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POST-OPERATIVE ATRIAL FIBRILLATION;
INCIDENCE AFTER CORONARY ARTERY BYPASS GRAFT SURGERY

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ABSTRACT: Atrial fibrillation is the most common arrhythmia observed following Coronary Artery Bypass Graft surgery. **Objectives:** To determine the incidence of post-operative atrial fibrillation in patients undergoing coronary artery bypass grafting. **Materials and Methods: Study Design:** Non-randomized prospective. **Setting:** Cardiac Surgery Department of Multan Institute of Cardiology, Multan. Period: 20-1-2014 to 01-05-2015. A total number of four hundred and ninety (490) patients having age more than 40 years undergoing isolated coronary artery bypass graft surgery were included in the study. Data was analyzed in SPSS V20 software. Frequency and percentages were used for Atrial Fibrillation. To see the impact of AF on morbidity, patients developing AF was compared with those who do not develop Atrial Fibrillation post-operatively using independent sample t-test for quantitative variables. Chi-square test and Fischer's Exact test (whenever appropriate) was used to compare qualitative variables. **Results:** A total number of four hundred and ninety (490) patients were included in this study. There were more 431 males (88.0%) in this study. of the patients 71.6% were in LV Grade I before surgery. Incidence of post-operative atrial fibrillation was 13.5%. In 4.5% patients IABP was inserted due to hemodynamic instability. Ventilation time and hospital stay time was significantly higher in patients with AF postoperatively (p value 0.03 and 0.02 respectively). But duration of inotropic support, post-op CKMB levels and IABP use were not significantly different in both groups. **Conclusion:** The incidence of post-operative Atrial Fibrillation is 13.5% according to this study. And these patients were associated with increased risk of morbidity.

Key words: Atrial Fibrillation, Coronary Artery Bypass Grafting.

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INTRODUCTION

Atrial fibrillation is the most common arrhythmia observed following CABG surgery.[1] Continuous ECG monitoring reported the incidence of post-operative atrial fibrillation ranging from 25-40% in isolated CABG surgery and more than 60 % after combined CABG and valvular surgery.[1-3] In Pakistani population lower rates of atrial fibrillation after CABG are reported with in incidence rate of about 6%.[4] African Americans also have a lower incidence of atrial fibrillation as compared to European Americans after coronary artery bypass grafting.[5] Atrial Fibrillation usually occurs within 2-4 days after surgery and the rate is less than 10% on first post-operative day.[6]

Despite of many improvements in cardiac surgery, there is a huge decline in complications of surgery, the incidence of atrial fibrillation is not decreased but actually it appears to be increasing perhaps due to increasing number of elderly patients undergoing CABG.[7,8] New onset of atrial fibrillation after CABG results in increased risk of long term mortality independent of patient pre-operative state.[9] Post-operative Atrial Fibrillation is associated with prolonged hospital stay, readmission to ICU, need for reintubation, cardiac failure, and stroke hence increase in overall cost.[10-12]

So we conducted this study to see the incidence of post-operative atrial fibrillation after coronary artery bypass grafting during hospital stay of patients.

OBJECTIVE

To determine the incidence of post-operative atrial fibrillation in patients undergoing coronary artery bypass grafting.

MATERIALS AND METHODS

It was a non-randomized prospective surgery conducted in cardiac surgery department of Multan Institute of Cardiology, Multan. The duration of study was from 20-1-2014 to 01-05-2015. A total number of 490 patients having age more than 40 years undergoing isolated coronary artery bypass graft surgery were included in the study. Patients having age <40 years at the time surgery, having atrial fibrillation before surgery, pre-operative impaired renal function or stroke, undergoing any other procedure along with CABG e.g. valvular or septal defects closure and intra-operative and post-operative death were excluded from the study.

Pre-operative, intra-operative and post-operative data of each patient was noted on a Performa. In all patients standard cardiopulmonary bypass was established and cold blood cardioplegia was used for myocardial protection. After surgery patients were shifted to cardiac surgery intensive care unit of the hospital. Patients were weaned off from ventilator support as soon as they met the following wean off criteria of the hospital; hemodynamic stability is achieved, no signs of major bleeding, consciousness is adequate and pain is under control.

All patients were monitored until discharge. Continuous monitoring for development of atrial fibrillation was done using ICU Monitor continuously and standard 12-leads ECG 12 hourly. In this study, the primary outcome was the development of post-operative Atrial Fibrillation. We use following criteria for defining post-op AF; development of Atrial Fibrillation more than 10 minutes or any length of time that requires intervention.

Data was analyzed in SPSS V20 software. Mean and standard deviation was used to express quantitative variables while frequency and percentages were used for discrete variables. To see the impact of AF on morbidity, patients developing AF was compared with those who do not develop Atrial Fibrillation post-operatively using independent sample t-test for quantitative variables. Chi-square test and Fischer's Exact test (whenever appropriate) was used to compare qualitative variables.

RESULTS

A total number of four hundred and ninety (490) patients were included in this study. There were more 431 males (88.0%) in this study. Regarding risk factors of coronary artery disease, 32.7% were diabetic, 40.8 % patients were hypertensive, 20.8% have positive family history of coronary artery disease (see table-I).

Most of the patients 71.6% were in LV Grade I before surgery. Incidence of post-operative atrial fibrillation was 13.5%. In 4.5% patients IABP was inserted due to hemodynamic instability.

