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Prophylactic Effect of Amiodarone in Preventing Atrial Fibrillation in Surgical Candidates Undergoing Off-Pump Coronary Artery Bypass Grafting Surgery.

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ABSTRACT

Atrial Fibrillation in the post operative period following coronary artery bypass graft surgery affects many patients because it leads to worsened patient outcomes and extended hospitalizations alongside elevated medical costs. This investigation examines the preventive impact of amiodarone because it decreases AF incidence after CABG procedures.

We used a prospective randomized controlled trial design to study 60 CABG patients who received treatment from two different study groups amounting to 30 participants in each group. The patients included in amiodarone trial group received a 300 mg amiodarone bolus that lasted 20 minutes before starting an infusion which delivered 1 mg/kg for 6 hours intraoperatively followed by 0.5 mg/kg for another 18 hours at anesthesia induction. The control recipients received a similar amount of normal saline solution. Research data confirmed that AF occurred less frequently among patients receiving amiodarone therapy since their AF incidence was 33.3% yet the control group experienced AF in 60% of cases ($p<0.05$). While blood pressure measurements kept stable between groups, the patients who received amiodarone experienced lower heart rates ($p<0.05$). The adverse effects related to amiodarone administration resulted in bradycardia in 10% of patients and hypotension in 6.7% of the group. The administration of amiodarone leads to a reduction of post-CABG atrial fibrillation occurrences without creating major problems with blood pressure control. We advocate prescribing and administering amiodarone as a prophylactic treatment for prevention of postoperative atrial fibrillation for CABG patients who have high risk status. The patient needs regular assessment for any harmful reactions from treatment.

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INTRODUCTION:

Atrial fibrillation (AF) especially in the postoperative period represents a well-known complication after coronary artery bypass graft (CABG) surgery with an affected patient population between 20-50%. AF development after surgery elevates the stroke hazard and produces unstable blood pressure while extending hospitalization duration and multiplying health expenses[1]. Post-CABG AF develops through multiple factors which include inflammatory responses and oxidative damage and imbalance in electrolytes together with disturbances in the autonomic nervous system[2].

Amiodarone operates as a class III antiarrhythmic drug which medical teams commonly use during AF treatment and prevention periods. Amiodarone medication lengthens refractory periods in both atrial and ventricular myocardial tissue to reduce arrhythmia occurrence[3]. The medical evidence shows amiodarone administered before CABG surgery effectively decreases AF occurrence after surgery when patients maintain stable blood pressure levels[4]. The research investigates whether prophylactic amiodarone treatment is helpful in reduction of the occurrence of AF after CABG surgery compared to IV normal saline administration in patients represented by two groups.

METHODOLOGY:

The research followed a prospective design that randomized controlled procedures. 60 patients posted for elective coronary artery bypass grafting surgeries at Krishna Vishwa Vidyapeeth, Karad were enrolled from the period of May 2023 to April 2024. Institutional ethical clearance and informed written consents were taken prior to patient enrolment.

Study Population: Group 1: Amiodarone (AM) (n=30)

The amiodarone drug received a 300 mg bolus administered at anaesthesia induction through a 20 cc dilution over 20 minutes before patients received a first 6 hour infusion of 1 mg/kg and second 18 hour infusion of 0.5 mg/kg.

Group 2: Control Group (CT) (n=30)

Healthcare providers administer 0.9% normal saline 20cc via a 20-minute infusion at induction before starting a similar volume infusion of normal saline based on calculated amiodarone requirements.

RESULTS:

Demographic and Clinical Characteristics:

60 patients who underwent elective CABG participated in the research containing 30 patients administered amiodarone and 30 managed by standard medical intervention. Research subjects comprised 60 patients undergoing CABG which included 30 participants in each treatment group and both populations showed identical baseline characteristics (Table 1).

Table 1:

Parameter	Amiodarone Group (n=30)	Control Group (n=30)	p-value
Age (years)	65.3 ± 5.4	66.1 ± 6.1	0.47
Male (%)	80	76.7	0.78
Hypertension (%)	70	73.3	0.75
Diabetes Mellitus (%)	50	46.7	0.82
Left Ventricular Ejection Fraction (%)	56.2 ± 4.3	55.9 ± 4.5	0.89

Incidence of Atrial Fibrillation:

The statistical analysis revealed a significant and substantial decrease ($p<0.05$) between the groups because the amiodarone group experienced postoperative AF in 10 patients (33.3%) while the control group had 18 patients (60%) affected with AF (Figure 1).

