

Effect of Aspirin on Postoperative Bleeding in Coronary Artery Bypass Grafting

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Purpose: It is not uncommon for aspirin therapy to be withheld before coronary artery bypass grafting (CABG) because it is thought to increase the risk of postoperative bleeding. Many studies have shown that continued aspirin therapy reduces postoperative myocardial infarction and increases survival. The purpose of this study is to analyze the effect of preoperative aspirin on postoperative bleeding in patients undergoing CABG.

Material and Methods: Patients ($n = 30$) undergoing CABG were divided into two groups, group 1 ($n = 15$) who received aspirin till the day of surgery, and group 2 in whom aspirin was stopped 5 days before surgery. Postoperative bleeding up to 76 h (approximately 3 days) was noted in both groups.

Results: Preoperative, intraoperative, and postoperative variables were equal in both groups. Postoperative bleeding in the 2nd hour was significantly lower in group 1 compared to group 2 ($p = 0.004$). Bleeding 28–76 h postoperatively was also significantly lower in the first group ($p = 0.043$).

Conclusion: Our study suggests that contrary to the commonly held beliefs in our setup, the use of aspirin till the date of surgery does not increase the risk of postoperative bleeding after CABG. In contrast, our data show reductions in the bleeding incidence of those in whom aspirin was not withheld prior to surgery. Therefore we strongly recommend its continued use of aspirin until the date of surgery. (*Ann Thorac Cardiovasc Surg* 2008; 14: 224–229)

Key words: coronary artery bypass grafting, aspirin, postoperative bleeding

Introduction

The management of aspirin therapy in the preoperative period in patients undergoing coronary artery bypass surgery is variable among surgeons and across medical centers. It is not uncommon for aspirin therapy to be withheld before coronary artery bypass surgery because it is thought to increase postoperative bleeding and the risk associated with it.^{1–12} Many studies have shown

that continued aspirin therapy reduces postoperative myocardial infarction, improves oxygenation, and increases survival.^{13,14} Coronary artery bypass surgery is not always able to achieve complete revascularization because of technical and anatomical factors. Preoperative ischemia is often evident through the demonstration of postoperative cardiac biomarker release^{15–18} and is associated with an increased risk of short-term and intermediate-term mortality. Platelet inhibition is well appreciated to confer significant benefits in the setting of acute coronary syndromes,^{19–23} and, indeed, platelet inhibition with aspirin has been shown to reduce the rates of acute and subacute bypass graft occlusion in patients undergoing coronary artery bypass surgery. The purpose of this study is to analyze the effect of preoperative aspirin use on postoperative bleeding in patients

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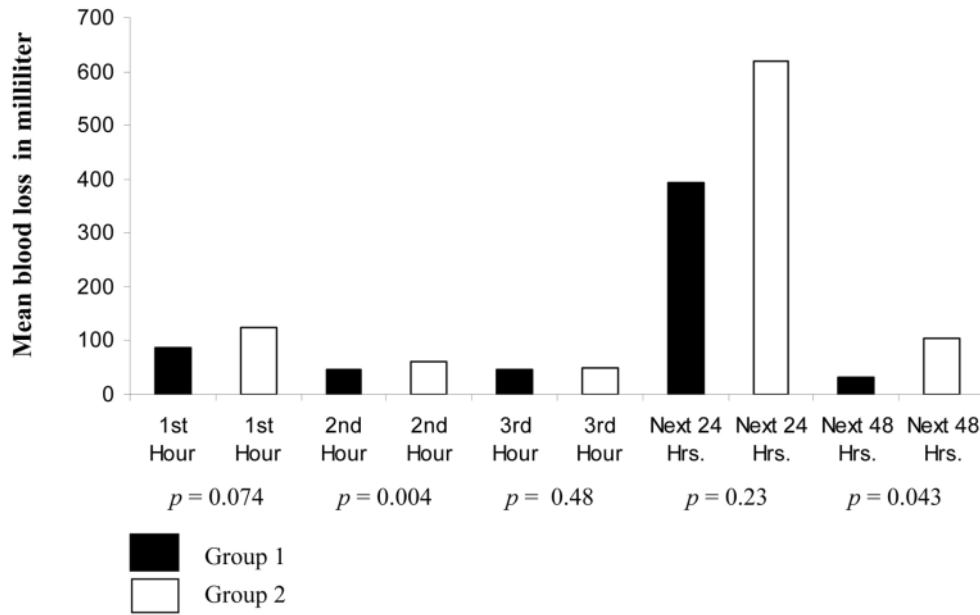


