



Comparison of Early Outcomes of Bilateral Internal Mammary Artery Graft with Left Internal Mammary Artery Graft in Patients Undergoing Coronary Artery Bypass Grafting

Ahmad Kamran Khan *

Corresponding Author: Ahmad Kamran Khan,.

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Abstract

Background: *There is a debate of using Bilateral Internal Mammary Artery grafts in CABG. There are certain loop holes that which is the best surgical technique. Those patients however who underwent Bilateral IMA had a much longer hospital stay & prolonged ventilation. But it should be kept in mind that the long term benefits of using Bilateral IMA grafts are far more advantageous than their shorter time risks.*

Objective: *Comparison between Bilateral IMA & Left IMA grafting in terms of hospital stay & early mortality.*

Materials & Methods: *Randomized control trial technique was used. The study was carried out in Cardiac Surgery Department, Mayo Hospital, KEMU.*

Results: *Patients in Groups A and B were respectively 47.43 ± 7.13 and 44.54 ± 7.40 years old. In our study there were 64.58% hypertensive and 40% diabetic patients in Group A and 66.67% hypertensive and 38% diabetic patients were in Group B.*

Comparison of DSWI, SWI and mortality showed insignificant p-values 0.646 and 0.067 respectively, however, comparison of length of hospital stay and prolonged ventilation showed significant difference in both groups.

Conclusion: *The findings depicted that there was no significant difference between the two techniques i.e. the bilateral IMA & Left IMA in terms of sternal wound infection, Hospital stay and early mortality. On the other hand, patients who underwent bilateral IMA grafts experienced considerably longer hospital stays and prolonged ventilation than patients who underwent left IMA graft. It should be remembered that the longer-term advantages of bilateral IMA outweigh its short-term risks hence it needs to be a more frequently used technique for CABG surgery.*

Keywords: *BIMA, LIMA, Mortality, SWIs.*

Introduction

Nowadays, the method used most frequently for coronary revascularization is CABG. To overcome stenosis in the LAD Artery, the left internal mammary artery (IMA) is used in traditional surgical revascularization procedures, and the great saphenous vein is used to open the other coronary arteries. (1)

Rates of in hospital and 30 days mortality of Left IMA patients seemed to be 1.5 to 2.7 % higher as compared to the Bilateral IMA patients. (2-3) However, SWI associated with Bilateral IMA grafting is still disputable. Usage of both ITA (internal thoracic arteries) has been inadequate in patients with diabetes mellitus resulting in larger incidence of deep sternal wound infections (DSWIs). (4)

A report was published in December 2016, in which single mammary artery graft was being compared with the double mammary artery graft. In this trial no significant difference was found in a 5 year follow up in term of all mortality sources, stroke, Myocardial Infarction etc. However more chances of sternal wound infections (SWIs) were associated with the usage of Bilateral Mammary Artery Grafting (3.5% to 1.9%, respectively; P-value = 0.005) and sternal reconstruction (1.9% vs 0.6%; p-value=0.002). Before restricting the technique of bilateral mammary artery grafting the practitioners should keep in mind that the survival rate increases after 5 year in case of bilateral internal mammary artery technique. A Cleveland Clinic report published in 2004 showed these results in which data showed that the bilateral mammary artery grafting presented improved outcome after 20 year follow up as compared to single IMA grafting.(5) In the study the postoperative curves for the survival started to deviate 5 year postoperatively in the favor of the bilateral mammary artery grafting. Despite these facts only 5% of the CABG surgeries are being done in US uses only Bilateral Internal Mammary Artery. Cleveland Clinic Policy allows this bilateral internal mammary grafting in only those selected patients in which the stability of the outcome is needed. The better clinical outcomes linked to the IMA features that are being published in some large series (6). The usage of the bilateral IMA harvesting should be encouraged because of the intrinsic biological properties of IMA and due better surgical outcomes. (6)

Literatures show that the usage of Bilateral IMA grafting is known to be beneficial over Left IMA grafting in terms of long term benefits and clinical outcomes. No study is available in which comparison for both techniques has been done for measuring the clinical outcomes and long term survival. There are few controversies about the usage of Bilateral IMA. However we have perceived that our local population has smaller caliber coronary arteries as compared to population in West. In

such circumstances we would like to see the effect of Bilateral skeletonized IMA in terms of hospital stay and early mortality. However consciousness of the outcome and their acceptance can increase the satisfaction of superior patency, avoid repeat revascularization and can enhance the survival benefits from BIMA grafting to majority of patients referred for surgical revascularization and routine surgical intervention.

Material and Methods

Inclusion Criteria: 1). Patients undergoing primary, elective CABG surgery who are under the age of 60. 2). Patients with double or tripple vessel disease.

Exclusion Criteria: 1). Patients with redo surgeries. 2). Patients undergoing simultaneous valve surgery. 3). Patients needing an intra-aortic balloon before surgery who are in cardiogenic shock. 4). Patients who are obese, particularly women.

Ethical Considerations: All participants gave informed consent voluntarily. Before collecting any data, verbal agreement was obtained from each study participant after they had been informed of the study's goal.

