

Echocardiographic and Angiographic Profile of Patients with Lateral Wall MI ECG Presentation in Inferior Wall MI (A Comparison Study)

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Abstract

Original Research Article

Background: Patient with lateral wall changes in inferior wall MI usually ignored most often. Patients with inferolateral MI show very diverse clinical presentations as compared to inferior wall MI without lateral MI ECG changes of inferolateral MI in comparison to inferior wall MI without lateral wall ECG changes. **Materials and methods:** This study enrolled 405 patients admitted to cardiology emergency with inferior wall MI. Patients divided into three groups on the basis of ECG changes, A) inferolateral B) isolated inferior wall MI C) inferior wall MI with RVMI. Patients with RVMI (group C) excluded from the group. Electrocardiographic, echocardiographic, angiographic outcomes compared between group A and B. **Results:** More than 1/3 rd patient with inferior wall MI have associated lateral wall changes. STEMI equivalent changes in anterior leads noted in around 2/3 rd patients. LV dysfunction seen in around 47.5% of the patient of inferolateral wall MI, which is significantly higher in comparison to 9% patients in inferior wall MI. Culprit lesion in inferolateral MI most often found to be left circumflex coronary artery. Multivessel lesion in inferolateral MI in 36.8% patients, which is significantly higher as compared to inferior wall MI without lateral wall ECG changes (i.e. 11.4% patient). **Conclusion:** Patient with inferolateral MI have grave prognosis due to higher incidence of LV dysfunction, multivessel involvement and mitral regurgitation. Culprit lesion is most often left circumflex artery. So meticulous attention should be given to patients with lateral wall MI changes in inferior wall MI for better treatment strategy.

Keywords: Lateral wall MI, LV systolic function, regional wall motion abnormality, left circumflex Artery, Multivessel disease.

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INTRODUCTION

It is commonly accepted that the heart is located in the thorax strictly in a posteroanterior position; However present day CMR imaging reveals that heart sits on diaphragm in a slightly oblique right-to-left line. So it is postulated that RS pattern in V1 is accounted for by lateral and not inferobasal MI (classically posterior MI). At present newly revised AHA definition of lateral wall MI includes prominent R wave in leads in V1, V2 along with ST elevation in lead I, avL and /or V5, V6. As a result horizon of lateral wall expanded with new definition [1, 2]. However lateral wall MI ECG changes all most commonly seen and most often ignored, when it has very dynamic impact on outcome of inferior wall MI. So study of echocardiography and angiographic profile very essential in the above group.

MATERIALS AND METHODS

Type of study – Prospective longitudinal case control study.

Place of study – VIMSAR, Burla.

Period of study – 15th December 2019 to 15th April 2020.

Inclusion criteria – inferior wall STEMI patient below 18yrs.

Total 427 patients with Inferior wall STEMI below 18years in admitted to VIMSAR, Burla enrolled in the study. Out of 427 patients 22 patients having associated anterior wall AMI (old), congenital heart disease, valvular heart disease, malignancy, chronic kidney disease, chronic lung disease, chronic liver disease, severe anaemia and patients with age more than 80 years are excluded. Consent taken from the patients enrolled in the study.

Out of 405 patients, 137 patients have ST elevation (I,avL),(V5,V6),(V7,V8,V9) or Q wave

equivalent with ST depression in V1,V2 (i.e lateral wall MI) included in group A. 157 patients have ST elevation V3R,V4R (RVMI) associated with inferior wall MI included in group C. 111 patients have inferior wall MI without lateral wall MI or RVMI ECG changes included in group B. Patients RVMI (group C) were excluded from the study.

ECG done 6hrly in every patient or as per the requirement needed. All patients routinely undergone echocardiography within 24hr of admission and parameters like EF, RWMA are taken into account. Patient with inferior wall MI are divided into groups (EF >50%-normal, EF 40-50%-mild, EF 30-39% moderate, EF <30% severe). Severity of LV dysfunction between two groups compared statistically. Incidence and pattern of RWMA compared between two groups. Number of lesions, culprit vessel noted in Patient undergoing angiography. To avoid confusion while finding the culprit vessel, single vessel disease

lesion taken into account for the study. Incidence of multivessel disease compared statistically between two groups.

STATISTICAL ANALYSIS

P value derived by comparing proportion of patients of two group statistically. P value <0.05 is significant.

Ethical approval – Ethical clearance taken from ethical committee

RESULTS

1) Out of 405 patients, it was seen 111 patients (27.4%) have isolated inferior wall MI, 137 patients (33.8%) have lateral wall MI associated with inferior wall MI, 157 patients (38.7%) have associated RVMI (Fig.1).

