IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 4 Ser. 1 (April. 2025), PP 28-31
www.iosrjournals.org

Case Report on Rescue Coronary Artery Bypass Grafting on An Arrest Survival Patient with Heart Failure with Mildly Reduced Ejection Fraction

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Abstract
Coronary artery disease (CAD) is a common cause of sudden cardiac arrest, and heart failure often complicates the prognosis in survivors. Coronary artery bypass grafting (CABG) has improved survival and quality of life in patients with CAD & HF. However, the decision to perform CABG in an arrest survival patient remains a complex clinical challenge due to the underlying myocardial damage and altered hemodynamics. Our patient, a 50-year-old cardiac arrest survival normotensive, nondiabetic lady with a positive family history of ischemic heart disease (IHD) with the diagnosis of coronary artery disease with heart failure with mildly reduced ejection fraction underwent rescue coronary artery bypass grafting. Her postoperative recovery was uneventful and she was discharged to home on the 7th postoperative day with the advice of medications and further follow-up. Here we describe the successful coronary artery bypass grafting in such a patient with coronary artery disease with left ventricular dysfunction.

Keywords: *Coronary Artery Bypass Grafting, Cardiac arrest, Heart Failure, Ejection Fraction*

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Date of Submission: 24-03-2025 Date of Acceptance: 04-04-2025

I. Introduction

Coronary artery disease (CAD) is a leading cause of mortality and morbidity globally. CAD results from the narrowing of the coronary arteries, which is caused by thickening and loss of elasticity of their walls also known as arteriosclerosis. When severe, it limits blood flow to the myocardium, and progressive narrowing causes complete occlusion later. CAD is classified based on the coronary arteries involved as single-vessel disease, double-vessel disease, and triple-vessel disease. Patients with coronary artery disease present with either acute or chronic clinical manifestations. Medical therapy decreases myocardial oxygen requirements to relieve myocardial ischemia in these patients. By contrast, revascularization procedures can effectively restore impaired myocardial blood supply [1].

Medical therapy in patients with coronary artery disease (CAD) and advanced left ventricular dysfunction (LVD) carries poor long-term survival [2,3]. Coronary artery bypass grafting (CABG) in these patients is associated with improved survival compared with medical treatment. Off-pump CABG can be performed adequately and safely on a beating heart without cardiopulmonary bypass (CPB) even in patients with ventricular dysfunction. Thus, patients can avoid the ischemia-reperfusion injury and the harmful effects of CPB with satisfactory short and long-term outcomes [4].

Previous studies have shown that the long-term benefits of coronary artery bypass grafting (CABG) are superior to medical therapy in patients with severe left ventricular dysfunction (ejection fraction [EF] ≤0.30) [5-7].

Survival to hospital discharge after out-of-hospital cardiac arrest remains inadequate (0.2–10% long-term survival), and in-hospital arrest survival is only moderately better (17% long-term survival) [8-10]. However, advances in surgical technique and myocardial protection have led to improved outcomes, allowing CABG to be a relatively safe procedure in high-risk patients [11].

In this study, we are reporting a case of coronary artery bypass grafting on an arrest survival patient with heart failure with a mildly reduced ejection fraction

II. Case Report

A 50-year-old non-hypertensive, non-diabetic, non-smoker lady, housewife in occupation with a positive family history, presented with sudden severe breathlessness on exertion, and severe cough for 7 days. Her breathlessness aggravated on lying flat. Her cough was productive with mucoid sputum expectoration. She also had symptoms of nausea, and vomiting but there were no complaints of fever or chest pain. Her bowel and bladder habits were normal. Then, the patient was admitted to the Cardiac Surgery department of Lubana General Hospital and Cardiac Centre, and after management for cardiac arrest urgent coronary artery bypass grafting was performed. On examination, the patient was mildly agitated with respiratory distress, pulse was 82 bpm, regular, of low volume, BP-120/70 mmHg, and bipedal edema was present. Functional status was NYHA class 4.

Echocardiography (ECG): Her color Doppler echocardiography showed left ventricular septal, mid to distal anterior and lateral wall hypokinesia, mild left ventricular systolic dysfunction (LVEF-44%), trivial MR, and Grade 1 diastolic dysfunction [Figure 1].

