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PREDICTORS OF ATRIAL FIBRILLATION AFTER CABG ASSESSED BY TRANSTHORACIC ECHOCARDIOGRAPHY

By

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ABSTRACT

Background: Atrial fibrillation is a common complication after coronary artery bypass grafting (CABG) surgery, although it is a benign arrhythmia it may contribute to morbidity, mortality and prolonged hospital stay.

Objective: To evaluate the echocardiographic predictors of atrial fibrillation (AF) after coronary artery bypass grafting.

Patients and methods: Our study was done on 100 patients who underwent CABG at National Heart Institute and Al-Azhar University hospitals from June 2020 to December 2020. Personal and medical histories were reviewed. Preoperative data included age, gender, and history of diabetes mellitus, history of hypertension and history of smoking. Intraoperative data included duration of bypass and cross clamping and number of grafts. Postoperative data included use of inotropic agents, revision of ECG during hospital stay, identification of atrial fibrillation and method of termination. Echocardiography was done during their hospital stay for assessment of the following: ejection fraction, TPASE, LV internal dimensions, LV septal and posterior wall thickness, left atrium diameter and LA Volume index, TR velocity and presence of MR. Also Pulsed wave and tissue Doppler of mitral annuli was performed to assess E/A ration, septal e', lateral e', septal E/e' and lateral E/e' and calculation of average E/e' was done.

Results: Old age and history of hypertension were predictors of atrial fibrillation after CABG surgery. AF developed more frequent in patients who had used an inotropic agent after surgery and in patients with lower ejection fraction, lower TAPSE, dilated LV internal dimensions, increased LV wall thickness, and dilated left atrium and high LAVI. Our findings indicated that development of postoperative atrial fibrillation (POAF) was more frequent with higher average E/e', septal E/e', lateral E/e' velocities and lower septal e' velocity.

Conclusion: Patients who had postoperative impaired LV and RV functions and increased LAVI and LA diameter experienced more frequent POAF than others. Also, higher average E/e', septal E/e', lateral E/e' and lower e' velocities were associated with higher incidence of POAF.

Keywords: Atrial fibrillation, POAF, CABG, Transthoracic echocardiography.

INTRODUCTION

New-onset postoperative atrial fibrillation (POAF) complicates approximately 20-60% of all cardiac surgical procedures and is associated with increased periprocedural mortality and morbidity, prolonged hospital stay, increased costs, and worse long-term survival. The true incidence of POAF following cardiac surgery remains somewhat unclear due to variability in

methods of detection and definitions of POAF *(Gudbjartsson et al., 2020)*. Its causes are multifactorial, and models to stratify patients into risk categories are progressing but a consistent, evidence-based system has not yet been developed. Pharmacologic and surgical interventions to prevent and treat this complication have been an area of ongoing research and recent societal guidelines reflect this *(Burrage et al., 2019)*.

POAF engenders multiple effects on the cardiopulmonary hemodynamic, tachyarrhythmia being the most common presentation. The rapid irregular ventricular rate can result in insufficient coronary flow to compensate myocardial oxygen demand, leading to myocardial ischemia. Furthermore, decreased diastolic filling time and cardiac output are important physiological consequences of tachyarrhythmias *(Gudbjartsson et al., 2020)*.

The POAF was reported to be associated with greater in-hospital mortality, prolonged hospital stays. In addition, the long-term survival was worse in patients who developed POAF. Patients who develop POAF incur additional hospital treatment cost and 2 to 4 fold increased risk of stroke, reoperation for bleeding, infection, renal or respiratory failure, cardiac arrest, cerebral complications and need for permanent pacemaker placement *(Greenberg et al., 2017)*.

A history of atrial fibrillation and indexed left atrial maximal volume are the best predictors of the occurrence of postoperative atrial fibrillation following coronary artery bypass graft. The identification of high risk population of postoperative atrial fibrillation using these two factors could lead to the development of targeted strategies to limit this frequent complication in these patients *(Magne et al., 2019)*.

In most patients, POAF will spontaneously convert to sinus rhythm within 24 hours after surgery. In hemodynamically stable patients, correction of predisposing factors such as hypoxia, anemia, and electrolyte imbalance, should be the first step in the management of POAF *(Bidar et al., 2013)*. In case of hemodynamically unstable patients, cardioversion to sinus rhythm by direct current or pharmacologically with ibutilide or amiodarone, should be pursued. Also if patients are highly symptomatic or when rate control is difficult to achieve, electrical direct current shock is recommended *(Members et al., 2012)*.

