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Impact of Atrial Fibrillation on Coronary Artery Complexity in Patient Underwent Percutaneous Coronary Intervention

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ABSTRACT:

Background: Atrial fibrillation (AF) is one of the most common arrhythmias encountered in cases with acute coronary syndrome (ACS) and in many cases, AF is relayed to coronary artery disease (CAD). The relationship is thought to be bidirectional. The results of Percutaneous Coronary Intervention are largely affected in the cases with AF.

Aim: Describe the angiographic and clinical characteristic of case with atrial fibrillation having coronary angiography with and without intervention and monitoring of in hospital course compared to patient without AF.

Subjects and Methods: The current research involved 70 cases with chronic AF, 35 cases with recent AF and 50 Sinus non-AF patients. The cases underwent detailed history taking and clinical examination. The ECG, echocardiography and laboratory data were performed to all the cases. Cardiac catheterization was through percutaneous coronary intervention (PCI). SYNTAX score was applied to determine the severity of CAD. The CHA2DS2-VA score was calculated for each case to evaluate thromboembolic risk. Patients were followed for the occurrence of cardiac events, neurological complications, bleeding and mortality. Follow up at 1 month for MACE and cardiac events.

Results: The incidence of high CHADSVA score (≥ 2) was significantly elevated in the cases with chronic AF (80%) and recent AF (85.7%) as compared to the cases with Sinus non-AF group (54%). The incidence of high syntax score was 34.3%, 40% and 18% in the chronic AF group, recent AF and sinus non-AF group respectively. The frequency of Neurological complications and Bleeding was statistically significantly elevated in the chronic AF group and recent AF group as compared to the sinus non-AF group. With follow up, non-fatal ACS, non-fatal stroke (neurological complications), bleeding and palpitations were significantly raised in the recent AF and sinus non-AF group

Conclusion: The existence of AF is related to higher complexity in the coronary arteries in the cases with CAD. Also, presence of AF was related to elevated possibility of short-term complications and higher incidence of complications with follow up.

1. INTRODUCTION

Atrial fibrillation is a common arrhythmia in case with acute coronary syndrome, with a reported prevalence that varies between six percent and twenty-two percent, based on the ACS subtype, comorbidity profile, and age [1].

Atrial fibrillation is frequently coexists with coronary artery disease [2]. AF in cases with CAD is related to higher possibilities of myocardial infarction, stroke, bleeding, and death, particularly following acute coronary syndromes and percutaneous coronary intervention (PCI) [3].

Despite the traditional perception that atrial fibrillation is an epiphenomenon resulted from metabolic stress or ischemia-related atrial pressure overload, a growing body of proof shows that atrial fibrillation may be a distinct high-risk phenotype rather than a coincidental finding in cases with ACS [4].

The in-hospital morbidity and mortality of these cases are usually significant, and they frequently necessitate anticoagulants and dual antiplatelet therapy [5]. The ideal antithrombotic therapeutic approach for simultaneously avoiding bleeding complications and thromboembolic events has been the subject of significant research until recently [6-8].

In new years, the application of PCIs has undergone significant changes, with the common application of 2nd-generation drug-eluting stents and the undergoing of procedures by cases with more severe comorbidities. [9].

In comparison to non-complex PCI cases, complex PCI cases are at an elevated risk of significant bleeding complications and adverse cardiovascular events, including MI, stent thrombosis (ST), and ischemia-driven revascularization [10].

Anatomical scoring systems for CAD are well-established instruments that enable researchers and doctors to estimate clinical results for cases and provide a standardized technique for risk assessment. The utilization of scoring systems in clinical decision-making is currently supported by professional guidelines [11, 12], and they have facilitated comparative efficacy research and clinical trials [13, 14].

The SYNTAX (Synergy Between Percutaneous Coronary Intervention [PCI] with Taxus and Cardiac Surgery) score, which is the most commonly utilized & established of these, integrates the anatomical complexity and burden of atherosclerotic CAD. It can be applied to estimate case risk by examining the relationship among the manually calculated score and clinical outcomes and is commonly applied [15, 16].

Nevertheless, the computation of these scores can be difficult and time-consuming, and their applicability to large existing data sets, such as those found in cardiovascular registries, is significantly restricted. [17].

The goal of the current research was to describe the clinical and angiographic characteristic of patient with AF having coronary angiography with and without intervention and monitoring of in hospital course compared to patient without AF.

2. PATIENTS AND METHODS

This was prospective observational research that was done at Cardiac Catheterization Laboratory of Mansoura Specialized Medical Hospital (MSMH) affiliated with Mansoura University, Egypt. The research was held for one year duration.

This study included adult patients from both genders who were diagnosed with coronary artery disease having coronary angiography.

Cases with rheumatic heart disease with or without AF, those who have bioprosthetic or mechanical heart valves, cases with severe kidney insufficiency, coexistence of immunological, neoplastic or inflammatory illness at the time of enrolment and those with contraindications to antiplatelet or antithrombotic treatment were excluded from the research.

