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Original Article

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Does off-pump coronary bypass surgery reduce the incidence of postoperative atrial fibrillation?

Abstract

Aim: We aimed to determine whether there was a difference in the incidence of new-onset postoperative atrial fibrillation (POAF) between off-pump coronary artery bypass (OPCAB) and conventional on-pump coronary artery bypass grafting (CCABG) surgery. In addition, we also aimed to determine the parameters that will help in the preoperative identification of patients who develop POAF.
Material and Methods: A total of 100 patients who underwent CCABG (Group 1) and 100 patients who underwent OPCAB (Group 2) were included in this retrospective observational cohort study, and the groups were then compared with each other in terms of preoperative, operative and postoperative patient characteristics. In addition, patients with and without POAF were compared according to their characteristics in both groups.
Results: New-onset POAF occurred in 16 of 100 patients in Group 1 and 18 of 100 patients in Group 2, and this difference was not statistically significant. Patients with POAF were significantly older than those without POAF in both Group 1 and Group 2. In addition, it was found that in only Group 2 the mean LVPS was significantly lower while the mean duration of hospital stay was significantly higher in patients with POAF than those without POAF.
Conclusion: We suggested that advanced age was the most significant predictor of POAF development following CABG. According to the findings of our study, except for age there was no reliable indicator that can predict POAF development, although the mean LVPS was found to be lower in patients with POAF than those without POAF in OPCAB group. Nevertheless, further prospective well-designed studies with larger patient participation are required to support the findings of our study and obtain more valuable and powerful scientific evidence.

Keywords: Atrial fibrillation, off-pump, conventional, coronary bypass surgery

INTRODUCTION

Atrial fibrillation (AF) is the most common arrhythmia after coronary artery bypass grafting (CABG) surgery and occurs in approximately 10-40% of cases (1-3). While AF was previously considered as a benign and self-limiting arrhythmia, recent studies have shown that it is associated with an increased risk of heart failure due to tachycardiomyopathy, thromboembolic events and mortality (4,5). To reduce these complications and mortality, it is important to determine the patients at high risk of postoperative atrial fibrillation (POAF) and take the necessary measures to prevent it. Although many different risk factors such as age, surgical trauma, electrolyte imbalance and hypoxia have been identified in the etiology of POAF in various studies, it has not been clarified which etiological factors play a definitive role in the pathogenesis (6,7).

The effect of cardiopulmonary bypass (CPB) in the etiology of POAF developing after CABG is still one of the controversial issues. While some studies have found a significant relationship between CPB and POAF after CABG (2,8), other studies (1,9,10) have not shown this relationship. Therefore, we designed this study to determine whether there was a decrease in the incidence of new-onset POAF with off-pump coronary artery bypass (OPCAB) compared to conventional on-pump coronary artery bypass grafting (CCABG) surgery. In addition, we also aimed to determine the parameters that will help in the preoperative identification of patients who develop POAF.

MATERIAL AND METHODS

Patients

This retrospective study was conducted by examining the files and coronary angiograms of patients who underwent CABG surgery at the Department of Cardiovascular Surgery, Uludağ University Faculty of Medicine between 1998 and 2000. Consecutive patients who did not meet the exclusion criteria and who would not undergo additional procedures other than coronary bypass were included in the study. A total of 100 patients who underwent CCABG (Group 1) and 100 patients who underwent OPCAB (Group 2) were included in the study, and the groups were then compared with each other in terms of preoperative, operative and postoperative patient characteristics. In addition, patients with and without POAF were compared according to their characteristics in both groups.

Exclusion criteria were: pre-existing AF, presence of atrial flutter or a history of paroxysmal AF, left ventricular ejection fraction below 40%, valvular heart disease, additional procedures such as valve repair or replacement, and left ventricular aneurysmectomy. All patients without valve disease and left ventricular dysfunction had a left atrial diameter of less than 40 mm.