The aim of this study was to evaluate the echocardiographic predictors of AF after CABG.

PATIENTS AND METHODS

Our study was conducted at National Heart Institute and Al-Azhar University hospitals from June 2020 to December 2020 and was a prospective observational study on 100 patients who had been operated coronary artery bypass grafting surgery and had fulfilled our inclusion criteria.

Inclusion Criteria: Patients who had underwent CABG > 18 years old.

Exclusion Criteria:

1. History of any form of preoperative AF.

2. History of myocardial infarction less than 2 weeks before the surgery.
3. Unstable angina.
4. Patients with valvular or combined valve and CABG surgeries.
5. Bypass time more than 100 min or cross clamp time more than 60 min.
6. Advanced heart block or severe conduction disturbance.
7. An implantable defibrillator.
8. Impaired renal function.

Tools and data collection:

One hundred patients who had underwent CABG at National Heart Institute and Al-Azhar University hospitals from June 2020 to December 2020. The following data was collected during their hospital stay:

A. Full medical history as documented by the treating physician included age, sex, smoking, DM and hypertension.

B. Intraoperative history as regard bypass time and aortic cross clamp time (aortic cross clamp time > 60 min and CPB time >100 min were important risk factors and number of grafts.

C. ICU history as regard use of inotropic agents for >30 min.

D. Development of POAF: AF was detected by 12 leads electrocardiogram monitoring and defined as any documented AF of more than 5 minutes in duration or for any length of time requiring intervention for hemodynamic compromise.

E. Echocardiography: Postoperative echocardiography was done to assess left ventricular systolic function, LV internal dimensions, LV wall thickness, left ventricular diastolic function parameters, left atrial size and indexed volume, right ventricular function by TAPSE.

F. Follow up of the patient throughout duration of hospital stay and determine discharge rhythm.

G. Our protocol was to use amiodarone in hemodynamically stable patients and Direct Current shock for hemodynamically unstable patients.

H. Measurement of the required parameters are illustrated in the next figures:

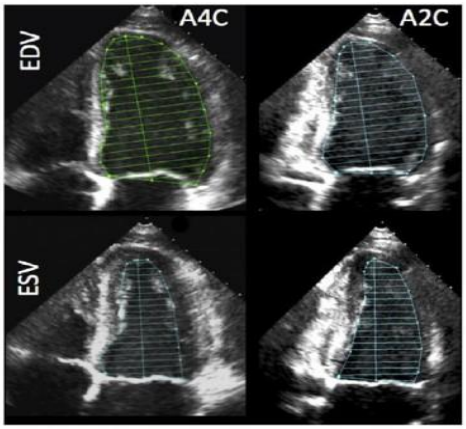

Figure (1): Ejection fraction by biplane Simpson's method.

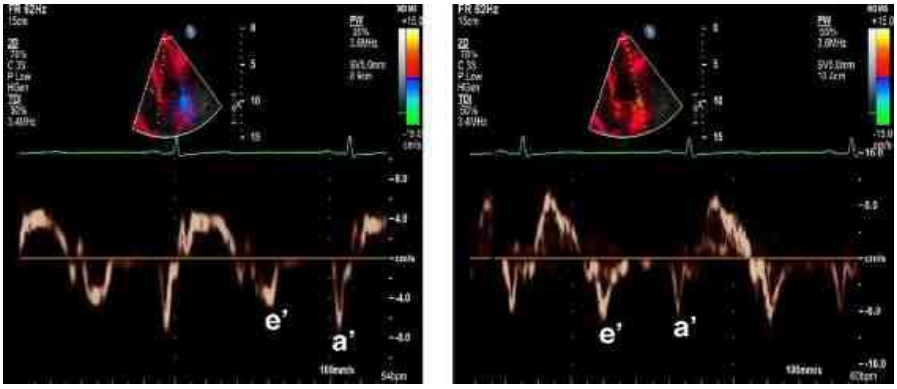

Figure (2): Septal (left) and lateral (right) tissue Doppler recordings.

