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Original Research Article

COMPARISON OF OUTCOME WITH OR WITHOUT ASPIRIN IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS SURGERY

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Abstract: *Preoperative use of aspirin in coronary artery bypass graft surgery (CABG) might rely more on surgeon's preference rather than on evidence-based approach. Conflicting guidelines and lack of reliable recommendations make ambiguous the preoperative aspirin administration before elective CABG. This study was conducted to compare the outcome with or without aspirin in patients undergoing coronary artery bypass surgery. The aim of the study was to compare the outcome with or without aspirin in patients undergoing coronary artery bypass surgery. This Randomized controlled trial was conducted at the Department of Cardiac Surgery, AFIC/ NIHD, Rawalpindi from 11th Dec 2018 to 10th June 2019. One hundred and fifty patients fulfilling inclusion criteria underwent through CABG were divided into two groups. In group A, 75 patients continued aspirin, while in group B, aspirin was stopped 5 days before surgery. Patient's demographic features, comorbid conditions, Postoperative bleeding, perioperative MI and need for blood transfusion were noted. The mean age and BMI of patients were 61.41 ± 3.09 and 63.96 ± 7.64 years and 28.98 ± 2.46 and 32.61 ± 1.98 Kg/m2 in group A and B, respectively. Male to female ratios were 3.41:1 and 4.35:1 in group A and B, respectively. Diabetes and hypertension were seen in 67(89.34%) and 59(78.67%) patients and 69(90.67%) and 70(93.34%) patients in group A and B, respectively. Perioperative MI and blood transfusion were statistically significant among both groups (5.34% vs. 9.34% patients; p=0.0001 and 5.34% vs. 1.34%; p=0.0003). Mean postoperative bleeding was 401.39 ± 121.04 and 389.21 ± 101.13 ml/24 hr. in group A and B, respectively. The continuation of aspirin therapy in patients undergoing elective CABG reduces perioperative MI, increases quantity of postoperative bleeding and need for blood transfusion. There is a significant difference in outcome with or without aspirin in patients undergoing coronary artery bypass surgery.*

Keywords: Aspirin, Perioperative MI, Postoperative bleeding, Coronary artery bypass grafting

Introduction

Athero-thrombosis is the major factor in the majority of cardiovascular events, and cardiovascular disease is the leading cause of mortality worldwide. Following coronary artery bypass grafting, aspirin is frequently given to prevent graft thrombosis (CABG) (DeFilippis et al., 2022). A significant number of patients allocated to CABG have reported that aspirin's antiplatelet efficacy varies widely from person to person, suggesting that aspirin may not always be an efficient inhibitor of platelet function. When treating individuals with coronary artery disease, aspirin is a crucial component since it prevents myocardial infarction (Van Oosterom et al., 2022). For primary or secondary thrombotic event prevention, aspirin is typically taken by patients with coronary artery disease. Giving aspirin prior to CABG surgery strikes a balance between perioperative thrombotic problems and bleeding (Palamaras and Semkova, 2015). Aspirin inhibits platelets irreversibly by acetylating the cyclooxygenase enzyme and preventing prostaglandin thromboxane A2 production in platelets. Platelets have a half-life of 4-5 days, at which point half of the pool is regenerated, which is thought to be enough to normalize bleeding time (Ward et al., 2019). Aspirin lowers the risk of myocardial infarction and has been demonstrated to increase the percentage of grafts that remain intact after coronary artery bypass surgery (CABG). Patients having coronary artery bypass grafting (CABG) have a higher risk of bleeding because platelet function is restricted, though this risk seems to be minimal (Gao et al., 2018). In order to lower the risk of bleeding, most cardiac surgical units have traditionally advised patients to discontinue taking aspirin five to seven days before surgery. According