The parameters investigated in the study included: age, gender, body mass index (BMI), chronic obstructive pulmonary disease (COPD), hypertension (HT), chronic renal disease (CRD), anemia, electrolyte imbalance, peripheral artery disease (PAD), smoking history, diabetes mellitus (DM), preoperative use of calcium channel blockers and beta-blockers, digitalis use, left ventricular performance score (LVPS), left ventricular segmental motion, severity of coronary artery disease, right coronary artery and sinus artery stenosis, cross-clamp times in CCABG cases, CPB durations, method of cardioplegia administration, type of stabilizer used in OPCAB cases, postoperative ventilator time, intensive care unit stay, and hospital stay. Additionally, the timing of initiation of preoperative medications in the early postoperative period, presence of electrocardiographic conduction abnormalities, P-wave duration, heart rate, and the number of distal anastomoses were evaluated.

Anesthesia Approach

All cases in both groups were started on antimicrobial prophylaxis with cefazolin sodium 1 gr (IV) at induction. In Group 1, instead of higher doses of fentanyl and vecuronium, pancuronium and longer-acting agents were predominantly used during anesthesia. Inhalation agents were avoided, especially in the post-CPB period, due to their myocardial depressive effects. Periodic blood gas measurements were evaluated in all cases to ensure acid-base and electrolyte balance. During and after the operation, cardiac rhythm was monitored with an electrocardiogram (ECG), urine output was monitored by placing a urinary catheter in the bladder, invasive arterial pressure was monitored by placing a radial artery catheter, temperature was monitored by placing an esophageal and rectal temperature probe, and pulmonary artery pressure was monitored continuously with a Swan-Ganz catheter.

Surgical Approach

In both groups, after routine skin, subcutaneous incision, and median sternotomy, the left internal mammary artery (LIMA) and, simultaneously, the saphenous vein from the lower extremity and, in some cases, the radial artery (RA) conduit were prepared. The pericardium was opened and suspension sutures were placed. After determining the baseline activated clotting time (ACT), heparin (Group 1: 350 IU/kg, Group 2: 100 IU/kg) was administered intravenously for anticoagulation. The target ACT was 400-600 seconds for Group 1 and 250-300 seconds for Group 2. During extracorporeal circulation, ACT was checked every 30 minutes, and additional heparin doses were administered if necessary.

In the CCABG group, the aorta and right atrium were cannulated. Antegrade cardioplegia was delivered through the aortic root cannula, and retrograde cardioplegia was delivered through the coronary sinus cannula. Extracorporeal circulation was maintained at a flow rate of 2.2-2.4 L/m²/min and moderate hypothermia (rectal temperature 30-32°C) was achieved. The mean perfusion pressure measured from the radial artery was maintained between 50 and 80 mm Hg. The aorta was clamped, and potassium-enriched blood cardioplegic solution at +4°C was administered to achieve cardiac arrest, with topical cold serum applied. Cardioplegia solution was administered both antegrade and retrograde at intervals of 15-20 minutes. Distal anastomoses were performed using a continuous suture technique with 7/0 polypropylene sutures, employing end-to-side and side-

to-side anastomosis techniques. After the final distal anastomosis was completed, warm blood cardioplegia was administered first retrograde and then antegrade. During this period, the patient was warmed, the cross-clamp was removed, and the heart was restarted. Proximal anastomoses were performed with partial occlusion of the aorta. Extracorporeal circulation was gradually reduced and terminated. Heparin was neutralized with protamine sulfate, and the patients were decannulated.

