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# Clinical Evaluation of Heart Failure in Post-Myocardial Infarction Patients

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## Abstract

**Background:** Cardiac failure is one of the most serious and disabling complications following myocardial infarction (MI), significantly contributing to morbidity, hospital readmissions, and mortality worldwide. In India, the burden is amplified by late presentations, poor risk factor control, and limited access to rehabilitation.

**Aim:** To assess the complications of MI, with a focus on cardiac failure, and to evaluate the precautionary and preventive steps adopted in post-MI patients at a tertiary care hospital.

**Material and Methods:** This prospective observational study was conducted on 70 patients with confirmed MI. Clinical, electrocardiographic (ECG), and echocardiographic (2D ECHO) parameters were recorded, alongside the presence of comorbidities. Functional classification using

the New York Heart Association (NYHA) scale and evaluation of preventive therapies were performed. Data were analyzed using descriptive statistics and Chi-square or t-tests, with a p-value <0.05 considered statistically significant.

**Results:** Systolic dysfunction was the predominant functional abnormality (60%), followed by diastolic dysfunction (21.4%). Hypokinetic regional wall motion abnormalities were present in 62.9% of patients. Anteroseptal MI (32.9%) was the most common ECG finding. Clinically, 74.3% of patients experienced paroxysmal nocturnal dyspnea or orthopnea, and 64.3% were classified as NYHA class III–IV. Hypertension (70%) and diabetes mellitus (58.6%) were the most frequent comorbidities. Despite the high disease burden, preventive measures such as optimal medical therapy and lifestyle modifications were underutilized.

**Conclusion:** Cardiac failure following MI remains a major challenge in India, driven by a high prevalence of systolic dysfunction, extensive infarctions, and comorbid conditions. Early recognition, adherence to guideline-directed medical therapy, and robust secondary prevention strategies are critical to improving long-term outcomes.

**Keywords:** Myocardial infarction, cardiac failure, echocardiography, NYHA classification, prevention

## Introduction

Myocardial infarction (MI) is one of the most prevalent and life-threatening cardiovascular emergencies worldwide, with significant morbidity and mortality despite major therapeutic advances [1]. It results from prolonged ischemia leading to necrosis of the myocardial tissue, typically due to occlusion of the coronary arteries by atherosclerotic plaques or thrombus [2]. With improvements in reperfusion therapies and pharmacologic interventions, acute mortality has decreased, yet the long-term burden of post-MI

complications, particularly cardiac failure, remains substantial [3,4].

Cardiac failure following MI arises from impaired myocardial contractility, ventricular remodeling, and neurohormonal activation, leading to progressive decline in cardiac function [5]. It is estimated that approximately 20–30% of MI survivors develop some form of cardiac dysfunction, ranging from asymptomatic left ventricular impairment to overt heart failure with reduced ejection fraction [6,7]. These patients are at increased risk of recurrent hospitalizations, poor quality of life, and adverse cardiovascular outcomes.

Multiple factors contribute to the development of cardiac failure after MI, including infarct size, location, reperfusion delay, comorbidities such as hypertension and diabetes, and inadequate secondary prevention [8]. Early diagnosis and management of post-MI heart failure are crucial to preventing disease progression. Pharmacologic agents such as beta-blockers, angiotensin-converting enzyme inhibitors, and mineralocorticoid receptor antagonists have been proven to mitigate remodeling and improve survival in these patients [9]. Non-pharmacologic measures, including lifestyle modifications, cardiac rehabilitation, and patient education, play an equally important role in secondary prevention and risk reduction [10].

In India, the incidence of MI is rising at an alarming pace due to urbanization, dietary shifts, sedentary lifestyles, and high prevalence of risk factors such as diabetes and hypertension [1,4]. Compounding this, limited awareness, delayed hospital presentation, and inadequate adherence to guideline-directed therapy contribute to worse outcomes compared to Western populations [6,8]. Understanding the pattern of MI complications, particularly cardiac failure, in the Indian context is critical for tailoring prevention and management

strategies that can improve survival and quality of life.

This study aims to assess the complications of myocardial infarction, with a particular focus on cardiac failure, and to evaluate the precautionary and preventive measures that can reduce its burden in patients managed at a tertiary care center in India.

