



ELECTROCARDIOGRAPHIC PREDICTORS OF MORTALITY IN ACUTE INFERIOR WALL ST ELEVATION MI PATIENTS

Cardiology

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ABSTRACT

Introduction- Outcome in Acute Inferior wall ST elevation MI (IWMI), as often expected, is not always good. Despite many studies on ECG parameters predicting poor outcome, direct head-to-head comparison of these parameters are lacking. This study was conducted to identify the prognostic significance of various ECG parameters in predicting mortality as a vital part of non-invasive evaluation prior to taking the patient to cath-lab. **Methods-** The study was prospective, observational based with 204 admitted patients of acute IWMI revascularized by either primary PCI or pharmaco-invasive strategy. Patients were assessed for ECG and other non-invasive parameters in relation to occurrence of death during hospital stay and at follow-up of one month. **Results-** Mean age was 57.98 ± 9.022 years with 164 (80.4%) males and 40 (19.6%) females. In-hospital mortality occurred in 20 patients (9.8%); mortality during follow up was noted in 4 out of 184 surviving patients. Among the non ECG parameters, only female gender, Killip grade of > 2 and mean LV Ejection Fraction $< 50\%$ were found to have significant association with in-hospital mortality. On ECG, ST elevation (avR), absolute sum of ST-depression (V1-V6) > 0.8 millivolt (s-STDV1-V6 > 0.8 mV), lateral wall involvement and presence of ventricular tachycardia/fibrillation were associated significantly with increased mortality during hospital stay while only s-STDV1-V6 > 0.8 mV had association with death during follow-up. Logistic regression analysis revealed female gender and s-STDV1-V6 > 0.8 mV as independent predictors of mortality during hospital stay. **Conclusion-** Acute IWMI patients with admission ECG finding of s-STDV1-V6 > 0.8 mV represents increased mortality during hospital stay and at follow-up of one month.

KEYWORDS

Acute Inferior wall MI, ECG, avR, primary PCI

INTRODUCTION

Inferior wall Myocardial Infarction [MI] has long been considered to have relatively better prognosis compared to anterior wall MI. But it is often marked as a diverse group with varying prognosis, particularly when it is associated with right ventricular MI (RVMI), Lateral wall MI, various tachy or bradyarrhythmia, where Inferior wall MI can cause poor outcome. In such circumstances, prompt recognition of high risk groups is of prime importance to avert the possible poorer outcome.¹ ECG is a cheap, easily available and less time consuming tool for detecting such high risk groups. Unfortunately, in the modern era of aggressive intervention facilities, ECG, apart from diagnosing is seldom used for prognostication. Various ECG parameters had been studied in the past with respect to detecting poor outcome groups in Inferior wall MI.^{2, 3, 4} But studies concerning direct head to head comparison of these parameters in relation to outcome are relatively lacking particularly in this part of the country. With this aim in view, this study was conducted to study the various ECG predictors of mortality in Inferior wall MI patients which could be of immense benefit especially in low infrastructure settings. Such application of ECG could also facilitate early mobilisation of high risk groups to equipped centres. Further, in well equipped centres, before mobilising the patient to cath lab, such predictors could help us to know beforehand the patients who may require close monitoring and precautionary measures to avert the probable complications.

MATERIALS AND METHODS

The study was a prospective, observational study conducted in the Department of Cardiology, Silchar Medical College and Hospital, Silchar, Assam over a period of one year between 2023- 2024 after clearance from the Ethical Committee. 204 number of admitted patients presenting with Inferior wall MI including either sex and belonging to any age group were included in the study. Inferior Wall ST Elevation Myocardial Infarction was selected according to the guidelines stated by the Joint European Society of Cardiology (ESC)/American College of Cardiology Foundation (ACCF)/American Heart Association (AHA)/World Heart Federation (WHF)

