

Short Term Outcome of Coronary Artery Bypass Grafting with and without Coronary Endarterectomy

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ABSTRACT

Objective: To compare hospital outcome of patients undergoing on-pump coronary artery bypass graft (CABG) with and without coronary endarterectomy (CE).

Study Design: Observational study

Place and Duration of Study: Department of Cardiac Surgery, Faisalabad Institute of cardiology, Faisalabad.

Period: July 2018 to July 2020.

Methodology: Two hundred patients who underwent isolated coronary artery bypass graft surgery were included and stratified into two groups according to coronary endarterectomy(CE) performed. Group A have patients who underwent CABG + CE while Group B has patients with CABG alone. Postoperative myocardial infarction (MI), dysrhythmias, time on ventilator, ICU stay, hospital stay, and mortality were recorded and compared.

Results: There is statistically significant difference regarding ICU stay, hospital stay, dysrhythmia, and time on ventilator (p-value0.001) in group A as compared to group B in short term ICU scenarios but in terms of overall short term outcomes there is no significant difference

Conclusion: Coronary endarterectomies (CE) are acceptable in patients with diffuse coronary artery disease requiring complete revascularization in respect to short term survival when there is no choice for satisfactorily revascularization.

Keywords: Coronary endarterectomy, Coronary artery bypass grafting, Revascularization, Myocardial infarction, Mortality, Outcomes

INTRODUCTION

In the late 1950s, for myocardial revascularization coronary endarterectomies were performed¹ which are characterized by removal of atheroma to restore the calibre of vessel for proper blood supply to distal territory.^{1,2} Patients with diffusely diseased vessels underwent CABG but CABG alone does not provide complete revascularization. So coronary endarterectomies become obligatory to achieve proper myocardial revascularization.¹ However, death rate is not influenced by incomplete revascularization rather, it increases the rate of redo surgeries due to restenosis of vessels which leads to adverse outcomes.³ Such patients experienced repeated episodes of angina, un-stability in haemodynamic and re-interventions as compared to patients having endarterectomies which shows better survival rate.⁴

Due to postoperative mortality and increased frequency of myocardial infarction many surgeons still avoid to do endarterectomies.⁵ On the other hand, many studies suggest good perioperative outcome in patients undergoing CABG with coronary endarterectomies.⁶ Some studies demonstrated better outcome when coronary endarterectomy (CE) performed on left anterior descending artery (LAD) as compared to multi-vessel CE.⁷ Some studies reported increased mortality and in hospital postoperative complications.⁸ But other studies suggests satisfactory perioperative and postoperative results for CE.⁹

Due to advancing surgical techniques, patients operated with CE had more acceptable results as compared to CABG alone.¹⁰

MATERIALS AND METHODS

This observational study was conducted at Department of Cardiac Surgery, Faisalabad Institute of cardiology, Faisalabad from 1st January 2018 to 31st July 2020. Two hundred patients who underwent isolated coronary artery bypass graft surgery were included and stratified into two groups according to coronary endarterectomy performed. Group A have patients who underwent CABG + CE while Group B has patients with CABG alone. All patients of both genders and age (30-80 years) undergoing CABG were included. Known atrial fibrillation (AF) status and/or any other documented cardiac arrhythmias, valvular diseases, surgery on emergency basis and cardiac re-do cases were excluded. Patients were admitted in the ward before surgery. Surgery was performed using standard techniques of median sternotomy, grafts harvesting, heparinization and standard cannulation to establish the standard cardio-pulmonary bypass (CPB), cold blood cardioplegia, grafts anastomosis, coronary endarterectomy (CE) in diffusely diseased vessels, CPB weaning off, decannulation, drains and pacing wires and chest closure. For LAD, left internal mammary artery is used as a conduit while for all other coronary vessels saphenous vein graft was used. Heparin 100 mg/kg was administered to keep the activated clotting time (ACT) between 200 and 400 sec. Patients were shifted to ICU and their post-operative outcomes were recorded. Data was entered and analyzed through SPSS-26. Comparison of qualitative variables between two groups will be made by using Chi-Square test. Comparison of quantitative variables between two groups will be made by using independent sample t-test or Mann-Whitney test as per normality of data. A p-value of ≤ 0.05 will be marked significant.

RESULTS

Mean age in group A was 57.10±3.855 while in group B 56.55±3.844 which was comparable. 75% male were in group A as compared to 70% in group B. Mean ejection fraction (EF) in group A was 42.20%±7.924% which was similar as compared to group B 43.65%±6.230%. CCS class III or IV symptoms and chronic diseases like diabetes mellitus, hypertension, smoking and COPD were more prevalent in group A as compared to group B (Table 1).