In the beating heart group, a single deep pericardial suspension suture was placed between the left inferior pulmonary vein and the inferior vena cava. The "OCTOPUS-2®" stabilizer was positioned on the epicardium with vacuum effect (-400 mmHg). In some cases where stabilization of the lateral and posterior walls was necessary, the heart position was adjusted with Trendelenburg and right rotation to ensure optimal visualization and function. Local wall stabilization was achieved, and once the hemodynamic condition was stable, coronary artery anastomosis was performed. When coronary blood flow was too high to allow proper visualization, a microvascular clamp was used to achieve proximal occlusion. During anastomosis, intermittent short-term blower (filtered air <50 L/min) was used when necessary. ECG changes were monitored during occlusion. Distal anastomoses were performed using a continuous suture technique with 7/0 polypropylene sutures, employing end-to-side and side-to-side anastomosis techniques. After completing the distal anastomoses, 75-100 cc of 20% mannitol was administered intravenously. Proximal anastomoses were performed with a side clamp on the aorta, either before or after distal anastomoses. Heparin was partially neutralized (1/2) with protamine sulfate.

Postoperative Care

Patients were admitted to the intensive care unit (ICU) in a hemodynamically stable condition and were connected to a volume-controlled mechanical ventilator. According to clinical monitoring and routine practice criteria, ventilatory support was reduced and eventually discontinued as early as possible. Additionally, intravenous nitroglycerin infusion (0.5-1.5 µg/kg/min) was administered to all patients. No prophylactic medication was used for atrial fibrillation. Antibiotic prophylaxis with cefazolin (1 g IV, 4 times daily) continued until the chest tubes and central venous catheter were removed. In the early postoperative period in the ICU, arterial blood gases were monitored hourly, later every two hours. Daily tests included serum creatinine, creatine kinase (CK), creatine kinase-myocardial band (CK-MB), aspartate aminotransferase (AST), alanine aminotransferase (ALT), glucose, hemogram, sodium, potassium, and complete urine analysis. Patients who were sufficiently hemodynamically stable and no longer required ICU observation were transferred to their clinical wards. Patients who no longer needed hospital care were discharged.

Rhythm monitoring was continuously performed in the ICU and, upon transfer to the clinical ward, daily electrocardiograms, routine daily examinations by the clinical physician (at least once a day), nursing observations every four hours, and examinations based on patient complaints were conducted.

Statistical Analysis

Data were entered into prepared forms and loaded into the SPSS program on a computer. Statistical evaluations were performed using the Mann-Whitney U test, Chi-square test, and Fisher's exact test. The binomial test was used for withdrawal syndrome related to beta-blocker discontinuation. A p-value of less than 0.05 was considered as statistically significant.

RESULTS

When the groups were compared in terms of preoperative, operative and postoperative patient characteristics, the mean values of heart rate, distal bypass, durations of postoperative mechanical ventilator, ICU and hospital stays were significantly higher in Group 1 compared to Group 2 while the mean values of p-wave duration and postoperative hemoglobin and frequencies of HT, preoperative and postoperative beta blocker use were significantly higher in Group 2 compared to Group 1. No significant differences were found between the groups in terms of the other studied variables (Table 1).

POAF developed in 16 patients who underwent CCABG and 18 patients who underwent OPCAB. When the patients' characteristics in Group 1 were compared in terms of whether POAF developed or not, patients with POAF were significantly older than those without POAF. Between patients with and without POAF in Group 1, no significant differences were found in terms of the other studied variables (Table 2).

When the patients characteristics in Group 2 were compared in terms of whether POAF developed or not, patients with POAF were significantly older than those without POAF. In addition, the mean LVPS was significantly lower while the mean duration of hospital stay was significantly higher in patients with POAF than those without POAF. Between patients with and without POAF in Group 2, no significant differences were found in terms of the other studied variables (Table 3).

