Atrial Septal Aneurysm in Young and Middle Age Patients with A New Paroxysm of Atrial Fibrillation in Babylon Province

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Abstract

Background and Objectives: Atrial fibrillation is one of the most common atrial arrhythmia , it may be associated with alote of structural and functional cardiac causes . The Aim of this study was to evaluate a possible causal relationship between ASA (atrial septal aneurysm) and the occurrence of paroxysmal AF in young and middle age patients , and reporting of some other structural and pathological abnormality diagnosed by standard transthoracic echocardiography.

Design and Methods: This study was involved young and middle age groups (20-55 years), itincluded 339 patients with new paroxysmal atrial fibrillation , but 37 of them was excluded from the study, (male 250 and female 52) with additional 300 control group. All patients were examined By standard transthoracic echocardiographic protochol that involve two dimension (2D) , M-Mood and dopplar , looking for possible cardiac structural causes for the new onset paroxysmal atrial fibrillation and special attention was made to the inter atrial septum.

The Results: The paroxysmal atrial fibrillation is more with 41-55 years age group that represents 65.56% of patients , while the age group 20-40 years which give 34.44%. The paroxysmal atrial fibrillation is more in male group (82.78%), than female group (17.22%) . The paroxysmal atrial fibrillation patients show many associated heart abnormalities (acquired and congenital diseases) by echocardiographic results, and specifically, the ASA is 17.21% in AF patients. The highest percentage of ASA are 21.2% in the age group 41-55 years old, and 18.4% in male group, with significant relationship between them(P value < 0.05, odds ratio is 12.3, chi-square is 42.64 , 95% confidence interval 4.8-31.19).

Conclusion: Echocardiography has a significant role in the diagnosis of causes of AF. There is a strong association of ASA and the onset of new paroxysmal AF, More for those patients older than 41 years old , more in male than female.

Keywords: new/paroxysmal atrial fibrillation (AF), transthoracic echocardiographic machine (TTE), atrial septal aneurysm (ASA).

الخلاصة

الأهداف: لتقييم العلاقة السببية المحتملة بين تمدد الجدار الفاصل بين الاذينين وحدوث ارتجاف اذيني اانتيابي في الشباب والمرضى في منتصف العمر، والإبلاغ عن بعض شذوذ الهيكلية والمرضية الأخرى التي تم تشخيصها بواسطة تخطيط صدى القلب عبر الصدر.

التصميم والطرق: شملت هذه الدراسة الفئات العمرية الشابة والمتوسطة (٢٠–٥٥ سنة)، وشملت ٣٣٩ مريضا يعانون من الرجفان الأذيني الانتيابي الجديد، ولكن ٣٧ منهم تم استبعادهم من الدراسة، (الذكور ٢٥٠ والإناث ٥٢) مع ٣٠٠ إضافية مجموعة التحكم. تم فحص الجميع بجهاز صدى القلب بلطريقة القياسية المعتمدة عالميا و تم تثبيت النتائج .

النتائج: الرجفان الأذيني الانتيابي هو أكثر مع الفئة العمرية ٤١ –٥٥ سنة التي تمثل ٦٥.٥٦٪ من المرضى، في حين أن الفئة العمرية ٢٠–٤٠ سنة والتي تعطي ٣٤.٤٤٪. الرجفان الأذيني الانتيابي هو أكثر في مجموعة الذكور (٨٢.٧٨٪)، من مجموعة الإناث (١٧.٢٢٪). يظهر

مرضى الرجفان الأذيني الانتيابي العديد من تشوهات القلب المرتبطة بها (الأمراض المكتسبة والخلقية) من خلال نتائج تخطيط صدى القلب، وعلى وجه التحديد، انبعاج او تمدد الجدار الفاصل بين الاذينينو بنسبة ١٧.٢١٪ في المرضى المصابين بارتجاف اذيني انتيابي . (٢١،٢٪) في الفئة العمرية (٤١–٥٥) سنة، و (١٨،٤٪) لدى الذكور، مع وجود علاقة معنوية بينهما P)<0.05)

الاستنتاج: تخطيط صدى القلب دورا هاما جدا في تشخيص سبب ارتجاف الاذين الانتيابي . وهناك ارتباط قوي من تمدد جدار الفاصل بين الاذينين وبدء ارتجاف الاذين الانتيابي الجديد. أكثر بالنسبة لأولئك المرضى الذين تزيد أعمارهم عن ٤١ سنة، وأكثر في الذكور من الإناث.