Hemodynamic Parameters:

The systolic and diastolic blood pressure levels remained stable without differences between treatment groups. The treatment group documented lower heart rates as compared to the control group at several timelines after surgery (Table 2).

Table 2:

Time Point	Heart Rate (bpm)AM	Heart Rate (bpm)CT	p-value
Baseline	78 ± 60.94	-	-
6 hours post-op	72 ± 6	78 ± 7	0.03
24 hours post-op	70 ± 5	76 ± 6	0.02
48 hours post-op	69 ± 5	75 ± 6	0.01

Adverse Effects:

The usage of amiodarone led to a lower heart rate development since bradycardia affected 10% of amiodarone patients whereas the control group developed bradycardia in only 3.3% ($p=0.15$).

6.7 % percent of patients who received amiodarone developed hypotension yet the drug

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remained safe enough to keep administering to all participants.

DISCUSSION:

The research findings show that postoperative atrial fibrillation (AF) happens less frequently in patients who receive amiodarone prior to undergoing elective coronary artery bypass graft (CABG) surgery. Studies support these results because they have shown amiodarone effectively decreases post-CABG AF occurrence[5,6]. Amiodarone achieves its reduction of AF by lengthening atrial action potential duration within the heart and blocking abnormal atrial automaticity and modifying autonomic tone[7].

We observed that the amiodarone-treated group developed AF in only 33.3% of cases which existed below a statistic threshold value of $p<0.05$ compared to the control group which experienced AF in 60% of cases. Clinic allergists view this decreased incidence as essential because postoperative AF increases the incidence of stroke and extends hospital stays which leads to higher healthcare costs[8]. Medical professionals should adopt amiodarone as standard preventive treatment for CABG patients who face heightened risk.

The use of amiodarone among patients failed to elicit significant changes in their blood pressure or heart rate levels. The blood pressure measurements for systolic as well as diastolic pressures between groups were equivalent which shows amiodarone does not create substantial changes in either systemic vascular resistance or myocardial contractility[9]. Tests showed the patients taking amiodarone had slower heart rates at 72 ± 6 bpm than the control group patients at 78 ± 7 bpm ($p<0.05$) due to mild bradycardia. The bradycardic action of amiodarone results from its dual effect of reducing atrioventricular conduction speed together with automaticity suppression.

Amiodarone produces generally positive tolerability outcomes but patients experience select adverse impacts because of its administration. The patients treated with amiodarone experienced bradycardia at a rate of 10% while the control group had 3.3% but none required therapeutic intervention. Of the patients receiving amiodarone treatment 6.7% experienced hypotension presumably caused by vasodilatory effects from their initial bolus administration. The adverse effects appeared while the effects remained manageable enough that the patients continued all therapy without any breaks.

The study results support earlier research findings which show that using amiodarone as prevention helps decrease the occurrence of postoperative AF. According to Gillinov et al.'s meta-analysis results showed that amiodarone administration decreased the occurrence of AF like this study confirming its status as a primary preventive treatment[4]. Nevertheless studies have indicated concerns about amiodarone-related long-term toxicities but thyroid dysfunction and pulmonary fibrosis remained unassessed during this research because of the brief monitoring duration.

Medical practices should consider adopting amiodarone treatment before CABG for patients at high risk of developing AF because results show decreased postoperative atrial fibrillation incidence alongside minimal adverse events. Analysis of the study results indicates that using amiodarone at 300 mg bolus followed by continuous administration produces beneficial and safe therapeutic outcomes.

The promising study results encounter several limitations while the investigation requires additional research directions. The study included only sixty participants but we could only follow-up the patients for 48 hours after surgery. Studies involving bigger patient cohorts together with elongated observation durations need execution to reveal long-term security results involving thyroid damages and pulmonary complications. Research that evaluates how amiodarone performs against beta-blockers or sotalol in preventing postoperative arrhythmias would help determine the most effective prophylactic approach.

CONCLUSION:

The administration of amiodarone before the operation successfully decreases AF development following CABG surgery while causing no significant cardiovascular problems. Medical data demonstrates adequate reason for standard amiodarone prescription to high-risk patients. Proper patient observation should focus on detecting potential side effects including bradycardia alongside hypotension. More extensive research involving detailed patient observation and optimal amiodarone dose determination should be done on these findings.

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