

Right Ventricular Infarction Complicating Inferior Wall Myocardial Infarction and it's in Hospital Adverse Outcome: An Observational Study**Gourab Das¹, Rajesh Kishore Debbarma², Suman Raul³, Abhishek Bhattacharjee⁴, Manodip Mandal⁵**¹Senior Resident, Department of General Medicine, Agartala Government Medical College & Govind Ballabh Pant Hospital, Agartala, Tripura 799006²Professor, Department of General Medicine, Agartala Government Medical College & Govind Ballabh Pant Hospital, Agartala, Tripura 799006³Post Graduate Trainee, Department of General Medicine, Agartala Government Medical College & Govind Ballabh Pant Hospital, Agartala, Tripura 799006⁴Post Graduate Trainee, Department of General Medicine, Agartala Government Medical College & Govind Ballabh Pant Hospital, Agartala, Tripura 799006⁵Senior Resident Doctor, Department of General Medicine, Agartala Government Medical College & Govind Ballabh Pant Hospital, Agartala, Tripura 799006

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Conflict of interest: Nil

Abstract:

Introduction: Inferior wall myocardial infarction (IWMI) is frequently caused by right coronary artery occlusion and can often also involve the right ventricle. Right ventricular infarction (RVI) occurs in a significant proportion of these cases and is associated with worse clinical outcomes such as hemodynamic instability, arrhythmias, and increased risk of in-hospital complications such as cardiogenic shock and death. Despite its impact, RVI is often underdiagnosed in routine clinical practice. Early recognition is essential for timely intervention and improved outcomes. This observational study aims to assess the incidence of RVI in patients with IWMI and evaluate its association with in-hospital adverse events.

Aims: Aim of the present study is to assess the RV infarction in Acute Inferior Wall Myocardial Infarction patients and it's correlation on in hospital outcome.

Materials & Methods: The study was Cross sectional Descriptive type of study. This study was completed within one and half year, One Year for data collection (2023-2024) and 6 months for data management. department of medicine, Agartala Government Medical College and GB Pant Hospital. And total sample size 110 acute inferior wall myocardial infarction patients.

Result: We found that Out of the 110 patients with acute inferior wall myocardial infarction (IWMI), 53 (48.2%) had right ventricular myocardial infarction (RVMI). Arrhythmias were significantly more common in patients without RVMI (26.3%) compared to those with RVMI (3.8%). Mortality was higher in the RVMI group (11.3%) compared to the non-RVMI group (7.0%). Heart failure occurred more frequently in patients with RVMI (11.3%) than in those without RVMI (3.5%). Hypotension or cardiogenic shock was also more prevalent among patients with RVMI (30.2%) compared to non-RVMI patients (19.3%). Survival without complications was slightly lower in the RVMI group (43.4%) compared to the non-RVMI group (43.9%). Statistical analysis using the chi-square test showed a significant association between RVMI and in-hospital outcomes, with a chi-square value of 13.2225 and a p-value of 0.0102, indicating statistical significance ($p < 0.05$).

Conclusion: We concluded that patients with inferior wall myocardial infarction (IWMI) with concomitant right ventricular (RV) infarction evaluated in this observational study. 53 patients out of 110 had RV involvement (RVMI) which begets adverse outcome.

Keywords: ECG, Cardiac Function, Prognostic Factors, And Right Ventricular Infarction.

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Introduction

Approximately 40% of all acute myocardial infarction involves the inferior wall, whereas the mortality rate of an inferior wall MI is less. But several com-

plicating factors increases mortality, Such as presence of right ventricular infarction may impose a higher risk of adverse events in Inferior Wall Myo-

cardial Infarction. Patients with right ventricular involvement may have higher rates of in-hospital mortality than isolated Inferior Wall Myocardial Infarction. When the RV is involved in an inferior wall Myocardial Infarction, it is an independent predictor of major complications and lengthening hospital stay. In addition, ischemia to the conducting pathways is disrupted leading to a high degree of an atrioventricular blockade that frequently requires pacing. The mortality rates when the RV is involved are often more than 25% compared to patients without Right ventricular involvement. In addition, even after discharge, a significant number of these patients need permanent pacing within 3 years. [1] Also considering the fact that Acute Right ventricular MI is prevalent in ≈50% of patients with an acute inferior MI. A functionally-relevant acute RVMI generally requires disruption of blood flow to both the RV free wall and a portion of the interventricular septum. It typically occurs when a dominant right coronary artery is occluded proximally to the major RV branch (es), leading to reduced RV systolic function and acute RV dilation. RVMI is associated with hemodynamic compromise in 25% to 50% of patients presenting with this infarct pattern. Early mortality is highest among patients with evidence of hemodynamic compromise.

Patients with RVMI have a greater burden of arrhythmias, contributing to mortality. In one series, mortality among patients with inferior MI with RVMI was 25% to 30% compared with 6% in patients without RVMI. Although patients with inferior MI have, in general, a better prognosis than those with anterior MI, the presence of RV involvement increases the risk of death, shock, and arrhythmia.[2] Cardiovascular disease (CVD) is one of the leading cause of death across the globe. An estimated burden of the disease has been found to be 32% of all global death. The present study is to assess the RV infarction in Acute Inferior Wall Myocardial Infarction patients and it’s correlation on in-hospital outcome.

