

COMPARISON OF OUTCOME OF CORONARY ARTERY BYPASS GRAFTING (CABG) INPATIENTS WITH LOW AND NORMAL PRE-OPERATIVE EJECTION FRICTION

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ABSTRACT

Background: Coronary artery bypass grafting (CABG) is an established treatment for severe coronary artery disease (CAD), particularly in high-risk patients with reduced left ventricular ejection fraction (LVEF). Preoperative LVEF is a key predictor of postoperative morbidity and mortality. Although patients with low LVEF are at increased risk of adverse outcomes, advances in surgical techniques and perioperative care have improved their prognosis.

Objective: To compare postoperative outcomes of CABG in patients with low (<40%) and normal (≥50%) preoperative ejection fraction, with emphasis on in-hospital mortality, postoperative complications, intensive care unit (ICU) stay, and one-year survival.

Study Design: Retrospective cohort study.

Place and Duration of Study: Department of Cardiology, Sandeman Provincial Hospital and Bolan Medical Complex Hospital, Quetta, from 01 July 2024 to 31 December 2024.

Methodology: A total of 50 patients undergoing CABG were included and categorized into two groups based on preoperative LVEF: low (<40%) and normal (≥50%). Demographic data, comorbidities, and postoperative outcomes were collected from medical records. Data were analyzed using SPSS version 24. Independent t-test and Chi-square test were applied where appropriate. A p-value of ≤0.05 was considered statistically significant.

Results: Out of 50 patients, 28 (56%) had low EF, while 22 (44%) had normal EF. Patients with low EF had significantly longer ICU stays (7.6 vs. 5.2 days, $p = 0.01$), higher inotropic support requirements (68% vs. 36%, $p = 0.02$), and increased in-hospital mortality (25% vs. 9%, $p = 0.03$). However, one-year survival rates were comparable between the two groups ($p = 0.21$).

Conclusion: Low preoperative ejection fraction is associated with increased early postoperative risk following CABG, including higher morbidity and mortality. However, with appropriate perioperative management, long-term survival outcomes may be comparable to patients with normal ejection fraction.

Keywords: CABG, Ejection Fraction, Cardiac Surgery, Postoperative Outcome

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INTRODUCTION

Coronary artery disease (CAD) remains one of the leading causes of morbidity and mortality worldwide,

particularly in developing countries where its burden continues to rise due to changing lifestyles and increasing

prevalence of cardiovascular risk factors ⁽¹⁾. Coronary artery bypass grafting (CABG) is a well-established surgical intervention for patients with advanced CAD, aimed at restoring myocardial perfusion, relieving anginal symptoms, and improving long-term survival ⁽²⁾.

Left ventricular ejection fraction (LVEF) is a crucial indicator of cardiac function and serves as an important prognostic marker in patients undergoing CABG. Patients with reduced LVEF are generally considered high-risk due to impaired myocardial contractility and decreased cardiac reserve, which may predispose them to adverse perioperative and postoperative outcomes ^(3, 4). Despite these challenges, CABG is frequently performed in patients with low EF, as it may provide significant symptomatic relief and survival benefit when combined with optimal perioperative management ⁽⁵⁾.

Several studies have reported that reduced preoperative EF is associated with increased postoperative morbidity and mortality, including prolonged intensive care unit (ICU) stay, higher requirement for inotropic support, increased incidence of complications, and longer hospital stay ^(6, 7). Furthermore, patients with compromised ventricular function are more likely to experience hemodynamic instability during the perioperative period, necessitating careful monitoring and advanced supportive measures ⁽⁸⁾.

However, with recent advancements in surgical techniques, anesthetic management, and postoperative care, outcomes in patients with low EF have improved considerably. Emerging evidence suggests that, despite higher perioperative risks, long-term outcomes in these patients can be comparable to those with preserved EF when appropriate management strategies are employed ⁽⁹⁾. This highlights the importance of individualized treatment approaches and meticulous perioperative planning in improving patient outcomes ⁽¹⁰⁾.

Understanding the relationship between preoperative LVEF and postoperative outcomes is essential for accurate risk stratification, informed clinical decision-making, and optimization of perioperative care. Therefore, this study aims to evaluate the impact of preoperative left ventricular ejection fraction on postoperative outcomes in patients undergoing coronary artery bypass grafting.

METHODOLOGY

This retrospective cohort study was conducted at the Department of Cardiology, Sandeman Provincial Hospital and Bolan Medical Complex Hospital, Quetta, Pakistan, from 01 July 2024 to 31 December 2024. A total of 50 patients who underwent coronary artery bypass grafting (CABG) during the study period were included through convenient sampling. Patients were categorized into two groups based on their preoperative left ventricular ejection fraction (LVEF), measured by transthoracic echocardiography: low ejection fraction (<40%) and normal ejection fraction ($\geq 50\%$).

Demographic data, comorbid conditions, preoperative clinical information, and postoperative outcomes were collected through review of electronic medical records. Ethical approval was obtained prior to data collection from the Ethical Review Committee of Bolan Medical College, Quetta, Balochistan (Ref No: BMC/REU/2939, dated 15 January 2024), and patient confidentiality was maintained throughout the study.