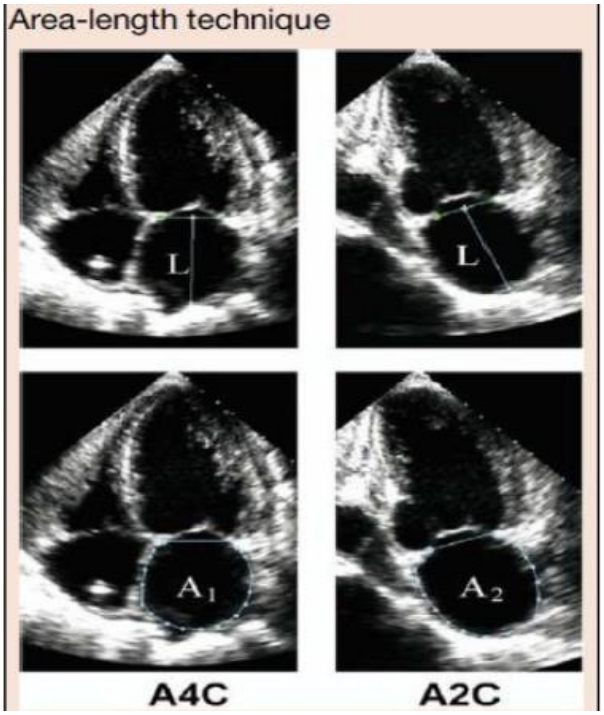

Figure (3): LAV.

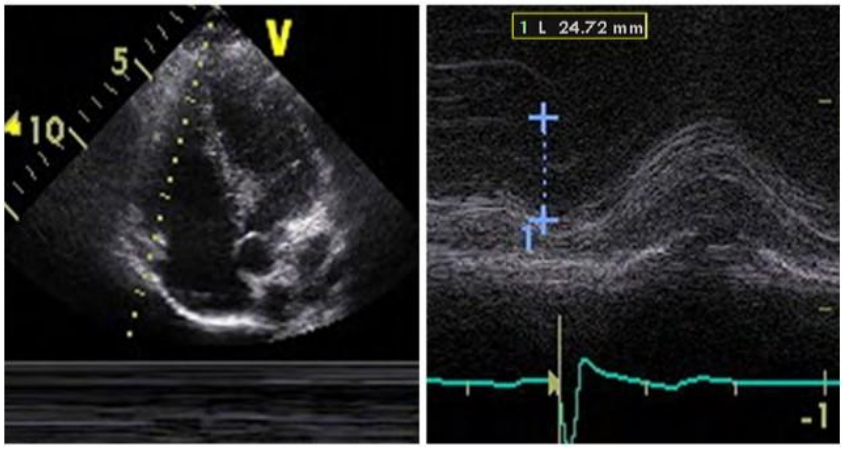

Figure (4): Measurement of tricuspid annular plane systolic excursion (TAPSE).

An approval of the study was obtained from Al-Azhar University academic and ethical committee.

Statistical analysis:

The analysis was performed using computer software statistical package for the social science (SPSS, version 20, SPSS Inc., Chicago, Illinois, USA) Description of quantitative (numerical) variables was performed in the form of mean ± SD. Description of qualitative (categorical) data was performed in the form of number of cases and percent. Appropriate test of associations was performed. Chi square test ($\chi 2$) to calculate difference between two or more groups of qualitative variables or Mann-Whitney U test. The significance level was set at p-value of less than 0.05.

RESULTS

Our study included 100 patients who had CABG. Mean age was 56.24 ± 7.47, 81% of patients were males and 19% females, 62 % had history of hypertension and 54 % had history of diabetes mellitus **(Table 1)**.

Table (1): Descriptive data of patients

		Total No. = 100
Age	Mean ± SD	56.24 ± 7.47
	Range	38 – 77
Gender	Females	19 (19.0%)
	Males	81 (81.0%)
BSA	Mean ± SD	1.95 ± 0.15
	Range	1.6 – 2.3
DM	No	46 (46.0%)
	Yes	54 (54.0%)
HTN	No	38 (38.0%)
	Yes	62 (62.0%)
Smoking	No	49 (49.0%)
	Yes	51 (51.0%)

We had divided patients into two groups; POAF group who had developed atrial fibrillation during their hospital stay and Non-POAF group who didn't develop AF. The incidence of POAF in our study was 24% representing 24 patients from a total number of 100 patients who have underwent coronary artery bypass grafting surgery. Most cases of POAF have occurred in the second day of the operation with incidence, the lowest incidence has occurred in the fifth day of the operation **(Table 2)**.

