UNVEILING THE PATTERNS OF ATRIAL FIBRILLATION AFTER CORONARY ARTERY BYPASS GRAFTING

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ABSTRACT: Coronary artery disease is the most prevalent form of heart disease. It along with its complications are a leading cause of morbidity and mortality among the world population. Coronary artery bypass grafting is done in significant (>50%) stenosis of all major coronary trunks and their branches. The burden of atrial fibrillation varies from one population to another among patients subjected to CABG.
OBJECTIVE: To determine the frequency of atrial fibrillation after coronary artery bypass grafting.
MATERIALS AND METHODS: This Descriptive cross-sectional study was conducted in the Cardiovascular Surgery unit of a tertiary care hospital in Peshawar over six months. A total of 144 patients were observed. All patients underwent CABG surgery by the same cardiovascular surgeon. All patients were observed till ten days post operation through daily ECG to detect atrial fibrillation.
RESULTS: A total of 144 patients were observed of which 33% of patients were in age 50-60 years and 67% patients were in age 61-75 years. The mean age was 63 years with SD ± 8.33. Sixty-nine percent of patients were male and 31% of patients were female. More than 17% of patients had atrial fibrillation while 83% of patients didn't have atrial fibrillation.
CONCLUSION: Our results show that 17% of patients developed atrial fibrillation following CABG surgery, emphasizing the importance of this arrhythmia throughout the recovery phase. A distinct age pattern was seen, with a significant proportion of atrial fibrillation instances found in individuals between 61 and 75 years old.

KEYWORDS: Atrial fibrillation, Postoperative atrial fibrillation, Coronary artery bypass grafting.

INTRODUCTION

Coronary artery disease is the most prevalent form of heart disease. It along with its complications are a leading cause of morbidity and mortality among the world population[1]. World Health Organization estimates 7.6 million deaths annually due to coronary heart disease around the globe[2]. Coronary artery bypass grafting (CABG) is done in significant (>50%) stenosis of all major coronary trunks and their branches. CABG surgery aims to improve the quality of life as well as the life expectancy of the patient[3].

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Atrial fibrillation (AF) is the predominant long-lasting heart rhythm disturbance and is becoming an increasingly concerning health issue. Approximately 6.1 million individuals in the US are already impacted, with projections indicating a potential increase to 12 to 16 million by 2050.[4] AF is linked to substantial morbidity and mortality, leading to a higher likelihood of stroke, heart failure, and premature death. In patients with non-valvular AF who are not receiving anticoagulation, the yearly risk of stroke is between 3% and 5%. AF is believed to be the cause of 15% of all thrombo-embolic strokes[5].

Postoperative atrial fibrillation (POAF) occurs in 10% to 40% of patients following coronary artery bypass grafting (CABG) and is the most frequent complication.[6] In recent years, the link between POAF and higher rates of early and late morbidity and mortality has become more evident.[7] Therefore, it is essential to recognize patients who are at risk of postoperative atrial fibrillation (POAF) in order to target specific groups for the development of successful preventative measures. An accurate scoring tool to predict POAF has not been discovered yet.[8] The reported frequency of AF after CABG is 21%[9], 10.4%[10], 19%[11], 34%[12] and 17.2%[13].

Coronary artery disorders requiring CABG are prevalent in contemporary society, and patients

may experience a significant decline in their quality of life if they encounter postoperative problems. Atrial fibrillation frequently occurs following CABG surgery and if left undiagnosed and untreated, it might result in further difficulties in these vulnerable patients.

OBJECTIVE

To determine the frequency of atrial fibrillation after CABG Surgery.

METHODOLOGY

This Descriptive cross-sectional study took place in the Cardiovascular Surgery unit of a tertiary care hospital in Peshawar for six months. The study included 144 participants determined using WHO software for sample size calculation (calculated using an AF frequency of 10.4%, a 95% confidence level, and a 5% margin of error). A total of 144 patients were chosen for observation in this study utilizing Non-probability sequential sampling. All patients were cases with triple vessel disease and left main stem disease diagnosed during coronary angiography before receiving CABG. The exclusion criteria involved patients who already had atrial fibrillation diagnosed by electrocardiography. Patients with chronic obstructive lung disease diagnosed by a FEV1/VC ratio less than 70% of the expected value and patients with chronic renal failure indicated by a blood creatinine level above 200 µmol/l were excluded. Rheumatic heart disease identified through echocardiography and individuals with Diabetes mellitus diagnosed with fasting blood glucose levels exceeding 126mg/dl and HbA1c levels above 6% were excluded from the study. These variables were considered confounding factors and were removed to minimize bias in the study findings.