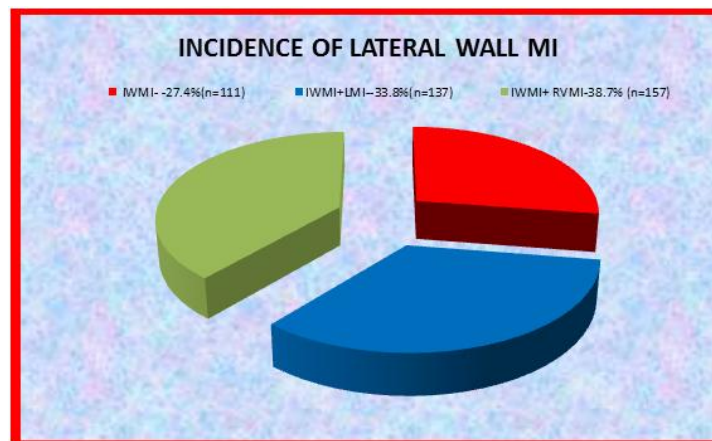


Fig-1: Incidence of lateral ami

2) In patients with lateral wall MI (137 patients), ST elevation in V5,V6 or Iavl seen in 47 patients (35%), ST depression with Qwave equivalent

seen in 63 patients (45.9%) and E.C.G changes in both group of leads found in only 26 (18.9%) patients (Fig.2).

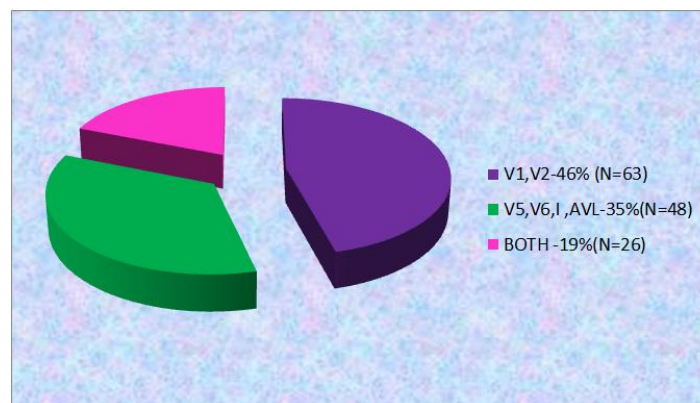


Fig-2: Distribution of lateral wall mi among ecg leads (n=137)

3) Around 66 (45.9%) patients in group-A have mild to moderate LV systolic dysfunction, whereas in group B around 10 (9%) patients have mild to moderate LV dysfunction. (Table 1) Mean EF in group A is

48±8.9 as compared group B 52 ±10.2 with p value 0.0011. Incidence of mitral regurgitation is significantly high in inferolateral group (Table 2).

Table-1: Comparison of systolic function in inferolateral mi and inferior wall mi

EF (%)	IWMI+LMI		IWMI		P VALUE
	(nos)	(%)	(nos)	(%)	
>50	71	51.8	101	90.9	<.0001
40-49	41	29.9	9	8.1	<.0001
30-39	22	16.0	1	0.9	<0.001
<30%	3	2.1	0	0	CANT BE COMPARED

Table-2: Comparison of mechanical complication in inferolateral mi and inferior wall mi

	INFEROLATERAL MI		INFERIOR WALL MI		P VALUE
	No.	%	No.	%	
MITRAL REGURGITATION	8	5.8	1	0.9	0.0396
VENTRICULAR SEPTAL RUPTURE	1	0.72	0	0	NS
PERICARDIAL EFFUSION	13	9.4	4	3.6	NS
LV ANEURYSM	0	0	0	0	NS

5) 70.8% patients with group A have shown RWMA in LCX territory as compared to group B

(16.2%) patient in group B with p value <0.001. (Table 3)

Table-3: Relation between rwma & association of lateral wall mi

RWMA	RCA TERRITORY		LCX TERRITORY		NO RWMA	
	nos	%	nos	%	nos	%
IWMI+LMI	36	26.2	97	70.8	4	2.9
IWMI	85	76.5	18	16.2	8	7.3
P VALUE	<0.001		<0.001		0.1094(NS)	

6) Angiography done in 109 patients out of 137 patients in group A, whereas 96 patients out of 111 patients in group B undergone angiography. It is observed that SVD found in 63.2% (n=69) patients in group A as compared 88.6% (n=85) patients in group B.

However most astonishing observation is that, multiple vessel disease in group A is 36.8% (n=40) patients which is significantly higher as compared to group B i.e. 11.4% (n=11) patients. (Table 4)

Table-4: Comparison of numbers of vessels affected in inferolateral ami & inferior wall ami

NUMBER OF CORONARY VESSEL EFFECTED	IWMI+LMI		IWMI ONLY		P-VALUE
	(nos)	(%)	(nos)	(%)	
SVD	69	63.2	85	88.6	<0.001
DVD	22	20.2	7	7.26	0.0076
TVD	18	16.6	4	4.16	>0.001

7) When SVD taken into account, LCX is main culprit artery in 69% (n=48) patients in inferolateral MI (Group A), where as in inferior wall MI (Group B) RCA is the main culprit artery in 83% (n=71) patients. (Table 5)

Table-5: Culprit vessel in inferior and inferolateral mi -a comparison study

CULPRIT VESSEL	LCX		RCA	
	(NOS)	(%)	(nos)	(%)
IWMI+LMI	48	69.5	21	30.4
IWMI	14	16.4	71	83.5
P-VALUE	<0.0001		<0.0001	

DISCUSSION

In our study, lateral wall MI present in 33.8% patients with inferior wall MI. ST-depression with Q-wave equivalent seen in v1, v2 around 46 % patients.