Task Force. Exclusion criteria included the patients who were unwilling to participate or those with Non ST Elevation MI/ Unstable angina/associated anterior wall MI, late presentation outside the window period, history of previous MI, percutaneous coronary intervention (PCI), and/or coronary artery bypass grafting (CABG), other cardiac diseases including heart failure, cardiomyopathy, valvular heart disease, previous documented LBBB/ Atrial Fibrillation, pericardial diseases, suspected Pulmonary Embolism or Pulmonary Hypertension, prior history of pacemaker/ other CIED implantation or other serious co-morbid illness. All the patients received guideline directed therapy for MI including pharmaco-invasive or primary PCI. Patients presenting within OPD timings were taken for primary PCI; other patients considered eligible for reperfusion and without contraindications to fibrinolysis were administered fibrinolytic therapy with Tenecteplase as per weight based dosing regimen followed by invasive procedures within 3-24 hours. Patients with high grade/complete atrio-ventricular block not reverted with medical therapy were considered for pacemaker support (temporary or permanent in case of persistent block beyond 2 weeks). Patients were evaluated in relation to mortality during hospital stay and at follow up for one month. Demographic parameters were assessed in relation to age, sex, Body mass index, presence of risk factors like Hypertension, Diabetes, smoking history and dyslipidemia. Killip class, Jugular Venous Pressure, presence of third/fourth hearts sounds were also assessed in each patient.

ECG- Standard 12-lead and right precordial leads along with posterior leads (V7, V8, V9) ECGs were recorded in all the patients at a paper speed of 25 mm/s and a voltage of 10 mm/mV at the time of admission, then every 6 hours for 2 consecutive days, then daily till discharge. The following ECG parameters in relation to mortality during hospital stay and at follow up of 1 month were assessed. (1) ST elevation was recorded in millimetres at 60 ms beyond the J-point from the lead in which maximum elevation was observed. ECG monitoring was done after administration of Tenecteplase (TNK). ST resolution was observed in the lead with the maximum ST elevation. Successful

resolution was defined as a reduction of $>50\%$, and failed resolution as reduction of $<50\%$ in ST elevation 180 minutes post thrombolysis. (2) the absolute sum of magnitude of ST-segment depressions was measured in all precordial leads V1-V6 of 12-lead ECG at 60 ms after J point with an accuracy of 0.5 mm. (3) ST segment changes (elevation or depression) in lead avR were measured manually at 60 ms after the J point, and a magnitude of 1 mm was considered significant. The magnitude of ST segment changes in lead avR was relative to the TP segment as a baseline. (4) In addition, other parameters looked for in ECG were presence of sinus tachycardia, high grade / complete AV block, Atrial Fibrillation, Ventricular tachycardia/fibrillation or bundle branch block, presence of associated lateral wall MI/RVMI. Inferior wall MI with right ventricular involvement was identified as ST-segment elevation in II, III and aVF with additional elevation of ST in lead V3R/V4R/V5R/V6R ≥ 1 mm; while inferior wall MI with lateral extension was selected as ST-segment elevation in II, III and aVF with concomitant RS in V1-V2 and/or Q wave in leads I, aVL and/or V5 and V6 and/or diminished R wave in V6.

Statistical Analysis

Statistical analysis was performed using SPSS for Windows version 22 (SPSS Inc., Chicago, IL). Data were expressed as mean $\pm$ SD (Standard Deviation) and as number (percentage) for continuous and categorical variables respectively. Difference in proportion in individual adverse clinical findings was compared through Mann-Whitney U test. $P < 0.05$ has been considered statistically significant. Univariate analysis was first performed to identify plausible factors affecting in hospital mortality and deaths at 1 month follow-up using either the two-sided Student's t-test or Pearson Chi-square χ^2 test, as appropriate. All variables with a p-value of < 0.05 from univariate analysis were subjected to multivariate logistic regression analysis to determine the independent predictors of mortality. A p-value of < 0.05 was considered statistically significant. Hazard ratio (HR) and 95% confidence interval (CI) were calculated by multivariate logistic regression model.

