Original Research Article

Clinical and Echocardiographic Predictor of Atrial Fibrillation in Patient with Rheumatic Mitral Valve Disease

Abstract

Background: Rheumatic fever principally influences kids in developing states, particularly where deficiency is common. Atrial fibrosis is a mutual characteristic of clinical atrial fibrillation (AF) and is accompanying with AF in a diversity of experiment sittings, **Aim and Objectives**: the current work aimed to assess whether there are any clinical or echo-cardiographic parameters that expect the existence of AF among cases with rheumatic mitral valve disorder (RMVD), **Subjects and methods**: the current study was a comparative cross-sectional was conducted on 100 RMVD cases at cardio-vascular medicine department Tanta university hospitals within 6-mths starting from September 2019. Cases have been allocated into 2 groups: Group-I: 50 cases with sinus rhythm. Group-II: 50 cases with AF, **Results**: a significant change was found among study groups regarding Fibrosis characteristics, There is a highly significant difference between the three different types regarding mitral valve area (MVA), LA-diameter, LA volume, LA-diameter/BSA and LA volume index, Age, area of mitral valve, LA-diameter and LA volume were found to be significant predictors for AF, **Conclusion**: Echo-cardiography factors could recognize cases at higher danger of advancing AF among RMVD cases who may benefit from preventive measures.

Abstract

i. The author should recast abstract
ii. Any abbreviation in the abstract that is the first mention should be in full and subsequent mention can be in abbreviation.

Keywords: **Atrial fibrillation, Atrial fibrosis, echocardiographic, mitral valve disorder, Rheumatic fever.**

Introduction:

Rheumatic heart disorder (RHD) is a principal worldwide health challenge, which dis-proportionally influences low- and middle-incomes country (LMICs). There are approximately 33,000,000 persons suffering from RHD, with around 80 percent of them living in LMICs. RHD lead to 275,000 mortalities yearly, 95 percent of these happening in LMICs (**1)**.

RHD caused by recurrent episodes of acute rheumatic fevers, an auto-immune responding to non-treated group A streptococcic pharyngitis that led to inflammations and fibrosis of the valves of the heart. Severe valvular damages cause changed hemo-dynamics, chamber re-modeling, consequently heart failures (HF), atrial fibrillation (AF), pulmonic high blood pressure, thromboembolism, infectious endocarditis, and finally pre-mature mortality (**2).**

The commonest reason for mitral stenosis (MS) is RHD. In spite of its reduced frequency in developed states, RHD still a chief challenge in the developing countries. MS could be accompanied by AF complication which influences around 40 percent of cases with this disease. AF influences cases with MS to thromboembolic conditions (**3).**

Various electro-cardiography, echo-cardiography, and clinical features were utilized for investigating the AF progress in MS cases. 2D strain and strain rate scanning (speckle-tracking) were established to investigate ventricular functions and utilized to assess atrial functions (**4)**.

It is non-dependent of cardiac translations as well as angle dependance, built on an automatic tracking system, and has a perfect re-producibility. There are a small number of researches studying the estimate of AF by left atrial strain assessed via speckle tracking echo-cardiography (STE) in MS cases.

AF is commonly accompanying with physical variations in the atria and echo-cardiography gives a full anatomic assessment. Furthermore, flow features and chamber pressure may as well be diagonosed by echo-cardiography (**5).**

Introduction

i. **The paragraph should be reduced to two or three**
ii. **Indentation should be block with appropriate spacing as in journal guidelines**

Patients and Methods

This Prospective cross-sectional research was done at cardio-vascular medicine department Tanta university hospitals. This work was performed on 100 RMVD cases from cardio-vascular medicine department Tanta university hospitals**, Sample size:** We enrolled 100 RMVD cases at cardio-vascular medicine department Tanta university hospitals. Patients had been separated into 2 groups: **Group-I:** 50 cases with sinus rhythm. **Group-II:** 50 cases with AF.

Inclusion criteria: Patients presenting with RMVD both those with sinus rhythm or with AF.

Exclusion criteria: Patients have any of the followings: Patients with poor echo-cardiographic images

Operational design: From each patient the following data had been collected upon admission

i. **Initial assessment :** Complete full history taking, including: Age, Gender, History of Previous Surgeries, History of DM, History of Other Comorbid Conditions Such As Cardiac Disorder, History of HCV and Special Habits of Medical Importance like Smoking.

ii. **Cardio-vascular examination:**

* **General Inspection**

Certain structural look must continuously prompt a knowledge about cardiac irregularities. Facial symptoms for which there is indication of a correlation with cardiac disorder. Lastly, it is significant to record the disorder of a probable cardiac case's teeth.

