Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Cardiac Surgery

Comparison of Peroperative Venous Grafts Number and Distribution of Distal Venous Grafts

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DOI: 10.36347/sjams.2023.v11i03.015 | **Received:** 13.02.2023 | **Accepted:** 08.03.2023 | **Published:** 21.03.2023

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Abstract **Original Research Article**

***Introduction*:** Coronary artery bypass grafting effectively relieves signs and symptoms of myocardial ischemia. Coronary artery bypass grafting (CABG) surgery aims to restore adequate blood supply to the ischemic heart and the success of the operation depends mainly upon the patency of the grafts. A major contributing factor to the early atherosclerotic process is damage to the vessel wall, specially endothelial injury that occurs during the conventional harvesting of the vein, using high-pressure distension. ***Objective*:** To determine the comparison of peroperative venous grafts number and distribution of distal venous grafts. ***Materials and Methods*:** This comparative cross-sectional study was carried out at the department of cardiac surgery in National Heart Foundation Hospital & Research Institute. The period of study was from January, 2019 to September, 2020 and purposive sampling method was applied for this study. The study population was 80, with two groups having 40 patients each. Grouping of patients were done by purposive sampling method and all patients underwent elective coronary artery bypass graft in 2015. These groups of patients again investigated through coronary computed tomography angiogram in 2020 for evaluation of saphenous vein patency and occlusion rate. Data was collected by using a standardized semi-structured questionnaire, face to face interview and hospital records. ***Results*:** Among the study population mean age in group A was 59.38±7.43 years and in group B was 58.70±8.27 years. The difference in age between two groups was not statistically significant (p=0.702). There was no statistical significance of gender in between the two study groups (p=0.762). The comparison of the presence of Chest pain (p=0.799), Dyspnea (p=0.262), Palpitation (p=0.633) in group A and B patients were statistically not significant (p>0.05). The number of venous grafts of group A was 3.65±0.74 & group B was 3.58±0.55 where the finding was statistically not significant ((p=0.607). RSVG to Diagonal was given in group A 28/40(72.5%) and group B 22/40(55%) which was statically not significant (p =0.170), RSVG to OM was given in group A 37/40 (92.5%) and group B 33/40 (82.5%) which was statically not significant (p=0.181), RSVG to PDA was given in group A 32/40 (80%) and group B 33/40 (82.5%) which was statically not significant(p=0.778). RSVG to PLV was given in group A 2/40 (5%) and group B 2/40 (5%) which was statically not significant (p=1.00). ***Conclusion*:** This study was concluded that, comparison of peroperative venous grafts number and distribution of distal venous grafts. It has also significantly slower progression of occlusion in pedicled vein grafts. Location of distal venous anastomosis. RSVG to Diagonal was given in group A and group B. The study will be significant impact on the knowledge upgradation and strategy development regarding the choice of method for vein harvesting.

Keywords: Peroperative Venous Grafts, Distal Venous Grafts, pedicled vein grafts.

INTRODUCTION

Coronary artery bypass grafting effectively relieves signs and symptoms of myocardial ischemia [1]. Coronary artery bypass grafting (CABG) surgery aims to restore adequate blood supply to the ischemic heart and the success of the operation depends mainly