Table (2): Distribution of POAF in the postoperative days

		Total no. = 100
AF	No	76 (76.0%)
	Yes	24 (24.0%)
Day	Mean ± SD	2.13 ± 0.99
	Day 1	6
	Day 2	12
	Day 3	4
	Day 4	1
	Day 5	1
Intervention	Amiodarone	19 (79.2%)
	Direct current shock	5 (20.8%)

Age was proportionally related to development of POAF and the presence of hypertension was associated with development of POAF. Patients in POAF group were older than those who did not develop POAF. Patients with POAF has mean age of (58.92 ± 8.24) versus mean age of (55.39 ± 7.05) in patients without POAF with significant (P value = 0.043): and the P. value was more significant in patients with history of hypertension (P value = 0.0135) as there were 20 patients of total 24 patients (representing 83%) who developed AF have history of hypertension versus 42 patients of total 76 patients (representing 55%) who didn't develop AF have history of hypertension. There were no significant associations between gender, diabetes mellitus and history of smoking and occurrence of AF after CABG with P value: 0.793, 0.058 and 0.561 respectively **(Table 3)**.

Table (3): Relationship between age, gender, DM, HTN & smoking and the occurrence of POAF

AF / **Parameter**		**No** **No. = 76**	**Yes** **No. = 24**	**P-value**
Age	Mean ± SD	55.39 ± 7.05	58.92 ± 8.24	0.043
	Range	38 – 70	40 – 77	
Gender	Females	14 (18.4%)	5 (20.8%)	0.793
	Males	62 (81.6%)	19 (79.2%)	
	Range	1.6 – 2.3	1.68 – 2.3	
DM	No	39 (51.3%)	7 (29.2%)	0.058
	Yes	37 (48.7%)	17 (70.8%)	
HTN	No	34 (44.7%)	4 (16.7%)	0.0135
	Yes	42 (55.3%)	20 (83.3%)	
Smoking	No	36 (47.4%)	13 (54.2%)	0.561
	Yes	40 (52.6%)	11 (45.8%)	

Left ventricular Ejection fraction (EF) was inversely related to development of POAF. Patients with POAF has mean EF of (43.42 ± 7.03) vs mean EF of (49.83 ± 10.59) in patients without POAF with significant (P value = 0.007). Left ventricular internal dimension in diastole (LVIDd): left ventricular internal dimension in systole (LVIDs): septal wall thickness, posterior wall thickness and left ventricular mass index (LVMI) were proportionally related to development of POAF where an increase in dimension, wall thickness or LV mass was associated

with an increase in the incidence of AF with extremely significance (P value of = 0.001) for the increased LVMI. There were no significant associations between increase in relative wall thickness (RWT) and occurrence of AF. Impaired right ventricular systolic function assessed by TAPSE increased the incidence of AF with significant P. value (0.011) **(Table 4).**

Table (4): Distribution of echocardiographic parameters in both AF and non-AF groups

AF / Parameters		No	Yes	P-value
		No. = 76	No. = 24	
EF	Mean ± SD	49.83 ± 10.59	43.42 ± 7.03	0.007
	Range	24 – 78	31 – 58	
LVIDd	Mean ± SD	5.05 ± 0.54	5.39 ± 0.55	0.008
	Range	3.7 – 6	4.5 – 6.9	
LVIDs	Mean ± SD	3.50 ± 0.51	3.96 ± 0.70	0.001
	Range	2.2 – 4.6	2.7 – 6	
SWT	Mean ± SD	10.50 ± 1.63	11.50 ± 2.25	0.019
	Range	6 – 14	6 – 16	
PWT	Mean ± SD	10.08 ± 1.87	11.29 ± 1.81	0.006
	Range	6 – 16	7 – 16	
LVM	Mean ± SD	193.67 ± 42.08	254.42 ± 58.16	0.000
	Range	95 – 297	118 – 373	
LVMI	Mean ± SD	96.79 ± 20.61	124.67 ± 35.12	0.000
	Range	45 – 137	55 – 212	
RWT	Mean ± SD	0.41 ± 0.10	0.42 ± 0.07	0.627
	Range	0.23 – 0.86	0.22 – 0.58	
TAPSE	Mean ± SD	21.70 ± 4.12	19.21 ± 4.13	0.011
	Range	12 – 30	12 – 27	
	Range	0.45 – 1.8	0.64 – 1.9	

Left atrium diameter (LAD): left atrium volume index (LAVI): average E/e', septal E/e' and lateral E/e' were proportionally related to development of POAF. Patients with POAF have mean LAD and LAVI of (4.00 ± 0.37) and (32.93 ± 11.07) respectively versus mean LAD and LAVI of (3.65 ± 0.43) and (25.65 ± 6.70) respectively in patients without POAF with highly significant P value = 0.000). The mean average E/e' was (8.73 ± 2.31) in patients with POAF versus (7.11 ± 2.29) in patients without POAF with (P value of 0.003). Decrease of septal e' velocity was associated with increased incidence of POAF. On the other hand, there were no associations between decreases in lateral e' velocity or increase in TR velocity and development of POAF. Also, presence of mitral regurgitation didn't increase the occurrence of AF **(Table 5)**.