Taking the pulse:

✓ Pick-up the case's hand, you must test for battering and any outlying symptoms of endocarditis. Notice the rate and record the rhythm of the pulse. The type and size of the pulse could as well be beneficial indications and conventionally it is supposed that these are simpler to notice in larger arteries like the carotid and the brachial.

✓ Inspection of the two radials at the same time is significant in all patients of chest pains as a collective monitoring examination for aortic dissections. Addition of radio-femoral postponement (or radio-femoral variance in volume) can notify you to constriction as uncommon reason of high blood

pressure.

Outlying pulses must as well be recorded, as outlying vascular disorder is a significant prognosticator of coronary artery disorder

* **Palpation:**

Previous to auscultation, examination of the precordium may be a beneficial sign of preceding operation – eg, midline sternotomy proposes preceding by-pass, side thoracotomy proposes preceding mitral valve or minimal-invasive by-pass operation (left interior mammary artery to left frontal descendant coronary artery). Locates the apex beats – the furthermost point sideways and inferiorly where you could obviously feel the apex (frequently the 5th inter-costal cavity in the mid-clavicular line).

* **Auscultation:**

Listen over the aortic (2^{nd} right inter-costal cavity) and pulmonic (2nd left inter-costal cavity) parts and at the left lower sternal edging with the diaphragm of your stetho-scope (better for higher pitches), then utilize the bell for the top. If in hesitation, utilize the two. Press slightly with the bell. If you hear an anomaly over the aortic or pulmonic zones, you must attend over the carotids. If you get an anomaly at the apex, listen in the axilla. Listen steadily. Beggen with the heart sound – overlook any other thing.

* **Examination of blood pressure:**

-Sphygmomanometer had been utilized to measure the blood pressure.
-It's better to locate the case down with his back maintained and legs un-crossed for the examination.
-Roll in the sleeves or eliminate any long-sleeved cloth, so the cuff could be set around his upper arm.
-The patient must be relaxed and avoided speaking during the examination.

iii. Investigations

Laboratory study: Complete blood picture (CBC): Hb concentrations (%), red RBCs, WBCs, platelet count. **Renal function test**: serum creatinine, blood urea and urine analysis. Liver Test Profile: serum alanine amino-transferases and aspartate

(AST and ALT), bilirubin, albumin, gamma-glutamyl transferase (GGT), international normalized ratio (INR) and prothrombin time.

iv. 12 lead Electrocardiogram (ECG).

Transthoracic Echo-cardiography: for estimation of the Tricuspid regurgitation velocity (TRV) (m/s) in addition to to evaluate the chance of pulmonic high blood pressure.

A. Administrative and Ethical Design:

An Official permission was obtained from Faculty of Medicine, Tanta University. An authorized agreement was attained from at cardio-vascular medicine department Tanta university hospital Approval by ethical committee in the faculty of medicine (Institutional Research Board IRB).

Method and Ethical Issue

i. An inform consent of patients are require for this type of research apart from the ethical clearance issued by board.
ii. Author need to show how he determine the sample size that represent a particular community.i.e statistical expression on sample size determination
iii. All the bulleting in the method should be remove and use appropriate sub-heading numbers like 2.1, 2.2 e.t.c to differentiate headings and sub-headings.

Statistical Analysis: collected data analysis has been performed via SPSS 22.0 (SPSS Inc., Chicago, IL, USA). Data have been tested for normality via the Shapiro Walk testing. Qualitative data have been presented as frequency and percentage. Chi square testing ($\chi 2$) and Fisher exact has been utilized to compare qualitative variables. Quantitative data have been presented as mean ± SD (Standard deviation) for parametric and median and range for non-parametric data. All statistical correlations were 2 tailed, data was judged significant at P-value ≤ 0.05, high significance at $p < 0.001$ and Non-significant at $P > 0.05$.