Fig. 1. Postoperative bleeding in both groups with time.

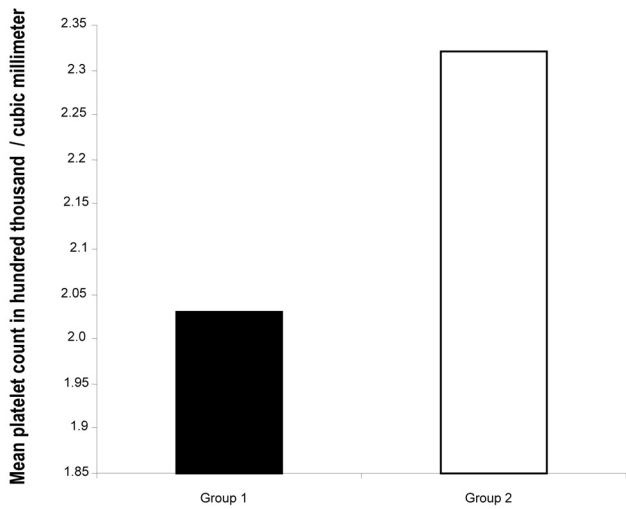


Fig. 2. Preoperative platelet count in both groups with p value = 0.236.

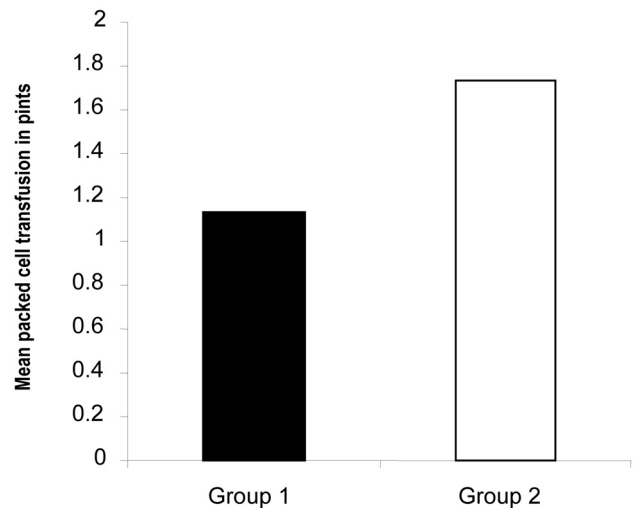


Fig. 3. Postoperative packed red cell transfusion in both groups with p value = 0.245.

undergoing coronary artery bypass grafting (CABG).

Material and Methods

This study was a quasi-experimental study (nonrandomized control trial) including 30 consecutive patients who underwent primary isolated CABG at our institution (Department of Cardiac Surgery, Dow University

of Health Sciences, Karachi) from July 2006 to January 2007. Patients were classified into two groups: group 1, in which aspirin therapy was continued until the date of surgery, and group 2, where aspirin was stopped five days before surgery. Patients excluded from the study were those on anticoagulation (e.g., mechanical heart valve, atrial fibrillation), allergy to or intolerance of aspirin or clopidogrel, history of bleeding diathesis, sig-

Table 1. Preoperative variables

Variables	Group 1 (n = 15)	Group 2 (n = 15)
Age (in years)	54 ± 9	51 ± 9
Male	13 (86)	14 (93)
Hypertension	3 (20)	4 (27)
Diabetes mellitus	4 (27)	5 (33)
Smoking	11 (73)	8 (53)
Ejection fraction		
Good (>60)	1 (6)	2 (13)
Moderate (30–60)	14 (94)	13 (87)
Platelet count (hundred thousand/mm ³)	2.0 ± 0.6	2.3 ± 0.7
INR	1.2 ± 0.2	1.3 ± 0.3

Data are shown by number followed by percentage in parentheses or mean with standard deviations.

