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Original Article

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A Study of Incidence, Clinical Profile and Complications of Right Ventricular Infarction in Patients with Inferior Wall Myocardial Infarction

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ABSTRACT

Background: Study of incidence, clinical profile and complications of right ventricular infarction in patients with inferior wall myocardial infarction admitted in VIMS hospital.
Methods: It is a cross sectional study done at VIMS, Ballari, with a sample size of 100 cases. Patients who fulfilled the inclusion criteria are assessed as per proforma specifically designed for the study.
Results: Out of 100 participants with IWMI, 40 of them had RVI. Most of the cases (42.8%) of RVI occurred in the age group of 41-50 years in the RVI group. Out of 100 participants, majority (80%) were male. Only 20% were female. Incidence of risk factors was more among IWMI with RVI than IWMI without RVI and most common risk factor was smoking. Out of 40 patients diagnosed with IWMI with RVI, all presented with chest pain, 16 patients had bradycardia,4 patients presented with shock. Among patients with IWMI with RVI – 6 patients died and among IWMI without RVI, 2 patients died.
Conclusion: RVI can occur among people with IWMI in almost one-third of the cases. Identifying risk factors and preventing further progression of disease plays vital role in managing patients with cardiac diseases. Hence risk stratification plays major role in reducing mortality and morbidity associated with MI. One such factor is involvement of right ventricle, that increases the complication rate as well as mortality among patients with inferior wall myocardial infarction.

Key Words: *IWMI (Inferior wall MI); RVI (right ventricular infarction); Bradycardia*

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INTRODUCTION

Ischemic heart disease (IHD) is a condition in which there is an inadequate supply of blood and oxygen to a portion of the myocardium; it typically occurs when there is an imbalance between myocardial oxygen supply and demand [1]. IHD causes more deaths and disability and incurs greater economic costs than any other illness in the developed world Risk factors associated with MI are hypertension, diabetes, obesity, smoking, alcohol and stress ECG is most commonly used investigation to diagnose Acute MI because of its easy availability and cost effectiveness. Right ventricular MI is diagnosed by using right precordial leads RPL. Diagnosis of RVI had been made easy and economical after the introduction of RPL [2]. RVI is seen in 1/3rd of the diagnosed cases of inferior wall MI [3]. The clinical Presentation, complication and management of RVI completely differs from that of Inferior wall MI with RV infarction has significant high mortality. Hence the study was aimed to analyse incidence, clinical profile and complications associated with RVI.

OBJECTIVES

1) Primary objective – To analyse the incidence of right ventricular infarction in inferior wall myocardial infarction
2) Secondary objective – To study the clinical manifestations and complications of right ventricular infarction.

METHODOLOGY

The current cross-sectional study was conducted on patients admitted in medical wards at Vijayanagara Institute of Medical Sciences Hospital, Ballari fulfilling the 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 the duration of the chest pain of less than 24 hours) after obtaining approval and clearance from the institutional ethics committee. A total of 100 participants were selected after explaining the purpose of the study and procedure in detail and, after attaining their consent in written format for each patient. Demographic data, history, clinical examination and details of investigations were recorded in the study proforma. The history was collected by direct interview of the patient and patient relatives accompanying the patient.

Relevant investigations were done to confirm diagnosis and detection of complications. The study was conducted for a total duration of 18 months (February 2021 to August 2022). The collected Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data will be expressed in terms of proportions Quantitative data will be expressed in terms of Mean and Standard deviation Association between two qualitative variables will be seen by using Chi square/ Fischer's exact test Comparison of mean and SD within same groups will be done by using paired t test to assess whether the mean difference between groups is significant or not Descriptive statistics of each variable will be presented in terms of Mean, standard deviation, standard error of mean. A p value of <0.05 will be considered as statistically significant.

