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Effectiveness of Beta Blocker In Preventing Arrhythmia in Post Operative [CABG] Patients

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Abstract

Introduction- Postoperative atrial fibrillation (POAF) is a potentially lethal and morbid complication after heart surgery. The present study was conducted to study the use of metoprolol in pre and post isolated CABG cases to reduce the incidence of atrial fibrillation.

Material and methods- 50 cases and controls who had undergone isolated CABG surgery with extracorporeal circulation participated in a randomised research. The administration of metoprolol orally to the patients during the postoperative phase was randomised. The results included the identification of persistent arrhythmia that was symptomatic or needed medical attention. Patients having baseline left ventricular ejection fractions less than 35%, prior episodes of AF, a history of bronchospasm, second- and third-degree atrioventricular blocks, inadequate cardiac output, and heart failure were excluded from the trial.

Results- In the metoprolol group, 10% patients experienced arrhythmias, compared to 23% in the control group (P=0.03). The arrhythmia that was seen the most commonly (85%) was AF. Arrhythmias occurred in 52% metoprolol-treated patients and 56% control patients among patients aged 70 or older with the 95% confidence interval for the risk was 0.10.

Conclusion- In the postoperative period following CABG surgery, metoprolol is useful in reducing arrhythmia, and this effect was especially noticeable in the group of senior patients.

Keywords- arrhythmia , atrial fibrillation, beta blocker, CABG, metoprolol

Introduction

The most significant form of secondary atrial fibrillation, postoperative atrial fibrillation (POAF), is a new-onset AF that occurs right after heart surgery.[1] After open heart surgery, POAF is a potentially fatal and morbid complication that affects 10%–20% of non-cardiac operations and 20%–40% of cardiac-related operations. Episodes of this consequence are often transient, asymptomatic, and paroxysmal, peaking between the second and fourth postoperative days. The incidence of AF in patients receiving concurrent valvular heart surgery is higher and can reach 64%.[2]

In patients with no past history of AF, the POAF typically self-limits and resolves on its own without treatment.[3] Even though it's thought to as a transient issue following heart surgery, POAF can cause morbidity and mortality in high-risk patients. Increased risk of thrombotic events, such as stroke, thrombophlebitis, myocardial infarction, and extended hospital stays, is linked to the development of POAF. Given that the patient population undergoing cardiac

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surgery is aging and the prevalence of POAF is mostly age dependant, it is expected that this problem will continue to worsen.[4]

Over the past three decades, a variety of pharmacological methods have been employed to prevent atrial fibrillation, with beta-blockers being the most popular treatment for this condition. Clinical trials using these drugs have yielded a range of outcomes, the majority of which were favorable [5,6]. However, at the time of these clinical investigations [7], there was no consensus regarding the use of beta-blockers to prevent atrial fibrillation and flutter. This may be because of the heterogeneity of these studies and their inconsistent criteria for describing the outcomes. However, there is currently agreement that beta-blockers should be used as the medicine of choice to halt these arrhythmias following myocardial revascularization surgery.[8]

Hence the present study was conducted to study the use of metoprolol in pre and post isolated CABG cases to reduce the incidence of atrial fibrillation.

Material & methods

The present study was conducted among 50 patients underwent isolated coronary artery bypass graft surgery at department of cardiology for a duration of one year. The ethical permission was obtained from the institutional ethical committee before commencement of study. Written informed consent was obtained from all the patients prior to study.

All the patients above the age of 18 years suffering with variable disease process of coronary artherosclerotic disease and willing to participate in the study were included in the study. Patients with the following characteristics were excluded from the study: a) history of bronchospasm; b) left ventricular ejection fraction < 35% in the preoperative period; c) if they had an implantable cardiac pacemaker, chronic atrial fibrillation, history of paroxysmal supraventricular arrhythmias or if they were using amiodarone; d) congestive heart failure, low cardiac output (cardiac index < 2.2 L/min/m2 or suggestive clinical signs), and dependence on inotropic agents, or the use of an intra-aortic balloon in the postoperative period; e) bradyarrhythmias (heart rate < 60 bpm, junctional rhythm, atrioventricular dissociation, or second- and third-degree blocks).

All medications being used in the preoperative period, including beta blockers, were administered until 6 or 12 hours prior to surgery. Randomization was then performed in the 12th postoperative hour with the patient hemodynamically stable. The use of medications interfering with atrioventricular conduction or having antiarrhythmic properties was not allowed. Thus two groups (Cases and control) of 50 patients were randomized to receive metoprolol (25 mg -50 mg) or not to receive the medication, which was administered either orally or with a nasogastric feeding tube if the patient was still intubated, from the 12th hour to the 7th postoperative day or hospital discharge, whichever happened first.

Continuous electrocardiographic monitoring was used to detect arrhythmias during the patient's first two to three days in the critical care unit, on average. The outcome of interest in this case was determined to be the existence of prolonged atrial fibrillation or flutter as determined by surface electrocardiography. These arrhythmias were identified based on the presence of symptoms or a clinical assessment after the patient was admitted to the ward, and electrocardiography also confirmed their presence. All patients had electrocardiography on the day of hospital discharge or on the seventh postoperative day to confirm the presence of sinus rhythm.