The complete research design has been permitted by the Institutional Review Board (IRB), faculty of medicine, Mansoura University (Number of IRB: MS.....). An informed consent was gathered from all the cases prior to inclusion in the research.

All the subjects underwent full history taking and full clinical examination. The history mainly concentrated on the risk factors for CAD such as hypertension, diabetes mellitus, dyslipidemia, positive family history of CAD, smoking and history of known AF.

Standard 12-lead ECG was obtained within ten minutes of 1st medical contact (FMC) according to ESC guidelines. Baseline laboratory tests included serum creatinine, cardiac enzymes comprise serum troponin and CK-MB and hemoglobin level.

Echocardiographic examinations were conducted in the left lateral supine position using a Vivid E9 scanner (GEVingmed Ulterasound). The cases were imaged in the left lateral decubitus position. The European Association of Cardiovascular Imaging and the American Society of Echocardiography [18] established guidelines for standard transthoracic echocardiography, which included Doppler analysis. The echocardiographic evaluation was conducted to evaluate the severity and existence of mitral regurgitation (MR), regional wall motion anomalies, and left ventricular ejection fraction (EF).

PCI was utilized to perform cardiac catheterization. The severity of coronary artery disease was assessed applying the SYNTAX score. The score will be determined by an online computer program (http://www.syntaxscore.com/calculator/start.htm) that comprises twelve sequential questions [19]. The major factors for determining the score of each lesion are as follows: diseased segments, dominant coronary artery, total occlusion, trifurcation or bifurcation, lesions that result in severe tortuosity, lesions with an aorto-ostial site, lesions that are more than ten millimeters in length, severe calcification of the lesion, the existence of a thrombus, and a diffusely narrowed and diseased segment. Based on their SYNTAX scores, cases with CAD were categorized into three groups: mild CAD (SYNTAX score: ≤22), moderate CAD (SYNTAX score: 23 - 32), and severe CAD (SYNTAX score: ≥33).

Each patient's CHA2DS2-VA score was computed to evaluate their thromboembolic risk. The components of the CHA2DS2-VASc score have been obtained for each case. The CHA2DS2-VASc score was determined via assigning one point to each of the following: the existence of chronic heart failure, hypertension, diabetes mellitus (DM), vascular illness, age sixty-five to seventy-four years, male gender as a sex category, and two points for the history of stroke or temporary ischemic attack and age not less than seventy-five years [20].

The CHA2DS2-VA score has superseded the CHA2DS2-VASc score. As of 2025, it is recommended to use the CHA2DS2-VA score for stroke risk assessment in atrial fibrillation patients. The CHA2DS2-VA score is a clinical instrument designed to assess stroke risk in cases with non-valvular atrial fibrillation. It is a modification of the widely used CHA2DS2-VASC score, with the primary distinction being the exclusion of sex parameter (female sex) as a risk factor. The total score varies from 0 to 9, with elevated scores demonstrating an elevated possibility of stroke [21].

Patients were followed for the occurrence of cardiac events, neurological complications, bleeding and mortality. Follow up at 1 month for MACE and cardiac events.

STATISTICAL ANALYSIS OF DATA

The Statistical Package for Social Sciences (SPSS) version 26 for Windows® (IBM, SPSS Inc, Chicago, IL, united states of America) was used to code, process, and analyze the data collected. Numbers (frequency) and percentages have been utilized to represent qualitative data. The comparison between groups was carried out applying the Chi-Square test (Fischer's exact test or Monte-Carlo test as a correction). Quantitative data was evaluated for normality applying the Kolmogorov-Smirnov test. Parametric data values were represented as the median ± standard deviation, whereas non-parametric information were represented as the median (range). To compare two groups with parametric and non-parametric information, the independent samples t-test and the Mann-Whitney u-test were applied, correspondingly. The one-way ANOVA test was utilized to compare 3 groups with normally distributed quantitative variables, and the Kruskal-Walli's test was utilized if the information were abnormally distributed. The statistical significance of the variances was determined by a P value of not more than 0.05.

3. RESULTS

The present research involved 70 patients with chronic AF, 35 cases with recent AF and 50 Sinus non-AF patients.

As illustrated un table (1), a statistically insignificant variance has been found between the three groups with regard to the presentation and clinical diagnosis. In the cases with chronic AF, there were 35 cases (50%) with acute coronary syndrome and 35 cases (50%) with chronic coronary syndrome, In the cases with recent AF, there were 22 cases (62.9%) with acute coronary syndrome and 13 cases (37.1%) with chronic coronary syndrome while in the sinus non-AF group, there were 22 cases (44%) with acute coronary syndrome and 28 cases (56%) with chronic coronary syndrome. In the cases with chronic AF, there were 3 cases (4.3%) with STEMI, 32 cases (45.7%) with NSTEMI and 35 cases (50%) with chronic coronary syndrome, in the cases with recent AF, there were 2 cases (5.7%) with STEMI, 20 cases (57.1%) with NSTEMI and 13 cases (37.1%) with chronic coronary syndrome while in the sinus non-AF group, there were 22 cases (44%) with NSTEMI and 28 cases (56%) with chronic coronary syndrome. There was a statistically insignificant alteration between the three groups with regard to the age. The mean

age was 62.11 ± 9.40 years, 64.46 ± 7.95 years and 58.96 ± 13.50 years in the chronic AF group, recent AF and sinus non-AF group respectively. There were high male prevalence in the cases with AF (65.7%) as compared to the cases with recent AF (28.6%) and cases with Sinus non-AF group (42%).