RESULTS

In the current study, out of 100 participants with IWMI, 60 were found to have RVI [TABLE 1] 40 patients (IWMI with RVI) majority (45%) of the study participants were in the age group of 51-60 years, followed by 10 participants (25%) in 41-50 years age group. >60 years were 8 and 31-40years were 4. Out of 60 participants having IWMI Without RVI majority (24%) were aged >60 years, followed by 16 in 51–61-year age group, 12 in 41–50-year age group and 8 in 31–40-year age group. (TABLE 2] Out of 100 participants, majority (80%) were male. Only 20% were female. [TABLE 3] Among 40 patients having IWMI with RVI, the risk factors observed were as follows: Diabetes (8), Hypertension (14), smoking (24), Alcohol (10), increased cholesterol levels (2) and family history of MI (18). Among 60 patients having IWMI with RVI, the risk factors observed were as follows: Diabetes (10), Hypertension (12), smoking (21), Alcohol (10), increased cholesterol levels (4) and family history of MI (12). [TABLE 4] IWMI with RVI: all the patients had chest pain (100%), sweating (90%), dyspnoea (45%), palpitation (40%), vomiting (40%), syncope (30%). IWMI without RVI: Chest pain (93%), sweating (73%), dyspnoea (40%), palpitation (23%), vomiting (23%), syncope (13%). [TABLE 5] Among patients with IWMI with RVI, 18 patients had normal pulse rate, 16 had bradycardia, and 6 had tachycardia. Blood pressure was normal among 14 patients, 18 were hypotensive and 8 were hypertensive was normal in 6 patients, elevated in 20 patients. 14 had Kussmaul sign, 8 had heart sounds (S3/S4), 8 had murmurs, 8 had basal crept and 4 patients presented with shock. Among patients with IWMI without RVI, 52 patients had normal pulse rate, 4 had bradycardia, and 4 had tachycardia. Blood pressure was normal among 46 patients, 6 were hypotensive and 8 were hypertensive was normal in 54 patients, elevated in 4 patients. 2 had Kussmaul sign, 4 had heart sounds (S3/S4), 8 had murmurs, 4 had basal crept and 2 patients presented with shock. [TABLE 6] ECG changes among IMVI with RVI: Change in 1 RPL: 2, In only 2 lead : 6, In Only 3 lead :12, In all 4 lead:20, No of patients with St elevation in RV4 : 36, Associate ST elevation in VI: 24.[TABLE 7] Among all the participants, none of them had SVT/AF. Among patients with IWMI with RVI 8 had ventricular ectopic, 4 with ventricular tachycardia, 4 with ventricular fibrillation, 19 with high degree AV block, 8 with second degree block and 16 with CHB. Among patients with IWMI with out RVI 4 had ventricular ectopic, 2 with ventricular tachycardia, 2 with ventricular fibrillation, 10 with high degree AV block, 4 with second degree block and 6 with CHB.[TABLE 8] Among patients with IWMI 70% of study participants had complicated clinical course and among IWMI without RVI , 33.33% had complicated clinical course.[TABLE 9] Among patients with IWMI with RVI – 6 patients died and among IWMI without RVI , 2 patients died.[TABLE 10]

AND TABLES

OBSERVATION AND RESULTS

Table 1: Incidence of RVI

	With RVI	Without RVI	IWMI
Incidence of RVI in IWMI	40(40.0%)	60(60.0%)	100(100.0)

Table 2: Age Incidence

Age group	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage
31-40 years	4	10	8	13.33
41-50 years	10	25	12	20.00
51-60 years	18	45	16	26.67
>60 years	8	20	24	40.00

Table 3: Sex prevalence

Gender	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage	Total no of IWMI	Percentage
Male	30	75	50	83.33	80	80
Female	10	25	10	16.67	20	20