Table 1. Comparison of preoperative and postoperative factors between G1 and G2

	G1; CPB (n:100)	G2; OPCAB (n:100)	P value
Age (year)	57.7±8.7	58.4±8.4	NS
Gender (F/M)	86/14	82/18	NS
BMI (kg/m²)	27.08±3.8	27.0±3.6	NS
COPD (+/-)	18/85	14-86	NS
HT (+/-)	20/80	42/58	<0.001
EI (+/-)	0/100	0/100	NS
Hb (mg/dl)	8.8±1.0	10.4±1.5	<0.001
CRD (+/-)	1/99	2/98	NS
PAD (+/-)	12/88	14/86	NS
Smoking (+/-)	69/31	65/35	NS
Preoperative calcium blocker use (+/-)	23/77	29/71	NS
Preoperative beta bloker blocker use (+/-)	44/56	61/39	<0.05
Preoperative digitalis use (+/-)	0/100	0/100	NS
DM (+/-)	12/88	19/81	NS
LVPS (P)	9.04±2.2	8.5±1.7	NS
CAD anatomy	2.6±0.5	2.5±0.7	NS
pWD (msec)	93.0±16.5	97.7±14.7	<0.05
Preoperative BPM (B/min)	77.7±11.5	74.5±10.9	<0.05
CA (+/-)	14/86	9/91	NS
LMCA stenosis (+/-)	13/87	11/89	NS
RCA stenosis (+/-)	81/19	77/23	NS
LAD stenosis (+/-)	97/3	98/2	NS
Cx stenosis (+/-)	89/11	71/29	NS
Lenght of ICU stay (hour)	41.3±12.4	29.6±10.7	<0.001
Lenght of hospital stay (day)	5.6±1.6	5.2±1.7	<0.05
Lenght of respirator stay (hour)	8.17±5.3	5.6±2.4	<0.001
X clamp time (min)	56.5±12.75	----------	---------
CPB time (min)	95.0±22.3	----------	---------
SAS (+/-)	0/100	0/100	NS
NDB	3.26±0.8	2.63±0.9	<0.001
Postoperative beta bloker blocker use (+/-)	21/79	36/64	<0.05
AF (%)	16	18	NS
AFST (day)	1.75±0.6	2.0±1.1	NS
AFD (min)	9.0±5.8	10.0±9.3	NS

OPCAB: off-pump coronary artery bypass, AF: atrial fibrillation, F: female, M: male, BMI body mass index, COPD: chronic obstructive pulmonary disease, HT: hypertension, EI: electrolide imbalance, Hb: hemoglobin, CRD: chronic renal disease, PAD: peripheral artery disease, DM: diabetes mellitus, LVPS(P): left ventricular performance score (points), CAD: coronary artery disease, pWD: p wave duration (millisecond), BPM (B/M): beats per minutes (beats/minutes), CA: conduction abnormalities, LMCA: left mean coronary artery, RCA: right coronary artery, LAD: left anterior descending, Cx: circumflex, ICU: intensive care unit, B: beats, X: cross, CPB: cardio pulmonary bypass, SNAS: sinus node artery stenosis, NDB: number of distal bypass, AFST(D): atrial fibrillation start time (day), AFD: atrial fibrillation duration

Table 2. Comparison of preoperative and postoperative factors in patiens with and without AF in G1

	Without AF (n: 84)	With AF (n: 16)	P value
Age (year)	56.9±8.9	61.8±5.9	<0.05
Gender (F/M)	74/10	12/4	NS
BMI (kg/m²)	26.9±3.7	28.2±4.1	NS
COPD (+/-)	11/73	4/12	NS
HT (+/-)	16/68	4/12	NS
EI (+/-)	0/100	0/100	NS
Hb (mg/dl)	8.7±1.0	8.9±0.8	NS
CRD (+/-)	1/83	0/16	NS
PAD (+/-)	12/72	0/16	NS
Smoking (+/-)	60/24	9/7	NS
Preoperative calcium blocker use (+/-)	16/68	7/9	NS
Preoperative beta bloker blocker use (+/-)	35/49	9/7	NS
Preoperative digitalis use (+/-)	0/100	0/100	NS
DM (+/-)	10/74	2/14	NS
LVPS (P)	8.9±2.0	9.6±2.8	NS
CAD anatomy	2.6±0.5	2.7±0.5	NS
pWD (msec)	93.3±11.7	91.3±21.6	NS
Preoperative BPM (B/min)	78.3±11.7	74.7±10.4	NS
CA (+/-)	11/73	3/13	NS
LMCA stenosis (+/-)	11/73	2/14	NS
RCA stenosis (+/-)	69/15	12/4	NS
LAD stenosis (+/-)	81/3	16/0	NS
Cx stenosis (+-)	73/11	16/0	NS
Lenght of ICU stay (hour)	40.6±10.8	44.9±19.1	NS
Lenght of hospital stay (day)	5.5±1.7	5.8±1.1	NS
Lenght of respirator stay (hour)	7.7±3.7	10.6±10.14	NS
X clamp time (min)	56.2±12.6	57.9±12.7	NS
CPB time (min)	94.5±22.6	97.8±21.0	NS
SAS (+/-)	0/84	0/16	NS
NDB	3.2±0.8	3.4±0.9	NS
Postoperative beta bloker blocker use (+/-)	16/68	5/11	NS
AFST (day)	----------	1.7±0.6	--------
AFD (min)	----------	9.0±5.8	---------