to the Society of Thoracic Surgery's recommendations, patients should cease taking aspirin 7–10 days before CABG (Aboul-Hassan et al., 2020). The cornerstone of treatment for atherothrombosis, aspirin, covers a broad range of clinical manifestations. While prior analyses of randomized and observational data support blood loss, transfusion, and surgical re-exploration in patients receiving preoperative aspirin, some studies have discovered indications of increased perioperative bleeding in conjunction with preoperative aspirin use. However, the benefit of aspirin on coronary graft flow and reduction in the risk of graft thrombosis, myocardial infarction, and possibly stroke may offset the increased risk of surgical bleeding (Filipescu et al., 2020). Modern management of complicated coronary artery disease depends solely on coronary artery bypass grafting. However, interpatient variability to antiplatelet medications has the risk of undermining the revascularization benefit by raising the frequency of unfavorable events. Within 24 hours of surgery, aspirin is frequently advised, however this doesn't work to stop thrombosis in the critical early postoperative stage (Walker et al., 2018).When aspirin is taken up until surgery, some observational studies have showed improved outcomes, including decreased death (Rothwell et al., 2012). These trials revealed no indication that perioperative aspirin significantly increased the risk of bleeding or other related complications, despite the fact that it may have a preventive impact against a variety of thrombotic risks and reduced mortality (Columbo et al., 2018). Aspirin is typically prescribed to individuals with coronary artery disease in order to prevent myocardial infarction, stroke, and death (Gelbenegger et al., 2019). Although there is debate about whether aspirin should be stopped before coronary artery surgery, it is known that it increases the risk of bleeding in people undergoing surgery (Hanalioglu et al., 2019; Sembi et al., 2021). According to one study, post CABG MI occurred in 13.8% of patients who continued taking aspirin versus 15.8% of patients who stopped taking aspirin (P=0.20), and blood transfusions were needed in 43.9% of patients who continued taking aspirin versus 42.6% of patients who had stopped taking aspirin prior to surgery (P=0.57) due to excessive blood loss(Myles et al., 2016). Another study found that post-CABG MI occurred in 2.1% of aspirin-taking patients compared to 3.5% of aspirin-stopping patients (p=0.12) and that blood transfusions were necessary in 21.8% of aspirin-taking patients compared to 24.8% of aspirin-stopping patients (p=0.044) (Myles et al., 2016). According to Jacob, the proportion of perioperative MI was 0.33 percent versus 0.39 percent (p=0.80) and the postoperative transfusion demand was 30% versus 26% (p=0.009) among patients who continued taking aspirin versus those who quit (Jacob et al., 2011). The study's objective was to assess the results for patients undergoing CABG with and without aspirin. To avoid excessive bleeding and certain intraoperative or postoperative problems, the Society of Thoracic Operation guidelines advise halting aspirin before CABG surgery, although the European Association for Cardio-Thoracic Surgery guidelines advise continuing aspirin during the procedure. The literature has demonstrated that there is a distinction between perioperative MI and blood transfusions in terms of the outcome. With the support of this study, we might change our approach and continue to utilize aspirin prior to surgery to lower the risk of perioperative MI and mortality.

Methodology

The current randomized controlled experiment was carried out at the AFIC/NIHD Rawalpindi Department of Cardiac Surgery. With 80% power of the test, a 5% threshold of significance, and the estimated percentage of postoperative MI, which is 10% with aspirin and 10% without aspirin in patients who underwent CABG, a sample size of 150 cases is computed, 75 instances in each group. After obtaining the participants' informed consent, a non-probability, consecutive sampling was conducted from December 11, 2018, to June 10, 2019.Both sexes between the ages of 30 and 70 who underwent elective CABG surgery were included in the study, but patients taking dual anti-platelets or heparin (as documented in their medical records), harvesting both bilateral internal mammary arteries, undergoing additional surgery concurrent with CABG, or having an endarterectomy or re-opening as a result of surgical bleeding were excluded. At the Armed Forces Institute of Cardiology in Rawalpindi, 150 patients had cardiac surgery as part of the trial after the hospital ethical council gave its clearance. There was informed consent received. The following demographic data was recorded: name, age, sex, and length of aspirin use. Patients were then split into two groups at random. Aspirin was continued in group A. Aspirin use was discontinued 05 days before surgery in group B. Then, with the aid of the researcher, a single surgical team performed CABG surgery on all patients using the on-pump technique while they were all under general anesthesia. Patients were moved into post-surgical wards with chest bottles for blood collection that would be calculated and were monitored there after surgery. Blood transfusion was required, there was bleeding, and there was perioperative MI (as per operational definition).This entire data was entered into a proforma. SPSS version 21 was used to analyze every piece of data. Age, BMI, aspirin use history, and bleeding were some

