

Incidence, Risk Factors, and Clinical Profile of Right Wall Myocardial Infarction with Inferior Wall Myocardial Infarction at a Single Tertiary Care Centre

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ABSTRACT

INTRODUCTION: Right ventricular myocardial infarction can lead to diminished right sided stroke volume with concomitant right ventricular dilatation and septal changes. The potential hemodynamic derangement associated with right ventricular infarction renders the patients unusually sensitive to diminished ventricular preload. These two circumstances can result in a severe decrease in right and, secondarily, left ventricular output resulting in a clinical triad of hypotension and jugular venous pressure distension in the presence of clear lung fields.

AIMS & OBJECTIVES: To study the incidence of RVMI in IWMI, risk factors and clinical profile of IWMI.

MATERIAL & METHODS: A total of 100 patients were taken. At the time of admission, a 16 lead ECG consisting of twelve conventional leads; and additional right precordial leads V3R, V4R, V5R, V6R were taken, risk factors and clinical features were noted.

RESULTS: Maximum number of patients in our study were in the age group 51 to 60 years (35%). IWMI was more common in males. Chest pain was most common symptom in RVMI. Hypertension was present in 40% and diabetes in 24% patients. Smoking was common risk factor in both RVI and NRVI IWMI patients. Hypotension and Kussmaul's sign was

present in about 28.5% and 10.7% patients of RVMI.

CONCLUSION: Right ventricular involvement in IWMI make the hemodynamics in these patients unstable. This explains the importance of diagnosing RVI in these patients.

KEYWORDS: Right Ventricular Infarction (RVI), Non Right Ventricular Infarction (NRVI), Right Precordial Leads (RPL)

I. INTRODUCTION

Myocardial infarction was previously thought to be a disease of mainly the left ventricle. Right Ventricular Infarction (RVI) was just a pathological entity. In 1974, for the first time, the potential serious and unique hemodynamic consequences of right ventricular infarction were described [1]. The advent of more sophisticated diagnostic techniques and more precise hemodynamic measurement has demonstrated that right ventricular infarction is well defined clinical entity and value of recognizing patients with predominant right ventricular dysfunction is related not only to instituting appropriate therapy for severe pump failure but also to avoid inappropriate therapy. It has also been shown that right ventricular infarction

occurs most commonly in association with inferior myocardial infarction or infero-posterior myocardial infarction [2,3]. Although isolated Right Ventricular Myocardial Infarction (RVMI) had been described in autopsy reports as less than 3% of all acute myocardial infarction, the incidence of right ventricular infarction associated with IWMI has been shown to be as high as 30%–50% [2,4,5]. It results primarily from occlusion of the right coronary artery and infrequently from involvement of the left anterior descending artery and occasionally in infero-posterior left ventricular infarction also [2,3]. Right ventricular myocardial infarction (RVMI) can lead to diminished right sided stroke volume with concomitant right ventricular dilatation and septal changes. The potential hemodynamic derangement associated with right ventricular infarction renders the patients unusually sensitive to diminished ventricular preload. These two circumstances can result in a severe decrease in right and, secondarily, left ventricular output resulting in a clinical triad of hypotension and jugular venous pressure distension in the presence of clear lung fields [6,7,8].

II. AIMS AND OBJECTIVES

1. To study the incidence of RVMI in patients with acute inferior wall myocardial infarction using right precordial electrocardiography.
2. To study the risk factors for IWMI.
3. To study the clinical profile of RVMI in patients of acute IWMI.

III. MATERIALS AND METHODS

This was a prospective clinical study conducted on patients between November 2020 to October 2021 admitted in Post Graduate Department of General Medicine, Govt. Medical College and Associated Hospitals, Jammu (J&K). A Total of 100 patients were taken. At the time of admission, a 16 lead ECG consisting of twelve conventional leads; and additional right precordial leads V3R, V4R, V5R, V6R

was taken. For recordings, a single channel ECG machine was used. All ECG's were recorded in 25mm/second 10 mV setting. The points on chest wall used for recordings chest leads were marked with a skin pencil so that same points could be used serially in a given patient. ECG's were also repeated whenever patient complained of chest pain. Patients were continuously monitored. The diagnosis of acute inferior wall myocardial infarction was made as typical history of chest pain, ST segment elevation in leads II, III and aVF and by development of pathological q waves in the above mentioned leads and increased serum cardiac enzymes Troponin-T. The diagnosis of right ventricular myocardial infarction was made as by the criteria of ST segment elevation of 0.1 mV or more in one or more of the right precordial leads (V3R, V4R, V5R & V6R) in those patients who satisfied the criteria for an inferior wall myocardial infarction.