AF: atrial fibrillation, F: female, M: male, BMI: body mass index, COPD: chronic obstructive pulmonary disease, HT: hypertension, EI: electrolide imbalance, Hb: hemoglobin, CRD: chronic renal disease, PAD: peripheric artery disease, DM: diabetes mellitus, LVPS(P): left ventricular performance score (points), CAD: coronary artery disease, pWD: p wave duration (millisecond), BPM (B/M): beats per minutes (beats/minutes), CA: conduction abnormalities, LMCA: left mean coronary artery, RCA: right coronary artery, LAD: left anterior descending, Cx: circumflex, ICU: intensive care unit, B: beats, X: cross, CPB: cardio pulmonary bypass, SNAS: sinus node artery stenosis, NDB: number of distal bypass, AFST(D): atrial bibrillation start time (day), AFD: atrial fibrillation duration

Table 3. Comparison of preoperative and postoperative factors in patiens with and without AF in G2

	Without AF (n: 82)	With AF (n: 18)	P value
Age (year)	57.4±8.6	62.6±5.8	<0.05
Gender (F/M)	68/14	14/4	NS
BMI (kg/m²)	26.8±3.6	27.8±3.3	NS
COPD (+/-)	12/70	2/16	NS
HT (+/-)	34/48	8/10	NS
EI (+/-)	0/82	0/18	NS
Hb (mg/dl)	10.4±1.5	10.4±1.4	NS
CRD (+/-)	2/80	0/18	NS
PAD (+/-)	10/72	4/14	NS
Smoking (+/-)	57/25	8/10	NS
Preoperative calcium blocker use (+/-)	21/61	8/10	NS
Preoperative beta bloker blocker use (+/-)	50/32	11/7	NS
Preoperative digitalis use (+/-)	0/82	0/18	NS
DM (+/-)	15/67	4/14	NS
LVPS (P)	8.6±1.7	7.8±1.2	<0.05
CAD anatomy	2.5±0.7	2.4±0.8	NS
pWD (msec)	97.7±14.4	96.9±16.4	NS
Preoperative BPM (B/min)	74.6±10.7	74.2±11.8	NS
CA (+/-)	9/73	0/18	NS
LMCA stenosis (+/-)	10/72	1/17	NS
RCA stenosis (+/-)	64/18	13/5	NS
LAD stenosis (+/-)	80/2	18/0	NS
Cx stenosis (+-)	58/24	12/6	NS
Lenght of ICU stay (hour)	28.8±9.4	33.3±15.5	NS
Lenght of hospital stay (day)	5.0±1.6	6.0±1.5	0.01
Lenght of respirator stay (hour)	5.5±2.5	6.0±2.0	NS
SAS (+/-)	0/82	0/18	NS
NDB	2.7±0.9	2.5±1.4	NS
Postoperative beta bloker blocker use (+/-)	28/54	8-10	NS
AFST (day)	----------	2.4±1.4	----------
AFD (min)	----------	16.4±9.3	----------