quantitative characteristics that were provided as mean and SD. Gender, diabetes, hypertension, perioperative MI, and blood transfusion were qualitative factors that were provided as frequency and percentage. Chi-square tests (for perioperative MI and blood transfusion) and independent sample t-tests (for bleeding) were used to compare the two groups. Age, gender, BMI, diabetes, hypertension, and aspirin use duration were used to stratify the data. Following stratification, the chi-square test and the independent sample t-test were used to compare the results of the two groups. P value 0.05 was regarded as significant. One hundred and fifty patients in total were involved in this investigation.

Results

In Group A, the mean age of the patients was 61.41 ± 3.09 years. In Group B, the mean age of the patients was 63.96 ± 7.64 years. There were 58 (77.34%) males and 17 (22.67%) female patients in group A. The male to female ratio was 3.41:1. In group B, there were 61 (81.34%) patients were male and 14 (18.67%) patients were female. The male to female ratio was 4.3:1 and the p-vale was 0.873.The gender ratio of total population is showed in the figure 1.In group A, the mean BMI was 28.98 ± 2.46 Kg/m^2. In group B, the mean BMI was 32.61 ± 1.98 Kg/m^2. The difference was not statistically significant (*p*-value= 0.853).In group A, the mean duration of aspirin was 3.01 ± 0.91 years whereas in group B it was 4.38 ± 1.05 years (Table 1)

Table 1: Demographic variables of both groups:

Age in years	Group A (n=75)		Group B (n=75)		P-Value
	No. of patients	Percentage(%)	No. of patients	Percentage (%)	
30 – 40	3	4	1	1.34	**0.973****
41 – 50	14	18.67	3	4	
51 – 60	27	36	31	41.34	
61 – 70	31	41.34	40	53.34	
Gender					
Male	58	77.34	61	81.34	**0.873****
Female	17	22.67	14	18.67	
BMI (Kg/m^2)					
<18.5	0	0	0	0	**0.853****
18.5-24.9	4	5.34	9	12	
25-29.9	39	52	24	32	
≥30	32	42.67	42	56	
Duration of aspirin					
≤5 years	48	64	40	53.34	**0.769****
>5 years	27	36	35	46.67	

** Chi-Square test, ** Not significant*

Table 2 Comparison of post operative bleeding, blood transfusion and myocardial infarction:

Perioperative MI	Group A (n=75)		Group B (n=75)		P-Value
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
Yes	4	5.34	7	9.34	**0.0001*[a]**
No	71	94.67	68	90.67	
Blood transfusion					
Yes	4	5.34	1	1.34	**0.0003*[a]**
No	71	94.67	74	98.67	
Postoperative bleeding (ml/24 hr.)					
<500	74	98.67	71	94.67	**0.997**[b]**
≥500	1	1.34	4	5.34	

*a Chi-Square test, * Significant, ** not significant, b independent sample t test*

