



Original Article

Frequency of Development of Atrial Fibrillation After Coronary Artery Bypass Grafting in Different Age Groups

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ABSTRACT

Atrial fibrillation is a known complication in patients having coronary artery bypass grafting (CABG) surgery with a Post- up to 32% after CABG reported incidence up to 32%. **Objective:** To determine the frequency of development of atrial fibrillation after coronary artery bypass grafting surgery in different age groups. **Methods:** This was an observational prospective cross sectional study, conducted at department of cardiac surgery Dr Ruth.K.M.Pfau Civil Hospital Karachi. The sample size of 199 was calculated. All patients between the ages of 30-70years. Irrespective of gender, refer for CABG surgery was included in the study. Two groups were made on the basis of their age, group 1, 30-50 years and group 2, 51-70 years. Those patients who came for CABG along with valve replacement and or other concomitant surgery were not included in my study. **Results:** After data collection through Performa data analyzed on SPSS 17.0. As per results 20.1% individuals in the study developed atrial fibrillation. Male to female ratio was 3: 1. In Group 1, 16.6% patients developed Atrial Fibrillation and in group 2 21.58% developed Atrial Fibrillation with p value of 0.85. Hypertension was a commonest co-morbid and present in 56.2% patients in this study. **Conclusion:** The study concluded that the frequency of development of atrial fibrillation after CABG as 20.10 %. Patients with positive family history of coronary artery diseases and smokers have significantly higher risk to develop atrial fibrillation after surgery.

INTRODUCTION

Postoperative Atrial fibrillation is a common problem after cardiac surgery with cardiopulmonary bypass [1]. It is linked with increased morbidity, including high chances of Cerebro-vascular accidents, prolonged duration of hospitalization and increased financial burden [2]. Numerous researchers have investigated the potential risk factors for development of postoperative atrial fibrillation. They found advanced age and preoperative withdrawal of beta-blockers are the most common risk factors [3]. If patients risk factors of atrial dysrhythmias after CABG could be identified preoperatively, the prophylactic efforts

would be more focused. Incidence of Atrial Fibrillation is still very high in spite of prophylactic use of magnesium, beta blocker and replacement of electrolyte measures. With the improvement of postoperative care, the mortality and morbidity in patients with AF after CABG has declined in recent years. Although there is a general decline in complications the incidence of postoperative AF has not decreased and actually appears to be increasing [4]. Pathophysiologically, the electrical impulses generated in the upper chambers of the heart in an organized rhythm are converted into rapid disorganized patterns. It is considered

that during aortic cross clamp, the blood supply to atrial tissue is compromised resulting in increase in the sympathetic supply and prolonged inflammatory response, that may play a critical role in the occurrence of Atrial fibrillation after CABG [5, 6]. In most of the cases, AF subsides after CABG surgery without any medication. However, even though AF is not associated with complications, its management needs further medical and nursing time and their hospital stay is usually extended [7]. Patients with recurrent atrial fibrillation had longer hospital stays and experienced greater infectious, renal and neurologic complications than those with single episodes [8]. Published literature has quoted the frequency of development of postoperative AF as high as 32% [9]. This is a fairly high frequency of any complication to be developed after CABG surgery. Another research shows the frequency of development of AF after CABG as low as 12.3%. One local study also showed frequency of atrial fibrillation 15.2% after CABG [10]. As the literature is not clear about the frequency, the present study is undertaken to fill the gap in literature and assess post-operative atrial fibrillation after coronary artery bypass grafting surgery in our population. That's why this study aimed to determine the frequency of development of atrial fibrillation after coronary artery bypass grafting surgery in different age groups.