الكلمات المفتاحية: الارتجاف الاذيني الانتيابي، جهاز تخطيط صدى القلب عبر الصدر، تمدد الاوعية الدموية في الحاجز الاذيني.

Introduction

Atrial septal aneurysm (ASA) is a secular deformity at the inter atrial septum at area of fossa ovali, that move to left or right atrium or both by at least 10mm with a distance across their base of about 15 mm, they can be associated with ASD, PFO and MVP and cand be a possible cardiac cause of emboli and arrhythmia[1]. Atrial fibrillation (AF) is a supraventricular arrhythmia that refers to irregular mechanical and electricalatrial activity. More Thus, the electrical activity of atria gives fluctuations that called fibrillatory (f) waves with atrial rate about 300 beats/minute,atrial fibrillation is a common arrhythmia and its prevalence in general population is about 1.5%-2%[2]

The occurrence of atrial fibrillation is believed to happen from either focal ectopic triggered or from reentry pathways [3]. More than 80% of patients with structural heart diseases produce atrial tissue changes (inflammation and fibrosis)which is responsible for sustaining the atrial fibrillation.The risk of occurring atrial fibrillation is 23%-26% for females and males respectively. Age is a dependable risk factor for the atrial fibrillation and when the age is more than 60 years old ,the age risk is double with each life decade. The prevalence of atrial fibrillation is more in males than females. New-onset atrial fibrillation shows a high risk of cardiovascular diseases and death[4].

The last data in the European Union by age beyond 55 years old and between 2010-2060 is to become about 17.9 million [5]. The common symptom of atrial fibrillation is fatigue[6] (while the other symptoms are palpitation, chest pain, dyspnea, lightheadedness,and asymptomatic that occurs specially in elderyage group [7].

Atrial fibrillation can occur without any diseases which called idiopathic (lone) atrial fibrillation(Levy S, Camm AJ, Saksena S, Aliot E, Breithardt G, Crijns H, et al. International consensus on nomenclature and classification of atrial fibrillation. Europace 2003 [8] or due to other diseases for examples cardiovascular disease, diabetes mellitus, hypertension , and obesity (The National Collaborating Centre for Chronic Conditions) [9]

In addition, there are other associated diseases with atrial fibrillation such as coronary heart disease, valvular heart disease, alcohol, caffeine, heart failure[10], and family history[11].Also, secondary atrial fibrillation can occur in situations that include pericarditis, myocarditis, hyperthyroidism, pulmonary embolism, and pneumonia [10].

Atrial fibrillation is classified by United State (AHA/ACC/HRS 2014), into two types, the **first diagnosed** atrial fibrillation and **recurrent** atrial fibrillation. *Recurrent* atrial fibrillation includes, the paroxysmal if it is finished spontaneously and the atrial fibrillation, which has treated with cardioversion within 7 days), **persistent** atrial fibrillation (it is more than 7 days) **, long-lasting persistent** (it is more than 12 months and for targeting rhythm control system), permanent atrial fibrillation (it is more than 1 years and more efforts to restore and/or keep sinus rhythm excluded[12].

Progression of atrial fibrillation may occur and it is usually from paroxysmal type to a permanent one (specially elderly age group), but the progression expectations is not well understanding and it depend highly on presence of seriousness ofstructural heart diseases. The most expectations factors for the progression are the age, diabetes mellitus, and the heart failure[13].

Laboratory investigations include complete blood count with serum electrolyte, coagulation status, assessing the functions of kidney and liver, brain natriuretic peptide with troponin I , thyroid function test, and D-dimer test[14].

Finally, atrial fibrillation is diagnosed simply by irregular RR interval with f waves in electrocardiographic technique. [2].

Complications of atrial fibrillation are stroke (5 folds), heart failure (3 folds), dementia and mortality (double folds) [6].

The goal of atrial fibrillation treatment is decrease symptoms, prevent complications, and this is done by holding the rate of ventricles, underlying abnormalities management, and thromboembolic prevention[9] (The National Collaborating Centre for Chronic Conditions).