AF: atrial fibrillation, F: female, M: male, BMI: body mass index, COPD: chronic obstructive pulmonary disease, HT: hypertension, EI: electrolide imbalance, Hb: hemoglobin, CRD: chronic renal disease, PAD: peripheric artery disease, DM: diabetes mellitus, LVPS(P): left ventricular performance score (points), CAD: coronary artery disease, pWD: p wave duration (millisecond), BPM (B/M): beats per minutes (beats/minutes), CA: conduction abnormalities, LMCA: left mean coronary artery, RCA: right coronary artery, LAD: left anterior descending, Cx: circumflex, ICU: intensive care unit, B: beats, X: cross, CPB: cardio pulmonary bypass, SNAS: sinus node artery stenosis, NDB: number of distal bypass, AFST(D): atrial bibrillation start time (day), AFD: atrial fibrillation duration

DISCUSSION

In the present study, POAF occurred in 16 of 100 patients in CCABG group (Group 1) and 18 of 100 patients in OPCAB group (Group 2) and this difference was not statistically significant. Patients with POAF were significantly older than those without POAF in both group 1 and group 2. In addition, the mean LVPS was significantly lower while the mean duration of hospital stay was significantly higher in patients with POAF than those without POAF in group 2.

AF is the most commonly observed arrhythmia after CABG and its incidence varies between 10% and 40% (1-3). The variability in these rates can be attributed to several factors such as definition, duration and monitoring of AF. We recorded this arrhythmia characterized by a new development of irregular atrial activity on the electrocardiogram, with no P waves, narrow complexes, and a ventricular response that is highly irregular, ranging between 300-600 bpm, and lasting longer than 15 minutes.

The most common complaints associated with atrial fibrillation (AF) are palpitations, feelings of anxiety, and related symptoms. While this may seem the simplest among serious risks, it often becomes the most significant complaint for patients who are unaware of the potential dangers. Dizziness and even fainting are other symptoms. Although arrhythmias generally do not cause fainting, episodes of AF stopping or temporarily pausing can lead to fainting, particularly in the presence of factors that impair cerebral perfusion. Another symptom is a rapid heart rate, which can lead to low cardiac output and subsequently result in hypotension, angina pectoris, and pulmonary congestion. Pain associated with angina, fear of death, dizziness from hypotension, fatigue, and exertional limitations or shortness of breath from pulmonary congestion can be quite distressing for patients. Heart failure is typically seen in patients with low left ventricular ejection fraction, especially in non-compliant left ventricles, though it can occasionally occur even with normal ventricular function (11).

POAF is a source of numerous problems, and various factors can influence or facilitate its onset. For many years, extensive experimental and clinical studies have been conducted to understand which factors can lead to AF, under what circumstances, and what measures can be taken to prevent it. Additionally, research has focused on when and how to treat AF if it does develop. However, the mechanisms underlying AF remain not fully understood. Most studies aim to preoperatively predict the occurrence of postoperative AF in patients using specific indicators. To effectively implement appropriate prophylaxis against the development of AF, it is essential to identify the group at high risk for its occurrence (12-14). The parameters that should be used as indicators for identifying this group are still a matter of debate. Besides age, there is no widely accepted etiological indicator.

Advanced age is widely recognized as a significant risk factor influencing the incidence of POAF development. Generally, the incidence of AF following CABG is reported as around 30% while this rate rises to 52% in patients over 80 years old (15). Additionally, a study indicated that the incidence of AF increases by about 2% every decade after the age of 30 (16). Various studies have reported that despite advancements in anesthesia and surgery, the incidence of AF has been rising over the years, primarily attributed to age, which appears to be a changing or increasing factor in these series (15,17). Our study also shows that advancing age contributes to the increased incidence of AF. This is likely due to the loss of atrial tissue associated with fibrosis and fatty degeneration as individuals age. Atrial fibrosis and dilation increase with age, resulting in decreased conduction across atrial muscle fibers and slower conduction velocities. Consequently, this leads to the development of conduction heterogeneity within the atrium, which can trigger reentry circuits and result in the onset of AF.