METHODS

The Study Design was Observational Prospective Cross Sectional study conducted at Department of Cardiac Surgery, Dr. Ruth K. M. Pfau Civil Hospital Karachi from January 2018 to January 2019. Through open EPI sample size was calculated and considering 15.2% proportion of atrial fibrillation as seen literature and margin of error 8%, confidence interval 95% sample size came out to be 199 patients. Patients with age of 30 to 70 years, either male or female and of any ethnic group who have recently undergone isolated coronary artery bypass grafting surgery with normal serum potassium levels (4.5-5.5mEq/L) were included in this study and patients with chronic atrial fibrillation or atrial flutter before surgery, Redo CABG, CABG with ischemic Mitral Regurgitation, CABG with Ventricular Septal rupture repair, Critical conducting disturbance preoperatively, Intraoperative death during hospital stay were excluded. Data collected through Non probability, consecutive sampling method using a Performa. Approval from the institutional ethical review committee and synopsis approval from DUHS has been taken. We included all patients meeting the inclusion criteria. Admitted patients enrolled from the cardiac surgery after formal written informed consent both in English and Urdu languages obtained preoperatively from

the patients. They were subsequently underwent coronary artery bypass grafting surgery. After surgery, patients were followed for four days for final outcome. The data along with demographic variables (age, gender, ethnic group) has been collected from the patients and mentioned in Performa. Risk factors included in Performa i.e. diabetes, HTN and smoking. Routine investigation, complete blood picture, BUN, Creatinine, electrolyte will be sent before and after surgery. Patients were observed postoperatively in the ICU for four days from the day of surgery as per standard protocol. Patients were categorized into two different groups based on their age, first group included patient's age between 30-50 years, second group included age between 51-70 years. Collected data were entered and analyzed in SPSS version 17.0. Age was analyzed in mean \pm SD. Gender and presence of atrial fibrillation were analyzed in proportions and percentages. Tabular and graphical representation of results was done. Data were stratified in age and gender variables. Post stratification chi square test was applied. P value ≤ 0.05 was taken as significant".

RESULTS

There were one hundred and ninety-nine patients underwent coronary artery bypass grafting surgery with normal serum potassium levels (4.5-5.5mEq/L) were included in this study. Patients were categorized into two different groups based on their age, first group (included patients age between 30-50 years) 30.15%, second group (included age between 51-70 years) 69.85% patients participated in this study. Out of 199 patients, 150 (75.376%) were male and 49 (24.623%) were female. Out 199 patients 76 (38.19%) were with EF more than 50%, 63 (31.7%) were with EF between 30-50% and less than 30% EF were present in 60 (30.15%) patients. AF found more (31.5%) in patients with good EF as presented in Figure 1.

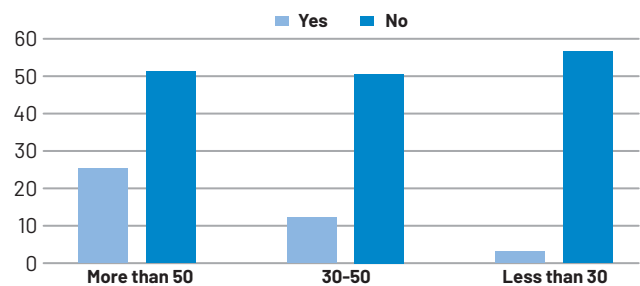


Figure 1: Frequency of Atrial Fibrillation with respect to Ejection Fraction

Regarding co-morbidity, Hypertension was the commonest co-morbid that was observed in 56.2% cases, followed by diabetes mellitus 53.2%, Smoker 36.6% and family history of CAD was 26.6% as presented in Table 1.

Table 1: Comorbidity status of the patients (n=199)

Co-morbidity	Frequency
Diabetes Mellitus	106 (53.2%)
Hypertension	112 (56.2%)
Smoker	73 (36.6%)
Family History of CAD	53 (26.6%)

Frequency of atrial fibrillation after coronary artery bypass grafting surgery was observed in 20.10% (40/199) patients as shown in Figure 2.

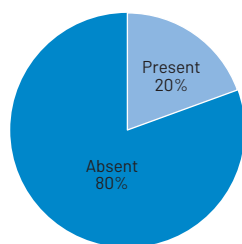


Figure 2: Frequency of development of Post-CABG Atrial Fibrillation

Frequency of development of post CABG atrial fibrillation in group 1 patients was 16.66% (10/60) and in group 2 was 21.58% (30/139) (Chi-Square= 0.32; p=0.85) in Table No. 2. Similarly Frequency of development of post CABG atrial fibrillation was also not significant between male and female (Chi-Square = 1.2; p=0.27) in Table 2. With respect to co-morbidity, rate of development of post CABG atrial fibrillation was significantly high in smokers and those having positive family history. Hypertension, diabetes mellitus and dyslipidemia has been found statistically non-significant.