Table (5): Distribution of LAD, LAVI and diastolic dysfunction parameters in both AF and non-AF groups

Parameters \ AF		No	Yes	P-value
		No. = 76	No. = 24	
LAD	Mean ± SD	3.65 ± 0.43	4.00 ± 0.37	0.000
	Range	2.5 – 4.6	3.3 – 4.7	
LAVI	Mean ± SD	25.65 ± 6.70	32.93 ± 11.07	0.000
	Range	15 – 47	18 – 57	
Average E/e'	Mean ± SD	7.11 ± 2.29	8.73 ± 2.31	0.003
	Range	3.3 – 14	4.6 – 12.9	
Septal e'	Mean ± SD	9.02 ± 2.07	7.79 ± 1.85	0.011
	Range	5 – 14	5 – 11.5	
Lateral e'	Mean ± SD	9.63 ± 2.21	9.39 ± 2.52	0.657
	Range	5 – 17	5.9 – 16	
Septal E/e'	Mean ± SD	7.38 ± 2.37	8.78 ± 2.49	0.015
	Range	3.5 – 15	5.2 – 14.5	
Lateral E/e'	Mean ± SD	6.65 ± 2.17	8.30 ± 2.11	0.001
	Range	3 – 14	5 – 12	
TR velocity	Mean ± SD	1.305 ± 60.81	1.367 ± 55.36	0.642
	Range	0.35 – 2.85	0.64 – 2.30	
MR	Non	60 (78.9%)	13 (54.2%)	0.067
	Mild	10 (13.2%)	6 (25.0%)	
	Moderate	5 (6.6%)	5 (20.8%)	
	Severe	1 (1.3%)	0 (0.0%)	

A multivariate logistic regression analysis was performed to test the significance of the aforementioned risk factors and development of AF after CABG and demonstrated that age more than 60 years, hypertension, use of inotropes for more than 30 minutes, LVEF (< 50%): LVIDd (>53 mm): LVIDs (>40 mm): LVMI (> 117): TAPSE (< 18 mm): LAVI (> 33.5 ml/m2): average E/e' (> 7.4 ms): septal e' (<7.3 ms) and all risk factors mentioned in table (8) except body surface area (> 1.97) were statistically significant and associated with development of AF after CABG **(Table 6)**.

Table (6): Univariate logistic regression analysis for factors associated with AF

Analysis / Parameters	B	S.E.	Wald	P-value	Odds ratio (OR)	95% C.I. for OR	
						Lower	Upper
Age >60	1.099	0.487	5.096	0.024	3.000	1.156	7.787
BSA >1.97	0.904	0.491	3.398	0.065	2.471	0.944	6.463
HTN	1.398	0.594	5.534	0.019	4.048	1.263	12.974
Inotrope	1.237	0.595	4.315	0.038	3.444	1.072	11.064
EF <=50	1.662	0.594	7.833	0.005	5.270	1.646	16.878
LVIDd >5.3	1.110	0.482	5.300	0.021	3.033	1.179	7.802
LVIDs >4	2.121	0.570	13.836	0.000	8.341	2.728	25.503
SWT >11	1.284	0.489	6.908	0.009	3.611	1.386	9.408
PWT >10	1.600	0.511	9.801	0.002	4.954	1.819	13.492
LVM >233	2.561	0.548	21.821	0.000	12.952	4.422	37.937
LVMI >117	2.089	0.520	16.129	0.000	8.077	2.914	22.388
TAPSE ≤ 18	1.236	0.501	6.087	0.014	3.441	1.289	9.184
LAD >3.7	1.546	0.553	7.818	0.005	4.694	1.588	13.877
LAVI >33.5	2.120	0.594	12.758	0.000	8.333	2.603	26.675
Average E/e' >7.4	1.933	0.533	13.136	0.000	6.913	2.430	19.667
Septal e' <=7.3	1.914	0.511	14.040	0.000	6.778	2.491	18.442
Septal E/e' >7.6	1.483	0.509	8.491	0.004	4.407	1.625	11.953
Lateral E/e' >7.6	1.833	0.507	13.070	0.000	6.250	2.314	16.879

A multivariate logistic regression analysis was performed to determine the most important risk factors that were associated with occurrence of postoperative AF and demonstrated that dilated LA (OR: 7.8; 95% CI 0.96-64): septal e' velocity (OR: 6.48; 95% CI 0.9-46): septal wall thickness (OR: 6; 95% CI 0.59-61): lateral E/e' velocity (OR: 4.59; 95% CI.149-141): LAVI (OR: 4.4; 95% CI 0.59-32): hypertension (OR: 5.3; 95% CI.49-57): LVM (OR: 5.5; 95% CI 0.148-205):) and impaired LV function (OR: 3; 95% CI 0.37-25) were the most important independent risk factors for development of AF after CABG **(Table 7)**.