Echocardiography have a very important role and specially if the patient is hemodynamically unstable[15], Transthoracic echocardiography (TTE) is an ultrasound instrument, non-invasive system, portable, low price, and it has an actual-time imaging [9] (The National Collaborating Centre for Chronic Conditions).

Transthoracic echocardiography gives full information about the heart and vessels structure and function, and it has good effect on diagnosis and management of patients. However, 2D TTE has perfect measurement for size of heart chambers, ventriculars function , heart wall thickness, structure of heart valves and great vessel diameters. Pulsewave, continuous wave, and color flow Doppler echocardiography measures speeds of blood flow, estimate pressure inside the heart and hemodynamics, and it can identify and measure the degree of valve stenosis, regurgitation, and other flow abnormality .

Transthoracic echocardiography has many technologies and it includes two parts (1) simple modes that involve the M-mode, 2D/cross-sectional and Doppler modes (color flow mapping, continuous waves, and pulsed wave), (2) Complex or invasive modes of TTE include stress/exercise echocardiography, three-dimensional echocardiography, contrast echocardiography, and intraoperative echocardiography[16].

Methods

This is a case control study, preformed in Babyllon / MarjanTeaching hospital, in the period that extended from February/2016 to February /2017. The clinical data of patients include age, sex, Residence, past medical, family, social history were taken, all patients with new AF paroxysm or 1st diagnosed AF are included, exclusion criteria that include any patient dose not welling to participate on this study and patients with Past history of IHD, uncontrolled Hypertension, active alcoholism, thyrotoxic patient, or any patient with clear cause of his AF attack other than structural heart disease apart from ischemia. A written informed concept was given to all patients enrolled in this study.

339 patients were enrolled in this study, 302 of them are included in the study, and 37 of them are excluded from the study (an overt cause is present like hyperthyroidism , pneumonia, severe hypertension, alcoholism). Age of patients presentation are ranging between 20-55 years old, with 250 are male, and 52 are female. All patients referred from CCU with first diagnosis of AF and underwent transthoracic echocardiographic examination as a routine examination to detect structural heart disease that might be the cause for AF and special attention was paid to ASA.

Transthoracic echocardiography with two-dimension (2D) and 2D guided M-mode are done according to standard method [17]. A Vivid E9 ultrasound machine used with 5 MSc (matrix) probe and 3D probe with full Doppler capability in addition to 3D and Multiplan mode views .

The Inter atrial septum was visualized carefully by apical 4 chamber view with zoom option to detect the abnormal motion near septum ovali , the site for ASA, which appear as a secular deformity move to left of right atrium or both . Other data like ejection fraction EF%, LA volume index, valves structure and function, myocardium , pericardium and Ascending aorta , Right side study, pulmonary artery pressure all were measured .
SPSS 22 computer program was used for full statistical analysis. Results were expressed as chi-sequar and frequency expressed as a percentage and Statistical is regarded as significant when a p value < 0.05.

Results

Total patients with paroxysmal atrial fibrillation was 339 which are divided into 302 (included patients) and 37 (excluded patients). While, 300 persons as control group .

The minimum age in patients and control group are 20 while The maximum age in both patients and control group are 55 as in table (1).

Table (1): Age groups distribution in patients with paroxysmal atrial fibrillation and control groups.

Figure (1), show the paroxysmal atrial fibrillation is more commor in patients age group (41-55)years that represents 65.56% of patients, in compare to patients with age group (20-40)years which give 34.44% .