RESULTS

In the present study the age of the patients ranged from 32 to 79 years with majority belonging to 51-60 years age group (47.1%). The mean age of the patients in the study was 57.9804 ± 9.022 years. Out of 204 patients studied, 164 (80.4%) were males and 40 (19.6%) were females. Among the risk factors, Diabetes was the most common, seen in 90 patients (44.1%), followed by dyslipidemia, (seen in 86 patients-42.2%), smoking history (in 76 patients-37.3%) and Hypertension in 36 patients (17.6%). Among the symptoms studied in the patient population, chest pain was the most common, seen in 200 patients (98.04%), followed successively by sweating, seen in 112 patients (54.9%), nausea/vomiting seen in 52 patients (25.49%), shortness of breath seen in 44 patients (21.57%), and palpitation in 36 patients (17.65%). Syncope/ pre-syncope were the least common manifestation seen in 14 patients (6.86%). In hospital mortality was observed in 20 patients (9.8%), while mortality during follow up was noted in 4 patients out of 184 surviving patients under follow up. There were no statistically significant association between mortality and demographic profile, risk factors, clinical findings and type of treatment received. Comparison of baseline demographic parameters, clinical parameters, LVEF (%) and type of treatment received with mortality is outlined in Table 1. Based on type of treatment received, ECG parameters were compared as shown in Table 2. Table 3 outlined the comparison of ECG parameters with in-hospital mortality while comparison of ECG parameters with mortality at follow-up was shown in Table 4. ECG variables selected in the study did not differ significantly between the two treatment arms. Out of ECG parameters, ST changes in avR (in the form of ST elevation/depression), higher magnitude of the absolute sum of ST depression in V1-V6 of more than 0.8 millivolt, lateral wall involvement and presence of ventricular tachycardia/fibrillation were associated significantly with increased mortality during hospital stay irrespective of treatment received. Further, ECG finding of higher magnitude of the absolute sum of ST depression in V1-V6 of more than 0.8 millivolt was associated with poor outcome in the present study. On applying multinomial logistic regression it was found that female gender and SUM OF ST Depression V1-V6 ≥ 0.8 mV were significant as independent predictors of mortality during hospital stay. This has been outlined in Table 5

DISCUSSION

This study, which investigated in Acute Inferior wall MI, the

comparison of electrocardiographic changes with mortality during hospital stay and during 1 month follow up provided several striking clinical implications. Mean age of the study population was 57.9804 ± 9.022 years. Similar findings were observed by Mehta et al.⁵ Males and females comprised of 80.4% and 19.6 % of the study population respectively. Mortality was noted in 20 patients (9.8%) which is comparable to other studies.⁶ Out of 40 females in the study population, 10 female patients (25%) died during hospital stay. While a relatively minor proportion of male patients (10 males out of total 164, accounting to 6.097%) succumbed during hospital stay and this gender difference in relation to hospital mortality was found statistically significant. This may be explained by increased incidence of MI in females of older age and older age itself is a risk factor. Also females often have other underlying risk factors like hypertension, diabetes. Also, significant association was noted between higher Killip grade of ≥ 2 and lower ejection fraction with mortality. This might be due to increased severity of the disease with higher Killip grade. As stated by the ACC/AHA guidelines 2013⁷, echocardiography parameter (LV ejection fraction) early after MI is helpful in estimating prognosis. Similarly, in the present study, low mean LVEF (%) was associated significantly with increased occurrence of mortality. There was no significant difference noted between the ECG variables across the two treatment arms. irrespective of treatment received, ST changes in avR (in the form of ST elevation/depression), higher magnitude of the absolute sum of ST depression in V1-V6 of more than 0.8 millivolt, lateral wall involvement and presence of ventricular tachycardia/fibrillation were associated significantly with increased mortality during hospital stay. In patients who died, lead avR showed ST elevation being more common followed by ST depression. This highlights the importance of lead avR as a prognostic marker with both ST elevation and depression indicating poor outcome. Similar results have been shown by many studies.⁸ ST elevation in lead avR is often due to multi-vessel involvement as outlined in such studies. Kukla et al.⁴ and Kosuge et al.⁹ in their study concluded that such changes could indicate impaired tissue perfusion and larger infarct area leading to poor outcome despite adequate epicardial coronary flow. The ECG finding of higher magnitude of the absolute sum of ST depression in V1-V6 of more than 0.8 millivolt associated with poor outcome in the present study correlates with the results shown by Peterson et al.¹⁰ - they observed that the cumulative sum of ST depression in precordial leads was independently associated with poorer short term and long term outcome; Sum of ST depression in V1-V6 of more than 0.8 millivolt was associated with significantly high poorer outcome and higher mortality of 7.5%. Precordial ST depression could be due to underlying multi-vessel disease or left anterior descending artery involvement¹¹ or profound sub-endocardial ischemia. In the present study presence of ST depression was not found to be associated with mortality. Hence it can be said that cumulative sum of ST depression in precordial leads is more important than with presence of precordial ST depression alone. Also lateral wall extension is also importantly associated with in hospital mortality as seen in the present study. Similar result has been found by Panda et al.¹² Lateral wall involvement is mainly due to left circumflex occlusion [LCX] and such lesions are associated with poor outcome as outlined by Rasoul et al.¹³, Chen et al.¹⁴, Sohrabi et al.¹⁵. Finally, multinomial logistic regression analysis was performed to identify the independent predictors of mortality; female gender and higher absolute sum of ST depression in V1-V6 of more than 0.8 millivolt were found to be statistically significant independent predictors of mortality.