In various studies, some risk factors such as female gender, HT, COPD and left atrial diameter have been identified as predictors of AF development following CABG (6,12,18). However, in our study, in addition to age, only LVPS was found to be a risk factor for POAF development in only OPCAB patients (Group 2), not in CCABG patients. LVPS, as firstly used in the Cleveland Clinic, involves dividing the heart into seven segments based on angiographic views and scoring segment motion as normal, hypokinesis, akinesis, dyskinesis, or aneurysm. Kramer et al. (19) have shown that poor left ventricular function predisposes to AF development. In our study, Group 1 showed an LVPS of 8.9±2.2 in the non-AF group, while the AF group had a score of 9.6±2.8 ($p>0.05$). However, in Group 2, the average LVPS was 8.6±1.7 for those who developed AF, compared to 7.8±1.2 in those who did not ($p<0.01$), which contrasts with existing literature.

AF increases hospital stay, necessitating the use of medications and non-pharmacological methods, thereby increasing costs. In a single-center study, the length of hospital stay increased by 3-4 days, with costs rising by $1016 (15). Similarly, in the study by Aranki et al. (20), the hospital stay in the AF group increased by 5 days, with corresponding hospital costs rising by $10,055. While this study did not investigate costs, the amounts reported in the literature are very high for our clinic. The average duration of AF for our patients was 10 hours, with no difference in hospital stay between those who developed AF and those who did not in group 1. In group 2, however, the hospital stay increased by 1 day in those with AF, which suggests that the costs are much lower than those reported in the literature, aside from one day's hospitalization charge and an additional electrocardiogram.

The results of this study are generally consistent with the literature. The age factor, widely accepted by almost all authorities, was also found to be significant in our study. Additionally, the beta blocker withdrawal syndrome, which is considered significant by most experts, was also significant in our study. However, there are many publications with negative findings for all other factors at a similar rate. Although AF theoretically poses numerous dangers, it is not practically a major problem. Primarily, post-operative AF is a self-limiting arrhythmia that can resolve spontaneously even without treatment (21,22). Furthermore, postoperative stroke, which is a significant cause of mortality linked to AF, is not very common (23). Indeed, among the total of 200 patients in Group 1 and Group 2, AF developed in 34, yet none experienced neurological issues (cognitive abilities were not evaluated due to special testing requirements) or mortality. The most frequently observed problem was subjective complaints and palpitations among the patients. AF returned to sinus rhythm at the earliest 2 hours and at the latest 70 hours, with most patients reverting to sinus rhythm around 6 hours. In both groups, one patient achieved rate control but did not revert to sinus rhythm. These patients were started on oral anticoagulants and low molecular weight heparin until their INR reached around 2-3 before discharge.

Our study had several limitations. The main limitations of our study were single-centered design, retrospective nature and relatively small sample size. Another limitation of the study was the lack of risk analysis for postoperative AF.

CONCLUSION

It is unclear who will experience atrial fibrillation and when it will occur. Since AF is independent of the type of the surgery, occurrence or continuation of AF in either on-pump CABG or off-pump CABG have no bearing with the technique employed. Many publications aim to identify factors in the etiology of AF and use these as indicators to identify groups at high risk for postoperative AF, with the intention of providing prophylaxis only to those patients and sparing others from unnecessary treatment. A critical point is the initiation of beta-blockers used preoperatively during the initial hours postoperatively within the context of intensive care. Nevertheless, further prospective well-designed studies with larger patient participation are required to support the findings of our study and obtain more valuable and powerful scientific evidence.

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Ethics Committee Approval: Since the study was retrospective, ethics committee approval was not obtained.

Patient Informed Consent: The patients included in the study were informed in detail about the operative and postoperative process and their written consent was obtained.

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