

Short Term Outcome of Preoperative Aspirin Continuation on Patients Undergoing Coronary Artery Bypass Grafting (CABG) Surgery

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Abstract

Background: Despite good evidence of continuing preoperative aspirin to improve coronary artery bypass surgery outcomes, practice for the routine continuation of preoperative aspirin is inconsistent due to concern for increased postoperative bleeding.

Objective: Was to evaluate role of aspirin in early postoperative outcome in CABG patients regarding incidence of bleeding, reopening, need of blood product transfusion and incidence of postoperative acute myocardial infarction, acute kidney injury, cerebrovascular accidents.

Patients and methods: Current study involved 600 patients who underwent CABG at Cardiothoracic Surgery Department – Kasr-Alainy Hospitals – Cairo University between April 2020 and October 2022. After considering the inclusion and exclusion criteria, the patients were divided into two groups: Aspirin group (n = 300) received aspirin till the day of the surgery, and for the other Non-Aspirin group (n = 300) aspirin was stopped five to seven days before the surgery.

Results: Continuation of aspirin during CABG surgery period is associated with increase in chest tube drainage in first 24 hours with increase in packed RBCs transfusion with no significant differences in reopening between studied groups. Aspirin group had lower incidence of postoperative CVS, and acute kidney injuries compared to non-aspirin group ($P < 0.05$). No significant differences between studied groups regards to postoperative MI, elevated cardiac enzymes, ($P > 0.05$).

Conclusion: Continuation of preoperative aspirin till the day of the surgery is associated with significant incidence of high drainage chest tubes and transfusion of packed RBCs and lower incidence of postoperative AKI and cerebrovascular accidents.

Keyword: *Aspirin, Coronary Artery Bypass Grafting.*

INTRODUCTION

Coronary artery disease (CAD) is among the leading causes of morbidity and mortality worldwide, and its prevalence and adverse impact continue to increase. Coronary artery bypass graft surgery (CABG) is an important therapeutic approach in CAD. Because platelets play a crucial role in the pathogenesis of thrombosis, antiplatelet drugs (especially aspirin) are broadly used as primary, secondary, and tertiary prevention strategies.¹

Aspirin (salicylate, acetylsalicylic acid (ASA)) remains one of the wonder drugs in the field of cardiology. The use of aspirin (derived naturally from plants) as pain relievers has been described since the times of first documented medical writings (Walker et al., 2018). The antithrombotic effects of aspirin were laid the foundation for use of it in prevention of myocardial infarction (MI) and other cardiovascular events. Aspirin is the cornerstone of modern-day therapy for patients suffered a major cardiovascular event.²

However, the mechanisms of aspirin that confer protection against myocardial infarction and postoperative graft thrombosis contribute to increased bleeding complications during cardiac surgery. Therefore, it is a long-established practice to stop aspirin a few days before any surgery including CABG. Meanwhile, several studies have demonstrated a reduction of early vein graft thrombosis when aspirin is started soon after CABG. It is associated with a reduction in postoperative ischemia and cardiac, cerebrovascular, gastrointestinal, and renal complications.²

Even though aspirin is of benefit to patients following CABG, continuation, or administration of preoperative aspirin before CABG or any cardiac surgical procedure remains controversial. The 2011 American College of Cardiology Foundation/American

Heart Association Guidelines for Coronary Artery Bypass Surgery recommends that preoperative aspirin at a dose of 100-325 mg/d should be continued or administered before CABG since it has been shown to reduce postoperative mortality and morbidity (class I recommendation).

On the other hand, the Society of Thoracic Surgeons Guidelines on "Use of antiplatelet drugs in patients having cardiac and noncardiac operations" suggest that discontinuation of preoperative aspirin therapy before purely elective operations and in high-risk patients is reasonable to decrease the risk of bleeding.³

Furthermore, the use of aspirin in patients with above mentioned profiles is like a double-edged sword for surgeons, which on the one hand is protective for patients from ischemia but on the other hand, increases the risk of surgical bleeding. The risk of bleeding following the aspirin or clopidogrel intake increases by up to 20%, and after combination therapy, it increases by up to 50%.⁴⁻⁶

There are still significant controversies regarding the timing of discontinuation of aspirin treatment in patients undergoing CABG.

Patients and methods

This study is prospective analytical non-randomized clinical trial including 600 patient's candidates for coronary-artery bypass surgery with the use of cardiopulmonary bypass. Decision of patient's categorization into who was on aspirin or not was referred to the operating surgeon.

All subjected patients were categorized into 2 equal groups:

Aspirin group: 300 patients with continuation of aspirin preoperatively at different doses of

aspirin (one tablet of 81 mg, one tablet of 100 mg or two tablets of 75 mg).

