gender within age ranged between twenty to forty years. The patients have neurological disorders, comorbid chronic physical illness:

hypertension, arrhythmia, coronary artery disease, diabetes mellitus, uremia, features of polyneuropathy, infectious disease, any recent stressor, already taking drugs such as antihypertensives, triptans, ergots and oral contraceptives female at menstrual period were excluded from the study.

All participants underwent transthoracic Echocardiography by the Vivid 7 procedure (Overall Electronic, Milwaukee, Wisconsin DC, USA) close-fitting through a 4.31 MHz probe with several frequencies and coordinated photography. To improve visualization of the atria, ventricles and intertribal septum, the apical four-compartment view was used for this purpose.

Each individual had an atypical auditory window or atypical resolution of the images was excluded from this study, 112 eligible patients 42 male (37.5%) and 70 female (62.5%) were examined in the neurology department under similar laboratory conditions. The procedures were explained to them before actual assessment. All the measurements were performed in an isolated quiet air-conditioned room, and conducted during the morning hours, in a single meeting. Autonomic function tested (AFT) by ECG recording from standard leads using the student physiography machine (INCO), while the blood pressure was measured under standard procedure by mercury sphygmomanometer with the Korotkoffs sound technique^{45, 46}, according to the American Heart Association Recommendations for Blood Pressure Measurement.⁴⁷

Expiratory-inspiratory (E: I ratio): The examination was conducted in the supine location. It's begun with a latent period which provides the relaxation time to the patient then asked to breathe 6 breaths per minute. ECG reported one-minute starting point prior to pursuing to the deep breathing exam. E: I ratio is the lengthiest RR interval throughout expiration/ shortest RR interval throughout inspiration from five cycles.

Stand-up to lying ratio (S/ L ratio): In this test, every patient requested to stand gently and subsequent lie down without helping whereas an incessant ECG was reported from twenty beats prior to sixty beats after lying down. S/L ratio is a longest RR period at five pulses earlier than mendacity down / shortest RR period throughout ten pulses afterward recumbent.

Thirty to fifteen ratios: after laid gently for 3 minutes, each patient put up and keep on immobile with a non-prevent ECG become reported. 30:15 ratios is an interval at beat 30 after status /RR period at pulse fifteen after reputation.

Valsalva ratio: after deep expirations, the sufferers had been made to blowing in opposition to locked glottis by a mouth part associated with an aneroid manometer and kept a stress about forty mm of Hg for fifteen seconds. a non-stop ECG became registered one minute in advance than (resting duration), sooner or later of 15 seconds and 1 minute next to strain duration. The vials lavas ratio is most RR interval next to the strain/ shortest RR period in the path of the strain.

Handgrip test: Patients were requested to apply sustained compression on the standardized hand grip, at 30% maximum voluntary contraction for one minute, before and

during one-minute blood pressure was observed. The variance of diastolic blood pressure prior and throughout the maneuver was calculated.

Data Analysis

Parametric statistical analyses were accomplished by Student t-tests using statistical package for social science (SPSS) software version 10. All Values are stated by means of means \pm standard deviation (SD). The limit of significance was set at 5%.

RESULTS

Of one hundred and twelve migraine sufferers, thirty-four (30.4%) migraineur having patent foramen ovale (MPFO) and 78 (69.6%) migraineur not having patent foramen ovale (MN). The mean resting systolic and diastolic blood pressure were 112.4 ± 3.4 , 81.5 ± 3.2 mmHg respectively for MPFO wherein MN it was 110.1 ± 3.1 , 84.2 ± 4.1 mmHg respectively. no statistical vast distinction became determined for each p values > 0.05 . The mean resting pulse rate for MPFO and MN were 77.9 ± 5 and 82.5 ± 6.1 respectively. There is no obvious statistical significant for the result P value > 0.05 . Patients with migraines with aura were twenty-eight /one hundred and twelve (25%), MPFO possessing aura eighteen/thirty-four (52.9%) oppose ten/seventy-eight (12.8%) patients with migraines, the aura revealed significant elevation in MPFO (P < 0.05).

DISCUSSION

The study showed that patients with MPFO had a significantly higher association with aura and markedly impaired AFT including; E: I, S/L, 30:15, Valsalva ratio and HG/DBP rise during the ictal stage compared to MN. MPFO have a higher association with aura agreed with

previous studies [10, 15-17] that show more incidence of PFO in migraineurs with aura. Moreover, topics with atypical structures of aura had 4-fold larger odds of having a PFO compared with patients with typical aura [48, 49]. Even, if we agreed that PFO and migraine could be a co-inherited disease with a comorbid association [4], our results seem to suggest that PFO and aura have causal relation rather than comorbid association.

There was no significant difference regarding the mean resting blood pressure and Pulse rate in both migraineurs with patent foramen overland migraineur without patent foramen ovale that proves the standards of laboratory conditions of the study and the similarity of both groups at resting conditions.

The AFT is significantly impaired in MPFO compared to MN, consequently; the PFO is seemed to be implicated in autonomic derangements in these patients. Our result is consistent with the findings of greater autonomic impairment in migraineurs with aura than without aura [50]. The alteration in autonomic nervous activity in MPFO can be explained either direct of shunted vasoactive chemicals or PFO influences on autonomic response to pain [51, 52].

Thus, we can assume the role of PFO in the pathogenesis of migraine trigger. This is supported by significant improvement in migraine symptoms following PFO closure. [9-14] And the higher incidence of migraine attacks in patients with RLS [53]. With the evidence of a relationship between atypical migraine aura and RLS that appears to effect meaningfully the ischemic attack risk independently of cardiovascular risk factors [48].

Table (1): Mean values of autonomic function test, regarding migraineur not having a patent foramen ovale and migraineur having patent foramen ovale.

AFT	MPFO	MN	P value
E: I	1.17	1.43	< 0.05
S/L	1.18	1.35	< 0.05
30/15	1.19	1.23	< 0.05
Valsalva ratio	1.32	1.41	< 0.05
HG/DBP rise	9.4 mmHg	15.8 mmHg	< 0.05

MPFO- migraineur having patent foramen ovale, MN-Migraineur not having a patent foramen ovale.

Table (2): Meanresting Blood Pressure and Pulse rate in both migraineur with patent foramen oval compared to migraineur without patent foramen ovale.

Parameter	A migraine with PFO	A migraine without PFO	P
Mean Systolic BP	112.4 ± 3.4	110 ± 3.1	> 0.05
Mean Systolic BP	112.4 ± 3.4	110 ± 3.1	> 0.05
Mean diastolic BP	81.5 ± 3.2	84.2 ± 4.1	> 0.05
Mean Pulse rate	77.9 ± 5	82.5 ± 6.1	> 0.05

Table (3): Association between aura and patent foramen ovaling migraine patients

Parameter	A migraine with PFO		A migraine without PFO		P
	N	%	N	%	
Aura	18	52.9	10	12.8	< 0.05
No aura	16	47.1	47.1	68	
Total	100.0	78	78	100.0	

A higher frequency of migraine attacks in patients with CHD without an intracardiac shunt, suggests additional mechanisms to explain the significant association of PFO with A migraine [54].

CONCLUSION

This research article finds that patients with MPFO have more aura incidence and markedly deranged autonomic function; accordingly, we can suggest that PFO is a trigger factor for a migraine or making migraines more vulnerable to external triggers.

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