Results

We found nonsignificant change among the study groups as regard ages, sex and BMI. **Table (1)**

A high significant change was found among the three different types regarding EF, MVA, LA-diameter, LA volume, LA-diameter/BSA and LA volume index. Thus, LA-diameter, LA volume, LA-diameter/BSA and LA volume index were high

significance in AF cases; meanwhile EF and MVA were low significance in AF cases in comparison with sinus rhythm cases. **Table (2)**

A significant change was found among the study groups. **Table (3)**

Long standing AF was the most prevalent type among the AF patients by 36%. **Table (4)**

A high significant change was found among the three different types as regard MVA, LA-diameter, LA volume, LA-diameter/BSA and LA volume index. **Table (5)**

Age, MVA, LA-diameter and LA volume were revealed to be significant prognosticators for AF. **Table (6)**

Table (1): Demographic characteristics between studied groups

Variables		**AF** (n=50)	**Sinus rhythm** (n=50)	**t / χ^2**	**P**
Age (years) Mean± SD		48.59 ± 12.43	46.86 ± 10.79	.743	.459
Sex	Male	30 (60%)	28 (56%)	.164	.685
	Female	20 (40%)	22 (44%)		
BMI (kg/m^2) Mean± SD		26.45 ± 2.74	25.97 ± 3.35	.784	.435

Table (2): Echo findings between the two studied groups

Variables	**AF** (n=50)	**Sinus rhythm** (n=50)	**t**	**P**
EF (%) Mean± SD	56.33 ± 8.41	59.93 ± 7.73	**2.23**	**.028**
MVA (cm^2) Mean± SD	1.15 ± 0.134	1.35 ± 0.216	**5.56**	**.000**
LA-diameter (cm) Mean± SD	5.12 ± 0.448	4.62 ± 0.342	**6.27**	**.000**
LA volume (ml) Mean± SD	77.35 ± 5.68	67.84 ± 6.35	**7.89**	**.000**

LA-diameter/BSA (cm/m^2) Mean± SD	2.77 ± 0.302	2.45 ± 0.219	**6.06**	**.000**
LA volume index (ml/m^2) Mean± SD	41.88 ± 3.74	36.97 ± 4.36	**6.04**	**.000**

Table (3): Fibrosis characteristics distribution between the two studied groups

Variables		**AF** (n=50)	**Sinus rhythm** (n=50)	χ^2	**P**
Fibrosis presence		47 (94%)	14 (28%)	**45**	**.000**
Fibrosis distribution					
Left atrial walls	Backward	42 (84%)	10 (20%)	**49**	**.000**
	Septum	31 (62%)	1 (2%)	**41**	**.000**
	Anterior	22 (44%)	5 (10%)	**14.7**	**.0001**
Right atrial walls		29 (58%)	7 (14%)	**21**	**.000**

Table (4): AF types distribution among the AF group.

	AF (n=50)
Paroxysmal AF	17 (34%)
Persistent AF	15 (30%)
Long standing AF	18 (36%)

Table (5): Echo findings according to different types among the AF group

Variables	**Paroxysmal AF** (n=17)	**Persistent AF** (n=15)	**Long standing AF** (n=18)	**F**	**P**

MVA (cm^2) Mean± SD	1.27 ± 0.075	1.19 ± 0.136	1.11 ± 0.124	**8.62**	**.001**
LA-diameter (cm) Mean± SD	4.72 ± 0.209	5.16 ± 0.453	5.48 ± 0.418	**18.2**	**.000**
LA volume (ml) Mean± SD	72.75 ± 1.84	78.84 ± 5.31	82.02 ± 4.11	**24.6**	**.000**
LA-diameter/BSA (cm/m^2) Mean± SD	2.56 ± 0.132	2.78 ± 0.207	3.07 ± 0.291	**23.2**	**.000**
LA volume index (ml/m^2) Mean± SD	40.34 ± 1.97	42.37 ± 3.24	45.12 ± 3.44	**11.6**	**.0001**

Table (6): Multi-variate logistic regressions analysis to determine the prognosticators of AF

	OR	**Wald**	**Sig.**	**95% CI**
Age	1.145	1.284	**.004***	.906 - 1.448
Male	12.15	1.199	.273	.139 - 16.79
Smoking	.465	.363	.547	.039 - 5.592
DM	.573	.187	.666	.046 - 7.167
EF	3.725	.555	.456	.117 - 118.321
MVA	.574	.359	**.001***	.026 - 0.681
LA-diameter	1.267	2.613	**.001***	.951 - 1.688
LA volume	1.295	4.315	**.001***	.836 - 1.387

Discussion

Cases with AF and MS have elevated frequency of thrombus formations in the LA. AF is the commonest met cardiac arrhythmia in this subgroup of cases with a high danger of thromboembolisms. While MS is measured as a significant danger factor

for AF, the considerations in MS that expect the danger of upcoming AF haven't been calculated. Echo-cardiography is the primer and comparatively easy tool for RMS cases following. AF is commonly accompanying with physical variations in the atria and echo-cardiography delivers a full anatomic assessment. Furthermore, flow features and chamber pressure could as well be diagnosed by echo-cardiography **(6)**.

In the present research we aimed to assess if there are any clinical or echo-cardiography parameter that predict the presence of AF among RMVD cases.