Patients were classified into two groups

- Group A: Inferior wall infarction with right ventricular infarction.
- Group B: Inferior wall infarction without right ventricular infarction.

INCLUSION CRITERIA

All patients with definite evidence of acute inferior wall myocardial infarction as proved by 12 lead ECG along with right precordial leads and chest pain of duration less than 24 hours and increased serum cardiac enzymes i.e. Troponin-T, were considered in our study.

EXCLUSION CRITERIA

- History of chest pain of more than 24 h duration.
- Patients whose initial ECG's showed an anteroseptal or anterior wall myocardial infarction will be excluded because these infarctions, may produce an anteriorly oriented ST vector which may also cause ST segment elevation in the right precordial leads. For the same

reason patients with pericarditis, left bundle branch block were excluded.

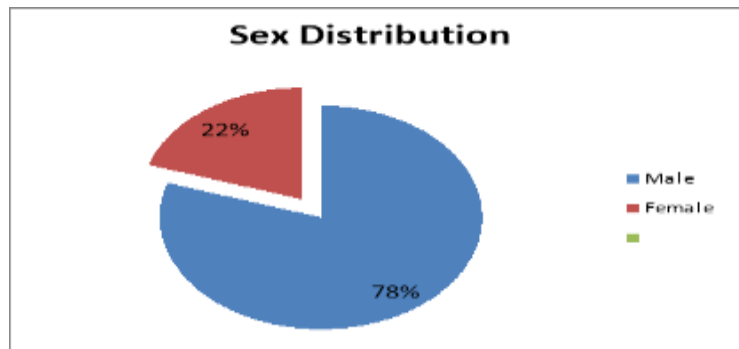
- Patients with chronic lung disease, cor pulmonale were excluded because they may be associated with a right ventricular dysfunction.
- Patients with previous history of a myocardial infarction were also excluded to avoid a false positive result for right precordial electrocardiography.

IV. RESULTS

TABLE 1: SEX DISTRIBUTION

Sex distribution	Frequency	Percentage
Male	78	78%
Female	22	22%
Total	100	100%

In this study, out of 100 patients with IWMI, 78% patients were males while 22% were females.

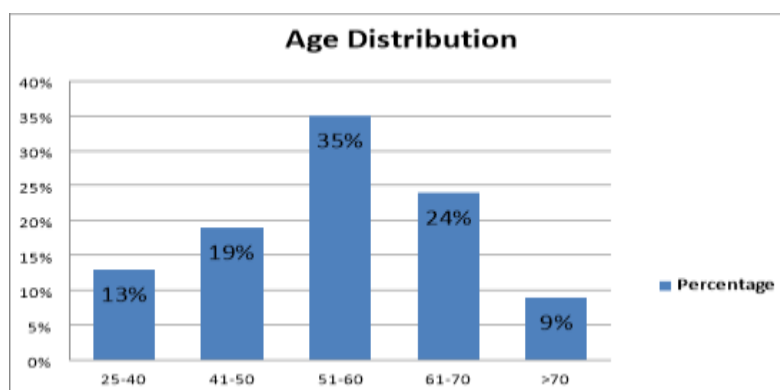


GRAPH 1; SEX DISTRIBUTION

TABLE 2: AGE DISTRIBUTION

Age distribution (In years)	Frequency	Percentage
25-40	13	13%
41-50	19	19%
51-60	35	35%
61-70	24	24%
>70	9	9%
Total	100	100%

The incidence of IWMI was more between the age group 51-60 years (35%) followed by 61-70 years (24%).