This table also illustrates that a statistically insignificant variance has been observed between the three groups with regard to the associated comorbidities and risk factors except for hypertension that was significantly elevated in the chronic AF group and recent AF as compared to the Sinus non-AF group. In the chronic AF group, hypertension was stated in 68.6 percent, diabetes mellitus in 50%, dyslipidemia in 37.1%, positive family history in 38.6% and smoking in 41.4% respectively. In the recent AF group, hypertension was reported in 65.7%, diabetes mellitus in 51.4%, dyslipidemia in 28.6%, positive family history in 31.4% and smoking in 42.9% respectively. In the sinus non-AF group, hypertension was reported in 46%, diabetes mellitus in 64%, dyslipidemia in 46%, positive family history in 50% and smoking in 60% correspondingly.

Table (1): Analysis of the clinical presentation, demographic data and risk factors in the three study groups

Variable	Chronic AF group (Number= 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
Type of presentation				
Acute coronary syndrome	35 (50%)	22 (62.9%)	22 (44%)	χ^2= 2.977 P = 0.226
Chronic coronary syndrome	35 (50%)	13 (37.1%)	28 (56%)	
Clinical diagnosis				
STEMI	3 (4.3%)	2 (5.7%)	0 (0%)	MC = 4.901 P= 0.298
NSTEMI	32 (45.7%)	20 (57.1%)	22 (44%)	
Chronic coronary syndrome	35 (50%)	13 (37.1%)	28 (56%)	
Age (years)	62.11 ± 9.40	64.46 ± 7.95	58.96 ± 13.50	F = 2.888 P = 0.059
Sex				
Males	46 (65.7%)	10 (28.6%)	21 (42%)	**χ^2= 9.531 P = 0.009***
Females	24 (34.3%)	25 (71.4%)	29 (58%)	
Hypertension	48 (68.6%)	23 (65.7%)	23 (46%)	**χ^2= 6.713 P = 0.035***
Diabetes mellitus	35 (50%)	18 (51.4%)	35 (64%)	χ^2= 2.521 P = 0.284
Dyslipidemia	26 (37.1%)	10 (28.6%)	23 (46%)	χ^2= 2.669 P = 0.259
Positive family history	27 (38.6%)	11 (31.4%)	25 (50%)	χ^2= 3.171 P = 0.205
Smoking	29 (41.4%)	15 (42.9%)	30 (60%)	χ^2= 4.464 P = 0.107
History of known AF	70 (100%)	0 (0%)	0 (0%)	**MC = 140 P < 0.001***

F: One-Way ANOVA test; MC: Monte-Carlo test; χ^2: Chi-square test; *: Statistically significant (P-value under 0.05)

As illustrated in table (2), a statistically insignificant variance has been found between the three groups regarding the CHADSVA score. However, the incidence of high CHADSVA score (≥ 2) was significantly elevated in the cases with chronic AF (80%) and recent AF (85.7%) as compared to the cases with Sinus non-AF group (54%).

This table also illustrates that a statistically insignificant variance has been found between the three groups in terms of the number of disease vessels or the dominance. Moreover, the prevalence of lesions in the culprit vessels was comparable between the three groups except for the LCX that showed significant higher affection in the Sinus non-AF group. There was statistically significant elevated occurrence of high syntax score in the chronic AF group and recent AF group. The incidence of high syntax score was 34.3%, 40% and 18% in the chronic AF group, recent AF and sinus non-AF group respectively.

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Table (2): Analysis of the results of angiography in the three study groups

Variable	Chronic AF group (Number = 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
CHADSVA score	2 (0 – 5)	3 (0 – 5)	2 (0 – 5)	KW = 2.454 P = 0.293
CHADSVA categories				
Low to intermediate	14 (20%)	5 (14.3%)	23 (46%)	**χ^2= 13.737** **P = 0.001***
High	56 (80%)	30 (85.7%)	57 (54%)	
Culprit vessel				
LM	10 (14.3%)	7 (20%)	7 (14%)	χ^2= 0.706 P = 0.702
LAD	41 (58.6%)	18 (51.4%)	19 (38%)	χ^2= 4.959 P = 0.084
RCA	39 (55.7%)	17 (48.6%)	24 (48%)	χ^2= 0.862 P = 0.650
LCX	22 (31.4%)	7 (20%)	27 (54%)	**χ^2= 11.536** **P = 0.003***
Number of diseases vessels				
Single vessel	35 (50%)	23 (65.7%)	28 (56%)	χ^2= 2.341 P = 0.310
Multiple vessels	35 (50%)	12 (34.3%)	22 (44%)	
Dominance				
Left dominance	24 (34.3%)	14 (40%)	17 (34%)	χ^2= 0.404 P = 0.817
Right dominance	46 (65.7%)	21 (60%)	33 (66%)	
Syntax score				
Low	19 (27.1%)	8 (22.9%)	25 (50%)	**χ^2 = 10.391** **P= 0.034***
Intermediate	27 (38.6%)	13 (37.1%)	16 (32%)	
High	24 (34.3%)	14 (40%)	9 (18%)	