upon the patency of the grafts. In the long-term, graft failure may lead to recurrent angina, myocardial infarction (MI), additional revascularization procedures or death. About 80% of cardiovascular disease deaths take place in low and middle socioeconomic countries and occur almost equally in men and women. If current trends are allowed to continue, by 2030 an estimated 23.6 million people will die from cardiovascular disease [2]. Incidence of ischemic heart disease is increasing in Bangladesh. In 1975 the incidence of ischemic heart disease in Bangladesh was reported to be 3.3/1000 [2] & that in 1985 it was 14/1000 [3]. In 2015, cardiovascular disease alone kills 2.56 lakh people in Bangladesh accounting for 30% of death caused by non-communicable disease [4]. Fibro-lipid plaques may become thick enough to encroach on the lumen of the artery, producing a stenotic lesion. Probably episodically and at times over a period of years, new material is deposited on the luminal side of the plaque, resulting in further narrowing and sometimes complete coronary occlusion. Small blood vessels form around and within the plaque. Gradual regression of plaque enlargement, seen clinically as regression of stenoses in a few patients and development of collateral coronary blood flow can result in at least partial spontaneous restoration of antegrade regional myocardial blood flow [5]. Atherosclerosis, the most common form of arteriosclerosis, is a process that in coronary arteries, as in other blood vessels, consists of focal intimal accumulations of lipids, complex carbohydrates, blood and blood products, fibrous tissue, and calcium deposits, as well as associated changes in the media. Lipid foci are associated with or converted into plaques of fibrous or hyaline connective tissue, although at least some atherosclerotic plaques may result from organization of thrombi [5]. During the first postoperative month, acute thrombosis is the main cause of graft failure. Acute thrombosis can occur due to technical factors such as small size of the target vessel leading to poor distal runoff and size mismatch between the graft and the target vessel resulting in turbulent flow. Graft ischemia and endothelial layer removal because of mechanical trauma and manual distention can also cause acute thrombosis. Platelet adhesion and thrombosis are induced by the removal of the endothelial layer. Furthermore, nitric oxide levels are decreased leading to vasospasm. Distension with normal saline to overcome spasm causes more damage to the media and intima layers of the graft. From 1 to 12 months after surgery (the subacute period), intimal hyperplasia is responsible for graft failure [6]. Atheroma development following intimal hyperplasia is responsible for graft failure after the 1st postoperative year. Vein atheroma can rupture and cause thrombotic occlusion of the graft just like coronary artery atheroma. However, vein atheroma characteristics make them more prone to rupture. The veins harvested using the pedicled technique have a patency rate 83% at 16 years, while conventional saphenous vein grafts fail at a rate as high as 25% in the first 18 months. It has also been suggested that in elderly patients with multiple comorbidities the pedicled saphenous graft could be used as a promising substitute for the left internal thoracic artery [7]. Usually in our country we used arterial conduit (LIMA, RIMA, Radial & Gastroepiploic) and venous conduit (great saphenous vein). Most of the time saphenous vein harvested in conventional method which is skeletonized vein and checked with heparinized solution is distended method. But in pedicled vein we checked the vein without distention. In department of cardiac surgery, NHFH & RI, CABG procedure performed regularly.

MATERIALS & METHODS

Study Design:

Comparative cross sectional study.

Study Population:

The study population was the patients who underwent CABG from January 2015 to December 2015 in National Heart Foundation Hospital & Research institute, Dhaka, Bangladesh.

Place of Study:

Department of cardiac surgery, National Heart Foundation Hospital & Research institute, Mirpur -2, Dhaka-1000, was my study area.

Study Period:

The period of study was from January 2019 to September 2020.

Sample Size & Grouping:

Total numbers of 80 patients were evaluated in two groups (40 patients in each group). Group A: 40 Patients who underwent CABG with pedicled saphenous vein harvesting technique. Group B: 40 Patients who underwent CABG with Conventional saphenous vein harvesting technique.

Inclusion Criteria:

- All patients (adult, irrespective of gender & who gave informed written consent under this study) in the group A and group B who will be initially selected purposively and asked for participate in a clinical and coronary computed tomography angiographic assessment.

Exclusion Criteria:

- Allergic to contrast media.
- Impaired renal function.