**Material and Methods**

This prospective observational study was conducted at the Department of Cardiology in a tertiary care hospital affiliated with an Indian institute over a one-year period. A total of 70 patients with a confirmed history of myocardial infarction (MI), admitted for follow-up or post-event care, were enrolled.

**Inclusion criteria:**

- Patients aged ≥18 years
- Patients with a confirmed diagnosis of acute MI (ST-elevation MI [STEMI] or non-ST-elevation MI [NSTEMI])
- Patients undergoing post-MI follow-up and evaluation during the study period

**Exclusion criteria:**

- Patients with pre-existing chronic heart failure prior to MI
- Patients with significant valvular heart disease or congenital heart disease
- Patients with advanced chronic kidney disease or liver disease
- Patients unwilling or unable to provide informed consent

All participants underwent comprehensive clinical and diagnostic evaluation, including:

- Complete Blood Count (CBC)
- Renal Function Test (RFT)
- Liver Function Test (LFT)
- Random Blood Sugar (RBS)
- B-Type Natriuretic Peptide (BNP)
- Urine routine examination
- Lipid profile
- 12-lead Electrocardiogram (ECG)

- Chest X-ray
- 2D Echocardiography (2D ECHO)
- Treadmill Test (TMT), if required
- Colour Doppler study, if indicated

Echocardiography was used to assess left ventricular ejection fraction (LVEF), regional wall motion abnormalities, left ventricular dilatation, mitral regurgitation, and pulmonary hypertension. Patients were evaluated clinically for heart failure symptoms and were classified using the New York Heart Association (NYHA) functional classification.

Preventive and precautionary measures were documented, including use of guideline-directed medical therapies (beta-blockers, ACE inhibitors, antiplatelets, statins), cardiac rehabilitation, dietary modifications, smoking cessation, and control of comorbid conditions (hypertension, diabetes, dyslipidemia).

The study was approved by the Institutional Ethics Committee prior to initiation. Written informed consent was obtained from all participants before enrollment. The study was conducted following the principles of the Declaration of Helsinki, ensuring patient confidentiality, privacy, and voluntary participation.

**Statistical analysis**

Data were analyzed using SPSS version 16.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Chi-square or Fisher's exact test was used for categorical data, and independent t-test for continuous variables. A p-value $<0.05$ was considered statistically significant.

**Results**

Table 1 shows the distribution of 2D echocardiographic findings in post-MI cardiac failure patients. Systolic dysfunction was the most common abnormality (60%), followed by diastolic dysfunction (21.4%), while conduction and global dysfunction were less frequent. Chamber enlargement

analysis revealed that left ventricular hypertrophy (LVH) and left atrial enlargement (LAE) were the predominant findings. In terms of regional wall motion abnormalities (RWMA), hypokinetic changes were the most frequent (62.9%), followed by diffuse (20%) and anterior segment involvement (8.6%).

Table 2 presents the distribution of ECG changes according to MI wall involvement. Anteroseptal infarction was the most common pattern (32.9%), followed by extensive anterior (20%) and inferior wall infarction (20%). Anterior infarction accounted for 15.7%, while lateral, non-Q wave, and right ventricular infarctions were less common.

Table 3 summarizes the clinical manifestations in post-MI cardiac failure patients. Elevated jugular venous pressure (JVP) or peripheral edema was present in 71.4% of patients, cardiomegaly in 68.6%, and paroxysmal nocturnal dyspnea (PND) or orthopnea in 74.3%, indicating a high burden of symptomatic heart failure in this cohort.

Table 4 describes the distribution of breathlessness based on the New York Heart Association (NYHA) classification across age groups. The majority of patients were in NYHA class III (34.3%) and class IV (30%), reflecting moderate to severe functional limitation, especially in older age groups. Mild symptoms (class I and II) were seen mainly in younger patients.

Table 5 presents the distribution of comorbid conditions. Hypertension was the most common comorbidity (70%), followed by diabetes mellitus (58.6%) and other conditions such as chronic kidney disease or chronic obstructive pulmonary disease (57.1%), highlighting the complex clinical background of post-MI patients.