Data are shown as mean ± standard deviation. To analyze the differences between the treatment and control groups, the Student t test was used for the continuous variables, the chi-square test for the qualitative variables, and the Mann-Whitney test for the variables with an asymmetric distribution. SPSS version 23.0 was used for the analysis keeping the significance value (p) <0.05.

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Results

The preoperative baseline characteristics of mean age, greater than 70 years of age, male sex, any comorbidity, left ventricular ejection fraction, extracorporeal circulation determined on echocardiography or cineventriculography is shown in Table 1. The results were non significant having p value >0.05.

Table 1: Baseline characteristics

Variable	Metaprolol group	Control group	P value
Age (years) (Mean ±SD)	68.5 ± 10.1	62.3 ± 11.3	>0.05
>70 years age (%)	15	16	>0.05
Male sex (%)	70	73	>0.05
Comorbidity (%)	82	83	>0.05
Ejection fraction (%)	39	37	>0.05
Extracorporeal circulation (min)	67 ± 25	71 ± 20	>0.05

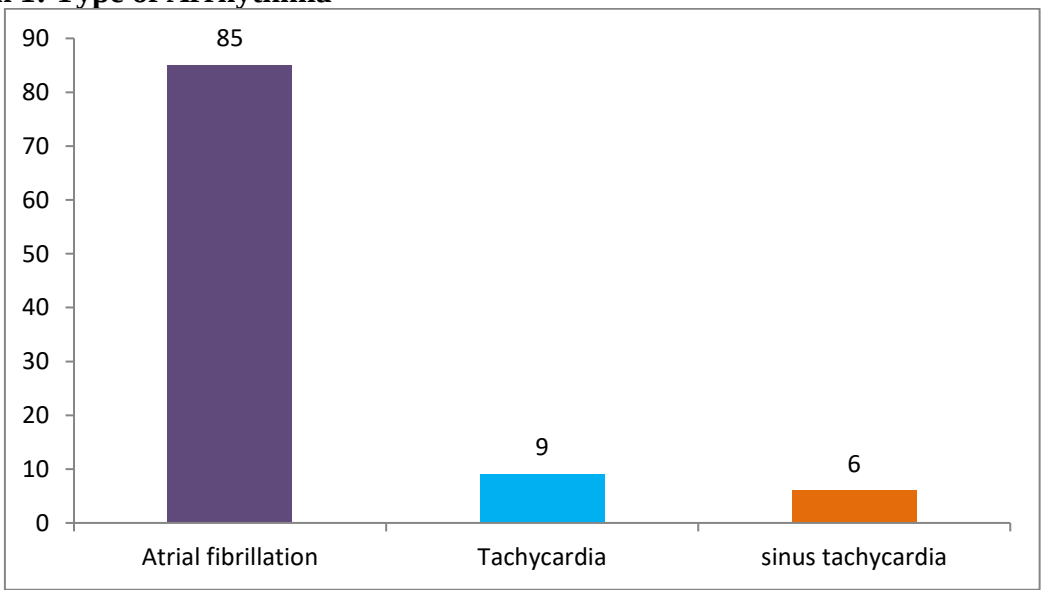
The group of patients receiving metoprolol had significantly fewer arrhythmias than the control group did, their respective incidences being 10% and 23% (P=0.03). The relative risk was 0.36. Patients having age greater than 70 years had higher incidence of arrhythmia with relative risk of 0.10 as shown in table 2.

Table 2: Incidence of arrhythmia between two groups

Variable	Metaprolol	Control	P value	RR
Arrhythmia	10%	23%	0.03*	0.36
Arrhythmia (>70 yrs age)	52%	56%	0.01*	0.10
RR- Relative risk, *significant				

The most common arrhythmia found in metaprolol group was atrial fibrillation (85%) , followed by tachycardia (9%) and sinus tachycardia (6%) as shown in graph 1.

Graph 1: Type of Arrhythmia



The dosages of metoprolol ranged from 25 to 50 mg/ day, the mean dosage being 40 ± 1.2 mg. Most patients received 40 mg/day (n=30), followed by 50 mg/day (n=9), 30 mg/day (n=7), and, finally, 25 mg/day (n=4) as shown in graph 2.