KW: Kruskal Wallis test

As shown in table (3), the median serum creatinine level was statistically significantly elevated in the chronic AF group and recent AF group as compared to the sinus non-AF group. The occurrence of abnormal kidney functions was 55.7%, 65.7% and 12% in the chronic AF group, recent AF & sinus non-AF group respectively. This table shows that the frequency of Moderate-Severe mitral regurge was statistically significantly raised in the chronic AF group and recent AF group as compared to the sinus non-AF group.

Table (3): Analysis of the laboratory and echocardiographic data in the three study groups

Variable	Chronic AF group (Number = 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
Serum creatinine	1.2 (0.7 – 3)	1.2 (0.7 – 2.2)	1 (0.7 – 3)	**KW = 17.430** **P < 0.001***
Renal functions				
Normal	31 (44.3%)	12 (34.3%)	44 (88%)	**χ^2 = 31.394** **P < 0.001***
Abnormal (Elevated)	39 (55.7%)	23 (65.7%)	6 (12%)	
Ejection fraction	53.43 ± 10.20	50.11 ± 9.59	53.26 ± 13.20	F = 1.154 P = 0.318
LA dimensions (mm)	44.67 ± 6.17	44.63 ± 6.09	42.12 ± 6.68	F = 2.727 P = 0.069
SWMA				
No	5 (7.1%)	1 (2.9%)	7 (14%)	MC = 3.584 P= 0.167
Yes	65 (92.9%)	34 (97.1%)	43 (86%)	
Mitral regurge				
None	16 (22.9%)	2 (5.7%)	31 (62%)	**MC = 34.880** **P < 0.001***
Mild	29 (41.4%)	19 (54.3%)	11 (22%)	
Moderate-Severe	25 (35.7%)	14 (40%)	8 (16%)	

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F: One-Way ANOVA test MC : Monte-Carlo test

Table (4) illustrates that a statistically insignificant variance has been found between the three groups with regard to the drug treatment except for Oral anticoagulants.

Table (4): Analysis of the drug treatment in the three study groups

Variable	Chronic AF group (Number = 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
Aspirin	70 (100%)	35 (100%)	50 (100%)	-------
Clopidogrel	70 (100%)	35 (100%)	50 (100%)	-------
Proton pump inhibitors (PPIs)	70 (100%)	35 (100%)	50 (100%)	-------
Oral anticoagulants	70 (100%)	0 (0%)	0 (0%)	**MC = 140 P < 0.001***
Mineralocorticoid Receptor Antagonist (MRA)	67 (95.7%)	34 (97.1%)	49 (98%)	χ^2= 0.508 P = 0.776
Sodium-Glucose Cotransporter (SGLT2)	63 (90%)	32 (91.4%)	47 (94%)	χ^2= 0.609 P = 0.737
Beta blockers	63 (90%)	29 (82.9%)	41 (82%)	χ^2= 1.856 P = 0.395
Angiotensin Receptor Blockers (ARBs)	45 (64.3%)	24 (68.6%)	41 (82%)	χ^2= 4.568 P = 0.102
ACE inhibitors	25 (35.7%)	11 (31.4%)	9 (18%)	χ^2= 4.568 P = 0.102

As illustrated in table (5), the frequency of Neurological complications and Bleeding was statistically significantly elevated in the chronic AF group and recent AF group as compared to the sinus non-AF group. The neurological complications were reported 20%, 25.7% and 4% in the chronic AF group, recent AF & sinus non-AF group respectively. Bleeding was reported 12.9%, 14.3% and 0% in the chronic AF group, recent AF and sinus non-AF group respectively.

Table (5): Analysis of the outcomes in the three study groups

Variable	Chronic AF group (Number = 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
Cardiac events	13 (18.6%)	3 (8.6%)	9 (18%)	χ^2= 1.916 P = 0.384
Neurological complications	14 (20%)	9 (25.7%)	2 (4%)	**MC = 8.590 P = 0.014***
Bleeding	9 (12.9%)	5 (14.3%)	0 (0%)	**MC = 7.387 P = 0.025***
Death	8 (11.4%)	5 (14.3%)	5 (10%)	χ^2= 0.373 P = 0.830

As illustrated in table (6), high statistically significant variance has been found in the cases with and without neurological complications regarding the prevalence of high syntax score (76% versus 21.5% respectively). This table also shows that cases with Neurological complications had statistically significant higher prevalence of high CHADSVA score (92%) as compared to the cases without neurological complications (69.2%).

