

Research Article



Post Operative Atrial Fibrillation Following Coronary Artery Bypass Grafting: Incidence and Management

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ABSTRACT

Postoperative Atrial Fibrillation (POAF) is one of the most widespread complications following cardiac surgery that has significant effects on outcomes. The objective of this study is to assess and identify the incidence and management of POAF following Coronary Artery Bypass Grafting (CABG). A total of 121 patients with preoperative sinus rhythm who underwent CABG were prospectively evaluated based on patient's characteristics, operative procedures, incidence of POAF and postoperative management. Out of 121 patients, 31 (25.6%) had developed POAF. The incidence of POAF was higher in male 27(87%) than female 14(11.5%). Patients with POAF were older population 21(67.7%) of around 61-75 years of age. Incidence of POAF was more among the population undergone on-pump CABG 22 (70.9%) when compared to off-pump 09 (29%). Compared to patients without POAF, those with POAF were more likely to have hypertension (71% Vs 65.5%) and diabetes mellitus (74.2% Vs 47.7%). Majority of the patients were treated with Amiodarone (83.9%), β -blockers (93.5%) and Anticoagulants (58%). Around 6.5% populations underwent cardioversion and 3.2% were on pacing. Complications were significantly higher in patients with POAF compared to No-POAF i.e. renal dysfunction (06 Vs 05), neurological deficit (0 Vs 02), median length of hospital stay (19.5 Vs 13), hospital mortality (02 Vs 01) and stroke (01Vs 0). The study concluded that POAF remains the most common complications following CABG surgery and it leads to significant morbidity and mortality. Therefore, efforts to determine the most effective preventive strategies and management practices are important.

Keywords: Coronary Artery Bypass Grafting; Post Operative Atrial fibrillation; Severity of Atrial Fibrillation scale.

INTRODUCTION

Post Operative Atrial Fibrillation (POAF) is the most widespread complications typically occurs within first 2 to 3 days following cardiac surgery.¹ Approximately 30% of patients undergoing Coronary Artery Bypass Grafting (CABG) surgery experiences POAF.² The distress caused by AF includes palpitations, chest pain, dizziness and heart failure leads to increased morbidity and mortality.^{3,4} In addition to traditional antiarrhythmic therapy, new upstream (non-antiarrhythmic) therapies received increasing attention for preventing POAF.⁵ The impact of POAF on clinical outcomes and healthcare utilization remains unknown.⁶ Hence the present study was aimed to assess the incidence, severity, management and outcomes of POAF following CABG surgery.

METHODOLOGY

Study Population

This study was carried out between the period of February 2017 and July 2017 at a multi-specialty tertiary care hospital. All consecutive patients undergoing CABG with or without valvular surgery were screened for this prospective observational study. All the data's were prospectively collected, and information about demographics, pre-operative characteristics, operative

details, and postoperative events during the hospital stay were registered using a validated data collection form. Patients with normal sinus rhythm of about 30-75 years were included in the study and those with pre-operative atrial fibrillation or supraventricular tachycardia were excluded to avoid over estimation of POAF incidence. Urgent or emergency CABG procedures were also excluded from the study. The final sample consisted of 121 patients. The study protocol was in compliance with the local institutional review boards and received full approval.

Procedure

Patient baseline data, as well as pre-operative and postoperative parameters, were prospectively entered into a clinical database. Preoperative management and surgical techniques of enrolled patients were consistent and have been previously reported.⁷ The decision to perform on-pump or off-pump procedures was based on surgeon's preference.⁸ Patients who underwent elective CABG procedure were not initiated with pre-operative preventive measures using antiarrhythmic agents, instead oral anti-oxidants were administered suggested by Xue-Hui Liu.^{9,10} β -blockers were also administered on the day of surgery and was restarted in the immediate postoperative period during Intensive Care Unit (ICU) stay.¹¹ Patients were continuously monitored on ECG until



transferred to the ward. Patients with new-onset AF were medically managed with oral or intravenous Amiodarone until AF was reverted to sinus rhythm. If failed to attain sinus rhythm, cardioversion and or pacing were done followed by the administration of parenteral anticoagulants which was then converted to oral form i.e Warfarin or Acitrom at the time of discharge.¹²

Outcome Measures

Primary end point of this study is to determine the incidence of new onset atrial fibrillation. It was diagnosed using 12-lead ECG telemetry. It was evaluated and classified as sinus rhythm, AF or sinus tachycardia. Severity of AF was assessed based on SAF scale. Management of atrial fibrillation, followed by its further complications were analyzed and follow up was done until discharge.¹³

Statistical Analysis

The data was analyzed using Graph Pad version 5.03. Chi square test was used to analyze the pre-existing factors and management of post operative atrial fibrillation. *P*-Value of ≤ 0.05 was considered to be significant. Using this value the significance for our study was calculated.