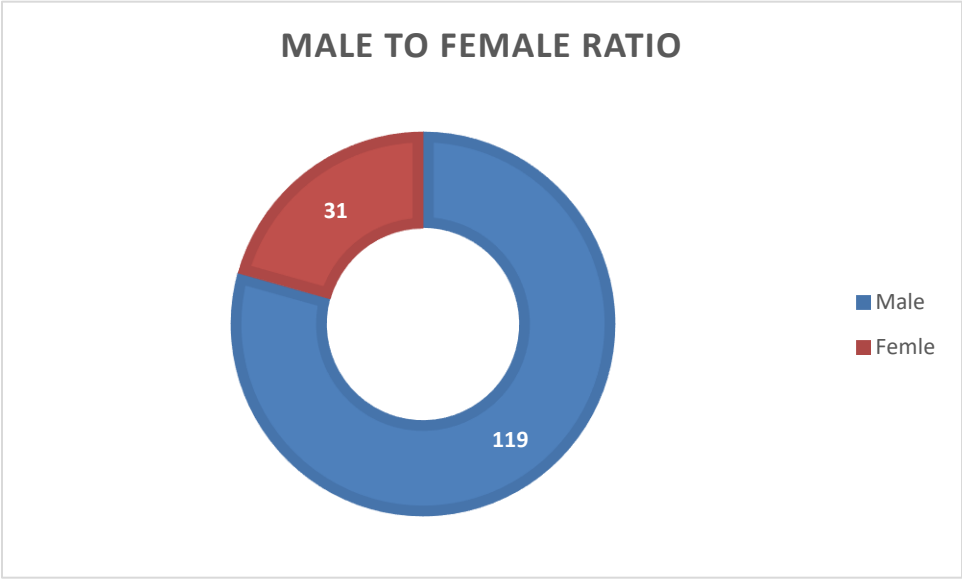

Figure 1 Distribution of male and female gender in total population

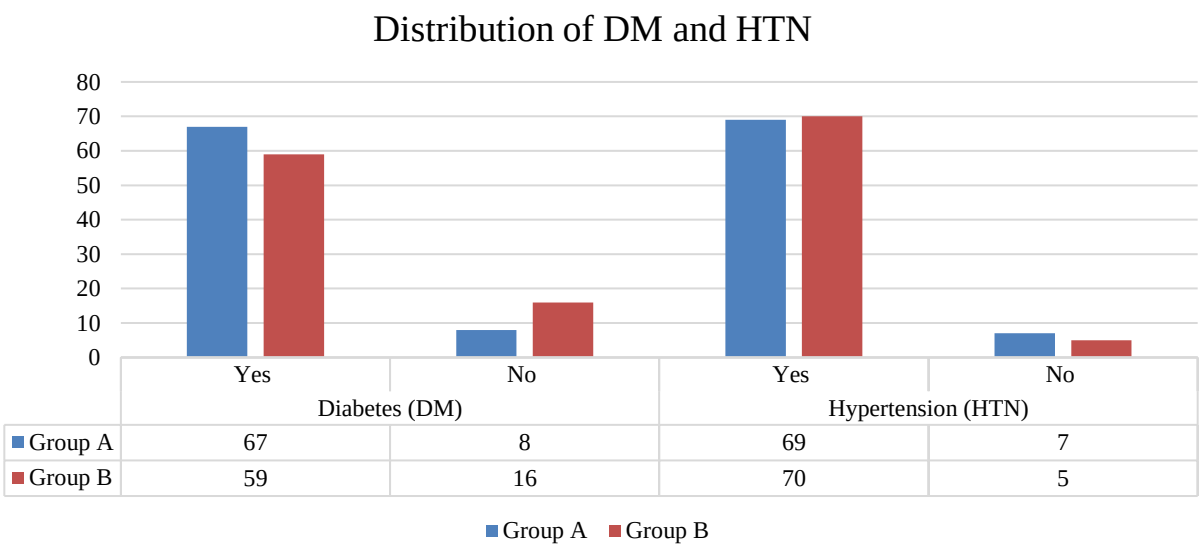

Figure 2 shows the distribution of diabetes and hypertension between the groups

Table 2 shows that there is statistically significant greater number of patients need blood ((p-value= 0.0003 but at the same time our results showed significantly greater number on perioperative incidence of MI in group B as compared to group A (p-value= 0.0001.There was no significant difference in post operative bleed in our study (p-value=0.783). table 2.