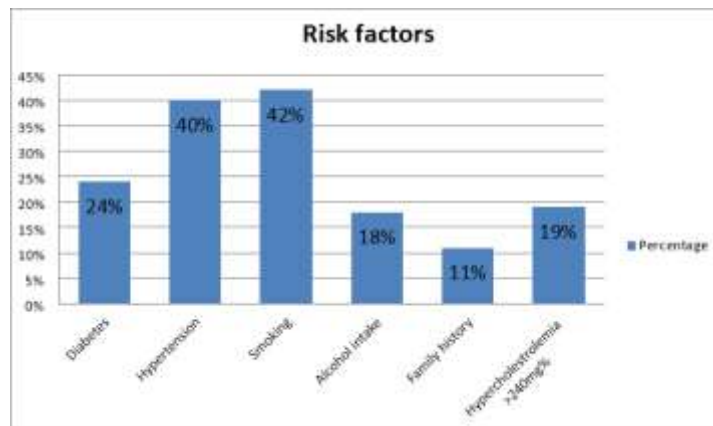


GRAPH 2: AGE DISTRIBUTION

TABLE 3: RISK FACTORS

Risk Factors	Frequency	Percentage
Diabetes	24	24%
Hypertension	40	40%
Smoking	42	42%
Alcohol intake	18	18%
Family history	11	11%
Hypercholesterolemia >240mg%	19	19%

Smoking was the major risk factor (42%), followed by hypertension (40%) and diabetes (24%).

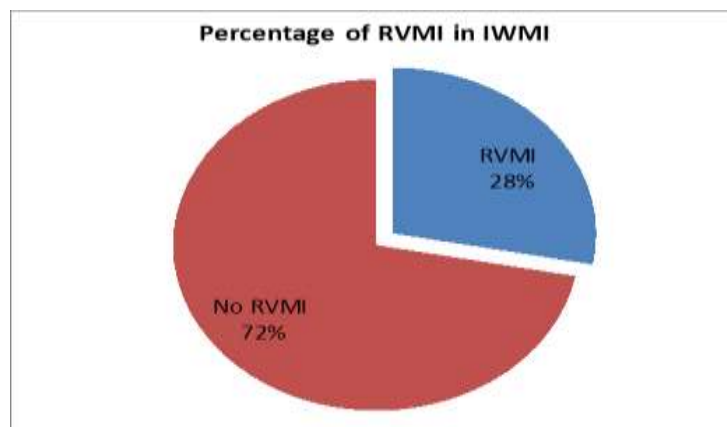


GRAPH 3: RISK FACTORS

TABLE 4: PERCENTAGE OF RVI IN INWMI

No. of cases	Frequency	Percentage
RVMI	28	28%
No RVMI	72	72%
Total	100	100%

The ECG criteria of >1mm ST elevation in RPL was seen in 28 patients out of 100 patients with inferior wall MI which showed an overall percentage of 28% in the present study.

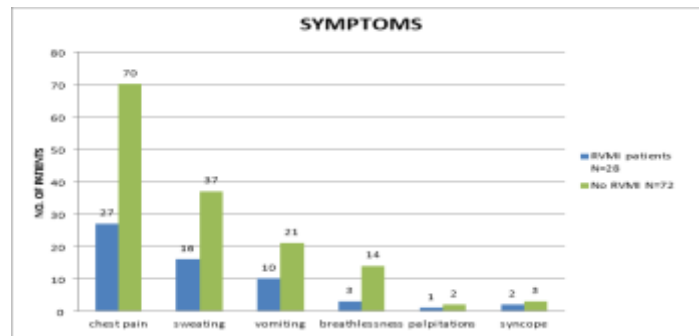


GRAPH 4: PERCENTAGE OF RVI IN INWMI

TABLE 5: SYMPTOMATOLOGY AT THE TIME OF PRESENTATION

Symptoms	RVMI		No RVMI		Total %
	N=28	%	N=72	%	
Chest pain	27	96.42	70	97.22	97
Sweating	16	57.14	37	51.38	53
Vomiting	10	35.71	21	29.16	31
Breathlessness	3	10.71	14	19.44	17
Palpitations	1	3.57	2	2.77	3
Syncope	2	7.14	3	4.16	5

The most common mode of presentation in both groups (with or without RVI) was chest pain (27 patients, 96.42% in RVI group and 70 patients, 97.22% in NRVI group). Only 1 patient with RVI and 2 patients without RVI did not have chest pain. Sweating was the next common symptom (16 patients, 57.14% in RVI and 37 patients, 51.38% in NRVI). Syncope was seen in 2 patients in RVI group and 3 patients NRVI group.