CONCLUSION

Patients presenting with acute Inferior wall MI with an admission ECG finding of higher magnitude of the absolute sum of ST depression in V1-V6 of more than 0.8 milli volt represent high risk group with increased occurrence of mortality during hospital stay and at follow up of one month.

Limitations

- As this was a single center study conducted at an urban healthcare facility with a relatively small sample size, the findings cannot be generalized.
- Lack of randomization or control design in the present study.
- In this study, detail on coronary angiography findings and revascularization strategies was not recorded as this was beyond the scope of the study.
- All cause deaths were mentioned; deaths related to extracardiac cause were not recorded.

Table 1: Comparison Of Baseline Demographic Parameters, Clinical Parameters, LVEF(%) And Treatment Received With Mortality

PARAMETERS		IN HOSPITAL MORTALITY PRESENT	IN HOSPITAL MORTALITY ABSENT	STATISTICAL SIGNIFICANCE
SEX	MALE	10	154	The chi-square statistic is 12.9934.
	FEMALE	10	30	The p-value is .0003126. Significant
AGE GROUP	<40	0	8	Chi-square statistic is 1.5178.
	41-50	2	28	The p-value is .8235.
	51-60	10	86	Not significant
	61-70	6	44	
	71-80	2	18	
HYPERTENSION	Yes	2	34	Chi-square statistic is 0.8922.
	No	18	150	The p-value is 0.3449. Not significant
DIABETES MELLITUS	Yes	10	80	Chi-square statistic is 0.3112.
	No	10	104	The p-value is .5769. Not significant
HISTORY OF SMOKING	Yes	8	68	Chi-square statistic is 0.07148.
	No	12	116	The p-value is 0.7892. Not significant
DYSLIPIDEMIA	Yes	10	76	Chi-square statistic is 0.5594.
	No	10	108	The p-value is .4545. Not significant
KILLIP CLASS	I	2	128	Chi-square statistic is 31.8904.
	II	10	30	The p-value is 5.519e-7.
	III	2	14	Significant
	IV	6	12	
RAISED JVP OR PRESENCE OF HEPATOJUGULAR REFLUX	Yes	11	67	Chi-square statistic is 2.6389.
	No	9	117	p-value is 0.1043. Not significant
MEAN AGE IN YEARS		60.8 ± 8.39	57.67 ± 9.08	Mann Whitney U 379.500, Wilcoxon W 4657.500, Z score -.907, p value .364, Non Significant
MEAN BMI [kg/m2]		23.73 ± 3.07	24.43 ± 1.75	Mann Whitney U 379.500, Wilcoxon W 434.500, Z score -.906, p value .365, Non Significant
MEAN HEART RATE [beats/minute]		117 ± 56.34	70.25 ± 32.43	Mann-Whitney U-431.000, Wilcoxon W-4436.000, Z score 1.501, p value- 0.133, Non Significant
MEAN SYSTOLIC BLOOD PRESSURE [mm Hg]		93.10 ± 16.79	111.67 ± 16.78	Mann Whitney U 88.000, Wilcoxon W 4183.000, Z score -.054, p value 0.957, Non Significant
MEAN DIASTOLIC BLOOD PRESSURE [mm Hg]		64.80 ± 9.62	75.15 ± 9.57	Mann Whitney U 89.000, Wilcoxon W 4184.000, Z score -.024, p value 0.979, Non Significant
MEAN LVEF (%)		48.10 ± 4.15	52.34 ± 4.93	Mann Whitney U 271.000, Wilcoxon W 326.000, Z score -2.142, p value .032, Significant
TREATMENT RECEIVED	Primary PCI	8	59	Chi-square value is 0.5149.
	Pharmaco-invasive	12	125	The p-value is 0.473. The result is not significant

