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Does Early Post-operative Administration of Aspirin Influence the Risk of Bleeding After Coronary Artery Bypass Graft Surgery? A Prospective Observational Study

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ABSTRACT

Background: Aspirin has a proven role in preventing thrombotic diseases. However, given its anti-platelet activity, it is often assumed that its early post-operative administration significantly increase the amount of post-operative bleeding. **Aim:** The aim of this study was to determine whether early post-operative administration of aspirin influence the risk of bleeding in patients undergoing coronary artery bypass graft (CABG) surgery. **Methods:** In a prospective observational study, 100 consecutive patients undergoing first time elective CABG surgery were include in the study. Patients received a low dose of aspirin (75-150 mg per day) either 1 hours (the early aspirin group; n=43) or 6 hours after surgery (the late aspirin group; n=57). Total mediastinal blood drainage, blood drainage after 6 hours, incidences of re-operation for the control of bleeding and transfusion of red blood cells (RBCs) and blood products were recorded and followed until chest tube removal. **Results:** The groups were found to be matched for the confounding variables and no significant differences were found between post-aspirin bleeding (p=0.37), RBCs and blood product usage (p=0.90) or incidences of re-operation for control of bleeding (p=1.00) between the two groups. **Conclusions:** Early administration (1 hour after surgery) of aspirin did not appear to increase the risk of post-operative bleeding in patients undergoing CABG. Thereby, its early administration in such cases may be considered. Although further well-designed randomized controlled trials to confirm the safety and efficacy of early administration of aspirin after CABG surgery are warranted.

Key words: Aspirin, CABG, Bleeding, Complication.

1. INTRODUCTION

Aspirin (ASA) is a non-steroidal anti-inflammatory drug with selective anti-platelet activity, whose effect is exerted by irreversibly inhibiting the enzyme cyclooxygenase in the arachidonic acid cascade (1). It plays a very important role in primary and secondary prevention of thrombotic diseases and indeed,

meta-analysis of over 180 independently-conducted medical trials has shown that overall, its administration reduces the risk of stroke, myocardial infarction and vascular death by 25% in patients with various cardiovascular diseases (2, 3, 4).

In patients undergoing CABG, graft patency is the most important indicator of the short and long-term

success of the operation. There, low dose (75-325 mg per day) of aspirin has been shown to significantly improve graft patency early and late following the operation. Aspirin also significantly reduces the incidences of post-operative myocardial re-infarction, cerebrovascular events and other thrombotic pathology (5-8).

However, inhibiting platelets can potentially increase the amount of post-operative bleeding and there have been a number of studies to suggest the fact. In keeping with this school of thought, it is common practice to defer post-operative administration of aspirin to at least 1 hour or 6 hour following the operation, in order not to expose patients to this risk. On the other hand, there are other studies which suggest that this risk is actually a lot less than often feared (8-14). The objective of this study was therefore to assess influences of early and late post-operative administration of aspirin on the amount of post-operative bleeding.

2. METHODS

After obtaining written informed consent from the patients, 100 consecutive patients undergoing first time elective CABG surgery using cardiopulmonary bypass (CPB), without concomitant valvular or aortic surgery, were included in this prospective observational study between April 2014 and March 2015. This study was conducted at Mazandaran Heart Center, a university teaching hospital affiliated to Mazandaran University of Medical Sciences.

The aspirin regime had, in all cases, been discontinued 3 days prior to the date of operation. Given the two schools of thought within the department, the patients received low dose of aspirin (75-150 mg per day) either 1 hours (the early aspirin group; n=43), or 6 hour after surgery (the late aspirin group; n=57). Demographic characteristics (e.g. age, sex, etc.), cardiopulmonary bypass time, type of grafts which used (LIMA, RIMA) and also number of grafts were obtained from patient notes. Information on post-operative RBCs and blood products transfusion, amount of post-operative mediastinal blood drainage and also, the incidences of re-operation for the control of bleeding were obtained from the patients' medical record. Variables of total and post-aspirin were defined in the following way: total bleeding was defined as that which occurred between the time t=0 hours post-operatively to when the chest tube was removed. Post-aspirin bleeding was defined as that which occurred between the hours of t=1 hours (start of aspirin in the early aspirin group) and when the chest tube was removed.

Comparisons were made using either Independent Samples T-test or Fisher's exact test. Two-tailed analyses were conducted in all cases.

3. RESULTS

The variables of age, sex, height, weight, number of grafts, LIMA and RIMA grafts, duration of cardiopulmonary bypass and total ischaemic time were recorded and are tabulated in Table 1.