Table (7): Multi-variate logistic regression analysis for factors associated with AF

Analysis / Parameters	B	S.E.	Wald	P-value	Odds ratio (OR)	95% C.I. for OR	
						Lower	Upper
Age >60	0.413	0.873	0.224	0.636	1.512	0.273	8.363
HTN	1.677	1.213	1.910	0.167	5.348	0.496	57.677
Inotrope	0.145	1.177	0.015	0.902	1.156	0.115	11.613
EF <=50	1.130	1.074	1.108	0.292	3.097	0.378	25.405
LVIDd >5.3	0.205	1.230	0.028	0.868	1.227	0.110	13.663
LVIDs >4	0.786	1.529	0.264	0.607	2.194	0.110	43.927
SWT >11	1.798	1.181	2.317	0.128	6.037	0.596	61.123
PWT >10	0.284	1.251	0.051	0.821	1.328	0.114	15.426
LVM >233	1.706	1.846	0.854	0.356	5.505	0.148	205.201
LVMI >117	0.027	1.366	0.000	0.984	1.027	0.071	14.952
TAPSE ≤ 18	0.142	1.019	0.020	0.889	1.153	0.156	8.498
LAD >3.7	2.062	1.073	3.693	0.055	7.863	0.960	64.407
LAVI >33.5	1.482	1.022	2.105	0.147	4.404	0.594	32.626
Average E/e' >7.4	0.424	2.147	0.039	0.843	1.529	0.023	102.776
Septal e' <=7.3	1.870	1.006	3.455	0.063	6.487	0.903	46.577
Septal E/e' >7.6	1.021	1.524	0.449	0.503	2.776	0.140	55.008
Lateral E/e' >7.6	1.524	1.749	0.759	0.384	4.591	0.149	141.484

DISCUSSION

Our study was conducted on 100 patients who had underwent CABG with the incidence of POAF was about 24 % with the peak incidence of POAF was in the second day, similar results were reported by *Dave et al. (2018)*. It has been consistently reported that the incidence of POAF range between 10% and 65% *(Alqahtani, 2010).*

The present study found that older people have higher risk of POAF but no significant difference between male and female gender. Advanced age is the most consistently reported and widely accepted risk factor for POAF *(January et al., 2014)*. The aging process leads to a loss of myocardial fibers, increased fibrosis and collagen deposition in the atria, particularly near the sinoatrial node, which alters atrial electrical properties. Age-related physiological changes are a 'setup' for POAF, with acute surgical trauma and inflammation likely providing the inciting factors that induce POAF *(Philip et al., 2014)*. However, a study by *Aranki et al. (2010)* reported that male gender is an independent predictor for the development of postoperative AF.

In our study, history of hypertension was strongly associated with development of POAF although diabetes was not. These results were consistent with *Dave et al. (2018)* where they found no association between DM and POAF, however other studies found significant association between them *(Alqahtani, 2010)*. Hypertension is considered one of the most important risk factors of AF in general population *(Hindricks et al., 2020)* and also after CABG *(Burrage et al., 2019)*. Hypertension-related structural changes may have a significant role in the genesis of associated arrhythmias. A number of changes in the hypertrophied heart, such as fibrosis, may act as a substrate for reentry arrhythmias *(Aranki et al., 2010)*.

Multiple studies demonstrated the effect of prolonged bypass time (CPB) on cardiopulmonary machine and prolonged aortic cross- clamp time on development of POAF *(Dave et al., 2018* and *Gudbjartsson et al., 2020)*. However, in our study there were no significant differences in both AF and non-AF groups with more prolonged bypass time or aortic cross-clamp time. But of note, we excluded patients with history of prolonged bypass time and cross clamp time as it is defined as a risk factor for development of POAF. CPB is associated with an ischemia-reperfusion injury inducing a complex inflammatory response, the analogous of which have been reported in patients with AF. These ranged from the presence of inflammatory infiltrates in atrial biopsies to increased concentrations of C-reactive protein which form the substrate for generation of ectopic activity *(Helgadottir et al., 2012)*. Also, there was no difference in patients with history of complete revascularization and incomplete revascularization in occurrence of AF.