Table (6): Analysis of the Syntax score and CHADSVA score according to the neurological complications

Variable	No neurological complications (Number = 130)	Neurological complications (Number = 25)	Test of sig.
Syntax score			

Low	51 (39.2%)	1 (4%)	**MC = 30.414 P < 0.001***
Intermediate	51 (39.2%)	5 (20%)	
High	28 (21.5%)	19 (76%)	
CHADSVA score			
Low to intermediate	40 (30.8%)	2 (8%)	**FET = 5.503 P= 0.019***
High	90 (69.2%)	23 (92%)	

As shown in table (7), at 1 month follow up, there were 55 cases (78.6%) with NYHA II and 55 cases (78.6%) with NYHA III in the chronic AF group, there were 30 cases (85.7%) with NYHA II and 5 cases (14.3%) with NYHA III in the chronic AF group and 45 cases (90%) with NYHA II and 5 cases (10%) with NYHA III in the Sinus non-AF group, with a statistically insignificant variance between the three groups. Death occurred in 8 cases (11.4%), 2 cases (5.7%) and 5 cases (10%) in the chronic AF group, recent AF and sinus non-AF group correspondingly, with a statistically insignificant variance between the three groups. Non-fatal ACS was reported in 18 cases (25.7%), 9 cases (25.7%) and 7 cases (14%) in the chronic AF group, recent AF and sinus non-AF group correspondingly, with a statistically insignificant variance between the three groups. Non-fatal stroke (neurological complications) was reported in 14 cases (20%), 5 cases (14.3%) and 2 cases (4%) in the chronic AF group, recent AF and sinus non-AF group correspondingly, with a statistically significant distinction between the three groups. Bleeding was reported in 9 cases (12.9%) in the AF only, with a statistically significant distinction between the three groups. Palpitations were reported in 50 cases (71.4%), 27 cases (77.1%) and 15 cases (30%) in the chronic AF group, recent AF and sinus non-AF group correspondingly, with a statistically significant variance between the three groups.

Table (7): Follow up at 1 month for MACE and cardiac events

Variable	Chronic AF group (Number = 70)	Recent AF group (Number = 35)	Sinus non-AF group (Number = 50)	Test of sig.
NYHA				
NYHA I	0 (0%)	0 (0%)	0 (0%)	MC = 2.930 P = 0.231
NYHA II	55 (78.6%)	30 (85.7%)	45 (90%)	
NYHA III	15 (21.4%)	5 (14.3%)	5 (10%)	
NYHA IV	0 (0%)	0 (0%)	0 (0%)	
MACE				
Death	8 (11.4%)	2 (5.7%)	5 (10%)	MC = 0.880 P = 0.644
Non-fatal ACS	18 (25.7%)	9(25.7%)	7 (14%)	χ^2= 2.714 P = 0.257
Non-fatal stroke (neurological complications)	14 (20%)	5 (14.3%)	2 (4%)	**MC = 6.396 P = 0.041***
Bleeding	9 (12.9%)	0 (0%)	0 (0%)	**MC = 11.602 P = 0.003***
Palpitations	50 (71.4%)	27 (77.1%)	15 (30%)	**χ^2= 26.680 P < 0.001***

4. DISCUSSION

The objective of the current research was to describe the angiographic and clinical characteristic of patient with AF having coronary angiography with and without intervention and monitoring of in hospital course compared to patient without AF.

The current study included 70 patients with chronic AF, 35 patients with recent AF and 50 Sinus non-AF patients. The cases were recruited from the cardiac catheterization laboratory of Mansoura Specialized Medical Hospital (MSMH) affiliated to Mansoura University. They were recruited from patients with indications for PCI (ACS or chronic coronary syndrome (CCS).

In our research, a statistically insignificant variance has been found between the three groups with regard to the presentation and clinical diagnosis. In the cases with chronic AF, there were 35 cases (50%) with acute coronary syndrome and 35 cases

(50%) with chronic coronary syndrome, In the cases with recent AF, there were 22 cases (62.9%) with acute coronary syndrome and 13 cases (37.1%) with chronic coronary syndrome while in the sinus non-AF group, there were 22 cases (44%) with acute coronary syndrome and 28 cases (56%) with chronic coronary syndrome. In the cases with chronic AF, there were 3 cases (4.3%) with STEMI, 32 cases (45.7%) with NSTEMI and 35 cases (50%) with chronic coronary syndrome, in the cases with recent AF, there were 2 cases (5.7%) with STEMI, 20 cases (57.1%) with NSTEMI and 13 cases (37.1%) with chronic coronary syndrome while in the sinus non-AF group, there were 22 cases (44%) with NSTEMI and 28 cases (56%) with chronic coronary syndrome.

Varying prevalence rates of new onset AF (NOAF) or recent AF have been stated in cases with ACS, & these differences were related to the severity of ACS.