	Early Aspirin	Late Aspirin	P
Patients (n)	43	57	
Age (year) (mean ± SD)	63.98 (6.16)	63.05 (8.14)	0.52
Female/Total (%)	34.37	16.32	0.20
Height (cm) (mean ± SD)	171.13 (7.58)	172.00 (7.94)	0.59
Weight (kg) (mean ± SD)	79.07 (12.00)	81.49 (11.59)	0.39
No. of Grafts (mean ± SD)	3.23 (0.72)	3.00 (0.76)	0.12
With LIMA (%)	100	96.50	0.51
With RIMA (%)	2.38	1.79	1.00
CT* (min) (mean ± SD)	25.08 (11.24)	25.51 (11.11)	0.85
CPBT** (min) (mean ± SD)	62.30 (24.35)	59.96 (20.43)	0.26

Table 1. Characteristics of the study population. * Clotting time. ** Cardiopulmonary bypass time

	Early Aspirin	Late Aspirin	P
TB* (ml) (mean ± SD)	578.26 (203.11)	609.21 (237.25)	0.85
PAB** (ml) (mean ± SD)	225.58 (103.15)	205.26 (120.34)	0.37
BBPU*** (U) (mean ± SD)	0.41 (1.08)	0.56 (1.51)	0.90
RFCB**** (%)	4.65	3.51	1.00

Table 2. Effect of aspirin on mediastinal drainage, blood and blood products usage and incidences of re-opening. * Total Bleeding, ** Post-Aspirin Bleeding, *** Blood and blood Products Usage, **** Re-operation for the Control of Bleeding

The two groups were found to be matched for all the above variables. Variables of interest, namely total bleeding, post-aspirin bleeding, blood and blood product usage, and incidences of re-operation for the control of bleeding were measured and recorded in Table 2. No statistically significant differences were found between any of the variables and the two groups were found to be matched for all the parameters investigated.

4. DISCUSSION

The results of this study showed that initiating aspirin administration after 1 or 6 hours postoperatively, did not influence the risk of bleeding after CABG surgery. Also total incidences of re-operation for the control of bleeding and also requirement for RBCs and blood products transfusion were not statistically different between two groups. Using aspirin in the post-operative period can reduce the incidence of vein graft occlusion and consequently maintenance the vein graft patency after CABG surgery (15, 16).

A meta-analysis which was conducted by Antiplatelet Trialists' Collaboration, indicate that anti-platelet therapy can reduce the incidence of graft occlusion in patients who underwent CABG surgery. In this meta-analysis has been shown that initiating aspirin administration immediately after surgery or in pre-operative period is associated with graft patency improvement (17). Nonetheless, if aspirin initiated more than 72 hours after surgery, may not be associated with improved graft patency (18). Also, it has been shown that if aspirin administration initiated more than 48 hours after surgery, no post-operative benefit would be achieved (19).

In spite of the research evidence regarding the potential benefits of aspirin in post-operative period in patients undergoing CABG surgery, clinicians have been unenthusiastic to recommend early aspirin for such cas-

es. The most common reasons for this are that clinicians believed that hemodilution, hypothermia and mechanical filtering during and after surgery can significantly reduce the concentration and function of platelets, thereby administering aspirin might have limited benefit and, in fact, be unsafe (6). In a study by Gavaghan et al. have been shown the largest risk reduction when aspirin administration starts at 1 hour after surgery; although this group had a non-significant higher rate of re-operation (8). However, in a study by Gukop et al have been stated that 6 hour after surgery is the ideal time for initiating aspirin administration, as long as bleeding has established (20).

The results of a retrospective study by Mangano with aim to evaluate the efficacy of early treatment with aspirin on patients' survival after CABG surgery showed that early use of aspirin is safe and is associated with a reduced risk of death and ischemic complications of cardiac, neurological, renal, and gastrointestinal system in CABG patients (21). The incidences of complications such as fatal or nonfatal bleeding, hematoma-related complications and needing to reoperation for control of bleeding were not statistically significant in studies which aspirin was initiated postoperatively, compared with those which used placebo (17).

5. CONCLUSION

In the light of evidence for the low risk of post operative bleeding associated with early administration (1 hour after surgery) of aspirin, and given its protective value, early post-operative use of aspirin in elective CABG patients may be considered. Although further well-designed randomized controlled trials to confirm the safety and efficacy of early administration of aspirin after CABG surgery are warranted.

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CONFLICT OF INTEREST: NONE DECLARED.

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