Inclusion criteria comprised adult patients aged 40 to 80 years undergoing CABG surgery with documented preoperative LVEF either below 40% or equal to or greater than 50%. Patients who underwent combined valve surgery, had a history of previous CABG, required emergency CABG procedures, or had incomplete medical records were excluded from the study.

Data collected included patient demographics, intraoperative variables, duration of intensive care unit (ICU) stay, postoperative complications, and in-hospital mortality. These data were also used to assess short-term outcomes following CABG.

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 24. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Independent t-test and Chi-square test were applied to compare continuous and categorical variables, respectively. A p-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 50 patients undergoing coronary artery bypass grafting (CABG) were included in the study. Among them, 28 (56%) patients had low ejection fraction (EF), while 22 (44%) had normal EF. The mean age of the study population was 62.4 ± 8.7 years, with no statistically significant difference between the two groups (p = 0.32). Baseline demographic and clinical characteristics of the study population are presented in Table 1.

Table 1: Baseline Characteristics of Study Population

Characteristic	Low EF (n=28)	Normal EF (n=22)	p-value
Mean Age (years)	62.4 ± 8.7	61.8 ± 9.2	0.32
Male (%)	18 (64%)	14 (64%)	0.95
Hypertension (%)	20 (71%)	15 (68%)	0.84
Diabetes Mellitus (%)	14 (50%)	9 (41%)	0.56
Smoking (%)	12 (43%)	8 (36%)	0.62

Patients with low EF experienced significantly prolonged intensive care unit (ICU) stays compared to those with normal EF (7.6 ± 2.1 vs. 5.2 ± 1.8 days, p = 0.01). The requirement for inotropic support was also higher in the low EF group (68% vs. 36%, p = 0.02). Additionally, patients with low EF had a higher requirement for ventilatory support (54% vs. 27%, p = 0.04). The in-hospital mortality rate was significantly greater among patients with low EF compared to those with normal EF (25% vs. 9%, p = 0.03). These clinical outcomes are summarized in Table 2.

Table 2: Clinical Outcomes During Hospital Stay

Clinical Parameter	Low EF (n=28)	Normal EF (n=22)	p-value
ICU Stay (days)	7.6 ± 2.1	5.2 ± 1.8	0.01
Inotropic Support (%)	19 (68%)	8 (36%)	0.02
Ventilator Requirement (%)	15 (54%)	6 (27%)	0.04
Hospital Mortality (%)	7 (25%)	2 (9%)	0.03

DISCUSSION

This study evaluated the impact of preoperative left ventricular ejection fraction (LVEF) on postoperative outcomes in patients undergoing coronary artery bypass grafting (CABG). The findings demonstrated that patients with low ejection fraction experienced significantly higher rates of postoperative complications, including prolonged intensive care unit (ICU) stay, increased inotropic support requirements, and higher in-hospital mortality compared to patients with normal ejection fraction.

Prior investigations have thoroughly evaluated how preoperative ejection fraction affects patient outcomes following CABG ⁽¹¹⁾. The study by Jones et al. reported that patients with low EF had higher in-hospital mortality

compared to those with normal EF, which is consistent with the findings of the present study ⁽¹²⁾. Similarly, patients with reduced EF are more likely to require prolonged ICU care and increased inotropic support, highlighting the importance of intensive perioperative management in this high-risk group ⁽¹³⁾.

The present study also demonstrated a higher frequency of postoperative morbidity among patients with low EF, which is in agreement with previously published data ⁽¹⁴⁾. Despite the increased perioperative risk, several studies have shown that with optimal perioperative care, patients with low EF can achieve long-term survival outcomes comparable to those with normal EF ⁽¹⁵⁾. Furthermore, the use of evidence-based medical therapies, including beta-blockers and angiotensin-converting enzyme (ACE) inhibitors, has been shown to improve postoperative outcomes in these patients ⁽¹⁶⁾.

Previous literature also suggests that although patients with low EF are at higher risk of early postoperative complications, their long-term survival may not differ significantly from those with normal EF when managed appropriately ⁽¹⁷⁾. These findings emphasize the importance of careful patient selection, optimized perioperative care, and vigilant postoperative monitoring to improve outcomes in this population ⁽¹⁸⁾.

Overall, the findings of this study, in conjunction with existing literature, suggest that while low preoperative EF is associated with increased perioperative risk, appropriate management strategies can mitigate these risks and lead to favorable long-term

outcomes. Future studies should focus on refining risk stratification models and developing individualized treatment approaches to further improve outcomes in patients with compromised ventricular function

CONCLUSION

Preoperative left ventricular ejection fraction is a significant predictor of postoperative outcomes in patients undergoing coronary artery bypass grafting. Patients with low ejection fraction are at increased risk of prolonged intensive care unit stay, greater need for inotropic support, and higher in-hospital mortality. Careful preoperative risk stratification, optimized perioperative management, and vigilant postoperative monitoring are essential to improve clinical outcomes in this high-risk group.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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AUTHORS CONTRIBUTIONS

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