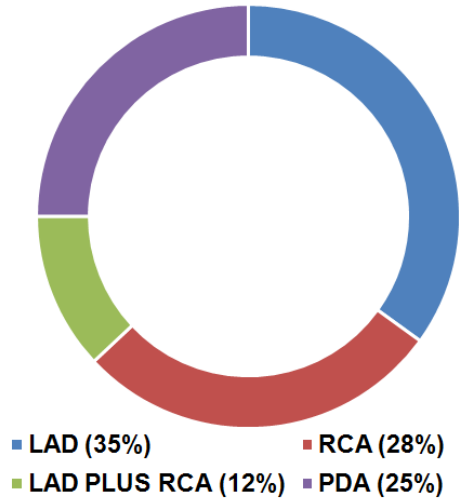


Fig. 1: Common endarterectomise

Table 1: Distribution of demographic and clinical characteristics in two groups

Variable	GROUP A CABG+CE	GROUP B CABG Alone
Age	57.10±3.855	56.55±3.844
Gender (male)	75 (75%)	70 (70%)
CCS Class 3 or 4	20	12 (12%)
Ejection Fraction	42.20±7.924	43.65±6.230
Hypertension	40	35 (35%)
Diabetes Mellitus	65	60 (60%)
Smoking	27	19 (19%)
COPD	10	5 (5%)

Table 2: Intraoperative and postoperative findings between two groups

Variable	Group A CABG+CE	Group B CABG Alone	P value
LIMA to LAD	90 (90%)	95 (95%)	0.283
GSV to LAD	10 (10%)	5 (5%)	
Operation time (minutes)	243.60±39.937	233.80±39.126	0.081
CPB Time (Minutes)	100.74±13.237	92.70±15.176	0.001
X Clamp Time (Minutes)	52.77±8.553	50.36±6.316	0.024
ICU Stay (days)	3.60±1.015	2.77±0.790	0.001
Hospital Stay (days)	6.95±0.796	5.95±0.796	0.001
Ventilation Time (Hours)	8.66±1.578	7.65±1.579	0.001
Postoperative MI	8 (8%)	2 (2%)	0.101
Mortality	5 (5%)	1 (1%)	0.212

The most common endarterectomies performed in the study were LAD (35%), RCA (28%), LAD plus RCA (12%) and PDA (25%) (Fig. 1) Perioperative findings were compared. LIMA to LAD found out to be almost similar in group A and group B (90 % and 95% respectively) However, operating time (p value 0.081), bypass time (p-value 0.001) and X-clamp time (p value- 0.024) is significantly longer in group A as compared to group B. There were statistically significant results in terms of ICU stay, hospital stay and ventilation time (p value – 0.001). Postoperative myocardial infarction and mortality were quite greater in group A. There was 05% mortality in group A as compared to 01% in group B (Table 2)

DISCUSSION

Coronary artery disease is the most common type of heart disease and is prevalent in both men and women. Due to increased prevalence of diabetes, patients having diffusely diseased vessels require coronary endarterectomies making inoperable disease operable. But due to higher incidence of mortality and postoperative MI many surgeons are reluctant to opt the option of CABG + CE as compared to CABG alone.^{11,12} Marinelli et al¹³ studied on 107 patients who underwent coronary endarterectomy and their 6 years follow up showed 91.2%±4.9% survival rate.

Sirivella et al¹⁴ reported that 5-year and 10-year survival rate were 83%±5%, and 74%±3%, respectively in CE patients.

In patients with diffusely diseased vessels, coronary endarterectomy has been safe and feasible method and showed excellent results when performed on LAD (grafted over with LIMA) but on selective group of patients.¹⁵

Many other studies have also witnessed that complete revascularization improved early and late outcomes in CABG with CE However, it is associated with higher mortality rate and postoperative complications in patients undergoing CE.¹⁶ Similarly many previous studies have also demonstrated decreased rate of morbidity and mortality in CABG alone as compared to CABG with CE.¹⁷

Nardi et al¹⁸ showed 11% perioperative MI in patient undergoing CABG with CE. Although this incidence cannot be ignored, CABG with CE found to have satisfactory results regarding early and late outcomes. It also concludes that CE on LAD has high probability of freedom from cardiac death.

Abdullah et al¹⁹ concludes CE as safe and viable option along with CABG in diffusely diseased vessels requiring revascularization. Sabzi et al²⁰ found to have longer hospital stay and higher rate of blood transfusion in patients undergoing CABG + CE however the results are acceptable in terms of short and long term survival. Similar results are shown by Ranjan et al²¹ and Iqbal et al.²²

Song et al²³ stated that CABG+CE is associated with decrease in graft patency, thus to obtain satisfactory results surgeons should consider benefits and adverse effects of CE.

CONCLUSION

Coronary endarterectomy may be a feasible method for adequate and complete myocardial revascularization of diffusely diseased vessels. It is associated with higher

mortality rate but this is related to co-morbidities rather than coronary endarterectomy.

Limitations: Our study is not randomised. Moreover we just performed a clinical follow up and not a graft patency assessment by means of imaging technique (i.e., CT coronary angiography). We focussed our attention on clinical results, but further analysis should associate clinical and angiographic findings.

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