Comparison was done in patients with AF and without AF to see the effect of post-op AF on early morbidity. Ventilation time and hospital stay time was significantly higher in patients with AF post-operatively (p value 0.03 and 0.02 respectively). But duration of inotropic support, post-op CKMB levels and IABP use were not significantly different in both groups (Table II).

So we found that 13.5% patients developed post-op atrial fibrillation and these patients were associated with increased risk of morbidity in early post-operative period.

DISCUSSION

Post-operative atrial fibrillation is the most common arrhythmia and can occur in up to 50% cases after open heart surgery.[13] Post-op AF is an important predictor of early post-operative morbidity. It can result in post-operative hemodynamic instability requiring prolonged mechanical ventilation, need for reintubation, and use of vesopressors and increased length of stay in intensive care units which are very costly thus increasing the overall cost of the surgery.[9,10,14]

Name of Variable		Value
No. of Patients		490
Age (years)		57.87±9.37
Gender (%)	Male	431 (88.0)
	Female	59 (12.0)
Body Mass Index		26.08±4.77
Diabetic history (%)		160 (32.7)
Smoking history (%)		175 (35.5)
History of Hypertension (%)		200 (40.8)
Family History (%)		102 (20.8)
Angina Class (CCS)*	Class I	53 (10.8)
	Class II	44 (9.0)
	Class III	354 (72.2)
	Class IV	39 (8.0)
Pre-op Creatinine levels (mg/dl)		1.01±0.67
Ejection Fraction (%)		52.78±9.71
L.V** Function Grades	Grade I	351 (71.6)
	Grade II	95 (19.4)
	Grade III	44 (9.0)
Parsonnet score		3.97±3.69
Bypass Time		111.81±31.51
X-Clamp*** Time		64.81± 20.12
No. of Grafts		3.32±1.35
Post-op CKMB± Levels		57.92 ± 41.51
Duration of Inotropic Support		13.06±20.83
Hospital Stay		7.43±2.54
Ventilation Time		7.67±14.64
ICU±± stay Time		39.06 ± 21.78
Atrial Fibrillation		66 (13.5)
IABP±±± Use		22 (4.5)

Table-I. Demographic, Angiographic and Peri-operative Characteristics of Patients.
**CCS= Canadian Cardiovascular Society,*
***L.V= Left Ventricle, X-Clamp= Cross Clamp' ±CKMB= Creatinine Kinase myocardial Band, ±±ICU=Intensive Care Unit,*
±±± IABP=Intra Aortic Balloon Pump.

The morbidity of Post-op AF has also noted to be extended beyond hospitalization time, and is associated with increased risk of embolic stroke within 30 days after surgery, readmissions related to recurrent or persistent arrhythmias and increase in overall mortality up to 6 months after discharge.[15]

Mechanism of post-op AF is still not completely understood. Recent studies have suggested that it is the result of multiple wavelets that revolve around the anatomical obstacles, and functional conduction bloc areas, thus randomly activating regions that have recovered from previous depolarization by another wavelet. Therefore the fibrillation process is based on re-entry, with different stimuli that exhibit a notable variability in terms of number and dimensions.[16,17] Many pre-operative and post-operative factors are defined by some studies that can increase the incidence of Post-op AF after conventional CABG. These factors are; hypertension, withdrawal of beta-blocker drugs, respiratory complications, advanced age and right coronary artery stenosis.[9,8,19]

The incidence of Post-op AF in the first year following CABG is more common in patients having age less than 70 years, and is associated with an higher rates of renal dysfunction and infection[20], and higher rate of in-hospital and early mortality after surgery.[21]

In this study, the incidence of post-op AF was 13.5%. The incidence of post-op AF ranges from 16-30% after isolated coronary artery bypass graft surgery. In this study the patients who developed post-op AF required prolonged mechanical ventilation and have increased hospital stay significantly. But we do not found significantly in-

Name of Variable	With Post-op AF	Without Post-op AF	P-value
Duration of Inotropic Support	13.24 ±21.82	11.88±12.42	0.63
Ventilation Time	9.39 ± 13.69	7.42± 12.7	0.03
ICU stay	39.60 ±22.58	38.97 ±21.68	0.83
Hospital Stay Time	8.10 ±4.18	7.32±2.14	0.02
Post-op CKMB levels	64.40 ±47.36	56.87 ±40.47	0.21
IABP use	4 (6.1)	18 (4.2)	0.51

Table-II. Comparison of Morbidity in Patients with Post-operative AF and without AF.

creased ICU stay time in this patient population. We also found increased post-operative CK-MB levels in patients who developed post-op AF and slightly higher use of IABP support. So patient with post-op AF were associated with higher rates of early morbidity according to this study.

CONCLUSION

The incidence of post-operative AF is 13.5% according to this study. And these patients were associated with increased risk of morbidity.

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"Never lie to someone who trusts you and never trust someone who lies to you."

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Ghulam Hussain	Conceived, designed and did statistical analysis & editing of mnuscript	
2	Naseem Ahmad	Did data collection and manuscript writing, did review	
3	Sara Zaheer	Did review and helped in final approval of manuscript	
4	Mirza Ahmad Raza Baig	Did review and helped in final approval of manuscript	