HAYDARPAŞA NUMUNE MEDICAL JOURNAL

DOI: 10.14744/hnhj.2025.54289
Haydarpasa Numune Med J 2025;65(4):297–301

hnhtipdergisi.com

ORIGINAL ARTICLE

Regaining the Rhythm: Early Outcomes After Reinstating Coronary Artery Bypass Surgery in a Previously Suspended Center

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Abstract

Introduction: This study aims to evaluate the early outcomes of isolated coronary artery bypass grafting (CABG) procedures performed at a center that had temporarily suspended surgical services due to a shortage of surgical staff and later resumed operations.

Methods: A total of 42 patients who underwent isolated on-pump CABG between January 2023 and February 2025 were retrospectively analyzed. Demographic characteristics, preoperative risk factors, intraoperative variables, and early postoperative outcomes were evaluated using descriptive statistical methods.

Results: The mean age of the patients was 61.9±10.3 years, and 71.4% were male. The most common comorbidities were hypertension (31.0%), diabetes mellitus (38.1%), and chronic kidney disease (7.1%). The mean ejection fraction was 52.7%, and the mean body mass index was 26.3 kg/m^2. All patients underwent surgery with cardiopulmonary bypass. The mean CPB time was 67.9 minutes, and the cross-clamp time was 39.4 minutes. The average hospital stay was 8.2±3.9 days. Early postoperative complications included acute kidney injury (11.9%), new-onset atrial fibrillation (14.3%), respiratory failure (7.1%), stroke or transient ischemic attack (9.5%), wound infection (4.8%), and reoperation (11.9%). The early mortality rate was 7.1%.

Discussion and Conclusion: The early outcomes of CABG surgeries performed in our reactivated center are within acceptable limits regarding complication rates. The findings suggest that the surgical program was successfully restructured and patient safety was maintained. However, further prospective studies with larger patient series are required for more robust evaluation of outcomes.

Keywords: Coronary artery bypass; health care quality; mortality; postoperative complications.

Coronary artery disease (CAD) is one of the leading causes of cardiovascular mortality worldwide and remains a major public health concern in both developed and developing countries [1]. CABG, a surgical treatment for CAD, has been shown to be superior to medical and percutaneous interventions in terms of symptom control, improved quality of life, and long-term survival—particularly in patients with multivessel disease, left main coronary artery involvement, and diabetes mellitus [2].

CABG not only involves surgical intervention but also requires a multi-step and sensitive management process, from preoperative risk assessment to postoperative

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Submitted Date: 28.05.2025 **Revised Date:** 07.06.2025 **Accepted Date:** 10.06.2025
Haydarpaşa Numune Medical Journal

intensive care. This complex structure necessitates coordinated collaboration across various disciplines such as cardiovascular surgery, cardiology, anesthesiology, intensive care, nursing, and support units. Therefore, CABG is a true team effort that demands a high level of coordination to achieve clinical success [3].

In our center, the previously initiated CABG program had to be suspended for a period due to a shortage of cardiovascular surgeons. However, in the recent period, the program has been reactivated with the reinforcement of the surgical team and the provision of adequate infrastructure and equipment support. During this process, the multidisciplinary team structure has also been reorganized, and surgical case management has been systematized.

In this study, we retrospectively analyzed the early-term outcomes of operations performed within the reinitiated CABG program in our center. Mortality, morbidity, and complication rates were examined, along with clinical variables that may influence these outcomes. Our aim is to assess our current situation in light of these data and to contribute to the development of future treatment approaches.

Materials and Methods

Study Design and Patient Selection

This retrospective study includes patients who underwent isolated CABG surgery for coronary artery disease at our center between January 2023 and February 2025. Patients who underwent concomitant valve surgery, aortic surgery, or any other cardiac surgical intervention during the same session were excluded from the study. Ethical approval was obtained from the Ethics Committee of Batman Training and Research Hospital (decision no: 420, date: 20.03.2025), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

All patient data were obtained by reviewing the hospital information system and surgical records. Demographic characteristics (age, sex, body mass index) and comorbidities (such as hypertension, diabetes mellitus, and chronic kidney disease) were recorded. In the preoperative evaluation, variables such as left ventricular ejection fraction (EF), coronary anatomy, whether the surgery was performed under emergency or elective conditions, as well as biochemical parameters, were analyzed.

