ROBOT-ASSISTED CORONARY ARTERY BYPASS GRAFTING: SINGLE-CENTER EXPERIENCE

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Abstract

Introduction: Approximately half a million coronary artery bypass grafting procedures are performed worldwide each year, with the proportion of minimally invasive techniques steadily increasing. Significant interest in minimally invasive approaches in cardiac surgery began to emerge in the 1990s, and today we are witnessing the gradual adoption of robotic systems across the globe. In 2024, our clinic commenced the implementation of robotic technology for cardiac surgery. This article details our initial experience. Our objective is to demonstrate the feasibility, efficacy, and safety of robotic systems in this surgical field based on our own results from robot-assisted coronary artery bypass grafting procedures.

Methods: From September 2024 through August 2025, a total of 50 robot-assisted coronary artery bypass grafting procedures were performed in the Department of Cardiac Surgery at University Clinical Hospital No. 1. All patients underwent a full range of necessary preoperative examinations, including coronary angiography to assess the severity of coronary artery lesions and to determine the specifics of the planned surgical intervention. Coronary angiography revealed hemodynamically significant single-vessel disease in 14 (28%) patients, two-vessel disease in 26 (52%), and three-vessel disease in 10 (20%). Among comorbidities, arterial hypertension was the most prevalent, observed in 39 (78%) patients. 16 patients (32%) had diabetes mellitus, and 6 (12%) had pulmonary hypertension. Pre- and postoperative echocardiographic examination was performed for all patients by certified specialists in accordance with current clinical guidelines. The early postoperative period was defined as the first 30 days after surgery.

Results: All 50 procedures were successfully completed. The majority of patients were male — 48 (96%). The median age was 63 years [59, 66], with the largest proportion of patients belonging to the 60-69 age group (52%). The mean body

mass index was 28.6 ± 5.6 kg/m². All surgeries were performed electively, and no prior cardiac surgeries were recorded. Bilateral internal mammary artery grafting was performed in 6 (12%) patients, and the great saphenous vein was used in 30 (60%) cases. A Y-graft configuration was applied in 6 (12%) patients, and sequential grafting was performed in 8 (16%). The 30-day mortality, rate of conversion to sternotomy, and incidence of postoperative bleeding were all 0%. The median procedure duration was 290 [214, 350] minutes. The intensive care unit stay was typically 1 day (48 patients, 96%). An extension to 2 days was noted in two patients. The mean pain intensity score on the visual analogue scale was 4/10 points (min — 3, max — 5). 10 (20%) procedures were performed using parallel cardiopulmonary bypass, while the remaining 40 (80%) were conducted off-pump.

Conclusion: This single-center study demonstrates the reproducibility and safety of robot-assisted coronary artery bypass grafting. Robotic cardiac surgery represents an effective and promising approach to myocardial revascularization. Reduced surgical trauma and, consequently, a quicker return to daily activities define the potential advantage of this technique over other minimally invasive interventions in patients requiring coronary artery bypass surgery.