Data Collection Tools: The data was collected on well-designed performa.

Data Analysis: Data analysis was done using SPSS version 21. For qualitative data, frequencies and percentages were given; for quantitative variables, mean and standard deviation were calculated. Chi square test was used to compare early outcomes in both groups. A P-value of < 0.05 was taken as significant.

Results

Study Groups	Age	Range
Group A (LIMA)	47.43 ± 7.13	35-58
Group B (BIMA)	44.54 ± 7.40	34-58

Table no. 1: Comparison of Patient's Age

	Group A	Group B	Total
Male Patients	31(64.58%)	32(66.67%)	63
Female Patients	17(35.42%)	16(33.33%)	33
Hypertension	31(64.58%)	32(66.67%)	63
Diabetes	19(40%)	18(38%)	37
History of Smoking	34(70%)	31(65%)	65

Table no.2: Comparison of Gender and risk factors

	Group A	Group B	Total no.	P-Value
DSWI				
Yes	2(4.17%)	3(6.25%)	5	0.646
No	46(95.83%)	45(93.75%)	91	
SWI				
Yes	2(4.17%)	3(6.25%)	5	0.646
No	46(95.83%)	45(93.75%)	91	
Total	48	48	96	
Length of Hospital Stay	7.02 ± 0.81	8.02 ± 1.43		<0.0001
Ventilation time > 24 hours	1(2.08%)	5 (10.4%)	6	0.01
Mortality				
Yes	0(0%)	1(2.08%)	1	0.067
No	48(100%)	47(97.92%)	96	
Total	48	48	96	

Table no. 3: Comparison of early outcomes in both Groups

Patients in Groups A and B were respectively 47.43 ± 7.13 and 44.54 ± 7.40 years old with minimum and maximum age 34 – 58. (Table 1)

The patients in Group A were 31 (54.58%) males and 17 (35.42%) females, whereas the patients in Group B were 32 (66.67%) males and 16 (33.33%) females. In our study there were 64.58% hypertensive and 40% diabetic patients in Group A and 66.67% hypertensive and 38% diabetic patients were in Group B. (Table 2)

Comparison of DSWI, SWI and mortality showed insignificant p-values 0.646 and 0.067 respectively, however, comparison of length of hospital stay and prolonged ventilation showed significant difference in both groups. (Table 3)

Discussions

Left IMA grafting was found to be superior to Venous grafting in terms of long-term results, the idea of performing Bilateral IMA grafting during CABG surgery has remained highly debatable.(7)

Patients in Groups A and B were respectively 47.43 ± 7.13 and 44.54 ± 7.40 years old with minimum and maximum age 34 – 58. The patients in Group A were 31 (54.58%) males and 17 (35.42%) females, whereas the patients in Group B were 32 (66.67%) males and 16 (33.33%) females. In our study there were 64.58% hypertensive and 40% diabetic patients in Group A and 66.67% hypertensive and 38% diabetic patients were in Group B.

The trial had one patient who expired (2.08%) in Group B and none in Group A (0.0%). ART outcomes showed a death rate of 1.2% at 30 days when bilateral IMA was used.(8) According to Weiss et al., patients who received BIMA grafting lived significantly longer than those who received LIMA grafting (9)

DSWIs can be a dangerous, potentially fatal condition because the harvesting method harms the sternal microcirculation. In reality, it is possible for simultaneous harvesting of both IMAs to harm sternal circulation and hinder the healing of wounds, particularly in individuals with diabetes, chronic obstructive pulmonary disease, or excess body weight.(10)

There was no discernible difference between Left IMA and Bilateral IMA for the DSWIs in this experiment. 6.25 % of the bilateral IMA, 4.17 % of the left IMA, and a p-value of 0.64. Recently, Sana N. Buttar showed in his meta-analysis from 2017 that BIMA was associated with an increase in SWI of 1.3 %. (11) In his study, Ravaux JM estimated a SWI incidence of 4% for patients with bilateral IMA. (12) Compared to N Buttar and JM Ravaux's findings, this analysis found a higher level of DSWI.

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In patients with diabetes, obesity, or respiratory impairment, BIMA grafting is not best option. (13-14) Several studies demonstrated that the use of BIMA grafts increased the length of the procedure by an average of 23 minutes and the time required for ventilator support by an average of 1 hour and 45 minutes, but did not appear to have an impact on the amount of time spent in the ICU or the length of the post-surgery hospital stay. (10)

In a study by Batric Popovic it was investigated that BIMA grafts were beneficial for individuals with left ventricular dysfunction. This research showed no difference in hospital stays between the Left IMA-SVG and Bilateral MI groups 8.2 vs. 9.3, $p=0.12$.(15)

Conclusion

The findings depicted that there was no significant difference between the two techniques i.e. the bilateral IMA & Left IMA in terms of sternal wound infection, Hospital stay and early mortality. On the other hand, patients who underwent bilateral IMA grafts experienced considerably longer hospital stays and prolonged ventilation than patients who underwent left IMA graft. It should be remembered that the longer-term advantages of bilateral IMA outweigh its short-term risks hence it needs to be a more frequently used technique for CABG surgery.

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