RESULTS

During the study period, 121 patients undergoing elective CABG procedures were randomly screened, age distribution of patients were analyzed which was found that 8 (6.6 %) patients were under age group of 30-45years, 42 (34.7 %) under age group of 46-60 years and 71(58.7 %) under age group of 61 - 75 years.(Table No.1). The study showed a male predominance 107 (88.4 %) than the female patients 14 (11.5%). Major co-morbidities observed in the study population were Hypertension 81 (66.9), Diabetes 66 (54.5%), Hypercholesterolemia 100 (82.6%), Myocardial infarction 52 (43%) and Angina pectoris 32 (26.4%) (Table No.1).

Table 1: Baseline characteristics

Characteristics	No.of Population N = 121	POAF N = 31	No-POAF N = 90
Gender			
Male	107 (88.4)	27 (87)	80 (88.8)
Female	14 (11.5)	04 (12.9)	10 (11.1)
Age Group			
30-45	08 (6.6)	01 (3.2)	07 (7.7)
46-60	42(34.7)	09 (29)	33 (36.6)
61-75	71(58.7)	21 (67.7)	50 (55.5)
Social Habits			
Alcoholic	48 (39.7)	23 (74.1)	25 (27.8)
Smokers	44 (36.4)	14 (45.2)	30 (33.3)
Tobacco Chewer	05 (5.5)	0 (0)	5 (5.5)
Vegetarian	32 (26.4)	08 (25.8)	24 (26.7)
Non-Vegetarian	89 (73.6)	23 (74.2)	66 (73.3)
Past Medical History			
Hypertension	81 (66.9)	22 (71)	59 (65.5)
Diabetes Mellitus	66 (54.5)	23 (74.2)	43 (47.7)
Hypercholesterolemia	100 (82.6)	22 (71)	78 (86.7)
Myocardial Infarction	52 (43)	12 (38.7)	40 (44.4)
Angina Pectoris	32 (26.4)	06 (19.4)	26 (28.9)
Obese/Overweight	62 (51.2)	21 (67.7)	41 (45.5)

Post operative ECG had shown that, only 57 patients (47.1%) experienced Sinus rhythm, whereas 31 (25.6%) developed new-onset atrial fibrillation, 23 (19%) developed ectopic and 10 (8.2%) developed sinus tachycardia. (Fig No.1)



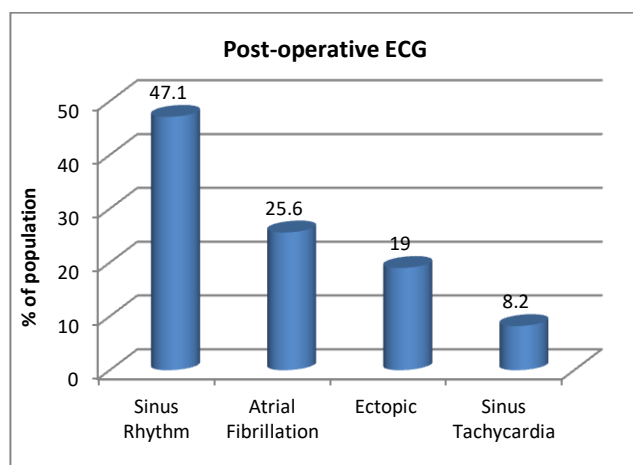


Figure 1: Post-operative electrocardiogram of CABG patients

The study had shown that patients with POAF were of older age (67.7% Vs 55.5%) and were more likely to have Hypertension (71% Vs 65.5%), Diabetes Mellitus (74.2% Vs 47.7%), and Obesity (67.7% Vs 45.5%). Incidence of POAF was found to be significantly higher in patients who underwent On-pump CABG (70.9% Vs 44.4%) when compared to Off-pump CABG (29% Vs 55.5%). (Fig No.2)