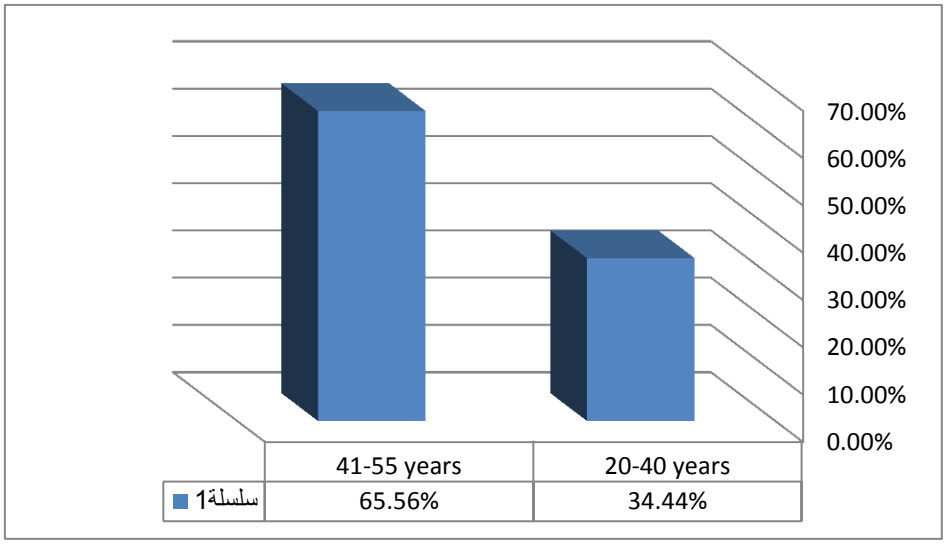

Figure (1): Patients age percentage in association with paroxysmal atrial fibrillation.

The paroxysmal atrial fibrillation is more common in male group that represents 83.3% and 82.78% in control and patients group, respectively, while the paroxysmal atrial fibrillation is less frequent in female group that represents 16.7% and 17.22% in control and patients group respectively as in table (2).

Table (2): Distribution of sex group in patients with paroxysmal atrial fibrillation and

Age group/years	control group (%)	patients group (%)
20-40	100 (33.3%)	104 (34.44%)
41-55	200 (66.7%)	198 (65.56%)

control group.

Sex group	control group (%)	patients group (%)
Male	250 (83.3%)	250 (82.78%)
Female	50 (16.7%)	52 (17.22%)

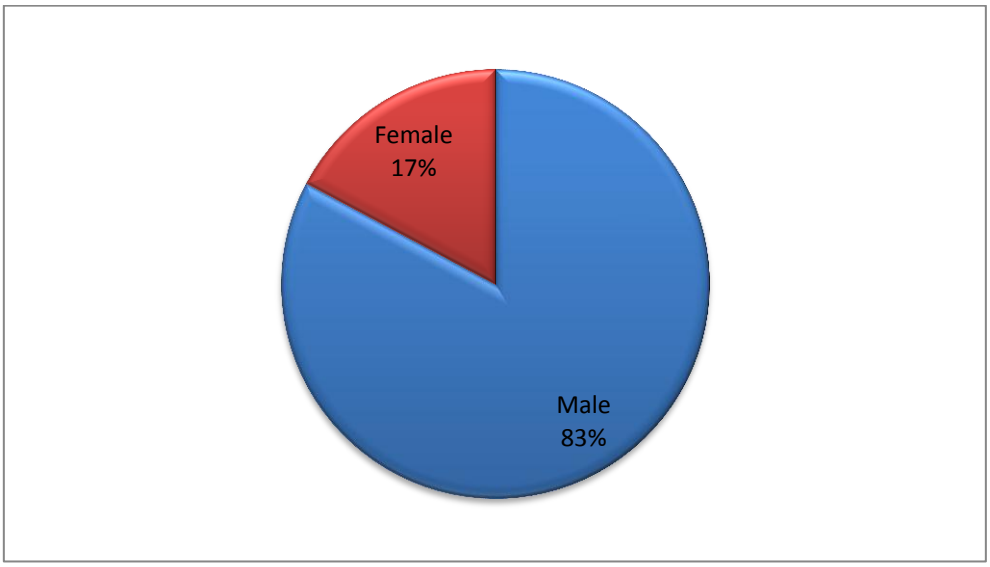

Figure (2): Distribution of paroxysmal AF according to sex

Table (3): Distribution of the Patients with paroxysmal atrial fibrillation that have an atrial septal aneurysm according to age and sex.