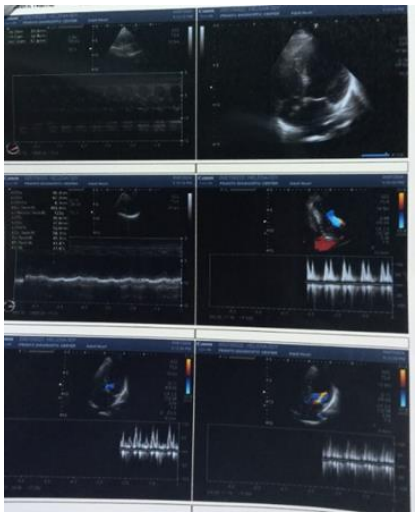
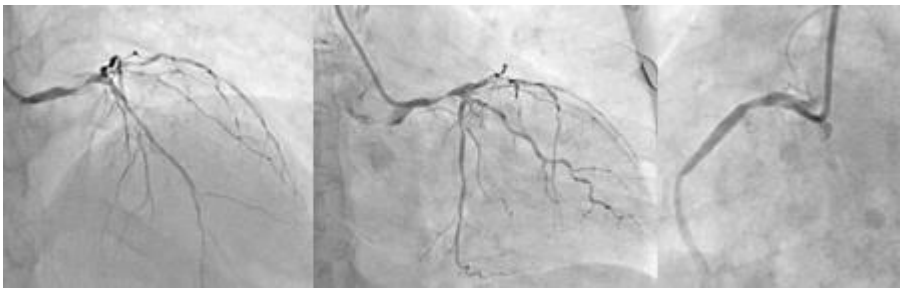


Figure 1: Echocardiography of the patient

Coronary Angiogram: Her coronary angiogram showed left main coronary artery had 90-95% stenosis after origin, the mid part of LAD had 85-90% stenosis, LCX was a narrow caliber vessel having 75-80% stenosis at the mid part, RCA is the dominant vessel with 30-40% stenosis at the proximal part of 70-75% stenosis at mid part.



A B C

Figure 2 (A-C): Coronary Angiogram of the patient

The patient went into cardiac arrest followed by heart failure and was treated with anti-failure, anti-anginal medications and high inotropic support. Despite the up titration of inotropic supports patient's hemodynamic condition did not improve.

CABG Procedure: We prepared the patient for urgent coronary artery bypass grafting. As it was a rescue operation, we didn't go for harvesting the left internal mammary artery. The left great saphenous vein was harvested for conduits. On-pump beating heart distal anastomoses were constructed in the following sequence: RSVG to LAD, RSVG to PDA, and RSVG to OM. Proximal anastomoses of grafts were constructed on the aorta by applying a side-biting clamp. Deaeration was done, wean from CPB and heparin was neutralized with protamine, and hemostasis was achieved properly. Left lower limb and median sternotomy wounds were closed

in layers leaving two drain tubes in the anterior mediastinum one drain tube each in the right and left pleura and one RV pacing wire in situ. Postoperatively patient required high inotropic support. The patient was on ventilation for 19 hours and then extubated. Extubation was uneventful. We kept inotropic support for another day and then tapered slowly. The postoperative period was uneventful. The patient was discharged home with the advice of medication and a further follow-up one month later. His post-operative follow-up echocardiogram showed moderate LV dysfunction (LVEF 37%) with normal RV function (TAPSE 14). Liver and renal function tests were within normal limits. The patient was advised for further follow-up 3 months later.

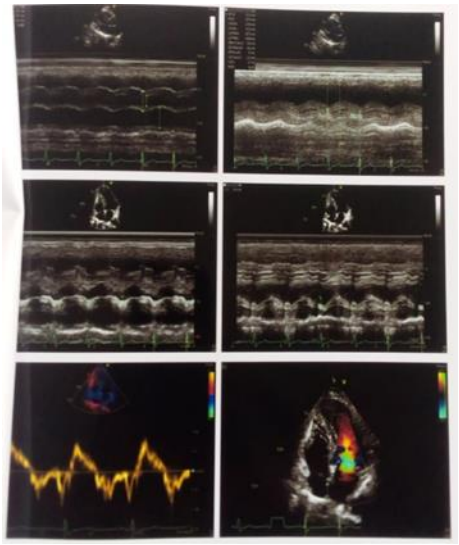


Figure 3: M-mode (motion mode) echocardiography of the patient.

