

Off-pump Coronary Artery Bypass Grafting in Patients with Coronary Artery Disease: Initial Results from The Cardiac Center – Hue Central Hospital

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This study aims to evaluate the outcomes of off -pump coronary artery bypass graft (CABG) surgery in patients with coronary artery disease Hue Central Hospital from 2023 to 2025. The sample size included 254 patients with an average age of 54.1 ± 2.2 years. Males accounted for 57.1%. Comorbidities included hypertension (53.1%), diabetes mellitus (29.1%), and peripheral vascular disease (16.1%). The average left ventricular ejection fraction (LVEF) was $48.26 \pm 10.1\%$, with 13.7% having LVEF below 35%. Three-vessel coronary artery disease was present in 53.9%; one or two-vessel disease accounted for 46.1%; and left main disease $> 50\%$ was present in 38.9%. The average number of bypass grafts per patient was 2.8 ± 0.8 . The average duration of mechanical ventilation and intensive care unit stay was 5.97 ± 1.23 hours and 5.3 ± 1.2 days, respectively. The early mortality rate within 30 days post-surgery was 2.8% (7 cases). The average follow-up duration was 12.1 months, with a late mortality rate of 2.3%.

Keywords: Coronary artery bypass grafting, OPCAB, MIDCAB .

Coronary artery disease is one of the leading causes of cardiovascular mortality worldwide. Treatment methods include medical therapy as the foundation, and revascularization through percutaneous interventions or surgery helps improve symptoms and survival in patients with significant coronary artery stenosis. While percutaneous interventions show advantages in cases of acute coronary syndromes, coronary artery bypass grafting plays a role in chronic coronary lesions, especially in patients with severe multi-vessel disease. Percutaneous coronary interventions are less invasive and are often indicated for patients with poor physical conditions, multiple comorbidities, and high surgical risks. Traditional coronary artery bypass grafting (on-pump CABG) has demonstrated effectiveness for many decades. However, this technique is associated with risks of coagulopathy, neurological complications, and kidney and lung damage due to the use of cardiopulmonary bypass machines. Therefore, the off-pump coronary artery bypass (OPCAB) technique has emerged and is increasingly being applied. OPCAB helps reduce complications related to cardiopulmonary bypass,

decreases the need for blood transfusions, shortens recovery time, and is particularly significant for high-risk patient groups such as the elderly, care, and surgical techniques, the indications for off-pump coronary artery bypass graft in patients are increasingly expanding. Results from studies worldwide also indicate low rates of mortality and complications. In Vietnam, The Cardiac Central at Hue Central Hospital is a major cardiac surgery center with 180-250 coronary surgeries performed annually. However, there has been no comprehensive summary for this technique. Therefore, this study on off-pump coronary artery bypass grafting is truly necessary. Thus, we conducted this study to evaluate the outcomes of off-pump coronary artery bypass graft surgery in patients with coronary artery disease and older at Hue Central Hospital from 2023 to 2025.

SUBJECTS AND METHODS

Subjects

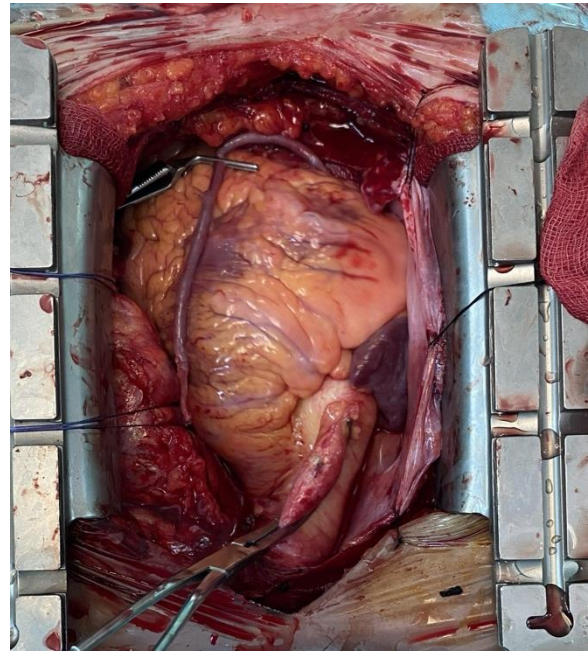
This study included all patients who underwent off-pump coronary artery bypass graft surgery at the Cardiovascular Central, Hue Central Hospital, from 2023 to 2025.

Inclusion Criteria

Patients who underwent off-pump coronary artery bypass graft surgery during the period from 2023 to 2025.

Indications for off-pump coronary artery bypass grafting: Patients were discussed among cardiologists, interventional specialists, and cardiovascular surgeons based on clinical symptoms and coronary

diabetic patients, patients with chronic kidney disease, and those following acute myocardial infarction. With advancements in anesthesia, intensive Fig 1.



lesions to decide on the indication for revascularization.

Indications for revascularization include:

Left main disease $\geq 50\%$.

Three-vessel disease $\geq 70\%$ or proximal left anterior descending artery disease with significant involvement of one other major branch.

Proximal left anterior descending artery disease with a large area of myocardial territory.

Surgery is indicated for complex coronary lesions (SYNTAX score > 22), when coronary anatomy is not suitable for percutaneous interventions, or when there are accompanying lesions requiring

surgery (valvular heart disease, cardiac tumors, etc.).