Table 4: Incidence of Risk Factor

Risk Factor	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage	Total no of IWMI (100)	Percentage
Diabetic	8	20.0	20	33.33	28	28.0
Hypertension	14	35.0	34	56.67	48	48.0
Smoking	24	60.0	48	80.00	72	72.0
Alcohol	10	25.0	14	23.33	24	24.0
Hyper cholesterol	2	5.0	4	6.67	6	6.0
Family History	18	45.0	20	33.33	38	38.0

Table 5: Symptomology at the time of presentation

Symptoms	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage	Chi square	P value
Chest pain	40	100	56	93.33	1.98	>0.05
Perspiration	8	20	16	26.67	1.23	>0.05
Palpitation	16	40	14	23.33	1.1	>0.05
Syncope	12	30	8	13.33	0.25	>0.05
Vomiting	16	40	14	23.33	1.5	>0.05
sweating	36	90	44	73.33	0.53	>0.05
Dyspnea	18	45	24	40.00	0.67	>0.05

Table 6: Physical finding at the time of presentation

Physical findings	IWMI With RVI (40)	Percentage	IWMI Without RVI (60)	Percentage	Chi square	P value
Pulse						
Normal	18	45	52	86.67	14.21	<0.01
Bradycardia	16	40	4	6.67		
Tachycardia	6	15	4	6.67		
Blood Presure						
Normotensive	14	35	46	76.67	10.51	<0.01
Hypotensive	18	45	6	10.00		
Hypertensive	8	20	8	13.33		
JVP						
Normal	6	15	54	90.00	39.41	<0.001
Elevation	20	50	4	6.67		
Kussmaul sign	14	35	2	3.33		
Heart sound(S3/S4)	8	20	4	6.67	3.02	>0.05
Murmur	8	20	8	13.33	0.56	>0.05
Basal crept	8	20	4	6.67	3.56	>0.05
Shock	4	10	2	3.33	2.36	>0.05

Table 7: ECG finding of RVI

Change in RPLs	IWMI With RVI(40)	Percentage
Change in 1 RPL	2	5
In only 2 lead	6	15
In only 3 lead	12	30
In all 4 lead	20	50
No of patients with St elevation in RV4	36	90
Associate ST elevation in VI	24	60

Table 8: Arrhythmias and conduction block

Nature of Arrhythmias	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage	Chi square	P value
AF	0	0	0	0		
Ventricular ectopic	8	20	4	6.67	1.82	>0.05
Ventricular tachycardia	8	20	4	6.67	1.05	>0.05
ventricular fibrillation	4	10	2	3.33	0.14	>0.05
High Degree AV block	19	47.50	10	16.67	9.24	<0.05
2nd degree block	8	20	4	6.67	1.05	>0.05
CHB	16	40	6	10.00	3.25	>0.05

Table 9: Clinical course of patients

Clinical course	IWMI With RVI(40)	Percentage	IWMI Without RVI(60)	Percentage
Complicated	28	70	20	33.33
Uncomplicated	12	30	40	66.67

Table 10: Comparison of mortality with and without RVI

	No of patients (100)	Percentage	Death	Percentage
With RVI	40	40	2	2
Without RVI	60	60	6	6

DISCUSSION

In the current study, Out of 60 participants having IWMI without RVI Majority(24%) were aged >60 years, followed by 16 in 51-61 year age group, 12 in 4150 year age group and 8 in 31-40 year age group. Out of 100 participants, majority (80%) were male. Only 20% were female. Among 40 patients (IWMI with RVI) majority (45%) of the study participants were in the age group of 51-60 years, followed by 10 participants (25%) in 41-50 years age group. >60 years were 8 and 31-40years were 4.Out of 100 participants, majority (80%) were male. Only 20% were female. The mean age of the patients was 52.05 years. Most of the cases (42.8%) of RVI occurred in the age group of 41-50 years in the RVI group compared to non-RVI that was commonly (75%) seen in the age group of 61-70 years. In the study conducted by Ali H et al, 74% were males. Among the 740 male patients in their study, 260 (35%) had RVI, while only 100 of the 260 females (38%) had evidence of RVI [4].