Study Procedure:

All relevant data were collected from each respondent by use of interview schedule, measured parameters and investigations in a predesigned format. Patient who was fulfill the inclusion criteria and willing to enroll in study was included in my study after receiving the proper consent. Patients who underwent

CABG using pedicled saphenous vein & conventional saphenous vein as a conduit will be my group A and group B. Venous graft patency rate was assessed by coronary CT angiogram who underwent CABG in 2015 and it was done at dept. of Radiology and Imaging, NHFH & RI. Detailed history, clinical examination and relevant investigation reports of all patients were recorded in the data collection sheet during the procedure. According to schedule, patients were taken to the operating room for coronary CT angiogram. Confidentiality of the subjects was maintained by giving assurance to the respondents that the information given by them were not disclosed and be used only for study purpose. Data collection form was filled during my study period and collected at the end of the study period.

Data Analysis:

Statistical analysis was conducted using Statistical Package for Social Science (SPSS) version 23.0 for windows software. Continuous variables were shown as mean +/- SD or mean rank and categorical variables were given as frequency (percent). Comparisons between groups were made with Student's t-test & Chi-Square test. The results were presented in tables. Observations were recorded as statistically significant if a p-value is ≤0.05.

RESULTS

Among the study population mean age in group A was 59.38±7.43 years and in group B was 58.70±8.27years. The difference in age between two groups was not statistically significant (p=0.702). There was no statistical significance of gender in between the two study groups (p=0.762) (Table-1).

Table 2 shows the distribution of data obtained by preoperative clinical features. The comparison of the presence of Chest pain (p=0.799), Dyspnea (p=0.262), Palpitation (p=0.633) in group A and B patients were statistically not significant (p>0.05).

Table 3 shows the number of venous grafts of group A was 3.65±0.74 & group B was 3.58±0.55 where the finding was statistically not significant ((p=0.607). RSVG to Diagonal was given in group A 28/40(72.5%) and group B 22/40(55%) which was statically not significant (p =0.170), RSVG to OM was given in group A 37/40 (92.5%) and group B 33/40 (82.5%) which was statically not significant (p=0.181), RSVG to PDA was given in group A 32/40 (80%) and group B 33/40 (82.5%) which was statically not significant(p=0.778). RSVG to PLV was given in group A 2/40 (5%) and group B 2/40 (5%) which was statically not significant (p=1.00).

Table-1: Comparison of demographic characteristics (N=80)

Attributes	Group		p-value*
	Group A (n=40)	Group B (n=40)	
Age (in years) Mean± SD Range	59.38±7.43 43-68	58.70±8.27 36-70	0.702^{ns}
Sex Male Female	 33 (82.5%) 7 (17.5%)	 34 (85%) 6 (15%)	0.762^{ns}

Data were analyzed using, Student's t-test was presented as mean ± SD. Chi-square test (χ^2) was used to measure the level of significance. *p>0.05 was considered not to be significant. n= number of subjects, s= significant, ns= not significant.

Table-2: Comparison of preoperative clinical features (N=80)

Attributes	Group		p-value*
	Group A (n=40)	Group B (n=40)	
Chest pain Yes No	 30 (75%) 10 (25%)	 29 (72.5%) 11 (27.5%)	0.799^{ns}
Dyspnea Yes No	 16 (40%) 24 (60%)	 21 (52.5%) 19 (47.5%)	0.262^{ns}
Palpitation Yes No	 12 (30%) 28 (70%)	 14 (35%) 26 (65%)	0.633^{ns}

Table-3: Comparison of peroperative venous grafts number and distribution of distal venous grafts (N=80)

Attributes	Group		p-value*
	Group A (n=40)	Group B (n=40)	
Number of venous grafts	3.65±0.74	3.58±0.55	0.607^{ns}
Location of distal venous anastomosis:			
Diagonal	28 (72.5%)	22 (55%)	0.170^{ns}
OM	37 (92.5%)	33 (82.5%)	0.181^{ns}
PDA	32 (80%)	33 (82.5%)	0.778^{ns}
PLV	2 (5%)	2 (5%)	1.00^{ns}