In our study, use of adrenaline was associated with higher incidence of POAF. *Hashemzadeh et al. (2013)* reported similar findings. Several studies have suggested that use of inotropes increase the sympathetic activity and this heightened sympathetic response predisposes a patient to developing POAF *(Workman, 2010* and *Hashemzadeh et al., 2013)*.

In the present study, impaired LV systolic function (ejection fraction) and impaired RV systolic function (TAPSE) increased the occurrence of AF and that was consistent with results reported by *Dave et al. (2018)* when they demonstrated that reduced ejection fraction was strongly associated with development of POAF after CABG surgery and also it is reported that heart failure is an independent risk factor *(Banach et al., 2010)*. A study conducted by *Ting et al. (2017)* showed that RV dysfunction is associated significantly with the occurrence of POAF in the context of cardiac surgery.

Increased left ventricular internal dimensions (systolic and diastolic): increased septal wall thickness, increased posterior wall thickness and LV mass index were significantly associated with development of POAF in this study. In agreement with the present work, other studies revealed a significant association between increased LV dimensions and LV hypertrophy and development of POAF *(Burrage et al., 2019* and *Gudbjartsson et al., 2020)*. In patients with LV hypertrophy, diastolic dysfunction, advanced age, myocardial ischemia, and myocardial fibrosis in addition to structural abnormalities with hypertrophy that include myocardial cell disarray, coronary microvasculature dysfunction and remodeling changes may predispose to AF *(Tian et al., 2018)*. In patients with dilated dimensions diffuse fibrosis or alterations in the structure or LV function may provide a substrate for AF *(Zecchin et al., 2019)*.

The present study showed that increased left atrial diameter and indexed volume increased the incidence of POAF significantly. It is well documented in multiple studies that increased LA volume or diameter is an important independent predictor of POAF which support our

results, patients who developed POAF after CABG had more fibrosis and increased LAVI *(Ozben et al., 2016* and *Gudbjartsson et al., 2020).* Larger post-operative LAVI was an independent predictor for the occurrence of AF *(Kang et al., 2018).* Larger atria may alter atrial electrophysiological properties and increase susceptibility to POAF *(Greenberg et al., 2017).*

There was association between increased septal E/e', lateral E/e' and average E/e' and decreased lateral e' and occurrence of POAF but that didn't happen with decreased septal e'. Despite the hypothesis that increased E/e' associated with impaired relaxation and diastolic dysfunction and increased LVEDP which predispose to POAF, *Rader et al. (2012)* did not find significant association between E/e' and postoperative AF after cardiac surgery. However, E/e', an established surrogate of LVEDP, has been shown to be predictive for AF after lung transplant *(Nojiri et al., 2010).*

In our study there was no significant association between occurrence of AF and increased tricuspid regurgitation velocity (TR velocity) or presence of mitral regurgitation. However, *Ronsoni et al. (2020)* stated that the presence of mitral valve disease was a predictor of POAF and increases the risk by 2.3-fold.

In the present work, a multivariate logistic regression analysis was performed to determine the most important risk factors that were associated with occurrence of postoperative AF and demonstrated that dilated LA, septal e' velocity, septal wall thickness, lateral E/e' velocity, LAVI, hypertension, LVM and impaired LV function were the most important independent risk factors for development of AF after CABG.

CONCLUSION

The incidence of POAF was 24% with peak incidence in the second postoperative day. Echocardiography was an essential tool for detection of other predictors where low ejection fraction, impaired RV systolic function (reduced TPASE): increased LV internal dimensions and increased LV walls thickness were important predictors for occurrence of POAF.

Dilated left atrium and increased left atrium volume index were significant predictors of atrial fibrillation after CABG. Tissue Doppler-derived measurements may serve as a tool for determination of POAF predictors and patients with high risk as increased average E/e', septal E/e', lateral E/e' velocities and decreased lateral e' velocity but not septal e' velocity were associated with higher incidence of POAF.

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تنبؤات حدوث الرجفة الأذينية بعد عمليات توصيل الشرايين التاجية المقيمة بواسطة الموجات فوق الصوتية على القلب عن طريق الصدر

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خلفيــة البحــث: تعـد الرجفــة الأذينيــة أشــهر اضــطرابات كهربــاء القلــب التــي تحـدث بعـد عمليــات توصــيل الشــرايين التاجيــة ورغــم أنهــا تعتبــر اضــطراب حميــد إلا أنهــا تســاهم بشــكل كبيــر فــي ارتفــاع معــدلات حــدوث المضــاعفات الأخــرى والوفيــات وتزيــد مــن مدة بقاء المريض بالمستشفى بعد إجراء الجراحة.