Non aspirin group: 300 patients who stopped aspirin 5-7 days preoperative.

Between April 2020 and October 2022, 600 patients of various ages and genders underwent on-pump CABG at Cardiothoracic Surgery Department – Kasr-Alainy Hospitals – Cairo University, to assess the effect of preoperative aspirin continuation on incidence of bleeding, reopening, need of blood product transfusion and incidence of postoperative acute myocardial infarction, acute kidney Injury, and cerebrovascular accidents.

Inclusion criteria: On pump CABG Patients without any other concomitant cardiac surgeries, Elective surgeries and Urgent surgeries.

Exclusion criteria: Off pump CABG Patients, CABG patients with concomitant cardiac surgeries, Redo CABG surgeries, Patients with any blood diseases and Patients with hepatic and renal impairment.

Methods

All patients were subjected to all the preoperative evaluation: Personal history taking, History of associated comorbidities, Preoperative laboratory, Urgent/Elective surgical status, Coronary Angio data, Procedural Characteristics and End point with <30 days events.

Statistical methods:

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 28 (IBM Corp., Armonk, NY, USA). Data was summarized using mean and standard deviation for quantitative variables and frequencies (number of cases) and relative frequencies (percentages) for categorical variables.

Results

Table (1): Baseline characteristics of studied groups (n=600)

	Aspirin		Non-aspirin		P value
	Mean	Standard Deviation	Mean	Standard Deviation	
Age	60.94	7.07	61.14	5.26	0.695
BMI	28.08	3.07	27.47	2.50	0.358

Preoperative data shown that the mean age of the patients was 60.94 years in the aspirin group and 61.14 years in the non-aspirin group, P=0.695.

Mean Body mass index (BMI) was in aspirin (28.08) and non-aspirin (27.47) groups (p=0.358). There was no significant difference between studied groups regards to BMI.

Figure (1): Gender differences among studied cases

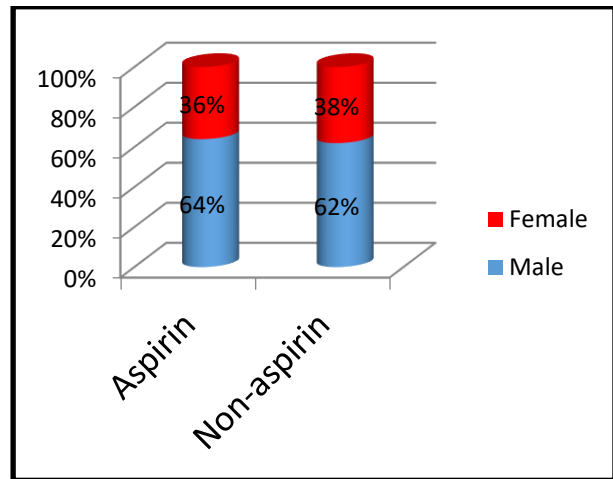


Table (2): Type of urgent or elective surgery among studied groups

	Aspirin		Non-aspirin		P value
	No.	%	No.	%	
Urgent	138	46.0%	78	26.0%	< 0.001
Elective	162	54.0%	222	74.0%	

Regarding type of surgery: 138 (46%) of aspirin group was in need for urgent CABG compared to 78 (26%) in non-aspirin group with high statistically significant difference between them (p<0.001).

Table (3-A): Coronary arteries characteristics of studied groups: number of Left Main (LM) artery stenosis patients (n=600)

		Aspirin		Non-aspirin		P value
		Count	%	Count	%	
LM stenosis	Yes	78	26.0%	54	18.0%	0.018
	No	222	74.0%	246	82.0%	

Table (3-B): Coronary arteries characteristics of studied groups: Degree of LM stenosis %.

		Aspirin		Non-aspirin		P value
		Mean	Standard Deviation	Mean	Standard Deviation	
LM stenosis %		76.86	12.95	81.11	12.98	0.066

Table (3-C): Coronary arteries characteristics of studied groups: Number of diseased Vessels.

		Aspirin		Non-aspirin		P value
		Count	%	Count	%	
Number of diseased Vessels	2 vessels disease	12	4.0%	36	12.0%	< 0.001
	3 vessels disease	288	96.0%	264	88.0%	

Table (3) showed that:

(A) Number of patients presented with LM stenosis in aspirin group was 78 patients (26%) higher than non-aspirin group 54 patients (18%) (p=0.018)

(B) There was no significant difference among both groups regarding Degree of LM stenosis % (p. 0.066)

(C) Number of diseased vessels were higher in aspirin group compared to non-aspirin group (p< 0.001).