Discussion

This is the one of the largest studies conducted in Pakistan comprising of 150 patients comparing the outcome with and without aspirin in patients underwent coronary artery bypass surgery. In our study, the mean age in group A that continued aspirin was 61.41 ± 3.09 and in group B that stopped aspirin 5 days before surgery, the mean age was 63.96 ± 7.64 years. Similarly, in a study by Myles PS *et al*, the mean age of patients using aspirin was 66.5±9.7 years and in patients with placebo was 66.2±10.2 years(Myles et al., 2016). In another study by Gielen CLI *et al*, the mean age of the patients was 66±9 years and 65±10 years in groups with and without aspirin, respectively(Gielen et al., 2015).

Diabetes mellitus, in our study, was commonly observed i.e. 89.34% and 78.67% patients in group A and B, respectively. However, in a study by Myles PS et al, the preexisting diabetes mellitus was

observed in a smaller number of patients in both groups i.e. 33.1% and 34.9% in aspirin and placebo groups, respectively(Myles et al., 2016). In another study by Gielen CLI et al, diabetes mellitus was less reported in both groups of patients i.e. 24.2% and 33.6% in patients with and without aspirin use, respectively(Gielen et al., 2015).

Perioperative MI was less frequently noted in patients with continued aspirin use i.e. 5.34% patients as compared to patients with stopped aspirin i.e. 9.34% patients and this differs significantly among two groups in our study (p=0.0001). However, in a study by Myles PS *et al*, myocardial infarction was observed almost equally in patients in both groups i.e. 13.8% and 15.8% in aspirin and placebo groups, respectively(Myles et al., 2016). In another study by Gielen CLI et al, perioperative MI was less reported in both groups of patients i.e. 2.1% and 3.5% (p=0.12) in patients with and without aspirin use, respectively(Gielen et al., 2015). In a study by Solo K *et al*, no significant difference was found in RBC transfusion (RR: 1.06, 95% CI: 0.90–1.25, I2=35%) between pre-operative aspirin use and control group(Solo et al., 2019).

Blood transfusions in our study were required mostly in patients with continued aspirin use i.e. 5.34% patients as compared to patients with stopped aspirin i.e. 1.34% patients (p=0.0003). However, in a study by Myles PS *et al*, blood transfusion was required in more patients of both groups i.e. 43.9% and 42.6% in aspirin and placebo groups, respectively(Myles et al., 2016). In another study by Gielen CLI et al, platelets transfusions were more required in patients with aspirin use i.e. 10.6% as compared to patients without aspirin use i.e. 8.8%(Gielen et al., 2015). In a study by Solo K *et al*, no difference was found in MI (RR: 0.84, 95% CI: 0.69–1.03, I2=0%) between pre-operative aspirin use and control group(Solo et al., 2019).

The mean postoperative bleeding was more in patients with continued use of aspirin i.e. 481.39 ± 121.04 ml/24 hr. as compared to patients with stopped use of aspirin i.e. 369.21 ± 101.13 ml/24 hr. in our study. However, in a study by Myles PS *et al*, reoperation for hemorrhage was done in 1.8% and 2.1% patients of aspirin and placebo groups, respectively(Myles et al., 2016). In a study by Solo K *et al*, it was found that pre-operative aspirin use increased the chest tube drainage (MD: 100.40 mL, 95% CI: 24.32–176.47 mL, P=0.01, I2=84%) and surgical re-exploration (RR: 1.52, 95% CI: 1.02–2.27, P=0.04, I2=8%) as compared to control group(Solo et al., 2019).

This study has certain limitations. This was a single center study with a limited population size. This was not a double-blind study. Further studies are required to find the role of aspirin continuation and discontinuation during CABG to make guidelines.

Conclusion

It is concluded from this study that the continuation of aspirin therapy in patients undergoing elective CABG reduces perioperative MI, increases quantity of postoperative bleeding and need for blood transfusion. There is a significant difference in outcome with or without aspirin in patients undergoing coronary artery bypass surgery.

Conflict of Interest

Authors declared no conflict of interest

Reference

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