Variables	atrial septal aneurysm findings in Patients with atrial fibrillation	Total Patients with atrial fibrillation	**P value**
	Number (%)	Number	
Age Group (years) 20-40 41-55	 10 (9.6%) 42 (21.2%)	 104 198	*P value < 0.0001
Sex group Male Female	 46 (18.4%) 6 (11.5%)	 250 52	*P value < 0.0001
Odds ratio	12.5		
95% confidence interval	Upper limits- 31.19 Lower limits- 4.8		
Chi-square	42.64		

*P value ≤0.05 is significant

In table (4), The patients with paroxysmal atrial fibrillation shows many associated heart abnormalities (acquired and congenital diseases) by echocardiographic results . 24.83% is the highest percentage of echocardiographic findings (paroxysmal atrial fibrillation) in patients that have No Structural Heart Disease. But, 94.6% is highest percentage of echocardiographic findings (normal heart) among control group. While, the Fallot tetralogy and Subacute infective endocarditis is less findings among paroxysmal atrial fibrillation patients that represent 0.33% for both. But aortic aneurysm is less finding among control people that represent 0.33% .

Table (4): Association between echocardiographic findings in paroxysmal atrial fibrillation patients and in control people .

Variables	Echocardiographic findings of Patients with paroxysmal atrial fibrillation	Echocardiographic of findings in control people	**P value**
	Number (%)	Number (%)	
1- Atrial septal aneurysm	52(17.21%)	5(1.7%)	*P value < 0.0001
2-Dilated left atrium	37(12.25%)	0(0%)	*P value < 0.0001
3- Pericarditis (pericardial effusion)	11(3.64%)	0(0%)	*P value < 0.0001
4-Mitral valve prolapse and regurgitation	35(11.58%)	10(3.3%)	*P value < 0.0001
5- No Structural Heart Disease	75(24.83%)	284(94.6%)	
6-Subacute infective endocarditis	1(0.33%)	0(0%)	
7-Cardiomyopathy (dilated cardiomyopathy ,hypertrophic cardiomyopathy)	28(9.27%)	0(0%)	
8-Ischemic heart disease	10(3.31%)	0(0%)	
9- Atrial septal defect	3(0.99%)	0(0%)	
10-Fallot tetralogy (TOF)	1(0.33%)	0(0%)	
11-Pulmonary hypertension	8(2.64%)	0(0%)	
12-Aortic stenosis	5(1.65%)	0(0%)	
13-Pulmonary embolism	4(1.32%)	0(0%)	
14-Left ventricular hypertrophy (LVH)	30(9.93%)	0(0%)	
15-Aortic aneurysm	2(0.66%)	1(0.33%)	

*P value ≤0.05 is significant

Discussion

Atrial septal aneurysm (ASA) is defined as disused and movable interatrial septum tissue that is expanding at least10-15 mm during cardiac cycle [18] . It was associated with congenital heart disease (like atrial sepal defect) and acquired heart disease, e.g. stroke and cardiac arrhythmias) [19].

In the present study, the incidence of ASA is 8.6% , while the ASA incidence reports 0.2%-4% using transthoracic echocardiography[20],and this study was done on young age [21] and middle age groups (Middle Age: definition of middle age in Oxford dictionary (American· English) [22]

In our study, the paroxysmal atrial fibrillation patients are 34.44% and 65.56% for the age group 20-40 old years and 41-55 old years respectively . The Rotterdam Study[23] , the risk of lifetime of atrial fibrillation in age 55 years was 22%- 24%, while in the Framingham cohort the risk of lifetime in age 40 years was 23%- 26%. That indicates, there is increased prevalence of atrial fibrillation with age[24].

Also, we found that 82.78% and 17.22% of paroxysmal atrial fibrillation patients are present in male and female respectively . The atrial fibrillation incidence rate were 78/100,000 person per years and 60/100,000 person per years for males and females respectively[25]. This indicate that atrial fibrillation is more in males than females.

We had found a significant relationship between paroxysmal atrial fibrillation and ASA (P value <0.05, odds ratio is 12.3, chi-square is 42.64 , 95% confidence interval 4.8-31.19) regarding both the sex and age , it was currently showing that atrial dysfunction, which is related to paroxysmal atrial fibrillation is commonly found in ASA patients in comparison to normal people, while the atrial dysfunction mechanism is not clear [26].

Conclusion

ASA is very important structural cardiac abnormality that can be one of the leading causes of AF in middle and young age patients .

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