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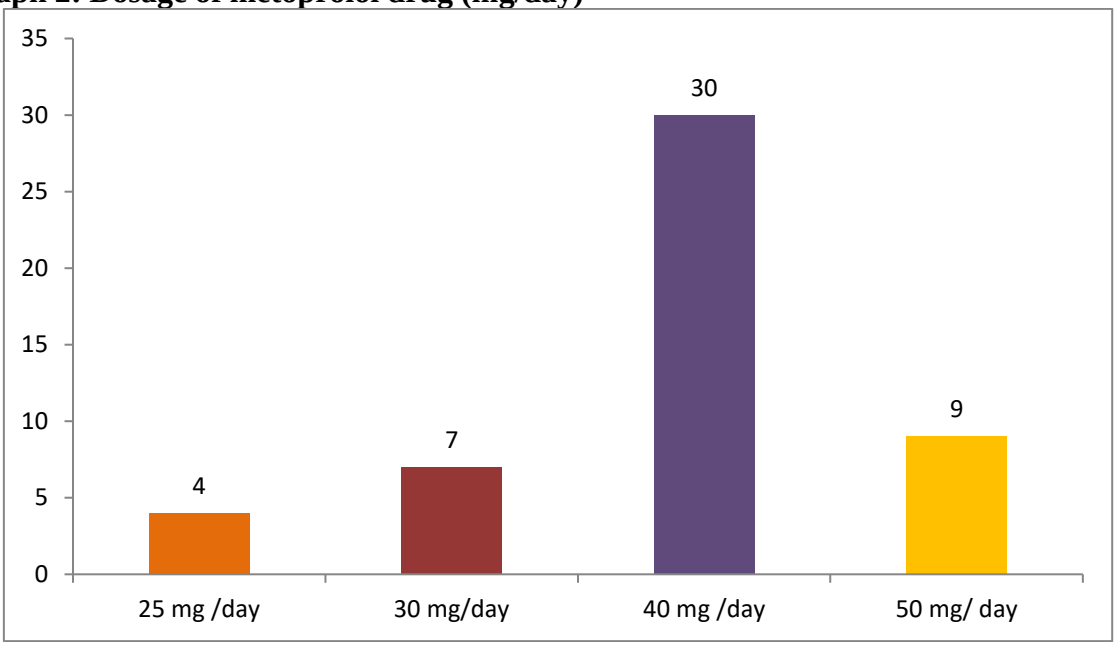
Graph 2: Dosage of metoprolol drug (mg/day)



Discussion

The aetiology of POAF is multifaceted, and several variables, including systemic and local inflammation, oxidative stress, and electrolyte imbalance, have been implicated.5 Ectopic firing or re-entry is the cause of AF during the recovery period. This happens because an atrial substrate that is a result of the postoperative remodelling process following heart surgery is present. Beta-blockers and amiodarone, as well as atrial pacing, are non-pharmacological treatments that have been widely employed in POAF prevention.[9] The present study was conducted at a tertiary care centre among 50 cases and controls diagnosed with cardiovascular disease undergoing surgery .

Depending on the standards used to define arrhythmia as an outcome, as well as the level and type of monitoring implemented, there are differences in the incidence of arrhythmia in the postoperative period. The incidence of these arrhythmias in the control group in the current study was 23%, which was marginally higher than the rate discovered by Leitch et al [10] using essentially the same type of monitoring. Given the possibility that these arrhythmias could be fleeting, if not fugacious, going unreported and having no clinical significance, we focused on the importance of the prolonged or symptomatic ones in this investigation, which were viewed as outcomes.

According to findings in the literature [11], atrial fibrillation, tachycardia, and sinus tachycardia were the most often discovered abnormalities. They may have occurred less frequently following a patient's release from the critical care unit due to the employment of a purely clinical approach of outcome detection in that circumstance.

In the current investigation, metoprolol administration significantly decreased the risk of arrhythmias; this reduction was slightly greater than that reported by Janssen et al [12] who used the same medication in fixed dosages and nearly identical monitoring. The usage of betablockers was found to reduce the risk of arrhythmias by 74% and 51%, respectively, according to the meta-analyses by Andrews et al [5] and Kowey et al [6]. It is important to note that the majority of these metaanalyses comprised analyses with longer electrocardiogram or Holter monitoring, and as a result, with a higher power to detect the outcomes.

Contrary to other research, which indicated that beta-blockers are less effective in the elderly, In this high-risk population, the current study demonstrated that metoprolol dramatically decreased the incidence of atrial fibrillation and flutter. The protective impact of the drug

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observed in the group of patients aged 70 or more was the key factor contributing to the study's success, it was determined. On the other hand, this favourable outcome was not confirmed in the group of patients aged less than 70 years. The systematic use of beta-blockers in this age range may lessen the influence of age as a risk factor for the emergence of those arrhythmias, which makes this result crucial given the rising number of elderly patients undergoing cardiac surgery.[13,14]

Due to the fact that the current study was an open, non-placebo-controlled experiment, it has several limitations and may be vulnerable to assessment bias. Due to a lack of continuous monitoring, particularly after a patient was discharged from the intensive care unit, transient or even persistent and asymptomatic arrhythmias may have gone missed. Metoprolol may have also lessened or covered up symptoms in arrhythmia sufferers. In this case, the study's design took into account the clinical impact outcomes that the medicine almost surely averted.

Conclusion

In conclusion, we think that prophylactic use of betablocker ,metoprolol in CABG patients' has reduced the risk of new onset atrial fibrillation in post operative period, and in some patients who received metoprolol also need another antiarrhythmic drug like magnesium, amiodarone, digoxin to control the development of arrhythmia postoperatively.

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