Table 2: Comparison Of ECG Parameters Between Two Treatment Groups

ECG parameters		Primary PCI	Pharmaco-invasive	STATISTICAL SIGNIFICANCE
ST CHANGES IN avR	Elevation	12	24	Chi-square value is 0.01016
	Depression	9	19	The p-value is 0.9949.
	No change	46	94	The result is not significant
PRECARDIAL ST DEPRESSION IN V4-V6	Yes	14	34	Chi-square value is 0.3847.
	No	53	103	The p-value is 0.5351, Not significant
ST ELEVATION IN RIGHT PRECORDIAL LEADS	Yes	13	19	Chi-square value is 1.042.
	No	54	118	The p-value is 0.3073. The result is not significant
LATERAL WALL EXTENSION	Yes	12	24	Chi-square value is 0.004762.
	No	55	113	p-value is 0.945, Not significant
SUM OF ST Depression V1-V6	< 0.2 m V	13	47	Chi-square value is 5.1987.
	0.2 to < 0.5 m V	18	26	The p-value is 0.1578.
	0.5 to < 0.8 m V	17	45	The result is not significant
	> 0.8 m V	9	29	
ATRIAL FIBRILLATION	Yes	2	8	Chi-square value is 0.7864.
	No	65	129	p-value is 0.3752. Not significant
BUNDLE BRANCH BLOCK	Yes	0	4	Chi-square value is 1.9953.
	No	67	133	p-value is 0.1578. Not significant
SINUS TACHYCARDIA	Yes	11	21	Chi-square value is 0.04038.
	No	56	116	p-value is 0.8407. Not significant
HIGH GRADE/ COMPLETE AV BLOCK	Yes	20	44	Chi-square value is 0.1073.
	No	47	93	p-value is 0.7432. Not significant

VENTRICULAR TACHYCARDIA/ FIBRILLATION	Yes	7	12	Chi-square value is 0.1519. The p-value is 0.6967. The result is not significant
	No	60	125	

Table 3: Comparison Of ECG Parameters With In-hospital Mortality

ECG PARAMETERS		IN HOSPITAL MORTALITY			STATISTICAL SIGNIFICANCE
		YES	NO	TOTAL	
ST CHANGES IN avR	ELEVATION	10	26	36	Chi-square value is 35.4107. The p value is 2.045 e-8. The result is significant
	DEPRESSION	8	20	28	
	NO CHANGE	2	138	140	
	TOTAL	20	184	204	
ST SEGMENT RESOLUTION POST THROMBOLYSIS	FAILED	5	35	40	Chi-square value is 0.9892. The p-value is .3199. The result is not significant
	SUCCESSFUL	7	90	97	
	TOTAL	12	125	137	
PRECORDIAL ST DEPRESSION IN V4-V6	YES	8	40	48	Chi-square value is 3.3431. The p-value is 0.06749. The result is not significant
	NO	12	144	156	
	TOTAL	20	184	204	
ST ELEVATION IN RIGHT PRECORDIAL LEADS	YES	4	28	32	Chi-square value is 0.312. The p-value is 0.5765. The result is not significant
	NO	16	156	172	
	TOTAL	20	184	204	
LATERAL WALL EXTENSION	YES	8	28	36	Chi-square value is 7.6236. The p-value is .005761. The result is significant
	NO	12	156	168	
	TOTAL	20	184	204	
SUM OF ST Depression V1-V6	< 0.2 m V	2	58	60	Chi-square value is 39.8274. The p-value is 1.159 e-8. The result is significant
	0.2 to < 0.5 m V	0	44	44	
	0.5 to < 0.8 m V	4	58	62	
	> 0.8 m V	14	24	38	
ATRIAL FIBRILLATION	YES	0	10	10	Chi-square value is 1.143. The p-value is 0.285. The result is not significant
	NO	20	174	194	
	TOTAL	20	184	204	
BUNDLE BRANCH BLOCK	YES	0	4	4	Chi-square value is 0.4435 The p-value is 0.5054 The result is not significant
	NO	20	180	200	
	TOTAL	20	184	204	
SINUS TACHYCARDIA	YES	4	28	32	Chi-square value is 0.312. The p-value is 0.5765. The result is not significant
	NO	16	156	172	
	TOTAL	20	184	204	
HIGH GRADE/ COMPLETE AV BLOCK	YES	4	60	64	Chi-square value is 1.332; The p-value is 0.2484. The result is not significant
	NO	16	124	140	
	TOTAL	20	184	204	
VENTRICULAR TACHYCARDIA/ FIBRILLATION	YES	7	12	19	Chi-square value is 17.3213. The p-value is 0.00003156. The result is significant
	NO	13	172	185	
	TOTAL	20	184	204	