Exclusion Criteria

Patients undergoing on pump coronary artery bypass graft surgery .

Patients undergoing coronary artery bypass graft surgery with accompanying lesions requiring surgery (valvular heart disease, cardiac tumors, etc)

Procedure: Data for the study were collected during the hospital stay based on a retrospective review of medical records. Follow-up data were retrieved from outpatient records or by contacting patients for follow-up visits at the time of the study or through telephone interviews.

Study Variables Include:

Patient characteristics before, during, and after surgery.

Qualitative variables (including: gender, comorbidities, coronary disease, accompanying diseases, postoperative complications, etc.) are expressed as frequency and percentage.

Quantitative variables (including: age, number of grafts, duration of surgery, duration of mechanical ventilation,

Methods

Study Design: Cross-sectional descriptive study with longitudinal follow-up.

Sample Size: From 2023 to 2025, there were 254 patients who underwent off-pump coronary artery bypass graft surgery.

intensive care unit stay, etc.) are expressed as mean \pm standard deviation.

Postoperative outcomes: evaluated through early and late mortality rates.

Early mortality: defined as death within 30 days post-surgery or during the hospital stay.

Late mortality: defined as death after discharge, beyond the 30-day postoperative period.

Data Analysis: Statistical calculations were performed using SPSS software version 20.0.

Ethical Considerations

The study adhered to all ethical standards in biomedical research, with confidentiality maintained for all information solely for scientific research purposes.

RESULTS

A total of 254 patients were included in the study group, of which males accounted for

57.1%, and females accounted for 42.9%. The average age was 54.1 ± 2.2 years, with the oldest patient being 86 years old. The average left ventricular ejection fraction (LVEF) was 48.3 ± 10.1 (min: 19% - max: 67%); among them,

13.7% had LVEF $< 35\%$. The estimated mortality rate according to the STS Score of the American College of Chest Surgeons was 3.3%. Patients had multiple comorbidities, including hypertension, diabetes mellitus,

peripheral vascular disease, chronic obstructive pulmonary disease, and prior myocardial infarction. All patients presented with chest pain symptoms, with the majority experiencing moderate pain on exertion (CCS II level pain

accounting for 71.1%). Most patients had three-vessel coronary artery disease (**91.1%**), with left main disease > 50% accounting for 38,9% .

In total, 247 patients were discharged alive, and all patients were followed up with an average follow-up duration of 16.1 months, with the shortest being 3 months and the longest being 18 months. During the follow-up period, there was 1 case of late mortality due to a cerebrovascular accident with extensive hemorrhage. None of the patients required reoperation or reintervention on the coronary arteries. The survival rate at the 18-month follow-up was 99.3% .

DISCUSSION

In the context of healthcare in Vietnam, the decision to perform surgery for CAD patients must be carefully considered, influenced by factors such as experience of surgeon, the learning curve of off pump procedure, physical condition. The average age of patients in our study was 54.1 ± 4.1 years (Table 1). The study included 57.1% males and 42.9% females, with a higher prevalence of coronary artery disease in males, consistent with the pathophysiology of

atherosclerosis. Additionally, comorbidities and risk factors were prevalent, with hypertension accounting for 53.1%, diabetes mellitus for 29.1%, and peripheral vascular disease (carotid artery stenosis, lower limb artery disease, renal artery stenosis) for 16.1%. Atherosclerotic vascular disease leads to reduced elasticity, vascular calcification, and poses challenges during anesthesia and intensive care due to poor response to vasopressor medications, increasing the risk of cerebrovascular accidents, as well as difficulties during surgical anastomosis.

In our study, 100% of patients presented with clinical symptoms of chest pain upon admission, with the majority experiencing moderate pain on exertion (CCS II, III level chest pain accounting for 86.6%). The proportion of patients with low left ventricular ejection fraction (LVEF < 35%) was 13.7%. 137 patients

had three-vessel disease, accounting for 53.9%. The rate of complete occlusion of one of the three coronary vessels was and over 50% stenosis in the left main coronary

artery. The estimated mortality rate according to the STS Score (Society of Thoracic Surgeons Score) in our study was $5.3 \pm 3.1\%$, compared to the actual early mortality rate of 2.8%, indicating relatively favorable surgical outcomes. 99 patients has left main stenosis $> 50\%$ disease ($\geq 50\%$) (Class I-B indication); patients with three-vessel disease ($\geq 70\%$) or proximal left anterior descending artery disease with significant involvement of one other major branch (Class I-B indication); and left anterior descending artery disease with a wide myocardial territory using the internal thoracic artery (Class IIa-B indication).

4.7%. Three-vessel disease is defined as atherosclerosis causing stenosis of 70% or more in the major coronary branches,

(38,9%). 5 patients just has proximal left anterior descending artery disease which used off-pump midcab technique.

According to the guidelines for coronary artery bypass grafting from the American College of Cardiology, surgery improves survival rates in patients with left main Fig 2.



CONCLUSION

The results of the study indicate that off-pump coronary artery bypass graft surgery in patients with CAD is a feasible treatment method for chronic coronary artery disease and yields favorable early and mid-term outcomes.

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