The study was undertaken with approval from the hospital's research and ethics board. 144 eligible patients scheduled for CABG were included in the study after being registered in the outpatient department and then admitted to the hospital's cardiothoracic surgery department for additional evaluation. The study's objectives and advantages were communicated to the patient, and their written informed permission was acquired. All patients underwent a thorough evaluation consisting of a full medical history, clinical examination, and standard pre-operative tests. All patients received CABG surgery performed by the same consultant cardiovascular surgeon with at least 7 years of expertise. All patients were monitored daily postoperatively until the 10th day after the operation using ECG to identify atrial fibrillation.

All the stated data, such as age, gender, indication of CABG, obesity, smoking status, hypertension, and hyperthyroidism, were documented. The data was recorded and analyzed using SPSS version 23. Categorical characteristics such as gender, obesity, smoking status, hypertension, hyperthyroidism, indication of CABG, and atrial fibrillation were analyzed to determine frequencies and percentages. Atrial fibrillation was analyzed based on age, gender, indication of CABG, obesity, smoking status, hypertension, and hyperthyroidism to assess the impact variations using a chi-square test with a significance level of $p < 0.05$.

RESULTS

The mean age of the 144 participants in the study was 63 years with SD ± 8.33. The demographics and health characteristics of the patient at the time of enrollment into the study are outlined in Table 1.

Table 1: Demographic and Health Characteristics of Participants

Parameter	Categories	Percentage
Age	50-60 years	33%
	61-75 years	67%
Gender	Male	69%
	Female	31%
OBESITY status	Obese	58%
	Non-obese	42%
Smoking status	Smokers	44%
	Non-smokers	56%
Blood pressure	Hypertensive	72%
	Non-Hypertensive	28%
Hyperthyroidism	Yes	37%
	No	63%

The main indication of CABG among 144 patients was double vessel disease. The percentages of the indications for CABG among the participants are shown in Figure 1.

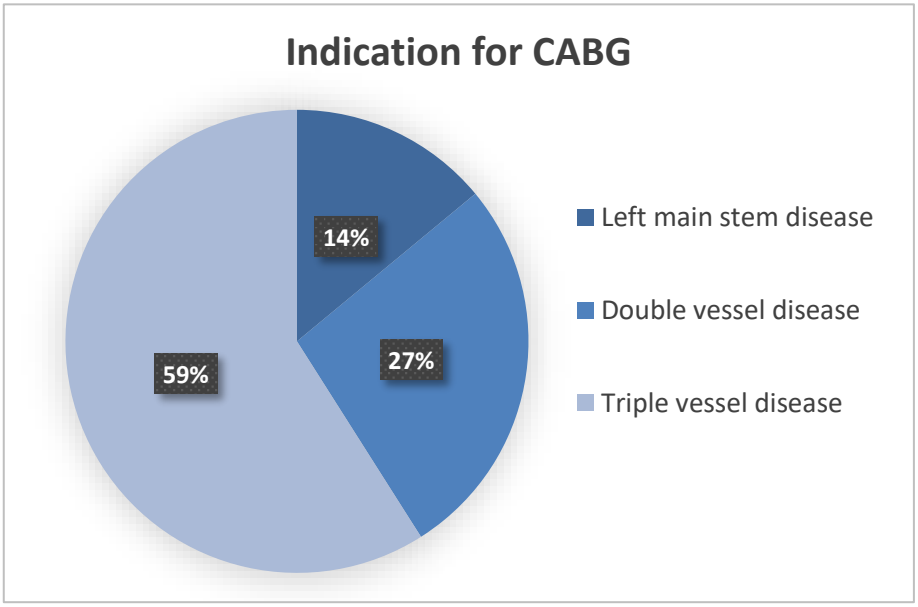

Figure 1. Indications of CABG among the participants

The percentage of patients who developed AF after CABG among 144 patients is shown in Figure 2.