INR, international normalized ratio.

nificant gastrointestinal (GI) bleed, or liver failure, patients with known renal failure, redo cardiac surgery, and off-pump surgery.

All operations were performed by one surgeon (MID). Anesthetic and cardiopulmonary bypass (CPB) techniques were standardized. The bypass circuit used a hollow fiber membrane oxygenator, nonpulsatile flow generated by a roller pump, and 40 µm arterial line filter. Flow was 2.4 L/min/m² at 37°C falling to 1.8 L/min/m² at 32°C. Arterial pressure was maintained from 50 to 70 mm Hg and hematocrit from 0.20 to 0.25, and alpha stat blood gas was used.

The distal and proximal anastomosis were performed during the same period of a single aortic cross-clamp time in both groups, and warm blood cardioplegia was used. All patients were weaned off CPB with a small dose of adrenaline, used routinely as an anesthetic protocol in our hospital. Platelet counts, prothrombin time (PT), activated partial thromboplastin time (APTT), and international normalized ratio (INR) of all patients were measured pre- and postoperatively. The postoperative amount of bleeding was calculated in the 1st, 2nd, and 3rd h, and then for the next 24 h and 48 h. All procedures were elective in nature and on CPB. Bypass time and cross-clamp time for individual patients were noted. All patients were given their first dose of aspirin immediately after extubation. The use of inotropes was monitored, and patients were followed up for any complications (exploration for bleeding and cardiac tamponade), and mortality during their stay in the intensive care unit (ICU). Postoperative packed cell use and transfusion of nonred blood cell products

Table 2. Intraoperative variables

Variables	Group 1 (n = 15)	Group 2 (n = 15)
Arterial grafts	12 (80)	12 (80)
Number of grafts		
Two	2 (13)	2 (13)
Three	12 (80)	13 (87)
Four	1 (7)	Nil
Blood transfusion (pints)		
Packed cells	1.1 ± 1.2	1.7 ± 1.7
Fresh frozen plasma	0.13 ± 0.35	0.4 ± 0.5
Platelets	0.06 ± 0.25	0.13 ± 0.35
Inotropic support	10 (67)	13 (87)
Cross-clamp time (min)	60.86 ± 15.4	62.5 ± 16.6
Bypass time (min)	92.3 ± 30.5	96.6 ± 22.2

Data are shown by number followed by percentage in parentheses or mean with standard deviations.

(fresh-frozen plasma, platelets, and cryoprecipitate) were recorded for both aspirin users (group 1) and non-users (group 2).

Informed consent from each patient and approval by the institutional review board were obtained.

Data are presented as mean with standard deviation and statistical comparisons are by paired samples *t*-test and with a probability of less than 0.05 considered significant.

Results

Fifteen patients were placed in each group. The preoperative, intraoperative, and postoperative variables are equally represented in two groups in Tables 1, 2, and 3, respectively. Postoperative bleeding in the 2nd hour was significantly lower in group 1 compared to group 2 (mean measurement with standard deviation was 45 ± 23.3 mL versus 60.3 ± 60.1 mL), with a *p* value of 0.004. Bleeding from 28 to 76 h postoperatively was also significantly lower in the first group (mean measurements with standard deviation were 32 ± 68.68 mL versus 102.8 ± 126.8 mL) with a *p* value of 0.043. Bleeding in the 1st h, 3rd h, and the next 24 h was found to be statistically nonsignificant. No patient showed any severe hemodynamic instability, reexploration for bleeding, cardiac tamponade, or the need for an intra-aortic balloon pump (IABP).