In a study conducted by Khandait H et al 52, he mentioned that the mean age of patients was 56.07±10.91years with 3:2 male preponderance which is in line with findings of previous similar studies conducted by Khan S53 and Memon AG54. Among 40 patients having IWMI With RVI, the risk factors observed were as follows: Diabetes (8), Hypertension (14), smoking (24), Alcohol (10), increased cholesterol levels (2) and family history of MI (18). Among 60 patients having IWMI With out RVI, the risk factors observed were as follows: Diabetes (10), Hypertension (12), smoking (21), Alcohol (10), increased cholesterol levels (4) and family history of MI (12). Therefore, incidence of risk factors was more among IWMI with RVI than IWMI without RVI. Ali H et al51, in their study mentioned that, the total number of patients with diabetes was 320, out of which 120 patients (37.5%) had an RVI. The total number of non-diabetic patients was 680, out of which 240 patients (35.2%) had RVI. From the total number of RVI cases of IWMI, the occurrence of RVI was higher in diabetic patients as compared to non-diabetic patients. Khandait V et al52 mentioned in their study that 58 (38.7%) were smokers and 28 (18.7%) were alcoholic, with significant difference between male and female patients. This was similar to observations made by Khan IS et al53 and Iqbal A et al [5].

IWMI with RVI: all the patients had chest pain (100%), sweating (90%), dyspnoea (45%), palpitation (40%), vomiting (40%), syncope(30%). IWMI without RVI: Chest pain (93%), sweating (73%), dyspnoea (40%), palpitation (23%), vomiting (23%), syncope(13%). Ardia, and 6 had tachycardia. Blood pressure was normal among 14 patients, 18 were hypotensive and 8 were hypertensive. JVP was normal in 6 patients, elevated in 20 patients. 14 had Kussmaul sign, 8 had heart sounds (S3/S4), 8 had murmurs, 8 had basal crepition and 4 patients presented with shock.

Among patients with IWMI without RVI, 52 patients had normal pulse rate, 4 had bradycardia, and 4 had tachycardia. Blood pressure was normal among 46 patients, 6 were hypotensive and 8 were hypertensive.JVP was normal in 54 patients, elevated in 4 patients. 2 had Kussmaul sign, 4 had heart sounds (S3/S4), 8 had murmurs, 4 had basal crepitations and 2 patients presented with shock.

All the above mentioned symptoms and clinical findings were more among IWMI with RVI that IWMI without RVI. This difference was found to be statistically significant. Among patients with IWMI 70% of study participants had complicated clinical Course and among IWMI without RVI, 20% had complicated clinical course Similar observations were made by studies conducted by Ali H et al51 and Khandait V et al [6]

Among patients with IWMI with RVI – 6 patients died and among IWMI without RVI, 2 patients died. Almost similar observations were made by other studies: Khandait V et al [6] reported that, of the total 22 (14.67%) deaths in the present study (12%) had associated RVMI and 4 (2.66%) isolated IWMI, which was statistically significant.

Ravikeerthy M et al 7, out of 50 cases of acute IWMI mortality rate was 15% in patients with associated RV infarction (RVMI) and 3.33% in isolated inferior wall MI (IWMI). George et al [7], found mortality rate to be 12% in patients with inferior wall myocardial infarction and significantly higher at 28% in patients having right ventricular involvement in inferior wall myocardial infarction cases. Memon AG et al54, reported more than double in-hospital mortality in RVMI Group as compared to without RVMI.

CONCLUSION

RVI can occur among people with IWMI in almost one-third of the cases. Identifying risk factors and preventing further progression of disease plays vital role in managing patients with cardiac diseases. Hence, risk stratification plays major role in reducing mortality and morbidity associated with MI. One such factor is involvement of right ventricle, that increases the complication rate as well as mortality among patients with inferior wall myocardial infarction.

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