DISCUSSION

In spite of the excellent long term angiographic results of the radial artery the need to improve the quality of saphenous vein grafts persists. The saphenous vein is still used in over 90% of CABG cases. Several attempts for improving the quality of saphenous vein grafts have been made. The Pedicled saphenous vein harvesting technique dramatically improves the long-term patency of saphenous vein grafts. Unlike the conventional technique, the pedicled vein harvesting technique leaves a perivascular tissue intact, preserves the outer layers of the vessel wall, and obviates the need for graft distension. This technique improved long term saphenous vein patency. The veins harvested using the pedicled technique have a patency rate 83% at 16 years, while conventional saphenous vein grafts fail at a rate as high as 25% in the first 18 months. It has also been suggested that in elderly patients with multiple comorbidities the pedicled saphenous graft could be used as a promising substitute for the left internal thoracic artery [7]. This leads to preservation of endothelial nitric oxide synthase, not only of the luminal endothelium, but also of the media and adventitia, resulting in increased thrombo resistance, superior vaso-relaxation and abolition of vasospasm [8]. Although the pedicled SV harvesting technique has been used in practice for more than 15 years, the evidence for this method is limited to studies with a small number of patients that have demonstrated improved angiographic patency [9]. The main message of this study is that the technique of harvesting the SV for CABG plays a crucial role in the long-term patency rate of vein grafts [10]. The demographic variables of the participating patients were recorded and analyzed. The mean age for group A was 59.38±7.43 years and group B was 58.70±8.27 years respectively, the difference was statistically not significant (p=0.702). The age range of the patients of this study was from 36 years to 70 years. A similar study carried out by Janiec *et al*., [9] showed long term clinical outcomes after coronary artery bypass grafting with pedicled saphenous vein grafts and relation to age was statistically not significant (p=0.788) where their study revealed that Group A (pedicled saphenous vein) was 60.44±5.43 years and group B (Conventional pedicled vein) was 57.70±6.30 years [9]. In group A, more than half of the populations were male 33 (82.5%) and rest of all were female 7 (17.5%). In group B, same as group A. Male and female patients were 34 (85%) and 6 (15%) respectively in group B. The distribution of gender between two groups were statistically not significant (p=0.762). Preoperative clinical feature of both groups was statistically not significant. In group A, Chest pain was present in 30 patients out of total 40 patients (75%) & absent 10 patients out of total 40 patients (25%) and in group B, chest pain was present in 24 patients out of total 40 patients (72.5%) & absent 11 patients out of total 40 patients (27.5%), where p=0.799. In group A, Dyspnea was present in 16 patients out of total 40 patients (40%) & absent 24 patients out of total 40 patients (60%) and in group B, Dyspnea was present in 21 patients out of total 40 patients (52.5%) & absent 19 patients out of total 40 patients (47.5%), where p=0.262. In group A, Palpitation was present in 12 patients out of total 40 patients (30%) & absent 28 patients out of total 40 patients (70%) and in group B, Palpitation was present in 14 patients out of total 40 patients (35%) & absent 26 patients out of total 40 patients (65%), where p=0.633. The number of venous grafts of group A was 3.65±0.74 & group B was 3.58±0.55 where the finding was statistically not significant. (p=0.607) Samano *et al.*, [10] published similar findings in their study. They showed the number of venous grafts of group A was 3.45±1.44 & group B was 3.38±5.85 where the finding was statistically not significant (p=0.665) [10].

CONCLUSION

This study was concluded that, comparison of peroperative venous grafts number and distribution of distal venous grafts. It has also significantly slower progression of occlusion in pedicled vein grafts. Location of distal venous anastomosis. RSVG to Diagonal was given in group A and group B. However, no publication has been carried out in Bangladesh to see the difference between pedicled saphenous vein versus Conventional saphenous vein. The study will be significant impact on the knowledge upgradation and strategy development regarding the choice of method for vein harvesting.

Conflict of Interest: None.
Source of Fund: Nil.

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