Preoperative biochemical evaluation included HbA1c (%) and creatinine (mg/dL) levels as indicators of glycemic control and renal function; hemoglobin, hematocrit, leukocyte ($\times10^3/mm^3$), and platelet ($\times10^3/mm^3$) counts as indicators of systemic inflammation and hematologic status; international normalized ratio (INR) values for coagulation status; and total cholesterol, LDL cholesterol, and triglyceride levels for lipid profile assessment.

Regarding the surgical procedure, all patients were operated using cardiopulmonary bypass (on-pump technique). Intraoperative variables such as the number and type of grafts used (arterial or venous), cross-clamp time, and cardiopulmonary bypass duration were analyzed. In the postoperative follow-up, data were collected on the length of hospital stay, erythrocyte suspension (ES) use, early-term mortality (within the first 30 days after surgery), need for reoperation, infections, postoperative arrhythmias, respiratory distress, neurological complications, and acute kidney injury.

Statistical Analysis

Measures of central tendency (mean and median) and measures of dispersion (standard deviation and interquartile range) were calculated. Absolute and relative frequencies were determined for categorical variables. Descriptive statistics were used to summarize the clinical characteristics of the patient group and to support clinical decision-making processes.

Surgical Technique

In all patients, access to the pericardial cavity was achieved via standard median sternotomy. Following systemic heparinization, cardiopulmonary bypass (CPB) was initiated using cannulas placed in the aorta and right atrium. Aortic cross-clamping was applied to arrest the heart, and cold blood cardioplegia solution was administered to achieve cardiac arrest. All procedures were performed using the on-pump technique.

Target coronary arteries were identified according to the revascularization plan. In all patients, the left internal mammary artery (LIMA) and great saphenous vein (SVG) grafts were used. Following the completion of distal anastomoses, proximal anastomoses were performed on the aorta under side-clamping. After achieving hemostasis, a drain was placed in the mediastinum, and the sternum was closed using steel wires. Intraoperative transfusion of ES was administered when needed, in accordance with national and international consensus guidelines on patient blood management.

Table 1. Preoperative parameters

Parameter	Value (mean±SD or %)
Male gender	71.4%
Age (years)	61.9±10.7
Body mass index (kg/m^2)	26.3±3.8
Ejection fraction (%)	52.7±10.2
Hemoglobin (g/dL)	14.2±1.9
Hematocrit (%)	43.1±5.5
HbA1c (%)	6.8±1.5
Creatinine (mg/dL)	1.02±0.21
White blood cell count (x10^3)	9.6±3.4
Platelet count (x10^3)	238.5±46.7
INR	1.08±0.11
Total cholesterol (mg/dL)	180.9±43.5
LDL cholesterol (mg/dL)	107.2±31.8
Triglycerides (mg/dL)	151.4±83.6

SD: Standard deviation; INR: International normalized ratio; LDL: Low-density lipoprotein.

Table 2. Intraoperative parameters

Parameter	Value (mean±SD or %)
Number of bypasses	3.4±0.7
Cardiopulmonary bypass time (min)	67.9±21.5
Cross-clamp time (min)	39.4±15.2

Table 3. Postoperative complications

Complication	Number of patients (n)	Rate (%)
Acute kidney injury	5	11.9
New-onset atrial fibrillation	6	14.3
Respiratory failure	3	7.1
Stroke/TIA	4	9.5
Wound infection	2	4.8
Early mortality	3	7.1
Reoperation	5	11.9

TIA:Transient ischemic attack.

Postoperative Monitoring and Follow-up

Postoperatively, all patients were transferred to the intensive care unit (ICU) while intubated. Within the framework of routine postoperative monitoring parameters, hemodynamic stability, rhythm monitoring, and bleeding control were ensured. Once clinical stability was achieved, patients were extubated and transferred to the ward.