Table 2: Development of post CABG atrial fibrillation with respect to age & gender

Group	Atrial Fibrillation		Total	p-Value
	Present (N=40)	Absent (N=159)		
Age (Years)				
30 to 50 Years	10(16.66%)	50(83.33%)	60	0.85
51 to 70 Years	30(21.58%)	109(78.41%)	139	
Gender				
Male	33(22%)	117(78%)	150	0.27
Female	7(14.2%)	42(85.7%)	49	

DISCUSSION

After CABG surgery “20% to 40% of patients developed Atrial Fibrillation (AF) [10-12]. In spite of advancements in anesthetic and surgical techniques, no change has been noticed in the incidence of Arrhythmias in majority of cases post CABG Atrial fibrillation is self-limiting [10]. Despite general decline in complications due to advances in surgery, there is no reduction seen in the development of postoperative atrial fibrillation. The incidence of AF is increasing because of the increasing age of patients underwent CABG [10, 12]. Although it is considered a benign complication but it may result in higher morbidity including

hypertension, palpitations, pain, fatigue, dyspnea, or generalized anxiety. Post CABG Atrial fibrillation has a well-known association with congestive heart failure, renal impairment, prolonged ventilation, readmission to the intensive care unit, and manifolds increased risk of early postoperative stroke [10, 12]. Research also shown that post CABG Atrial fibrillation increases cost of treatment [11-13]. The increase rate of hospital readmission after discharge has been seen in Post CABG Atrial fibrillation [14]. The risk of developing AF is more in elderly population after CABG [15, 16]. This seems to be due to fibrosis of Atrial muscle, its dilatation, [17] and loss of conduction between inter-conducting fibers [18]. Which leads to decreased conduction rate and increased chances of developing arrhythmias. After CABG surgery there will be tissue remodeling in cardiac tissue that leads to fibrosis and scarring which increases the risk of development of AF. Advanced age is an independent risk factor in development of post-operative AF as shown in one of the study [12]. Increased in atrial connective tissue is one of the factors for the development of AF at the age of eighty years as shown by Mathew et al. [10, 19]. Some studies also shown age is not an independent factor, [20, 21] for the development of AF. Although in elderly patients, its incidence is high which is concordant to Spodick DH et al study [21]. In our study most of the patient belong to group 2 (51-70 years). Several researchers have found an increased incidence among males, [10-12, 22] whereas others have reported no difference [23, 24]. Data derived from a research conducted by M Golmohammadi et al in Iran from 2006- 2008 [25] and Auer et al. [21] did not support that male patients have more incidence of AF. In our study, Out of 199 patients, 75.37% were male and 24.63% were female, we did not find any difference on univariate analysis, but on multivariate analysis male gender was the only factor for development of AF after CABG. In our study, Hypertension was the commonest co-morbidity in 56.2% cases, but the incidence of AF did not reach to significant level. Although, the study of Ananke and colleagues [11] demonstrates that hypertension is the predictor of AF in the post CABG population. In our study, frequency of development of post CABG Atrial fibrillation was observed in 20.10% (40/199), while a similar study by M Golmohammadi et al [25] concluded that 12.3% of patients developed post CABG AF which is much less than our study. This could be due to difference in study design, population and criteria of assessment of AF in post CABG patients.

CONCLUSIONS

We concluded in this study that the frequency of development of Atrial Fibrillation after CABG was found to be 20.10%. Patients with positive family history of

coronary artery diseases and smokers have significantly higher risk to develop Atrial Fibrillation after surgery". Patients with age more than 50 years have the higher risk to develop Atrial fibrillation (15%) but not significant. High blood pressure and diabetes mellitus also have high risk for AF but not reached significant values.

Authors Contribution

Conceptualization: AAK
Methodology: MFK, AAK, SA, VB
Formal analysis: MID, HA
Writing-review and editing: AAK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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