In the multinational GRACE research, a total of 21,785 cases with ACS were involved, and 6.2% of the patients were diagnosed with NOAF. Additionally, the frequency of STEMI in cases in the NOAF group was significantly elevated in comparison with that in the WAF group (forty-three percent versus thirty-four percent , p-value under 0.001). [22].

A further investigation indicated that 4.4 percent of cases with ACS had NOAF, & the frequency of NOAF was greater in the STEMI group compared to the NSTEACS group [23].

Cases in the NOAF group exhibited a significantly elevated frequency of a STEMI and an elevated GRACE score in comparison with those in the WAF or PAF group, as reported by an investigation. The occurrence of NOAF in ACS was 9.2% [24].

Approximately one in every eight cases presented with NOAF or PAF in an investigation carried out by SU et al. The reported occurrence of NOAF in ACS was 6.7 percent, & approximately fifty percent of the cases with new onset AF had STEMI (48.6%). However, the frequency of STEMI in the cases with new onset AF wasn't substantially greater in comparison with the other cases [25].

These results suggest that the severity of acute coronary syndrome and underlying illness may be illness to the frequency of NOAF.

In the current research, the mean age was 62.11 ± 9.40 years, 64.46 ± 7.95 years and 58.96 ± 13.50 years in the chronic AF group, recent AF and sinus non-AF group respectively. The age was lower in the sinus non-AF group, but it didn't attain a statistically significant difference.

This was in agreement with Su et al., who demonstrated that the cases in the no AF group were younger than those in the chronic AF and NOAF groups (61.5 ± 12.7, 73.35 ± 14.7, and 73.81 ± 12.4 years, correspondingly, p-value under 0.001) [25].

It is well established that incidence of AF rises with age [26]. The electrophysiologic substrate for the propagation and initiation of AF is provided by age-related structural changes in atrial tissues, physiologic alterations in ion currents, and alterations in impulse conduction and initiation. [27].

The lack of significant difference in the current research could be because of small included sample size.

In the present research, a statistically insignificant variance has been found between the three groups with regard to the associated comorbidities and risk factors except for hypertension that was significantly elevated in the chronic AF group and recent AF as than the Sinus non-AF group.

This was corroborated by Arslan and Baysal, who demonstrated that hypertension was significantly more common in the AF group, while the occurrence of DM didn't vary significantly among the groups. [1].

Cardiovascular disease is adversely affected by AF, as evidenced by research. It has also been demonstrated that cases with a history of atrial fibrillation have an elevated occurrence of diabetes mellitus and stroke, which may elevate their cardiovascular risk throughout ACS [28, 29].

In the current study, the ejection fraction was reduced in the recent AF group as compared to the chronic AF and Sinus non-AF group, but it didn't reach a statistically significant value.

The AF group's impaired ejection fraction offers additional mechanistic insight. Experimental and clinical research suggests that atrial fibrillation results in the reduction of atrial contribution to ventricular filling, the promotion of tachycardia-induced cardiomyopathy, and the precipitation of subendocardial ischemia via shortening diastolic perfusion time[30].

Atrial fibrillation's adverse hemodynamic effects on left ventricular function were consistently illustrated in both clinical & experimental investigations, thereby substantiating its status as a marker of diminished cardiac performance throughout acute ischemic states. [31].

Acute coronary syndrome exacerbates this vulnerable condition by increasing left ventricular end-diastolic pressure, microvascular dysfunction, and catecholamine surge. Consequently, our results support the hypothesis that AF exacerbates ischemic stress at the microvascular & chamber-function levels. New proof indicates that cardiovascular results in high-risk atrial fibrillation populations may be enhanced by early rhythm control strategies; however, there is a scarcity of data that particularly addresses rhythm control throughout the acute phase of ACS [32].

In the current research, the incidence of high CHADSVA score (≥ 2) was significantly elevated in the cases with chronic AF (80%) and recent AF (85.7%) as compared to the cases with Sinus non-AF group (54%).

This agreed with Su et al. who illustrated that as compared to the cases in the chronic AF and NOAF groups, those in the no AF group lower CHA2DS2-VASc score (2.8 ± 1.6, 4.1 ± 2.2, and 4.7 ± 1.6, correspondingly, p-value under 0.001) [25].

Parfrey et al. investigated the function of the CHA2DS2-VASc score in the assessment of cases with atrial fibrillation who had percutaneous coronary intervention. The research involved 564 cases with AF who had worse results with elevated scores [33].

In our study, the frequency of Moderate-Severe mitral regurge was statistically significantly elevated in the chronic AF group and recent AF group as compared to the sinus non-AF group.

This agreed with Shakeel et al. who illustrated that mitral regurgitation was significantly more prevalent in those with AF (55.4 percent versus 27.0 percent, p-value under 0.001) [34].