Discussion

Aspirin therapy has been shown to be beneficial in the

setting of acute coronary syndromes, where it significantly reduces mortality in patients with unstable coronary artery disease.⁹⁻²⁴ It would be reasonable to postulate that preoperative aspirin therapy might also confer an early postoperative benefit given the well-proven benefit of platelet inhibition in the setting of acute coronary syndromes and myocardial ischemia, the reduction of early vein graft thrombosis when aspirin is started soon after coronary bypass surgery, and the associated reduction in postoperative ischemic, cardiac, cerebrovascular, gastrointestinal, and renal complications with early initiation of postoperative aspirin therapy.^{8,9}

Dacey et al.,⁷ using a case-control design of 368 in-hospital deaths after coronary artery bypass surgery, found that preoperative aspirin usage within 7 days before bypass surgery was associated with a 27% reduction of in-hospital mortality. Furthermore, there were no significant differences in chest tube drainage, blood product transfusion, or need for reexploration for hemorrhage in patients exposed to preoperative aspirin compared with those not receiving it in a nonrandomized prospective cohort study. Additionally, the initiation of early aspirin therapy did not result in an increased risk of reoperation for bleeding or blood product transfusion requirements. In the analysis by Mangano,⁸ a discontinuation of aspirin therapy before coronary artery bypass surgery was a strong independent risk factor for postoperative mortality in the multivariate analysis. This finding also suggests that a preoperative continuation of aspirin therapy is quite likely advantageous and that preoperative discontinuation of aspirin therapy may be detrimental.

Although there are reports of increased bleeding associated with preoperative platelet inhibition, the more current robust data suggest that there is not a significantly increased risk associated with the administration of preoperative oral antiplatelet agents, with the exception of clopidogrel.^{1-8,25,26} In fact, our data show a reduction in the bleeding incidence of those in whom aspirin was not withheld prior to surgery; it is clearly shown in our results that postoperative bleeding in the 2nd h was lower in group 1 compared to group 2. This phenomenon may be due to the comparatively shorter bypass time in the first group.²⁷ Our data support the published American College of Cardiology/American Heart Association guidelines on the management of patients undergoing coronary artery bypass surgery, which recommends the continuation of aspirin therapy up to the time of surgery in patients with a recent acute

Table 3. Postoperative variables

Variables	Group 1 (n = 15)	Group 2 (n = 15)
Bleeding (mL)		
1 st hour	88 ± 63	125 ± 128
2 nd hour	45 ± 23.3	60.3 ± 60.1
3 rd hour	47.0 ± 35.0	48.0 ± 43.2
Next 24 hour	392.3 ± 333.5	619.3 ± 392.0
Next 48 hour	32.0 ± 68.68	102.8 ± 106.8
Removal of drain (days)		
1 st day	8 (53)	8 (53)
2 nd day	7 (47)	6 (40)
3 rd day	Nil	1 (7)
Platelet count (hundred thousand/mm ³)		
Immediate	1.51 ± 0.42	1.66 ± 0.67
1 st day	1.50 ± 0.40	1.40 ± 0.53
2 nd day	1.13 ± 0.42	1.28 ± 0.62
Predischarge	1.44 ± 0.58	1.26 ± 0.49
INR	1.3 ± 0.3	1.3 ± 0.3
ICU stay (days)	2.2 ± 0.88	2.4 ± 0.63
Ward stay (days)	3.3 ± 0.48	3.3 ± 0.48

Data are shown by number followed by percentage in parentheses or mean with standard deviations.

INR, international normalized ratio; ICU, intensive care unit.

coronary syndrome, and that all other patients should receive aspirin within 24 h of surgery.²⁸ Our findings suggest that preoperative aspirin therapy may be beneficial because it decreases the risk of myocardial infarction, improves survival, and is not associated with increased bleeding or reexploration. Therefore we strongly recommend the continued use of aspirin until the date of surgery.

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