Table (4): Early postoperative events in both study groups

		Aspirin		Non-aspirin		P value
		No.	%	No.	%	
IAB pump	Yes	6	2.0%	12	4.0%	0.151
	No	294	98.0%	288	96.0%	
Inotropes	Yes	231	77.0%	246	82.0%	0.129
	No	69	23.0%	54	18.0%	
Inotropes details (number of patients)	Adrenaline	111	37.0%	108	36.0%	0.079
	Noradrenaline	51	17.0%	54	18.0%	
	Adrenaline +Noradrenaline	65	21.7%	84	28.0%	
	Adrenaline +Noradrenaline +Levosimendan	4	1.3%	0	0.0%	
	No	69	23.0%	54	18.0%	
Anti-Arrhythmic drugs	Amiodarone	14	4.7%	24	8.0%	0.094
	No	286	95.3%	276	92.0%	

The Table showed that no significant differences between studied groups regards to need for intra-aortic balloon (IAB) pump and total need for pharmacological inotropic support (p>0.05). 24 patients (8%) in non-

aspirin group were complaining of tachycardia and arrhythmia that in need for Amiodarone as antiarrhythmic agent compared to 14 (4.7%) in aspirin group with no statistically significant difference between them (p=0.094).

Table (5): Dosage of inotropic supports used in both study groups

	Aspirin				Non-aspirin				P value
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Adrenaline (nanograms/kg/min)	65.89	21.42	30	100	64.22	21.33	30	100	0.452
Noradrenaline (nanograms/kg/min)	72.42	17.20	50	100	74.49	17.43	50	100	0.338

The Table showed that no significant dosage of adrenaline and noradrenaline used differences between studied groups regards to in studied groups ($p>0.05$).

Table (6): Incidence of undesired events after surgery in both study groups

		Aspirin		Non-aspirin		P value
		No.	%	No.	%	
CVS	Yes	3	1.0%	18	6.0%	0.001
	No	297	99.0%	282	94.0%	
MI	Yes	6	2.0%	12	4.0%	0.151
	No	294	98.0%	288	96.0%	
ECG	ischemic changes	6	2.0%	12	4.0%	0.090
	AF	9	3.0%	17	5.7%	
	No	285	95.0%	271	90.3%	
Cardiac enzymes	Yes	6	2.0%	12	4.0%	0.151
	No	294	98.0%	288	96.0%	
Reopening	Yes	12	4.0%	12	4.0%	1
	No	288	96.0%	288	96.0%	
Transfusion	Yes	214	71.3%	186	62.0%	<0.001
	No	86	28.7%	114	38.0%	
AKI	Yes	12	4.0%	24	8.0%	0.039
	No	288	96.0%	276	92.0%	

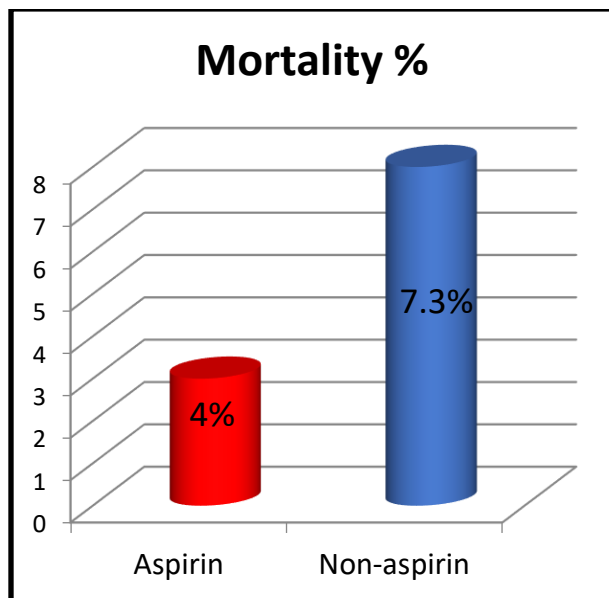
Continuing usage of preoperative aspirin was significantly associated with lower incidence of postoperative CVS, and acute kidney injuries compared to non-aspirin group ($P<0.05$).

There was significant difference in rate of blood transfusion in aspirin group compared to non-aspirin however there was no significant differences regarding both groups in the rate of reopening.

No significant differences between both studied groups regards to postoperative MI, elevated cardiac enzymes,. Even though aspirin group had lower incidence of these events.

Regarding post-operative acute kidney injury (AKI): in aspirin group 12 patients was complicated with AKI (7 patients,58.3%) required permanent hemodialysis and rest of patients (5 patients,41.7%) required temporary hemodialysis while in non-aspirin group (18 patients,75%) required permanent hemodialysis and rest of patients (6 patients,25%) required temporary hemodialysis of total 24 patients.

