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Echocardiographic Predictors of Early Inhospital Heart Failure During First St-Elevation Myocardial Infarction

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KEYWORDS

NEED FOR THE STUDY

Acute Myocardial infarction (AMI) is a significant public health problem on increase in developing countries

Heart failure(HF) following AMI is a leading cause of cardio-vascular(CVS) mortality and morbidity

Echocardiography was introduced in clinical practice in 1970 and it rapidly grew in popularity once its outstanding abilities to diagnose valve disease and assess left ventricular function was established, it is most widely used advanced imaging technique in cardiovascular system as it allows rapid non in-vasive assessment of cardiac structure and function in a wide variety of hospital settings

An increasing no of studies have reported the use of several indices like the ejection fraction(EF) left atrial volume index(LA-VI) and diastolic indices like E/A ratio,deceleration time(DT)in predicting early in-hospital failure in patients with ST elevation myocardial infarction

Hence the study to analyze the role of left atrial volume com-pared to other conventional parameters of systolic and diastol-ic left ventricular function in patients with first ST elevation MI in predicting early heart failure

OBJECTIVE OF THE STUDY

- TO ANALYZE THE ROLE OF LEFT ATRIAL
- VOLUME COMPARED TO OTHER
- CONVENTIONAL PARAMETERS OF
- SYSTOLIC AND DIASTOLIC LEFT
- VENTRICULAR FUNCTION IN PATEINTS
- WITH FIRST TIME ST ELEVATION
- MYOCARDIAL INFARCTION, IN PREDICTING
- EARLY CONGESTIVE HEART FAILURE
- DURING IN-HOSPITAL EVOLUTION BY
- ECHOCARDIOGRAPHY

MATERIAL AND METHODS

The present hospital based study was carried out in basave-shwar teaching and general hospital attached to M R Medical college

- The study period was from JAN 2014 to MAY 2015
- Sample size :100
- 61 patient were enrolled in the study on approval from the institutional ethical committee
- will be preformed within 1 week of chest pain in 61 pa-tients with first ST elevation MI admitted to basaveshwar teaching and general hospital attached to M R Medical college
- Several Clinical and Echocardiographic Variables will be analyzed

ECHOCARDIOGRAPHY VARIABLES:

- A Comprehensive 2D Color Doppler Echo will be per-formed in all patients with above inclusion criteria
- The various indices used to predict early in hospital fail-ure on Echo will be determined by a single observer throughout the study
- The various indices were calculated on Echo using the
- M mode to determine the various indices
- The following parameters were done to establish the
- CHF
- LVEF: The ejection fraction was calculated using the sipmson method
- EDV-ESV/EDV*100 On M mode
- LA volume: The Left Atrial volume was calculated by the 2 Dimensional 4 chamber view by simps**on's** method
- E/A RATIO and Deceleration time(DT):
- ¢ *Mitral diastolic inflow velocities at the tip of leaflets
- * LV systolic outflow curves obtained just below aortic valve
- ¢ Using these following were calculated
- E/A ratio diastolic velocities
- Deceleration time of early diastolic filling(DT)
- Left ventricular end diastolic volume(LVED)
- Left ventricular end systolic volume(LVES)
- Patients will also be clinically defined as per KILLIP clas-sification

KILLIP CLASSIFICATION

1. No clinical signs of heart failure(KILLIP CLASS I)
2. Rales or crackles in lungs,S3, raised JVP
3. Frank pulmonary Edema
4. Cardiogenic shock or hypotension(peripheral vasocon-striction, BP<90mmhg, oliguria)

All case were interviewed ,examined and investigated accord-ing to pre designed Performa

INCLUSION CRITERIA :

- Patients age of Adult age
- Characteristic chest pain>20 min
- ¢ ST elevation> 1mm in at least 2 contiguous leads
- ¢ Transient rise in CPKMB

EXCLUSION CRITERIA:

- Non ST elevation MI
- Early reinfarction
- In- hospital Death
- Previous Coronary Bypass
- Valvular heart disease
- Congenital heart disease
- LBBB
- Chronic heart failure

PARAMETERS FOR ASSESSMENT

- The following statistical tests will be performed
- All results are expressed as Mean + one SD.
- Two samples will be compared by Mann Whitney rank sum test or unpaired **'t'te**st
- For Qualitative data Chi square test or **Fischer"s** exact test will be applied
- To find correlation between patients with Heart failure and Echocardiographic parameters ,Linear regression will be applied.

FOLLOWING INVESTIGATIONS DONE……!!!

- Blood examination: –Hb%, Total count ,Differential count, ESR.
- Serum creatinine ,Blood urea
- Blood sugars
- -Fasting
- -Post prandial
- Creatine Phosphokinase (CPKMB):
- Fasting Lipid Profile
- .Urine examination:- Albumin,sugar,microscopy
- . Electrocardiography: 12 Lead ECG
- . Radiological examination: Chest Xray PA view:
- .2D Echocardiography and color doppler

OBSERVATIONS AND RESULTS

A total of 61 patients were included in the study, who were admitted in Basaveshwar hospital kalaburgi,during the study period.

A total of 170 Acute coronary syndrome patients were admitted,82 patients presented as ST elevation myocardial infarction(STEMI),59 patients were Non ST elevation myocardial infarction(NSTEMI) and 29 patients presented as unstable angina(UA). 82 patients presented as STEMI, out of which 61 patients were included in our study, 21 were excluded. Of the 21 excluded patients, 15 patients died in hospital,1 patient had reinfarction, 3 patients had a left bundle branch block and 2 patients did not undergo echocardiography.