GRAPH 5: SYMPTOMATOLOGY AT THE TIME OF PRESENTATION

TABLE 6: PHYSICAL FINDINGS

Physical findings	With RVI (N=28)		Without RVI (N=72)		Total (N=100)	p-value
	N	%	N	%		
pulse						
<60	8	28.57	6	8.33	14	0.009 S
60-90	18	64.28	62	86.11	80	
>90	2	7.14	4	5.55	6	
Blood pressure						
Hypotensive SBP <90	8	28.57	5	6.94	13	0.004
Normotensive 91-140	16	57.14	50	69.44	66	
hypertensive >140	4	14.28	17	23.61	21	0.304
JVP						
elevated	11	39.28	5	6.94	16	>0.001
Kussmaul's Sign	3	10.71	0	0	3	
S3	1	3.57	4	5.55	5	
S4	1	3.57	4	5.55	5	
Murmur	1	3.57	2	2.77	3	
Basal crepts	8	28.57	5	6.94	13	
Hepatomegaly	1	3.57	1	1.38	2	
Tachypnoea	13	46.42	25	34.72	38	

V. DISCUSSION

TABLE 8: AGE OF PEAK INCIDENCE

Study	Age of Peak incidence of IWMI
Dittirich et al	75.26% in below 60 years
S. Khan et al	Mean age 56.3 (33-83 years range)
Present study	35% in 51-60 years group

S. Khan et al in 100 case of inferior wall reported 86% males and 14% Females.

In our study also, males predominated in both RVI, NRVI groups.

TABLE 9: SEX DISTRIBUTION

Study	Males	Females
S. Khan et al [2]	86%	14%
Chinnaiah et al [10]	72%	28%
Present study	78%	22%

Symptomatology

There was no difference in the 2 groups in presenting symptoms except that more number of patients with evidence of RVI had syncope (7.14%) as compared to 4.16% without RVI. Breathlessness was more common in patients without RVI (19.44%)

Risk Factors:

Smoking was the major risk factor present in both groups (42% in total). Other studies have showed a much higher incidence.

TABLE 10: SMOKING INCIDENCE

Incidence of smoking	Percentage
Masaharu I. et al [11]	90 %
Framingham study [12]	86%
Present study	42%

In our study 19% patients had hypercholesterolemia, 24% Diabetes, 40% hypertension. (Framingham study also showed hypertension in 40% in MI patients). Alcohol intake (18%) and family history (11%) were less common risk factors.

Physical Findings

Among the physical findings, hypotension was a significant finding in patients with RVI (28.57%) than without RVI (6.94%). A similar number of patients having

Bradycardia 28.57% was observed in RVI group. (8.33% in non RVI group)

TABLE 11: PHYSICAL FINDINGS

Study	Bradycardia	Hypotension
Niaki et al [13]	66 %	55 %
Braat S H et al [14]	48%	-
Present study (InRVI) group	28.57%	28.57%

Dell Italia et al (15), found elevated JVP to be 88% sensitive and yet only 69% specific for RVI with inferior infarction. Cintron et al [16], detected Kussmaul's sign in 16 of 45 patients with inferior or posterior transmural infarction. Of the 16, 9 had hemodynamically substantiated RVI. Bellamy et al [17] determined Kussmaul's sign to be 59% sensitive and 89% specific. In present study 39.28% in RVI group had elevated JVP and only 10.71% showed Kussmaul's sign. No case in patients without RVI showed it.

VI. CONCLUSION

Acute inferior wall myocardial infarction is complicated by right ventricular infarction and is a well-known entity. RVI makes the hemodynamics of the patient unstable. However elevated JVP, hypotension and bradyarrhythmia were common in these patients, although they are not fully diagnostic of the condition. This explains the importance of RVI in these patients to diagnose the condition.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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