Results

The mean age of the patients included in the study was 61.9 years. Of the patients, 71.4% were male and 28.6% were female. The mean body mass index (BMI) was 26.3 kg/m^2, and the mean EF was calculated as 52.7% (Table 1).

Evaluation of preoperative biochemical parameters revealed a mean hemoglobin (Hgb) level of 14.2 g/dL, Hct level of 43.1%, HbA1c level of 6.8%, creatinine level of 1.02 mg/dL, and leukocyte count of 9.6×10^3/mm^3. The average INR was 1.08. In the lipid profile assessment, total cholesterol was 180.9 mg/dL, LDL cholesterol was 107.2 mg/dL, and triglyceride level was 151.4 mg/dL (Table 1).

Intraoperative data showed that the mean number of coronary artery bypasses per patient was 3.4 (Table 2). The most frequently used graft combination was LIMA and SVG. All patients received cardiopulmonary bypass support.

The mean cardiopulmonary bypass time was 67.9 minutes, and the mean aortic cross-clamp time was 39.4 minutes (Table 2).

During the postoperative follow-up period, the average length of hospital stay was 8.2 days.

Among postoperative complications, acute kidney injury occurred in 11.9% of patients. New-onset atrial fibrillation was observed in 14.3% of cases. Respiratory failure was noted in 7.1% of patients, while neurological complications—such as stroke or transient ischemic attack (TIA)—were recorded in 9.5%. Surgical site infection occurred in 4.8% of patients (Table 3).

The early-term (within 30 days) mortality rate was calculated at 7.1%. During the same period, 11.9% of patients required reoperation due to bleeding disorders, cardiac tamponade, or other surgical causes (Table 3).

Discussion

In this study, we evaluated the early clinical outcomes of patients who underwent CABG following the re-establishment of the surgical program in our center. The data obtained indicate that the procedure was performed with generally acceptable rates of mortality and morbidity.

The preoperative demographic and biochemical characteristics of the patients in our study were largely consistent with those reported in similar studies from other centers. In particular, our findings related to mean age, EF, BMI, and biochemical parameters were in line with the patient profiles documented by various international centers [4]. This consistency supports the notion that our

study population reflects the general CABG population and that the outcomes may be considered broadly applicable.

In our cohort, the mean age was 61.9 years, the mean BMI was 26.3 kg/m^2, and the mean EF was 52.7%. Additionally, 71.4% of the patients were male and 28.6% were female. In the study by Dassanayake et al. [5], which examined 12,736 patients who underwent isolated CABG, 75.2% were male (n=9.573) and 24.8% were female (n=3.163). This distribution is comparable to the gender ratios in our study. That same study reported that female patients were generally older than males (mean age: 65 vs. 66 years) and had a higher burden of comorbidities. Although our study did not include a gender-based subgroup analysis, the demographic structure of our population appears to be consistent with international data.

In our study, the mean cardiopulmonary bypass (CPB) time was 67.9 minutes, and the mean aortic cross-clamp time (XCT) was 39.4 minutes in patients undergoing isolated on-pump CABG. In contrast, the multicenter prospective E-CABG study by Ruggieri et al. [6] reported an average CPB time of 84±34 minutes and XCT time of 58±25 minutes.

In this context, both the CPB and XCT durations in our study were shorter than those reported by Ruggieri et al. [6] The notably shorter XCT time may reflect reduced myocardial ischemia duration and effective myocardial protection. The shorter CPB time, on the other hand, may be attributed to surgical team efficiency, grafting strategies, and optimized operative protocols.

Compared to international data, these relatively shorter operative times suggest that our surgical process is both safe and efficient. Nevertheless, to better understand their impact on early outcomes, these parameters should be further analyzed in relation to postoperative complications and mortality.

In our series, the incidence of postoperative new-onset atrial fibrillation (AF) was 14.3%. In the literature, the incidence of AF after CABG is generally reported to range between 20–40%. Thus, our results lie at the lower end of this spectrum. In the prospective study by Omar et al. [7], which included 366 patients, the incidence of postoperative AF was 26.8%. That study found advanced age, preoperative anemia, and low EF to be significantly associated with AF. Although our patient cohort also had a relatively high mean age and moderately reduced EF, the lower observed AF rate may be explained by patient selection, perioperative care protocols, and effective use of pharmacological prophylaxis. However, it is important to interpret this lower rate with caution due to the limited sample size.