الهــدف مــن البحــث: تقيــيم تنبــئ تخطــيط صــدى القلــب للرجفــان الأذينــي بعــد عمليــات توصيل الشرايين التاجية.

المرضــي وطــرق البحــث: أجريــت هــذه الدراســة علــى مائــة مــريض ممــن خضــعوا لعمليــة توصــيل شــرايين تاجيــة بمعهــد القلــب القــومي ومستشــفيات جامعــة الأزهــر خــلال الفتــرة مــن يونيــه 2020 وحتــى ديســمبر 2020. وقــد تــم مراجعــة التــاريخ المرضــى لهــؤلاء المرضــى والــذي شــمل العمــر، الجــنس (ذكر/أنثــى) والتــدخين والإصــابة بمــرض ارتفــاع ضــغط الــدم أو الــداء الســكري. كمــا تــم أيضــاً مراجعــة تــاريخ المرضــى داخــل غرفــة العمليــات فيمــا يخــص مــدة بقــاء المــريض علــى جهــاز القلــب والرئة الصناعي وعدد الطعوم التي تم ذراعتها على الشرايين التاجية.

تــم متابعــة المرضــى بعــد خــروجهم مــن غرفــة العمليــات داخــل وحــدة الرعايــة المركــزة وداخــل الجنــاح العــام بالمستشــفى وتســجيل المرضــى الــذين اســتخدموا أدويــة داعمــة لعضــلة القلــب ومراجعــة رســم كهربــاء القلــب لتحديــد المرضــى الــذين عــانوا مــن حدوث رجفان أذينية والوسيلة المستخدمة لعلاج هذا الاضطراب.

وقد تم إجراء موجات فوق صوتية على القلب على هؤلاء المرضى لتحديد القياسات الأتية: كفاءة البطين الأيسر، كفاءة البطين الأيمن، تحديد الأطوال الداخلية للبطين الأيسر وتحديد سمك جدار البطين الأيسر، قطر الأذين الأيسر وقياس مؤشر حجم الأذين الأيسر وتم أيضاً عمل دوبلر على حلقتي الصمام الميترالي لتحديد كلاً من نسبة سرعة التدفق المبكرة عبر الصمام الميترالي إلى سرعة انقباض الأذين الأيسر ونسبة سرعة التدفق المبكرة عبر الصمام الميترالي إلى السرعة الإنقباضية المبكرة والسرعة الإنقباضية المبكرة على الحلقة الأنسية والسرعة الإنقباضية المبكرة على الحلقة الجانبية للصمام الميترالي.

نتائج البحث: وقد أظهرت نتائج هذه الدراسة أن كلاً من التقدم في العمر ووجود تاريخ مرضي للإصابة بمرض ارتفاع ضغط الدم قبل العملية واستخدام الأدوية الداعمة لعضلة القلب بعد العملية كانت مؤشرات تنبؤية لحدوث الرجفة الأذينية بعد عمليات توصيل الشرايين التاجية. كما أظهرت الدراسة أن المرضى الذين كانوا يعانون من ضعف كفاءة البطين الأيسر، ضعف كفاءة البطين الأيمن، تمدد بالبطين الأيسر والأذين الأيسر، إرتفاع سمك جدار البطين الأيسر، وإرتفاع مؤشر حجم الأذين الأيسر كان معدل حدوث الرجفة الأذينية بعد الجراحة معهم أكثر من غيرهم من المرضى.

الاستنتاج: هناك ارتباط بين ضعف كفاءة البطين الأيسر، ضعف كفاءة البطين الأيمن، وتمدد البطين الأيسر والأذين الأيسر، وإرتفاع سمك جدار البطين الأيسر، ارتفاع مؤشر حجم الأذين الأيسر، وزيادة نسبة سرعة التدفق المبكرة إلى السرعة الانقباضية المبكرة على حلقتي الصمام الميترالي، ونقص السرعة الانقباضية المبكرة على الحلقة الأنسية وبين ارتفاع معدل حدوث الرجفة الأذينية بعد الجراحة. كما لم تُظهر الدراسة ارتباط بين نقص السرعة الانقباضية المبكرة على الحلقة الجانبية للصمام الميترالي وحدوث الرجفة الأذينية.

الكلمات الدالة: الرجفة الاذينية، توصيل الشرايين التاجية، تخطيط صدى القلب عبر الصدر.