Materials and Methods

Study Design: Cross sectional type of study.

Study Setting: This study was conducted in-patients under the department of general medicine,

Agartala Government Medical College and GB Pant Hospital.

Study Period: This study was completed within one and half year, One Year for data collection (2023-2024) and 6 months for data management.

Study Population: All diagnosed patients of acute myocardial infarction admitted in medicine ward of AGMC & GBP Hospital. Out of all cases of myocardial infarction, inferior wall myocardial infarction was my study population.

Sample Size: 110 patients with acute inferior wall myocardial infarction.

Inclusion Criteria: Patients admitted with acute Inferior wall Myocardial Infarction.

Exclusion Criteria

- Pregnancy with MI.
- Patients who may deny participating in this study, not given written informed consent.

Study Parameter

- RVI
- Extent of Inferior Wall Myocardial Infarction
- Age and sex of patients

Statistical Analysis: For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while Data were entered into Excel and analyzed using SPSS and GraphPad Prism.

Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher’s exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

Result

Table 1: Association between Comorbid Condition: ECG findings

ECG					
Comorbid Condition		Acute inferior Wall MI with RVMI	Acute inferior Wall MI without RVMI	Total	p-value
Diabetes		13(24.5%)	10(17.5%)	23(20.9%)	0.1332
Dyslipidaemia		6(11.3%)	2(3.5%)	8(7.3%)	
FHO CVDs		2(3.8%)	0	2(1.8%)	
Hypertension		24(45.3%)	30(52.6%)	54(49.1%)	
No Comorbid condition		8(15.1%)	15(26.3%)	23(20.9%)	
Total		53(100.0%)	57(100.0%)	110(100.0%)	

Table 2: Association between JVP: ECG findings

ECG			
JVP	Acute inferior Wall MI with RVMI	Acute inferior Wall MI without RVMI	Total
Not Raised	13 (24.5%)	33 (57.9%)	46
Raised	40 (75.5%)	24 (42.1%)	64
Total	53 (100.00%)	57 (100.00%)	110

Table 3: Association between Outcome: ECG findings

ECG			
Outcome	Acute inferior Wall MI with RVMI	Acute inferior Wall MI without RVMI	Total
Arrythmias	2 (3.8%)	15 (26.3%)	17
Death	6 (11.3%)	4 (7.0%)	10
Heart Failure	6 (11.3%)	2 (3.5%)	8
Hypotension/Cardiogenic Shock	16 (30.2%)	11 (19.3%)	27
Survival With No Compli-cation	23 (43.4%)	25 (43.9%)	48
Total	53 (100.0%)	57 (100.0%)	110

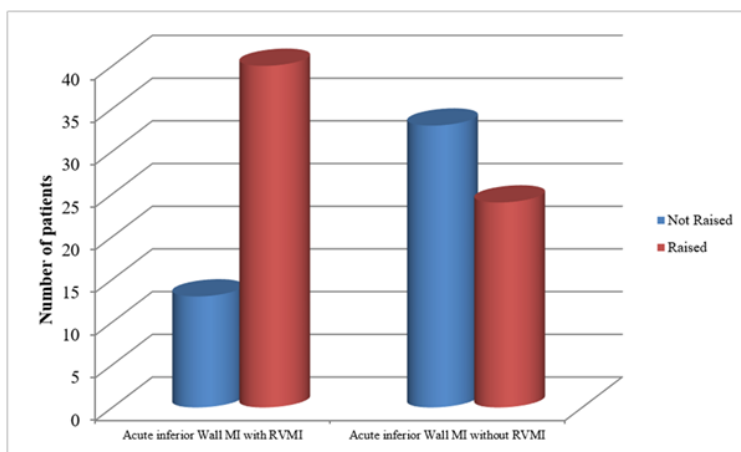


Figure 1: Comparison of Troponin Levels in Acute Inferior Wall MI Patients with and Without Right Ventricular Myocardial Infarction (RVMI)

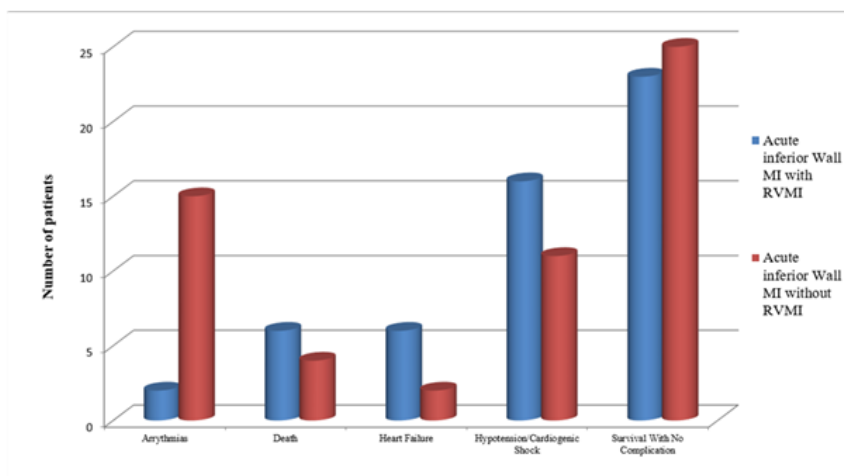


Figure 2: Comparison of In-Hospital Complications in Acute Inferior Wall MI Patients with and Without Right Ventricular Myocardial Infarction (RVMI)