Similar to our results, Saad et al. showed that regarding Mitral regurgitation (MR): In group 1, 20 patients had moderate to severe MR (50 %). In group 2, 10 patients had moderate to severe MR (25 %); A statistically significant variance has been found among the examined groups as moderate to severe MR was more common in group 1 (P value = 0.021) [35].

Enlargement of left atrium was an independent predictor of af in the research carried out by Bahouth, Fadel et al., despite the fact that variances in left atrial size among cases with and without AF were minor. The larger left atrial size in the AF group may be a pre-existing predisposing factor and may additionally be partially because of a transient left atrial dilation in cases with decreased left ventricular systolic function or FMR [36].

In the present research, there was statistically significant elevated occurrence of high syntax score in the chronic AF group and recent AF group. The incidence of high syntax score was 34.3%, 40% and 18% in the chronic AF group, recent AF and sinus non-AF group respectively.

This was in line with Yildirim et al. who illustrated that the SSII and SS were significantly elevated in NOAF group (all P-value under .001). With regard to the outcomes of multivariate logistic regression analysis, the SSII was related to NOAF (-value under .001) in the study groups [37].

In a further investigation, cases with NOAF exhibited significantly elevated SS and SSII in comparison with those without, both in the matched population (18.6 ± 4 versus 16.75 ± 3.6; p-value under .001 and 42 ± 13.4 vs 35.1 ± 13.1; p-value under .001, correspondingly) and in the entire study population (18.6 ± 4 versus 16.5 ± 4.6; p-value under 001 and 42 ± 13.3 versus 31.5 ± 11.9; p-value under .001, correspondingly). SSII was the sole independent predictor of NOAF in comparison to its components (OR: 1,041 ninety-five percent CI: 1.015–1.068; p-value equal .002) [38].

In this study, the prevalence of lesions in the culprit vessels was comparable between the three groups except for the LCX that showed significant higher affection in the Sinus non-AF group.

This was in line with Saad et al. who stated that regarding Infarction related artery (IRA): In group 1, the IRA was the LAD (left anterior descending artery) in 15 cases (37.5%), RCA (right coronary artery) in 21 patients (52.5%) and LCX (left circumflex artery) in 4 patients (10%). In group 2, the IRA was the LAD in 22 cases (55%), RCA in ten cases (25%) and LCX in 8 cases

(20%); A statistically significant variance has been found among both groups with cases in group 1 had elevated incidence of RCA as IRA (P value =0.038) [35].

AF may be associated with left atria1 ischemia or infarction. Furthermore, as the sinus node artery is derived from the right coronary artery in fifty-five percent of cases and from the AV nodal artery in nearly ninety percent of cases, it was impossible to disregard their possible involvement in the development of atria1 arrhythmias over RV infarction. Sinus node ischemia and dysfunction can induce episodes of tachycardia, which increases the likelihood of atrial ectopic activity, junctional rhythms, and AF, comparable to sick sinus syndrome [39].

It is important to note that doctors make difficult therapeutic decisions when treating AF throughout an acute AMI, particularly when atrial fibrillation occurs exclusively throughout the acute phase of the event, in order to balance the risks of embolism and hemorrhage. This is particularly true when the pharmacological treatment of the cases under investigation is described. These decisions are frequently derived from current guidelines [41-43] and expert consensus [40].

In our research, a statistically insignificant variance has been found between the three groups with regard to the drug treatment except for Oral anticoagulants.

This agreed with Raczkowska-Golanko et al. who illustrated that elevated rate of suggested triple antithrombotic treatment (dual antiplatelet and oral anticoagulation therapy), but probably not efficient: seventy percent for AF cases, fifty-seven percent for NOAF and forty-five percent for Prior-AF group [44].

Acute ischemic stress, transient hemodynamic deterioration, and catecholamine surge may be indicative of new-onset AF, while chronic AF is more likely to be indicative of long-standing cardiovascular disease and advanced atrial remodeling. Consequently, the observed correlations should be interpreted with consideration of the present study's inability to differentiate among these entities. [1].

In the current research the frequency of neurological complications and Bleeding was statistically significantly elevated in the chronic AF group and recent AF group as compared to the sinus non-AF group. The neurological complications were reported 20%, 25.7% and 4% in the chronic AF group, recent AF and sinus non-AF group respectively. Bleeding was reported 12.9%, 14.3% and 0% in the chronic AF group, recent AF and sinus non-AF group respectively.

This was consistent with the findings of Zhou et al., who demonstrated that NOAF was linked to an increased risk of all-cause death (hazard ratio [HR] 2.26, ninety-five percent confidence interval [CI] 1.08–4.71), heart failure (HR 4.29, ninety-five percent CI 2.81–6.55), cardiogenic shock (HR 4.30, ninety-five percent CI 2.28–8.13), in-stent thrombosis (HR 6.04, ninety-five percent CI 1.71–21.45), and major hemorrhage (HR 2.86, ninety-five percent CI 1.44–5.66) throughout hospitalization. [45].