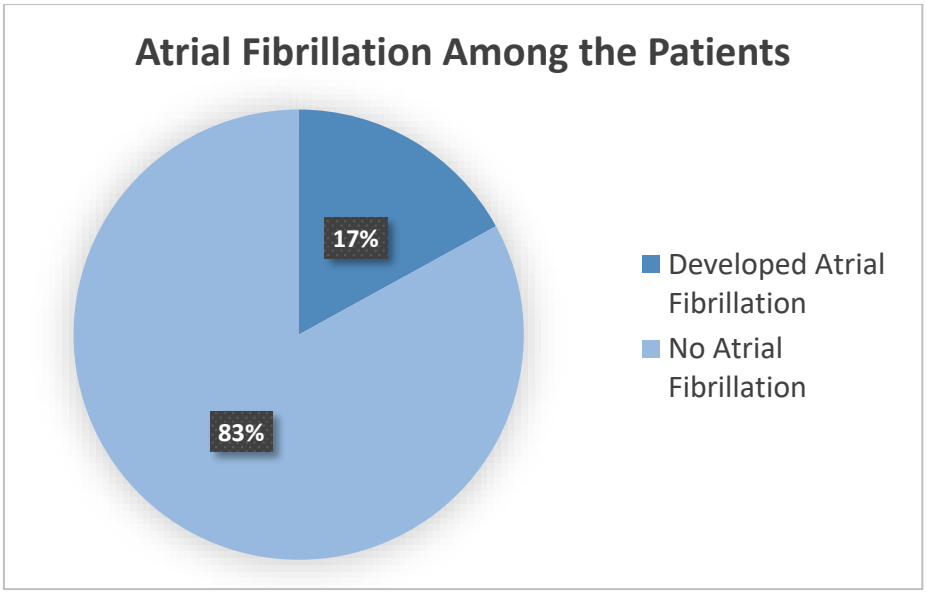

Table 2 shows the stratification of AF with the multiple variables among the participating patients of the study. The association between AF and the gender was calculated using Chi square test and was found to be non-significant (p=0.8093). The association between AF and the obesity status of the patients was also not significant as shown by a p value of 1.

The association between development of AF and smoking was also found to be not significant with a p value of 0.8216. The association between development of AF and hypertension among the patients was also found to be not significant with a p value of 0.8678. The association with hyperthyroidism was also insignificant.

Table 2: Stratification of atrial fibrillation with multiple variables

AF	**Male**	**Female**	**Total**	**P value**
Yes	17	7	24	0.8093
No	82	38	120	
	Obese	**Non Obese**		
Yes	14	10	24	1.0000
No	70	50	120	
	Smokers	**Non Smokers**		
Yes	11	13	24	0.8216
No	52	68	120	
	Hypertensive	**Non-Hypertensive**		
Yes	17	7	24	0.8678
No	87	33	120	
	Hyperthyroid	**Non-Hyperthyroid**		
Yes	9	15	24	0.9384
No	44	76	120	

DISCUSSION:

Seventeen percent of patients in our study were diagnosed with atrial fibrillation, while eighty-three percent of patients did not acquire atrial fibrillation. In a different study that was carried out by Perrier S et al, [14] the frequency of postoperative atrial fibrillation was found to be 21%. Comparable findings were seen in this investigation. The findings of another investigation carried out by Abdel-Salam Z et al, [15] in which all of the patients completed a 30-day follow-up, were comparable to those reported in the first trial. Heart failure was observed in 10.4% of the patients. The second post-operative day was the day that saw the majority of bouts of atrial fibrillation (47 out of

77 events, or 61%) occur. After the first five post-operative days, there were only three instances of atrial fibrillation (AF), which accounts for 3.9% of the total number of episodes.

Atrial fibrillation was revealed to be 19.0% (n=20) in another study that was carried out by Folla C et al.[16] The findings of this study were comparable to those of the previous study. In the post-surgical era, patients who had a left atrial diameter of more than 40.5 millimeters and who were older than 64.5 years had a greater likelihood of developing the arrhythmia. In a different study that was carried out by Guenancia C et al, [17] the researchers found that out of the 34 patients who experienced new-onset atrial fibrillation, thirteen of them had silent atrial fibrillation. 30% of patients with silent atrial fibrillation had developed symptomatic atrial fibrillation at the one-year follow-up, compared to 7% in the Sinus Rhythm group (p = 0.03) and 11% in the clinical atrial fibrillation group (p = 0.21). Similar findings were found in a different study that was carried out by Omer S et al.[18] In this investigation, postoperative atrial fibrillation was discovered in 215 patients, which contributed to 17.2% of the total. Age greater than or equal to sixty-five years and a body mass index greater than or equal to thirty kilograms per square meter were independent predictors of this sequela.

CONCLUSION

Our results show that 17% of patients developed atrial fibrillation following CABG surgery, emphasizing the importance of this arrhythmia throughout the recovery phase. A distinct age pattern was seen, with a significant proportion of atrial fibrillation instances found in individuals between 61 and 75 years old.

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