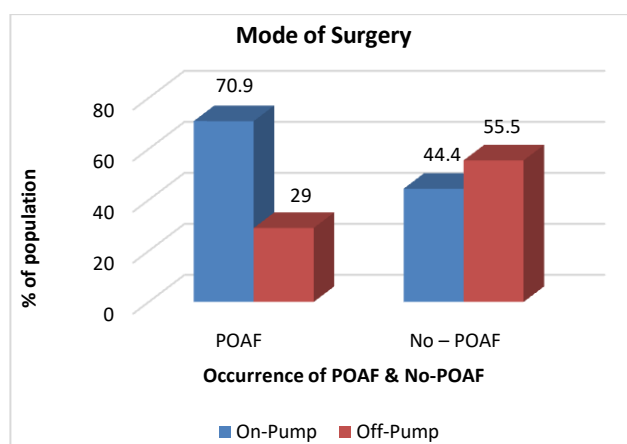


Figure 2: Based on mode of surgery (N=121)

Among 31 patients who developed POAF, 02(6.4%) patients developed acute AF and 29 (93.5%) experienced paroxysmal AF. On assessing the nature of POAF as per the Severity of Atrial Fibrillation (SAF) Scale, it was identified that 08(25.8%) patients were asymptomatic (Class-0), 07(22.6%) had minimal effect (Class-I), 07(22.6%) had minor effect (Class-II), 05(16.1%) had moderate effect (Class-III) and 04(12.9%) had severe (Class IV) impact on their quality of life. (Fig No.3)

In our study CHADS₂-VASc score was used as the predictive tool and it was determined that 08(6.6%) patients were at intermediate, and 113(93.3%) at high risk for POAF. Among the above groups, occurrence of POAF was found to be more in case of high risk population (96.7% Vs 92.2%) than low risk population (3.2% Vs 7.7%) (Fig No.4).

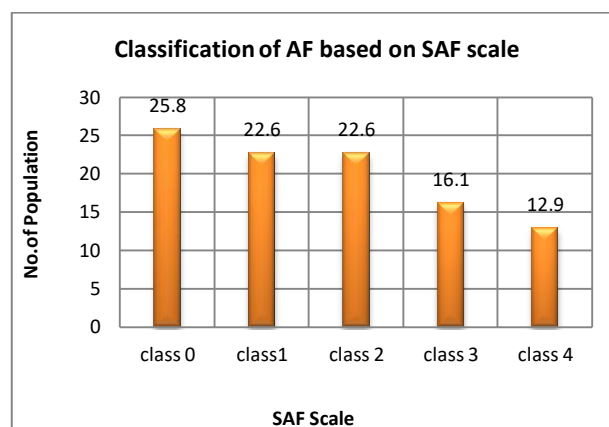


Figure 3: Classification of POAF Patients Based on SAF Scale

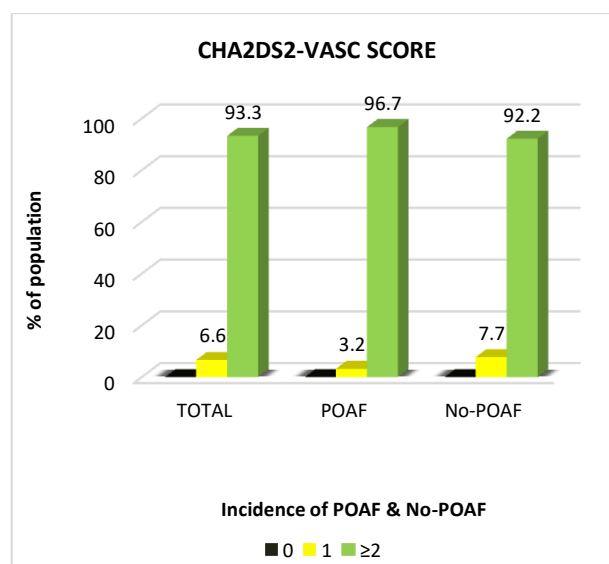


Figure 4: CHA₂DS₂-VASC SCORE

Patients with POAF were medically managed as per AHA/ACC/HRS Guidelines and the study found that majority of the patients were treated with β -blockers 29(93.5%), followed by Amiodarone 26(83.9%), Anticoagulants 18 (58%), ACE inhibitors 09(29%) and Calcium channel blockers 01(3.2%) where as 01 (3.2%) undergone Cardioversion and 02(6.5%) were on pacing (Fig No.5).