A comparative cross-sectional research was done on 100 RMVD cases at cardio-vascular medicine department Tanta university hospitals within 6 months starting from September 2019. Cases were separated into 2 groups: Group-I: 50 cases with sinus rhythm. Group-II: 50 cases with AF.

A nonsignificant change was found among the studied groups as regard age, sex and BMI. The majority of them were males. Recast

Our results were in contrary with study of **Mansour et al., (7)** as they reported that 22 cases (44%) advanced AF (Group-1) and 28 (56%) cases still in sinus rhythm (Group-2). Group-1 cases were older significantly (53.32±6.9-yrs versus 46.78±6.49-yrs; p-value=0.001), a result agreed with preceding report by **Osranek et al. (168).** Also, they found that cases who advanced AF had significantly great BMI (29.54±0.71 versus 28.07± 0.68; p value<0.001). Recast

In the study of **Drissi et al., (8)**, 159 cases (26 males and 133 females) were evaluated over a 17-mths interval. All of them had severe rheumatic MS with nonsignificant mitral regurgitations. The ages mean was 40.87 ± 12.19-yrs (range 11–75-yrs).

AF is a common arrhythmia realized in clinical practices. The frequency is 0.5% in cases of ages < 60-yrs and 10 percent in cases >80-yrs. In Western states, ageing people is at danger, but in states like India where RHD is widespread, it is a common reason of death and morbidities in the young .15% of strokes are connected to AF accompanying with thromboembolic conditions. Electro- physiologically, AF signifies dis-organized atrial depolarizations that caused by chronic wavelets of reentry. The differed reasons of AF that were proposed are injury to sinoatrial node and inter-nodal path-ways, atrial dilatations and blocking of the nodal artery **(9)**.

In this work, A high significant change was found among the three different types regarding EF, MVA, LA-diameter, LA volume, LA-diameter/BSA and LA volume index. Thus, LA-diameter, LA volume, LA-diameter/BSA and LA volume index have high significance in AF cases; meanwhile EF and MVA have low significance in AF

cases in comparison with sinus rhythm cases. A significant change was detected among the two studied groups as regard fibrosis in atrial walls. A high significant change was found among the three different types as regard MVA, LA-diameter, LA volume, LA-diameter/BSA and LA volume index.

Our results were supported by study of **Mansour et al., (7)** as they reported that LA-diameters (antero-backward, crosswise, and longitudinal) were greater in Group-1 (4.84±0.17 cm versus 4.51±0.09 cm, 4.61±0.13 cm versus 4.35±0.11 cm, and 6.13±0.25 cm versus 5.39±0.18 cm, correspondingly; p value<0.001), a result agreed with **Kernis et al. (10).** LA volumes (maximum and minimum) have great significance in Group-1 (103.68±3.66 mL versus 93.23±3.96 mL and 66.18±7.85 mL versus 54.9±3.25 mL, respectively; p<0.001). This is in agreement with **Haffajee et al. (11)**, who concluded that indexed maximum (p value=0.023) and minimum (p value<0.001) LA volumes were greater in cases who advanced post-operative AF. A nonsignificant change was found among the study groups regarding LA emptying fraction (37.04±7.74 percent versus 40.47±5.39 percent; p value=0.08).

Also, in their study Group-1 had decreased significantly LV ejecting fraction (53.77±7.71 percent versus 62.37±2.2 percent; p-value<0.001) and high pulmonic artery systolic pressure (49.82±3.42 mmHg versus 47.9±1.9 mmHg; p=0.01). Group-1 revealed significantly reduced early diastolic mitral annular speed and late diastolic speed (0.11±0.03 m/sec versus 0.14±0.02 m/sec; p<0.001 and 0.76±0.07 m/sec versus 0.82±0.08 m/sec; p=0.01, respectively). Ratio amid early mitral inflow speed and early diastolic speed has great significance (9.84±2.15 versus 6.19±1.16; p=0.001). A nonsignificant change was found regarding systolic speed (0.08±0.01 m/s versus 0.08±0.01 m/sec; p value=0.08). Group-1 had lower systolic LA strain (19.53±0.51 percent versus 23.45±0.27 percent; p value<0.001), a result agreed with **Candan et al. (12)** and lower LV global longitudinal strain (LVGLS) (-14.27±1.61 percent versus -20.25±1.02 percent; p value<0.001).

In the study of **Singh et al., (13)**, out of 66 cases of RHD mean LA-size has been revealed raised (more than 40 mm) in 60 cases. Between nonrheumatic cases 19 out of 44 cases had LA size >40mms. 5 cases have appendage clot and they all have fundamental RHD.