In the study published by Apaydın et al. [8], the relationship between AF following CABG and the insertion site of the drainage tube was investigated. The study demonstrated that intercostal drain placement was associated with significantly higher levels of pain and an increased incidence of AF compared to subxiphoid placement. These findings suggest that the drain insertion site may be an independent predisposing factor for postoperative AF. However, since drain placement sites were not evaluated in our study, further analysis is needed to explore this relationship.

Surgical site infection (SSI) was observed in 4.8% of patients in our study. This rate is lower than the 7.3% reported by Alghamdi et al. [9] in their evaluation of infections following cardiac surgery. Risk factors for SSI identified in that study included diabetes, advanced age, obesity, and prolonged operative times. In our cohort, the incidence of these risk factors may have been relatively limited. Additionally, differences in institutional protocols, patient selection, and preoperative preparation may contribute to the observed variation.

The 30-day mortality rate following isolated CABG in our study was 7.1%. This is notably higher than the 3.2% reported in a large-scale national registry study from Denmark by Adelborg et al. [10], and the 2.61% reported in a multicenter cohort of 34.310 patients from the Italian National Health System [10,11]. However, the Italian study revealed considerable variation in mortality across institutions, ranging from 0.33% to 7.63%, highlighting the influence of institutional experience. The relatively high mortality rate observed in our center may be explained by the recent reinitiation of our CABG program, the limited number of cases, and the high-risk nature of the patient population. Furthermore, the lower mortality rates reported in the aforementioned studies likely reflect many years of accumulated experience, meticulous patient selection, and robust quality assurance processes. In this regard, it is reasonable to expect that outcomes will improve over time in newly restructured centers, especially with systematic performance monitoring and quality improvement initiatives.

During the reactivation process of our center, several challenges were encountered. Due to the suspension of surgical services, the local population had turned to alternative centers in neighboring cities, making it initially difficult to regain patient trust. Additionally, the surgical team faced some adaptation issues in re-establishing operational routines after a long hiatus. Nevertheless, with prior experience, strong team cohesion, and determination,

these difficulties were successfully overcome, and the system was restored to full functionality in a short period.

Despite our center's recent reintroduction of CABG surgery, the rapid progress and promising outcomes observed suggest that the program has been re-established through a well-structured and disciplined approach. The emphasis on team cohesion, operational discipline, and patient safety has enabled our center to steadily move toward surgical excellence. The experience gained during this period is promising for the sustainability of clinical performance in the future.

Limitations

This study was conducted retrospectively and at a single center, and the limited sample size restricts the generalizability of the findings. As data were obtained from hospital records, the level of detail for some clinical parameters was limited. Furthermore, the follow-up period was confined to the early postoperative phase, and long-term outcomes could not be evaluated. Since only the on-pump surgical technique was used, comparisons with alternative surgical approaches were not possible. Therefore, multicenter prospective studies are needed to support and expand upon our findings.

Conclusion

In conclusion, the re-establishment of our CABG program yielded safe and efficient early outcomes, characterized by short operative times and low complication rates. Although the mortality rate reflects the initial adaptation phase, these findings validate the feasibility of restoring surgical services through a disciplined team approach. Continued quality monitoring and increased case experience are expected to further improve survival and long-term results.

Ethics Committee Approval: The study was approved by Batman Training and Research Hospital Ethics Committee (No: 420, Date: 20.03.2025).

Use of AI for Writing Assistance: No artificial intelligence tools were used in the preparation or analysis of this manuscript.

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept – A.A.; Design – A.A.; Supervision – T.C.; Data collection and/or processing – A.A., K.G.K.; Analysis and/or interpretation – K.G.K.; Literature search – A.A., T.C.; Writing – A.A., K.G.K., T.C.; Critical review – A.A., K.G.K., T.C.

Conflict of Interest: The authors declare that there is no conflict of interest.

Financial Disclosure: This research received no financial support from any funding agency in the public, commercial, or not-for-profit sectors.

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