III. Discussion

Coronary artery bypass grafting (CABG) in patients with heart failure who have survived cardiac arrest presents a complex and multifaceted clinical scenario. These patients often have advanced coronary artery disease, ischemic heart disease, and left ventricular dysfunction. CABG in this context aims to improve myocardial perfusion, alleviate symptoms, and potentially reduce mortality.

Appoo J et al. stated that patients with severe CAD and markedly reduced EF represent a high-risk group that can undergo isolated CABG safely, as compared with patients with milder or no decrease in EF. However, 5-year survival rates are still very good, relative to previously published reports on prognosis in such patients. Advances in adjuvant medical and surgical therapies may further enhance survival in this high-risk group of patients [11]. Salehi M et al, reported that coronary artery bypass grafting in patients with poor left ventricular function improved myocardial function [12]. A study by Caputti GM et al, showed that coronary artery bypass grafting in selected patients with severe left ventricular dysfunction is valid and safe and promotes less mortality and morbidity compared with conventional operations wherein they performed and compared the outcomes of both off-pump and on-pump CABG [13]. Garatti et al. stated that the key concept behind the significant survival benefit after CABG in severe CAD and severe LV dysfunction was the presence of viable myocardium, which can resume function following revascularization [14]. Allman KC et al., in a meta-analysis of a population of 3,008 patients stated that the myocardial viability had a direct relationship between the severity of LV dysfunction and the magnitude of benefit with revascularization [15]. Nagendran J et al. found that, after controlling for variations in baseline risk profiles, CABG was associated with decreased rates of recurrent revascularization and better survival than PCI for patients with coronary artery disease and left ventricular dysfunction [16]. Rasmussen et al. performed 59 re-angiographies and 12 blind reoperations in their 71 CABG patients with PMI and reported early graft occlusion at rates of 73% and 92%, respectively [17]. Isbir et al. revealed that CABG can be performed with acceptable mortality and long-term survival in these high-risk patients (5.6% operative mortality versus 2.4% annual mortality in patients with EF >30%, and 74% survival at 4 years) [18].

We successfully performed coronary artery bypass grafting on this arrest survival patient with coronary artery disease with heart failure with mildly reduced ejection fraction. Her post-operative recovery was uneventful. Her post-operative follow-up echocardiogram after one month showed anterior and septal wall hypokinesia, moderate LV systolic dysfunction (LVEF 37), diastolic dysfunction of LV (Grade 1) normal RV systolic function (TAPSE 14). From our point of view, urgent CABG has a promising outcome in a case of arrest survival coronary artery disease patient with heart failure.

IV. Conclusion

This case report highlights the need for early intervention in the management of patients with heart failure and cardiac arrest who have a slightly reduced ejection fraction. Rescue coronary artery bypass grafting (CABG) has demonstrated potential as a life-saving procedure in some CAD cases with a slightly lower ejection fraction. The patient's positive outcome highlights the need for prompt re-revascularization in situations of cardiac arrest following CABG. The present case also emphasizes the importance of advanced cardiac care methods in emergency medicine to provide timely and effective treatment for high-risk cardiac patients.

Further studies with a long-term follow-up of similar cases are necessary to refine guidelines and optimize outcomes in high-risk cardiac patients.

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References

[1] Libby P, Theroux P. Pathophysiology of Coronary Artery Disease Circulation.2005;111:3481–8

[2] Bruschke AVG, Proudfit WL, Sones FM. Progress Study Of 590 Consecutive Nonsurgical Cases of Coronary Disease Followed 5–9 Years. Circulation.1973;47:1144–1163.

[3] Scott SM, Deupree RH, Sharma GVRK, Et Al. VA Study of Unstable Angina. 10-Year Results Show Duration of Surgical Advantage for Patients with Impaired Ejection Fraction. Circulation. 1994;90(Suppl 2):120–3.

[4] Ling Y, Liu X, Chen Y, Chen S, Jin X, Dong S, Et Al One Center Experience in China Int J Clin Exp Med. 2015;8:21477–81

[5] Shapira I, Isakov A, Yakirevich V, Topilsky M. Long-Term Results of Coronary Artery Bypass Surgery in Patients with Severely Depressed Left Ventricular Function. Chest. 1995 Dec 1;108(6):1546-50.