In comparison to other sub-groups, Raczkowska-Golanko et al. demonstrated that NOAF cases had the maximum in-hospital mortality (ninety percent), which was two times that of AF cases (nine percent) and four to six times that of the other groups. [44].

Jabre et al. conducted a comprehensive meta-analysis that encompassed over 275,000 patients from forty-three researches. Their findings indicated that NOAF was related to an elevated death rate in cases with MI, irrespective of the timing of atrial fibrillation [46].

In addition, an additional investigation revealed that cases in the NSTEACS group who developed NOAF throughout their intensive care stay had a 4.4-fold increased possibility of in-hospital death compared to other cases [47].

Furthermore, even without structural heart illness, the vicious electromechanical cycle of NOAF can lead to left ventricular dysfunction and heart failure [48], & cases with NOAF following acute myocardial infarction have been noted to be two times as prone to developing heart failure compared to normal cases [49].

Atrial fibrillation also predisposes cases to thrombus development and is linked to elevated possibilities of stroke and death. Zusman et al. documented a yearly ischemic stroke frequency of 4.4 percent in cases with new onset AF compared to 0.2 percent in those without AF following acute myocardial infarction; additionally, they indicated that NOAF in acute coronary syndrome patients served as an independent predictor of stroke [50].

Kundu et al. noted a 2.5 times increased likelihood of in-hospital stroke in cases who experienced NOAF after MI in contrast to those without AF [49]. Asanin et al. additionally identified other predictors of stroke in ACS patients with NOAF, such as the lack of anticoagulation at discharge, and the recurrence of AF and HF throughout monitoring [51].

The connections between atrial fibrillation and a more severe ACS presentation are probably multifactorial. Atrial fibrillation leads to compromised coronary perfusion due to the absence of atrial contraction, quick ventricular response, and heightened myocardial oxygen requirements [52]. Moreover, atrial fibrillation is closely dependent on systemic inflammation, endothelial impairment, and increased thrombotic propensity, all of which exacerbate ischemia load throughout acute coronary syndrome [53]. Cases with atrial fibrillation are generally older and have an elevated prevalence of concomitant conditions, including hypertension, diabetes, and chronic renal disease, which complicates therapeutic care [54].

In the current study, with follow up, non-fatal stroke (neurological complications), bleeding and palpitations were significantly greater in chronic atrial fibrillation group followed by recent AF group as compared to the non-AF group.

This agreed with the findings of Shakeel et al., who indicated that cases were monitored for a median duration of sixty months (IQR: 53–67), throughout which there were Number = 258 fatalities, and Number = 168 cases experienced at least one readmission due to MI, CVA, or a significant GI hemorrhage. The MACCE rates were significantly elevated in cases with AF in comparison with those without AF, exhibiting an unadjusted hazard ratio (HR) of 1.86 (ninety-five percent CI: 1.32–2.64, p-value under 0.001), with estimated five-year rates of 50.8% for the AF group and 34.2% for the non-AF group [34].

In our study, the cases with Neurological complications had statistically significant higher prevalence of high CHADSVA score (92%) as compared to the cases without neurological complications (69.2%).

This agrees with the findings of Kim et al., who involved a cohort of 298 cases experiencing stroke associated to atrial fibrillation in their research. A significant CHADS2 score at the time of admission was a strong indicator of unfavorable neurological outcomes [for NIHSS: odds ratio (OR), 4.17; ninety-five percent confidence interval , 1.76-9.87; for mRS: OR, 2.97; ninety-five percent CI, 1.23-7.16] after adjusting for all potential confounders [55].

In line with our results, Melgaard et al. demonstrated that among patients devoid of AF, the probabilities of ischemic stroke, thromboembolism, and mortality were 3.1 percent (number = 977), 9.9 percent (number = 3187), and 21.8 percent (number = 6956), correspondingly; these probabilities escalated with higher CHA2DS2-VASc scores as follows, for scores ranging from 1 to 6: (1) ischemic stroke with concomitant AF: 4.5 percent, 3.7 percent, 3.2 percent, 4.3%, 5.6 percent, and 8.4 percent; without concomitant AF: 1.5 percent, 1.5 percent, 2.0 percent, 3.0%, 3.7 percent, and 7 percent and (2) all-cause mortality with concomitant AF: 19.8 percent, 19.5 percent, 26.1 percent, 35.1 percent, 37.7 percent, and 45.5 percent; without concomitant AF: 7.6 percent, 8.3 percent , 17.8 percent, 25.6 percent, 27.9 percent, and 35.0 percent. At elevated CHA2DS2-VASc scores (≥4), the absolute thromboembolism risk was significant regardless of the atrial fibrillation occurrence (for a score of 4, 9.7 percent in cases without AF versus 8.2% in those with AF; overall P<.001 for interaction) [56].

5. CONCLUSION

With coronary artery disease, the occurrence of atrial fibrillation is related to an elevated level of complexity in the coronary arteries. It was also found that the existence of atrial fibrillation was linked to an elevated risk of problems in the short term as well as a higher incidence of complications throughout follow-up.

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