Ismail et al., (14) revealed that AF cases were older and have extended period of signs, slighter valve area, greater LA size, and further fibrosis, including the left atrium more than the right one with the backward left atrial barrier commonest

included. Between the atrial walls investigated (septal, frontal and backward LA, and RA walls), the backward LA wall is the commonest influenced location in all cases (56.6%) and in sinus as well as AF subgroups (26.7% and 86.7%, respectively). This can be clarified to the local tendencies for inflammatory reactions in rheumatic fever (MacCallum patch).

In contrary with our results, study of **Agca et al., (15)** as they revealed that MVA, transmittal pressure gradient, the grade of mitral regurgitations, LA size, LA and RA super inferior diameter and sizes attained in apical 4-chamber and 2-chamber views didn't vary among the studied groups.

Literature have provided data concerning AF recurrencies or have matched chronic AF cases to controls with an ordinary sinus rhythm. Some clinical, electro-cardiography and echo-cardiography factors were assumed as prognosticators of AF recurrencies like very old ages, left atrial expansion and physical heart disorder, while the consequences are disagreeing. The function of LA-diameter in expecting AF still contentious **(16)**.

The present study showed that age, MVA, LA-diameter and LA volume have been found to be significant predictors for AF.

Our results were supported by study of Diker et al., (17) has proposed that ages, LA-diameter and mean trans-valvular gradient can expect AF incidence in their retrospective research. Recast

In the report of **Agca et al., (15)**, LA and RA mediolateral diameters at apical 4-chambers view were significantly larger in group-1. But only the volume of RA was revealed to be significantly higher in group-1. This may be clarified by that the medio-lateral diameter of the RA was utilized for D2 as well as D3 in the volume formulation. Furthermore, an eccentric expansion of the atria could as well contribute in these consequences.

Age seems to be prognostic of AF recurrencies only in cases with ages >70-yrs. But age couldn't be measured as a prognostic factor for AF recurrence in MS cases **(18).**

The existence of an interatrial conducting postponement was revealed to be accompanying with incidence and AF recurrence and some researchers claim that clinical reduction in interatrial conducting time by bi-atrial pacing can decrease AF recurrence in cases with interatrial conducting postponement. Interatrial conducting postponement can endorse AF by easing microreentry circuits. There is a continuing debate regarding the mechanism of these subjects. A standard noninvasive technique

of measuring interatrial conductions time is lost. **Fuenmayor et al** (**19)** confirmed that IACT was invasively determined by electrode catheter, associated with IACT determined via transthoracic echo-cardiography as the period from the start of the P-wave to the start of the mitral A-wave**.**

Furthermore, **Ismail et al., (14**) revealed that the amount of atrial fibrosis trailed by LA size was the most significant prognosticator of AF. LA size was larger in cases with AF than those in sinus rhythm and the LA size significantly varies across the AF spectrum. The LA size was larger in AF cases than those non-AF cases. Between clinical and echo-cardiography parameters, LA-diameter had the maximum association with LA fibrosis ($r = 0.74$, P value < 0.001). LA-diameter ≥ 50.5 mm may expect severe AF with a sensitivity (93 percent) and specificity (94 percent). Consequently, they may settle that LA could be utilized as a simple indicator of AF and can lead the AF ablation success in cases with RMVD.

In the study of **Pourafkari et al., (20)**, the features non-dependently correlated with AF were LA strain (odds ratio = 7.53 [4.47–12.69], p value< 0.001), RA pressures (odds ratio = 1.09 [1.02–1.17], p value= 0.01), age (odds ratio = 1.14 [1.05–1.25], p value= 0.002), and EF (odds ratio = 0.92 [0.87–0.97], p value= 0.003). The AUC for the joint ROC for this model was 0.90 ± 0.12.

Discussions

i. All et al should be italicized and inside citations should be in square bracket [] not in ().
ii. The author failed to give direct comparisons of his work with other study.
iii. In the discussion section; the author did not shows the differences of his findings with the previous studies
iv. Author should give a tabular comparisons between his work and previous one to make it easy for scientific communities.

Conclusion

Echo-cardiography parameters could recognize cases at higher danger of evolving AF among RMVD cases who can advantage from preventing measures. It can as well lead prosthesis selection. Recast

Conclusion

i. The conclusion was poorly written and short;

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References

i. Boldness should be remove from author's names and transferred it to Year, Volume, Issue and page No
ii. The " " should be use on the title of the paper
iii. Author failed to use up to date references.
iv. The numbers of references list should be in square bracket []