Right Ventricular Function in Inferior Wall Myocardial Infarction: case study

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***Abstract :** Acute myocardial infarction (MI) involving only the right ventricle is an uncommon event. Right ventricular myocardial infarction has been an independent predictor of major complications and mortality. Electrocardiogram (ECG) through right precordial leads (V_4R) is a useful & convenient tool of diagnosing right ventricular infarction. Standard surface ECG by using V_4R could aid clinical recognition of concomitant right ventricular infarction in patients with inferior wall myocardial infarction. Increasing age, male sex & previous history of ischemic heart disease were found to be important risk factors for the occurrence of right ventricular infarction.*
***Keyword:** electrocardiography, inferior wall myocardial infarction, myocardial infarction, right ventricular function. Myocardial performance index, Tricuspid annular motion*

I. Introduction

Inferior wall of the heart is formed by both left ventricle and right ventricle. In about 50 percent of the patient with inferior wall myocardial infarction [1, 2, 3], the right ventricle is involved. Recognition of right ventricle infarction is important because of its various hemodynamic consequences. Presence of right ventricular myocardial infarction may enforce an increased risk of shock, arrhythmia and death in inferior wall myocardial infarction [4]. The increased risk is related to the presence of right ventricle involvement itself rather than the extent of left ventricular myocardial damage [5]. Inferior wall myocardial infarction patients with right ventricular infarction comprises a high risk subset of patient with a mortality rate as high as 25 to 30 % as opposed to an overall mortality rate of approx 6 % of patients with inferior myocardial infarction without right ventricular infarction. Occlusion of proximal dominant RCA is usually responsible for right ventricular infarction in inferior wall myocardial infarction [6].

Right ventricular function has not widely been studied after a MI unlike a LV function. There is right ventricular involvement in more than $1/3^{rd}$ of patients with acute inferior wall myocardial infarction. Right ventricle involvement has been reported to be an independent predictor of major complications and in hospital mortality after acute MI [7]. ST segment elevation in right precordial lead, V_4R is one of the most reliable echocardiographic signs of acute right ventricular infarction. ECG is one of the major diagnostic tool being cost effective and easily available. A hypokinetic or akinetic segment of RV observed by ECG can also be used to detect RV dysfunction after right ventricular infarction. The presence of ST segment elevation on leads II, III, and AVF on ECG are always suggestive of RVI [8, 9]. The present study has been made to estimate the correlation using clinical examination and surface ECG.
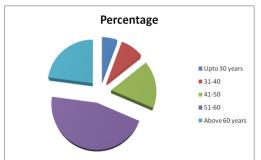
II. Materials and Methods

35 patients, 80 % male and 20% females with inferior wall myocardial infarction admitted to Department of Medicine and Cardiology, RIMS, Ranchi during October 2012 to September 2013 and 10 control subjects were selected for the present study. The patients were subjected to ECG and Echo examination. inferior wall myocardial infarction was diagnosed by the presence of ST segment elevation >1 mm in lead V4R were used as the main criteria for the diagnosis of right ventricular infarction.

The data analysis was done by sstatistical software SPSS (19.0)

III. Results And Discussion

In our study the mean age of the patient 54 ± 12 years. More than 50 patient were among 50-60 age group. The age distribution is given in figure 1.

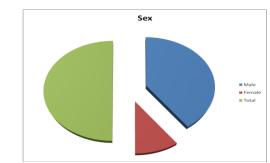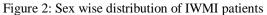Figure 1: Age wise distribution of IWMI patients

Figure 2: Sex wise distribution of IWMI patients

ECG revealed changes of RVMI in 32 patients (91.42%) with inferior wall myocardial infarction.