**Table 1: Distribution According to 2D ECHO Finding in Post MI Cardiac Failure in the study group.**

| Category | Parameter | Number | % |
|---|---|---|---|
| **Functional Abnormality** | CD (Conduction Disorder) | 6 | 8.6 |
| | DD (Diastolic Dysfunction) | 15 | 21.4 |
| | GD (Global Dysfunction) | 5 | 7.1 |
| | RVD (Right Ventricular Dysfunction) | 2 | 2.9 |
| | SD (Systolic Dysfunction) | 42 | 60.0 |
| | **Total Functional** | **70** | **100** |
| **Chamber Enlargement** | LAE | 22 | 31.4 |
| | LAE + LVH | 14 | 20.0 |
| | LVH | 25 | 35.7 |
| | RAE | 3 | 4.3 |
| | RVH | 3 | 4.3 |
| | No Enlargement | 3 | 4.3 |
| **RWMA** | A (Anterior) | 6 | 8.6 |
| | C (Combined) | 2 | 2.9 |
| | D (Diffuse) | 14 | 20.0 |
| | H (Hypokinetic) | 44 | 62.9 |
| | N (Normal) | 4 | 5.7 |

**Table 2: Distribution according to ECG Changes in Post MI Wall.**

| MI Wall | Number | % |
|---|---|---|

| | | |
|---|---|---|
| AI (Anterior Infarct) | 11 | 15.7 |
| AS (Anteroseptal) | 23 | 32.9 |
| Ext-A (Extensive Anterior) | 14 | 20.0 |
| Inf (Inferior) | 14 | 20.0 |
| Lat (Lateral) | 3 | 4.3 |
| NQ (Non-Q wave MI) | 3 | 4.3 |
| RV (Right Ventricular MI) | 2 | 2.9 |
| Total | 70 | 100 |

**Table 3: Analysis of clinical manifestations in post-MI cardiac failure.**

| Manifestation | Present / Elevated | % | Absent / Normal | % | Total |
|---|---|---|---|---|---|
| JVP / Edema | 50 | 71.4 | 20 | 28.6 | 70 |
| Cardiomegaly | 48 | 68.6 | 22 | 31.4 | 70 |
| PND / Orthopnea | 52 | 74.3 | 18 | 25.7 | 70 |

**Table 4: Breathlessness according to (NYHA-New York Heart Association).**

| Age (years) | I | % | II | % | III | % | IV | % |
|---|---|---|---|---|---|---|---|---|
| 21–30 | 1 | 1.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31–40 | 2 | 2.9 | 3 | 4.3 | 2 | 2.9 | 0 | 0 |
| 41–50 | 2 | 2.9 | 8 | 11.4 | 6 | 8.6 | 3 | 4.3 |
| 51–60 | 2 | 2.9 | 6 | 8.6 | 8 | 11.4 | 6 | 8.6 |
| 61–70 | 0 | 0 | 3 | 4.3 | 8 | 11.4 | 12 | 17.1 |
| Total | 7 | 10.0 | 20 | 28.6 | 24 | 34.3 | 21 | 30.0 |

**Table 5: Distribution according to Co-morbid conditions in the study group.**

| Co-morbid Condition | Yes | % | No | % | Total |
|---|---|---|---|---|---|
| Diabetes Mellitus (DM) | 41 | 58.6 | 29 | 41.4 | 70 |
| Hypertension (HTN) | 49 | 70.0 | 21 | 30.0 | 70 |
| Others (e.g., CKD, COPD) | 40 | 57.1 | 30 | 42.9 | 70 |

**Discussion**

This study provides important insights into the clinical and echocardiographic profiles, ECG patterns, and comorbid burden among patients with cardiac failure following myocardial infarction (MI). The high prevalence of systolic dysfunction (60%) observed in this cohort aligns with prior research, emphasizing that left ventricular systolic impairment remains the most significant predictor of post-MI heart failure and adverse outcomes [11]. Diastolic dysfunction (21.4%) was also common, reflecting the complex interplay between ischemic injury and myocardial stiffness, particularly in hypertensive and elderly patients [12].