Table 4: Comparison Of ECG Parameters With Mortality At Follow-up

ECG PARAMETERS		MORTALITY AT 1 MONTH			STATISTICAL SIGNIFICANCE
		YES	NO	TOTAL	
ST CHANGES IN aVR	ELEVATION	2	24	26	Chi square value is 4.5083, p-value is 0.105, The result is not significant
	DEPRESSION	0	20	20	
	NO CHANGE	2	136	138	
	TOTAL	4	180	184	
ST SEGMENT RESOLUTION POST THROMBOLYSIS	FAILED	2	38	40	Chi square value is 1.9195, p-value is 0.1659, The result is not significant
	SUCCESSFUL	2	142	144	
	TOTAL	4	180	184	
PRECORDIAL ST DEPRESSION IN V4-V6	YES	2	38	40	Chi square value is 1.9195, p-value is 0.1659, The result is not significant
	NO	2	142	144	
	TOTAL	4	180	184	
ST ELEVATION IN RIGHT PRECORDIAL LEADS	YES	0	28	28	Chi square value is 0.7339, p-value is 0.3916, The result is not significant
	NO	4	152	156	
	TOTAL	4	180	184	
SUM OF ST DEPRESSION V1-V6	< 0.2 m V	0	56	56	Chi square value is 27.2593, p-value is 0.000005195, The result is significant
	0.2 to < 0.5 m V	0	46	46	
	0.5 to < 0.8 m V	0	58	58	
	> 0.8 m V	4	20	24	
LATERAL WALL EXTENSION	YES	2	26	28	Chi square value is 3.8343, p-value is 0.05021, The result is not significant
	NO	2	154	156	
	TOTAL	4	180	184	
ATRIAL FIBRILLATION	YES	0	10	10	Chi square value is 0.235, p-value is 0.6278, The result is not significant
	NO	4	170	174	
	TOTAL	4	180	184	
BUNDLE BRANCH BLOCK	YES	0	4	4	Chi square value is 0.09086, p-value is 0.7631, The result is not significant
	NO	4	176	180	
	TOTAL	4	180	184	

SINUS TACHYCARDIA	YES	2	26	28	Chi square value is 3.8343, p-value is 0.05021, The result is not significant
	NO	2	154	156	
	TOTAL	4	180	184	
HIGH GRADE/COMPLETE AV BLOCK	YES	0	60	60	Chi square value is 1.9785, p-value is 0.1595; The result is not significant
	NO	4	120	124	
	TOTAL	4	180	184	
VENTRICULAR TACHYCARDIA/ FIBRILLATION	YES	1	11	12	Chi square value is 2.2901, p-value is 0.1302; The result is not significant
	NO	3	169	172	
	TOTAL	4	180	184	

Table 5: Result Of Multinomial Logistic Regression Analysis In Determining Independent Predictors Of In-hospital Mortality

Variable	Coefficient	Standard Error	p-value	Odds Ratio	95% Confidence Interval
FEMALE GENDER	-1.6522	0.7020	0.0186	0.1916	(0.0484, 0.7587)
KILLIP CLASS OF GRADE> /=2	0.3125	0.3840	0.4158	1.3668	(0.6440, 2.9008)
ST CHANGES IN avR	0.5623	0.5580	0.3136	1.7547	(0.5878, 5.2383)
LATERAL WALL EXTENSION	0.0487	0.9101	0.9573	1.0500	(0.1764, 6.2495)
SUM OF ST Depression V1-V6	0.2367	0.0793	0.0028	1.2671	(1.0847, 1.4803)
VENTRICULAR TACHYCARDIA/ FIBRILLATION	1.4472	0.9021	0.1086	4.2513	(0.7256, 24.9099)
LVEF (%)	-0.0694	0.1138	0.5422	0.9330	(0.7464, 1.1662)
Constant	-0.9432	6.4796	0.8843		