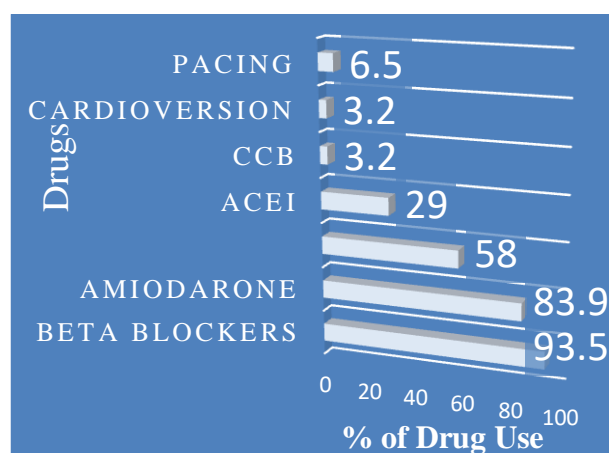


Figure 5: Management of POAF patients

The complications of POAF followed by CABG were assessed and no statistically significant difference were observed between patients with POAF and No-POAF i.e., Renal Dysfunction (06 Vs 04), Neurological deficit (02 Vs 0), Median length of hospital stay (19.5 Vs 13), Hospital mortality (02 Vs 01) and Stroke (01Vs 0).

DISCUSSION

CABG procedure involves manipulation of heart and pericardium, which may place thoracic cavity under surgical stress inducing inflammatory response and release of pro-inflammatory cytokines, via surgical incision of atrium leading to ischemia or scar tissue which may acts as substrate for AF. POAF was thought to be well tolerated benign and self limiting complication of CABG surgery that was temporary and easily treated.¹⁴ Despite the importance of POAF, the most effective management strategy for the common surgical complications remains uncertain. The Joint Guidelines of American College of Cardiology, American Heart Association and Heart rhythm Society recommends the rate control with β -blockers as first line therapy in patients with hemodynamic stability and amiodarone or cardioversion as rhythm control therapy.¹⁵ Our study found that, majority of patients with POAF were treated with amiodarone and beta-blockers whereas only 1 patient with POAF underwent cardioversion and 2 patients with POAF were on pacing. The occurrence of POAF was highly associated with increased length of stay in hospital. Previous study by Susanna C *et al.*, & Alanna M *et al.*, suggested that smokers and alcoholics were at higher risk of new onset AF where as similar studies concluded that preexisting factors like hypertension and diabetes also contributes to AF¹⁶⁻¹⁸. Similarly, our study had demonstrated that majority of smokers (45.2% Vs 33.3%) and alcoholics (74.1% Vs 27.8%) experienced POAF as well as those with POAF were more likely to have Hypertension (71% Vs 65.5%), Diabetes Mellitus (74.2% Vs 47.7%). Patients with POAF in the current study had higher CHADS₂-VASc score. Finally at the time of discharge, 118 (97.5%) patients were with sinus rhythm and the mortality rate was 3(2.5%) patients. Thus the management of POAF was consistent with general clinical practice, β -blockers and amiodarone were effective treatment to revert AF to sinus rhythm, similar study was reported by Damian Sanchez-Quintana *et al.*,¹⁹

CONCLUSION

The study concluded that the post-operative AF remains a common complication for patients undergoing CABG and the prevalence is more among the population with pre-existing co-morbidities like hypertension, diabetes, smoke, alcohol etc. Hence CHADS₂-VASc score can be used as the predictive tool in determination of POAF. When compared to patients without POAF, those with POAF have significantly higher rates of all types of complications and increased length of stay in hospital. Though majority of patients with POAF were medically managed with amiodarone and/or beta-blockers,

incidence of POAF had severe negative impact on the quality of life of the patients. Hence further investigations on strategies for the prevention and management of POAF are essential. Radical improvement of AF management will result if future research discovers earlier and possibly more effective interventions to revert or to maintain sinus rhythm so as to dislodge morbidity and mortality rates associated with POAF.

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