Regional wall motion abnormalities (RWMA), particularly hypokinetic segments (62.9%), were frequently identified, consistent with infarct-related remodeling. Prior studies have shown that the extent of RWMA correlates closely with left ventricular ejection fraction (LVEF) and is predictive of long-term prognosis [13]. The dominance of anteroseptal and anterior infarctions on ECG suggests a predominance of left anterior descending artery involvement in this cohort — a finding

commonly associated with larger infarct sizes and worse functional recovery [14].

The clinical manifestations noted, including elevated jugular venous pressure, cardiomegaly, and paroxysmal nocturnal dyspnea, reinforce the importance of thorough bedside assessment, as these signs remain reliable indicators of volume overload and decompensation in heart failure patients. The NYHA distribution revealed that nearly two-thirds of patients were in class III or IV, underscoring the late presentation and advanced disease stage frequently seen in Indian settings, where awareness and early follow-up remain suboptimal [15].

The presence of comorbidities such as hypertension (70%) and diabetes mellitus (58.6%) further compounded the clinical complexity, as these conditions are well-known to exacerbate post-MI remodeling and impair recovery [12,14]. The high burden of other conditions like chronic kidney disease and COPD reflects the need for a multidisciplinary approach to management.

Importantly, this study highlights the need for robust preventive strategies, including strict blood pressure and glycemic control, use of guideline-directed medical therapy, timely revascularization, and structured cardiac rehabilitation programs. Prior work suggests that optimizing these measures can significantly reduce rehospitalizations and improve survival in post-MI patients [11,13,15].

**Conclusion**

Cardiac failure remains a major complication following myocardial infarction, with systolic dysfunction, regional wall motion abnormalities, and extensive ECG changes as key features. The high prevalence of comorbid conditions and advanced heart failure symptoms underscores the urgent need for improved preventive care, early detection, and aggressive secondary

prevention strategies. Strengthening patient education, medication adherence, and cardiac rehabilitation services will be critical to improving outcomes in this high-risk population.

**References**


1. Gupta R, Mohan I, Narula J. Trends in coronary heart disease epidemiology in India. Ann Glob Health. 2014;82(2):307–315.
2. Ibanez B, James S, Agewall S, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J. 2012;39(2):119–177.
3. Benjamin EJ, Muntner P, Alonso A, et al. Heart disease and stroke statistics—2019 update: a report from the American Heart Association. Circulation. 2009;139(10):e56–528.
4. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. Circulation. 2014;133(16):1605–1620.
5. McMurray JJV, Pfeffer MA. Heart failure. Lancet. 2005;365(9474):1877–1889.
6. Yancy CW, Jessup M, Bozkurt B, et al. 2017 ACC/AHA/HFSA focused update of the 2013 ACCF/AHA guideline for the management of heart failure. J Am Coll Cardiol. 2014;70(6):776–803.
7. Velazquez EJ, Morrow DA, DeVore AD, et al. Angiotensin–neprilysin inhibition in acute myocardial infarction. N Engl J Med. 2009;380(6):513–522.
8. Kumbhani DJ, Steg PG, Cannon CP, et al. Clinical outcomes after

myocardial infarction in patients with diabetes mellitus: a global perspective. Am Heart J. 2014;168(6):777–785.

9. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2014;37(27):2129–2200.
10. Anderson L, Oldridge N, Thompson DR, et al. Exercise-based cardiac rehabilitation for coronary heart disease. J Am Coll Cardiol. 2014;67(1):1–12.
11. Ndrepepa G. Myocardial infarction and heart failure: an intimate relationship. Anatol J Cardiol. 2010;24(3):153–160.
12. Paulus WJ, Tschöpe C. A novel paradigm for heart failure with preserved ejection fraction. J Am Coll Cardiol. 2013;62(4):263–271.
13. Hung CL, Verma A, Uno H, et al. Longitudinal and circumferential strain rate, left ventricular remodeling, and prognosis after myocardial infarction. J Am Coll Cardiol. 2010;56(22):1812–1822.
14. Januzzi JL, Butler J, Jarolim P, et al. Natriuretic peptide testing for heart failure. J Am Coll Cardiol. 2015;73(5):505–511.
15. Savarese G, Lund LH. Global public health burden of heart failure. Card Fail Rev. 2015;3(1):7–11.