REFERENCES

- Berger PB, Ryan TJ. Inferior myocardial infarction. High-risk subgroups. *Circulation* 1990;81:401-11.
- Clinical outcomes after inferior myocardial infarction J Nasmith, D Marpole, D Rahal, J Homan, S Stewart, A Sniderman Ann Intern Med . 1982 Jan; 96 (1):22-6. doi: 10.7326/0003-4819-96-1-22.98
- Occurrence of Anterior ST Depression in Inferior Myocardial Infarction and Relation to Clinical Outcome J. HERLITZ, A. HJALMARSSON. Clin. Cardiol. 10, 529-534 (1987)
- Kukla P, Bryniarski L, Dudek D, et al. Prognostic significance of ST segment changes in lead aVR in patients with acute inferior myocardial infarction with ST segment elevation. *Kardiologia Pol* 2012; 70(2):111-8
- Impact of Right Ventricular Involvement on Mortality and Morbidity in Patients With Inferior Myocardial Infarction Shamir R, Mehta, John W. Eikelboom, Madhu K. Natarajan, Journal of the American College of Cardiology Vol. 37, No. 1, 2001 by the American College of Cardiology ISSN 0735-1097/01
- Kennedy JW, Martin GV, Davis KB et al. The Western Washington intravenous streptokinase in acute myocardial infarction randomized trial. *Circulation*, 1988; 77: 345-352.
- 2013 ACC/AHA Guideline for the Management of ST-Elevation Myocardial Infarction .A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2013;61(4):e78.
- Kukla et al, Beyranvand et al. The Relationship of ST Segment Changes in Lead aVR with Outcomes after Myocardial Infarction; a Cross Sectional Study. *Emerg (Tehran)*. 2017; 5 (1):e73. Epub 2017 Jun 30.
- Kosuge M, Kimura K, Ishikawa T et al. ST-segment depression in lead aVR predicts predischarge left ventricular dysfunction in patients with reperfused anterior acute myocardial infarction with anterolateral ST-segment elevation. *Am Heart J*, 2001;142: 51.
- Prognostic significance of precordial ST segment depression during inferior myocardial infarction in the thrombolytic era: results in 16,521 patients . E D Peterson, W R Hathaway, K M Zabel, K S Pieper, C B Granger, G S Wagner, E J Topol, E R Bates, M L Simoons, R M Califf. *J Am Coll Cardiol* . 1996 Aug;28(2):305-12. doi: 10.1016/0735-1097(96)00133-7.
- Prognostic Significance of Precordial ST Segment Depression on Admission Electrocardiogram in Patients With Inferior Wall Myocardial Infarction. *JACC* Vol.28, No.2, August 1996:313-8
- Echocardiographic and Angiographic Profile of Patients with Lateral Wall MI Ecg Presentation in Inferior Wall MI (A Comparison Study) Sibaram Panda & Sunil Kumar Sharma; *Sch J App Med Sci*, Nov, 2020; 8(11): 2573-2577
- Rasoul S, de Boer MJ, Suryapranata H, Hoortje JC, Gosselink AT, Zijlstra F, et al. Circumflex artery-related acute myocardial infarction: Limited ECG abnormalities but poor outcome. *Neth Heart J* 2007;15:286-90.
- Chen YL, Hang CL, Fang HY, Tsai TH, Sun CK, Chen CJ, et al. Comparison of prognostic outcome between left circumflex artery-related and right coronary artery-related acute inferior wall myocardial infarction undergoing primary percutaneous coronary intervention. *Clin Cardiol* 2011;34:249-53.
- Difference between Outcome of Left Circumflex Artery and Right Coronary Artery Related Acute Inferior Wall Myocardial Infarction in Patients Undergoing Adjunctive Angioplasty after Fibrinolysis. Bahram Sohrabi, Ahmad Separham, Reza Madadi, Mehroush Toufan, Nasibeh Mohammadi, Naser Aslanabadi, Babak Kazemi. *J Cardiovasc Thorac Res*, 2014, 6(2), 101-104 doi: 10.5681/jcvtr.2014.022http://journals.tbzmed.ac.ir/jcvtr