Figure (2): Mortality rate among studied cases



Discussion

Cardiovascular disease is a leading cause of morbidity and mortality with platelets playing a major role in the pathogenesis of cardiovascular events.⁷

The National Institute for Health and Care Excellence (NICE) recommends low-dose (75–100 mg) aspirin monotherapy for angina, peripheral arterial disease, transient ischemic attack/stroke and after percutaneous coronary intervention (NICE 2017). Many of these patients requiring coronary artery bypass graft (CABG) are therefore on aspirin.⁸

In current study, 600 consecutive patients of various ages and genders underwent on-pump CABG was prospectively divided into 2 equal groups: Aspirin group: 300 patients with continuation of aspirin preoperatively at a common prescribed doses (one tablet of 81 mg, one tablet of 100 mg or two tablets of 75 mg) and Non aspirin group: 300 patients who stopped aspirin 5-7 days preoperative.

Preoperative data shown that the mean age of the patients was 60.94 years in the aspirin group and 61.14 years in the non-aspirin

group, $P=0.695$. Regarding gender, the majority were males ($n=378$; 63%), of whom 192 in aspirin group and 186 in non-aspirin group. Among female patients ($n=222$; 37%), of whom 108 in aspirin group and 114 in non-aspirin group. Male/female ratio was 1.78 and 1.63 in aspirin and non-aspirin group respectively ($P=0.612$).

In our study regarding mean BMI there was nearly similar in aspirin group (28.08) and non-aspirin group (27.47) $p=0.358$.

Current findings agreed with Al-Manzo et al., (2021) who studied 74 patients most of them were in the 51-60-year age group and were males. According to their demography and risk factors, both groups were similar.¹

About associated co-morbidities, in current study there were no significant differences between both groups regarding associated co-morbidities. In agreement with our study Al-Lawati et al., 2013; Berg et al., 2013; Wu et al., 2015; Myles et al., 2016 studies revealed similar findings with no significant differences between patients on aspirin and no aspirin regards to associated comorbidities.⁹⁻¹²

In current study, 138 (46%) of aspirin group was in need for urgent CABG compared to 78 (26%) in non-aspirin group with high statistically significant difference between them ($p<0.001$). Compared to our findings, Little et al., 2022 revealed 35.6% of patients who continued aspirin had urgent cases compared to 10.6% in aspirin discontinued patients ($P<0.001$).⁸

In our study there were higher percentage of patients having LM disease in aspirin group (26%) compared to (18%) in non-aspirin group ($p=0.018$). Also, number of diseased vessels was higher in aspirin group ($p < 0.001$). Compared to our findings Jacob et al. 2011, the late-use group included more patients with at least 50% left main coronary artery stenosis. The groups were similar with

regard to the number of diseased coronary arteries.¹³

In our study no statistically significant differences between studied groups regards to total bypass (mean 104.35 minutes in aspirin group versus 105.10 minutes in non-aspirin group) and cross clamp times (mean 55.40 minutes in aspirin group versus 56.95 minutes in non-aspirin group) ($P>0.05$); in agreement with Jacob et al. 2011, The duration of myocardial ischemia was similar, but cardiopulmonary bypass time was slightly longer for the early-discontinuation group (91.728.5 versus 90.227.4 minutes).¹³

Regards to postoperative adverse events, no significant differences between studied groups regards to needing for intra-aortic balloon (IAB) pump and total need for pharmacological inotropic support ($p>0.05$).

24 patients (8%) in non-aspirin group were complaining of tachycardia and arrhythmia that in need for Amiodarone as antiarrhythmic agent compared to 14 (4.7%) in aspirin group with no statistically significant difference between them ($p=0.094$).

In our study Continuing usage of preoperative aspirin was significantly associated with lower incidence of postoperative CVS (3 patients in aspirin group 1% versus 18 patients 6% in non-aspirin group) and acute kidney injuries (12 patients in aspirin group 4% versus 24 patients 8% in non-aspirin group) ($P<0.05$).

No significant differences between studied groups regards to postoperative MI, elevated cardiac enzymes, ($P>0.05$).

Regarding early in hospital mortality in our study there was no differences between aspirin group (4%) and non-aspirin group (7.3%) that matched with a study done by Myles et al. 2016. Death or thrombotic complications occurred within the first 30 days after surgery in 202 patients (19.3%) in the aspirin group and in 215 patients (20.4%) in the placebo

group, preoperative aspirin did not show any statistically significant impact on postoperative mortality.¹²

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