We found that among the 110 patients with acute inferior wall myocardial infarction, 53 had associated

RVMI and 57 did not. In the RVMI group (n=53), diabetes was present in 13 patients (24.5%),

dyslipidemia in 6 patients (11.3%), hypertension in 24 patients (45.3%), and family history of cardiovascular disease (FHO CVDs) in 2 patients (3.8%). Eight patients (15.1%) had no comorbid conditions. In the group without RVMI (n=57), diabetes was observed in 10 patients (17.5%), dyslipidemia in 2 patients (3.5%), and hypertension in 30 patients (52.6%). No patients in this group had a family history of cardiovascular disease, while 15 patients (26.3%) had no comorbid conditions. Although some comorbidities appeared more frequently in the RVMI group, the overall difference in distribution was not statistically significant ($p = 0.1332$). Among the 53 patients with acute inferior wall MI and RVMI, 40 (75.5%) had raised JVP, while only 13 (24.5%) had normal JVP. In contrast, among the 57 patients without RVMI, raised JVP was observed in only 24 patients (42.1%), while 33 (57.9%) had normal JVP. This difference in JVP findings between the two groups was statistically significant ($p = 0.0003$), suggesting a strong association between RVMI and elevated right-sided filling pressures. Out of the 110 patients with acute inferior wall myocardial infarction (IWMI), 53 (48.2%) had right ventricular myocardial infarction (RVMI). Arrhythmias were significantly more common in patients without RVMI (26.3%) compared to those with RVMI (3.8%). Mortality was higher in the RVMI group (11.3%) compared to the non-RVMI group (7.0%). Heart failure occurred more frequently in patients with RVMI (11.3%) than in those without RVMI (3.5%). Hypotension or cardiogenic shock was also more prevalent among patients with RVMI (30.2%) compared to non-RVMI patients (19.3%). Survival without complications was slightly lower in the RVMI group (43.4%) compared to the non-RVMI group (43.9%). Statistical analysis using the chi-square test showed a significant association between RVMI and in-hospital outcomes, with a chi-square value of 13.2225 and a p-value of 0.0102, indicating statistical significance ($p < 0.05$).

Discussion

In similar study by Pradhan et al.[3](2018) found that, where 47% of IWMI patients had hypertension, without significant correlation to RV involvement. We found that Hypertension was present in 24 out of 53 (45.3%) patients with acute inferior wall MI and RVMI, compared to 30 out of 57 (52.6%) patients without RVMI. Although a higher percentage of hypertensive patients were observed in the non-RVMI group, the difference between the two groups was not statistically significant ($p = 0.1332$). This suggests that while hypertension is a common comorbidity in both groups, it does not significantly differentiate between the presence or absence of RVMI in this cohort. Therefore, hypertension may not be a key distinguishing factor between the two groups in acute inferior wall MI.

In a similar study by Srinivasan SS et al [4] (2023) found that on 200 Inferior wall MI patients with or without RV involvement found that complications such as atrial fibrillation (39%) cardiogenic shock (30%), AV blocks (25%), ICCU stays > 7 days, death (10%) significantly more in patients with RVMI (P value < 0.001). We showed that In terms of outcomes, survival without complications was notably higher in the non-RVMI group. Specifically, 44 patients (67.7%) in the non-RVMI group survived without complications, compared to only 4 patients (8.9%) in the RVMI group. This difference was statistically significant ($p < 0.0001$), highlighting that patients with RV wall motion abnormality had significantly worse in-hospital outcomes, with a much lower rate of survival without complications.

In others study by Mehta SR et al [5] observed that raised JVP was observed in 62.3% of patients with RVMI versus 14.0% in those without RVMI ($p < 0.001$). Among patients with raised JVP. We observed that In terms of jugular venous pressure (JVP), raised JVP was significantly more common in the RVMI group. Specifically, 40 patients (75.5%) with acute inferior wall MI and RVMI had raised JVP, compared to only 24 patients (42.1%) in the non-RVMI group. This difference was statistically significant ($p = 0.0003$), suggesting a strong association between raised JVP and RVMI, which reflects elevated right-sided filling pressures in patients with RV involvement.

Conclusion

We concluded that patients with inferior wall myocardial infarction (IWMI) had evaluated for right ventricular (RV) infarction in this observational study. 53 patients out of 110 had RV involvement (RVMI). Early detection relied heavily on ECG, especially right-sided leads. Significantly greater incidences of cardiogenic shock, mortality, and heart failure were linked to RVMI. Although widespread, comorbidities such as hypertension did not differ significantly. RV infarction must be promptly identified with ECG or echocardiography in order to improve in-hospital outcomes and risk classification.

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