[6] Christakis GT, Weisel RD, Fremes SE, Ivanov J, David TE, Goldman BS, Salerno TA. Coronary Artery Bypass Grafting in Patients with Poor Ventricular Function. The Journal of Thoracic and Cardiovascular Surgery. 1992 Jun 1;103(6):1083-92.

[7] Kaul TK, Agnihotri AK, Fields BL, Riggins LS, Wyatt DA, Jones CR. Coronary Artery Bypass Grafting in Patients with An Ejection Fraction of Twenty Percent or Less. The Journal of Thoracic and Cardiovascular Surgery. 1996 May 1;111(5):1001-12.

[8] Bunch TJ, White RD, Gersh BJ, Et Al. Long-Term Outcomes of Out-Of-Hospital Cardiac Arrest After Successful Early Defibrillation. N Engl J Med 2003;348:2626–33.

[9] Chen YS, Lin JW, Yu HY, Et Al. Cardiopulmonary Resuscitation with Assisted Extracorporeal Life-Support Versus Conventional Cardiopulmonary Resuscitation in Adults with In-Hospital Cardiac Arrest: An Observational Study and Propensity Analysis. Lancet 2008;372:554–61.

[10] Dunne RB, Compton S, Zalenski RJ, Swor R, Welch R, Bock BF. Outcomes From Out-Of-Hospital Cardiac Arrest in Detroit. Resuscitation 2007;72:59–65.

[11] Appoo J, Norris C, Merali S, Graham MM, Koshal A, Knudtson ML, Ghali WA. Long-Term Outcome of Isolated Coronary Artery Bypass Surgery in Patients with Severe Left Ventricular Dysfunction. Circulation. 2004 Sep 14;110(11_Suppl_1):II-13.

[12] Salehi M, Bakhshandeh A, Rahmanian M, Saberi K, Kahrom M, Sobhanian K. Coronary Artery Bypass Grafting in Patients with Advanced Left Ventricular Dysfunction: Excellent Early Outcome with Improved Ejection Fraction. J Tehran Heart Cent. 2016 Jan 13;11(1):6-10.

[13] Caputti GM, Palma JH, Gaia DF, Buffolo E. Off-Pump Coronary Artery Bypass Surgery in Selected Patients Is Superior to The Conventional Approach for Patients with Severely Depressed Left Ventricular Function. Clinics. 2011;66:2049-53.

[14] Garatti A, Castelvecchio S, Canziani A, Santoro T, Menicanti L. CABG In Patients with Left Ventricular Dysfunction: Indications, Techniques and Outcomes. Indian Journal of Thoracic and Cardiovascular Surgery. 2018 Dec 20;34:279-86.

[15] Allman KC, Shaw LJ, Hachamovitch R, Udelson JE. Myocardial Viability Testing and Impact of Revascularization on Prognosis in Patients with Coronary Artery Disease and Left Ventricular Dysfunction: A Meta-Analysis. Journal of The American College of Cardiology. 2002 Apr 3;39(7):1151-8.

[16] Nagendran J, Norris CM, Graham MM, Ross DB, Macarthur RG, Kieser TM, Maitland AM, Southern D, Meyer SR, APPROACH Investigators. Coronary Revascularization for Patients with Severe Left Ventricular Dysfunction. The Annals of Thoracic Surgery. 2013 Dec 1;96(6):2038-44.

[17] Rasmussen C, Thiis JJ, Clemmensen P, Efsen F, Arendrup HC, Saunamäki K, Madsen JK, Pettersson G. Significance and Management of Early Graft Failure After Coronary Artery Bypass Grafting: Feasibility and Results of Acute Angiography and Re-Re-Vascularization. European Journal of Cardio-Thoracic Surgery. 1997 Dec 1;12(6):847-52.

[18] Isbir CS, Yildirim T, Akgun S, Civelek A, Aksoy N, Oz M, Arsan S. Coronary Artery Bypass Surgery in Patients with Severe Left Ventricular Dysfunction. International Journal of Cardiology. 2003 Aug 1;90(2-3):309-16.