TABLE 1: ECG finding of RVI

Changes in RPL's	Study cases	
	Number (35)	Percentage
Changes in one RPL	2	5.7
In only two leads	5	14.3
In only 3 leads	10	28.57
In all 4 leads	18	51.43
No. of patients with ST elevation in RV4	31	88.57
Associate ST elevation in V1	21	60

In electrocardiographic evaluation of the inferior wall myocardial infarction patients, it was being found that 31 patients (88.57 %) of the total patients had ST elevation in V_4R lead and 21 patients (60 %) had ST elevation in V1 chest lead. Patients having ST elevation in all the four leads were 18 (51.43 %), having ST elevation in three leads constitutes 28.57 %, 5 patients had ST elevation in two leads and 2 patients (5.7 %) had ST elevation in only one RPL
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Table 2: Rv Dimensions

Para-meter	Group A			Group B			'P'
	Range	Mean	Std. Dev.	Range	Mean	Std. Dev.	
RV base	2-4.4	3.29	0.49	2.2-2.8	2.48	0.22	0.0001 Significant
RVLA	5.2-8.9	7.18	0.82	7.4-7.8	7.57	0.18	0.2284 Not Significant
RV EDA	10.4-23.7	14.4	2.7	15-18	17.1	1.1	0.0008 Significant
RV ESA	4.82-14.01	8.9	2.25	8-10	8.9	0.74	0.8057 Not Significant
RV FAC	19.3-57.9	38.1	10.7	46.7-50	48	2.33	0.0049 Significant
RV WT	3-7	4.37	0.84	0.3-0.4	0.38	0.004	0.0001 Significant

The difference in right ventricular infarction dimensions between group A and B were statistically significant in case of RV base (P value 0.0001), RV EDA (P value 0.0008), RVFAC (P value 0.0049, RV free wall thickness (P value 0.0001) and not significant in case of RV long axis (P value 0.2284) and RV ESA (P Value0.8057) (Table 13) .In our study the dimension of RV base is 3.29 ± 0.49, RVLA is 7.18 ± 0.82, of RV EDA is 14.4 ± 2..7 , RV ESA is 8.9 ± 2.25 , RV FAC is 38.1 ± 10.7 and RV WT is 4.37 ± 0.84 in inferior wall myocardial infarction patients.

Abnormalities in wall motion was seen in 29 patients (82.8%) in group A; while all the subjects in group B showed normal wall motion of the right ventricle. The difference in wall motion between the two groups was statistically significant (P value 0.0001) [Table 2]. Paradoxical motion of the interventricular septum was not seen in both groups .In our study the patient with inferior wall myocardial infarction the 25 patients (71.4%) have hypokinetic right ventricle wall motion and 4 patients (11.4%) have akinetic wall motion of RV.The remaining 6 patients (17.1%) have normal right ventricle wall motion.

TABLE 3: RV Wall Motion

Wall Motion	Group A		Group B	
	Number	Percentage	Number	Percentage
Hypokinetic	25	71.4	-	-
Akinetic	4	11.4	-	-
Normal	6	17.1	10	100
Total	35	100	10	100
'p'	0.0001 (Significant)			

IV. Conclusion

Our study also shows an increased prevalence of MI in patients aged > 40 years (85%).Patients aged 40-59 yrs constitutes 63 % of the total patients similar to the western and national picture . 80% of our patients are males. The most common symptom of any patient presenting with MI is central chest pain lasting >20 minutes. In our study, significant reduction in TAM is seen in inferior wall myocardial infarction patients compared to healthy individuals. This is probably an expression of decreased right ventricle function along the long axis in inferior MI. We conclude that many of our patients with inferior wall myocardial infarction have significant impairment of right ventricle function.

Echocardiography helps one to identify such patients easily and to treat them immediately. As discussed such patients have a decreased tricuspid annular motion, tricuspid annular velocity and right ventricle MPI compared with normal healthy individuals. This probably reflects a reduced right ventricle function after right ventricle infarction. So we conclude that an immediate echocardiography can help us to identify and treat such patients with right ventricle involvement and thereby to reduce the morbidity and mortality.

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