ST elevation in leads like I, aVL and V5, V6 seen in around 35% patients. Lateral wall ECG changes in both group of leads i.e. v1, v2, v5, v6, I, aVL seen in 18.9 % of patient with inferolateral MI. Peterson *et al.* found out that 38.9% patients with inferior wall MI have ST depression in V1 & V2[3]. Whereas our studies found out to be 36.2%. Adawi and Atar *et al.* studied in inferior wall MI that, 68 (57%) patients had inferior wall ECG changes only, and 51 (42.8%) patients had inferior with lateral wall involvement (i.e. leads I, AVL and/or V5-V6)[4]. However inclusion criteria for both the above study are different. Our study included STEMI equivalent in V1V2 in addition lead I, AV1 and V5, V6, which is not included in the adawiatar *et al.* study.

Mean EF of inferolateral MI patients at the time of presentation also significantly lower as compared to inferior wall MI (group B). 51.9 % of

patient of inferolateral MI have normal systolic function, 29.8 % patients have mild LV systolic dysfunction, 16 % have moderate LV dysfunction and 2.1% have severe LV dysfunction. On the other hand in inferior wall MI only 9 % patients have LV dysfunction, out of which 8.1 % patients have mild LV dysfunction & 0.9% Patients has mod LV dysfunction. No patients in inferior wall MI (group B) have any form of severe LV dysfunction. So it is concluded that patients with inferior wall MI (group B) rarely have mod to severe LV dysfunction. Also it is seen that, our findings are consistent with findings of other studies. Oraii, Maleki-etal have also found out that patient with tall R wave in V1, V2 with inferior wall MI have lower EF, more complications and increased in hospital mortality [5]. Matetzky *et al.* found high peak creatinine kinase (with p value less than 0.02), lower LVEF at hospital discharge ($p < 0.008$) [6] in patient with posterior wall motion abnormality during radionuclide angiography [6].

In our study, we have found more incidence of mitral regurgitation with statistical significance. Adawi and Atar *et al.* found that, inferolateral MI patient have higher incidence significant MR, which coincide to finding in our study [4]. The cause of MR may be due to more incidence of posteromedial papillary muscle rupture or dysfunction as a result of single blood supply to it. As more area of myocardium are jeopardised in inferolateral MI group leading to abnormal contraction pattern, LV dilation & subsequently papillary muscle are displacement, which may be an explanation for MR.

Out of 109 patients of inferolateral MI, 96 patients underwent angiography. To avoid confusion while finding the culprit vessel, SVD lesion taken into account for the study. It is seen that, LCX is the culprit lesion in 69.5 % patients with inferolateral MI. However RCA is the culprit lesion in 83.5 % inferior wall MI patients. Kulkarni-*et al.* observed in his study that ST elevation in lateral and posterior leads was most frequently seen during LCX inflation but ST elevation in inferior leads alone was not seen in LCX inflation [7].

Surprisingly it is seen that 36.8 % of patient in group-A have more than 1 vessel disease as compared to 11.4% in group-B with statistical significance ($p < 0.001$). These findings are more consistent with finding of Birnbaum-etal, who found that, ST-depression in anterior precordial leads in inferior wall MI are associated with more incidence of multivessel disease [8]. Also Peter B. Berger- etal found that 25 patients out of 53 patients with acute inferior infarction accompanied by ST depression in anterior leads have multivessel disease [9].

LV dysfunction, mitral regurgitation and multivessel involvement lead to complications like LVF, cardiogenic shock, arrhythmia. Eric. D. Peterson

found out in his study that patients with lateral wall changes in V1,V2 have more post infraction complications like CHF or shock and higher mortality as compared to patient without ST-depression in V1,V2 [3]. So patient with lateral wall ECG changes presents with more incidence cardiovascular complications and mortality as compared to inferior wall MI without lateral wall ECG changes.

CONCLUSION

Around 1/3 rd patients with inferior wall STEMI have ECG changes of lateral wall AMI. STEMI equivalent in lead V1,V2 which was previously ignored in other studies, constitute about 2/3rd of entity. Around half of the Inferolateral MI patients have LV systolic dysfunction. LCX is main culprit artery, but multivessel disease seen in more than 1/3rd cases, which is comparatively higher indicating grave prognosis. As patient's presents with LV dysfunction, multivessel disease and mitral regurgitation, so it has grievous impact on clinical outcome. Meticulous attention should be given to the ECG changes in lateral leads in inferior wall MI to increase the efficacy of emergency management strategy. Limitation of Study: Small number of patient studied. Further subgroup analysis required in inferolateral MI.

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