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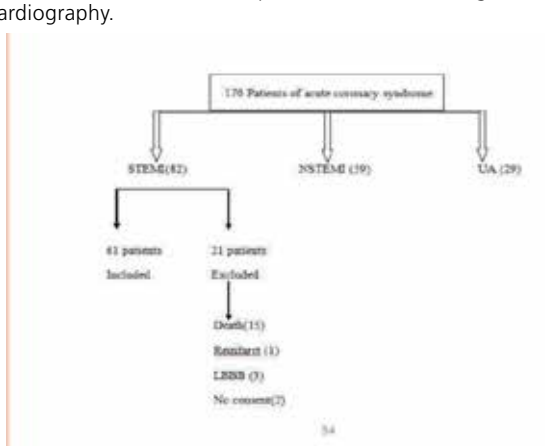
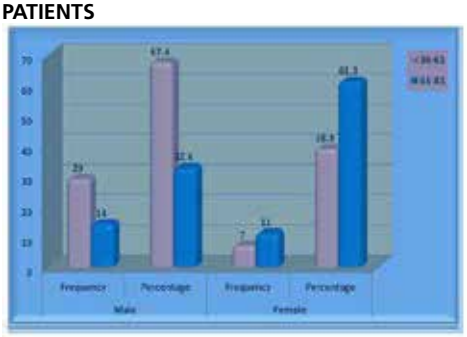


ôAGE AND SEX DISTRIBUTION OF PATIENTS



From the above table and graph, in our study of the total 61 patients 43 (70.4%) were male patients and 18(29.6) were female patients.

There were 36 patients in the age group of 36-60 years with 29 of them being male and 7 being females and 25 of patients were in age group of 60-80years and 14 of them being male and 11 being female.

ôCLINICAL VARIABLES ACCORDING TO ABSENCE OR PRESENCE OF HF

		HF PRESENT		HF ABSENT		P-VALUE
		NO.OF PATIENTS	PERCENTAGE (%)	NO.OF PATIENTS	PERCENTAGE	
HTN	Present	05	62.5	03	37.5	
	Absent	20	37.7	33	62.3	0.254
Location	Anterior	24	52.5	22	47.8	
	Inferior	01	6.7	14	93.3	0.001*
Diabetis Mellitus	Present	18	64.2	10	35.8	
	Absent	07	21.2	26	78.8	<0.0001*
		Mean	Standard deviation	Mean	Standard deviation	
Age (years)		64.12	9.3	52.97	11.00	<0.0001
CKMB		72.12	15.08	52.802	12.92	<0.0001*

From above Table, in our study ,there was no significant association between HTN and heart failure with a p value of 0.254,

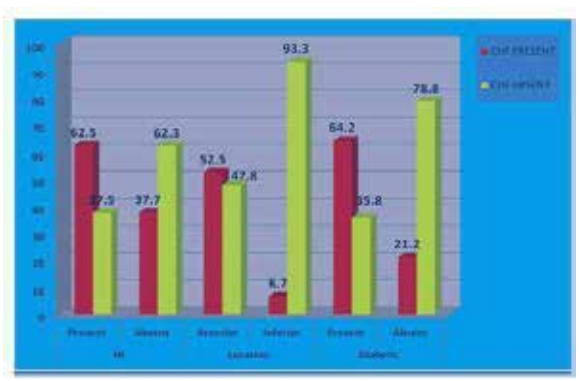
however there was significant association between anterior wall infarction and heart failure with a p value<0.001 and the p value was<0.0001 indicating the difference is highly significant and

strong association between Diabetes mellitus and heart failure and there was a significant association

between age and heart failure with a p value<0.001

there was also a strong significance between levels of CPKMB with heart failure with a p value<0.001.

ôCLINICAL VARIABLES ACCORDING TO ABSENCE OR PRESENCE OF HF

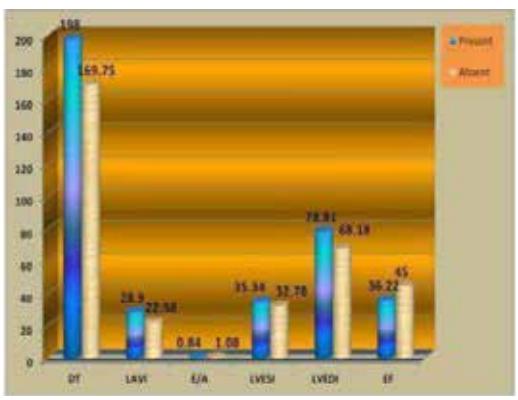


ECHO CARDIOGRAPHIC VARIABLES

ACCORDING TO PRESENCE OR

ABSENCE OF HF

	HF PRESENT(25)		HF ABSENT(36)		P-VALUE
	Mean	Standard deviation	Mean	Standard deviation	
DT(ms)	198.0(25)	27.53	169.75(36)	27.81	0.01
LAVI (ml/m²)	28.96(25)	3.30	22.58(36)	2.94	0.001*
E/A RATIO	0.844	0.15	1.0892	0.21	Ns
LVESI(ml/m²)	35.34	3.94	32.78	3.27	0.08
LVEDI(ml/m²)	78.81	7.61	68.18	7.63	0.072
EF(%)	36.20	4.15	45.00	6.54	<0.001*



- From above table, we infer that in our study the statistical difference was significant suggesting a strong association between deceleration time and heart failure with p value of 0.0001 ,
- the left atrial volume index also had a strong association with heart failure with a p value 0.005 and
- there was strong association between Ejection fraction and heart failure with a p value<0.001,
- however there was no significant association between

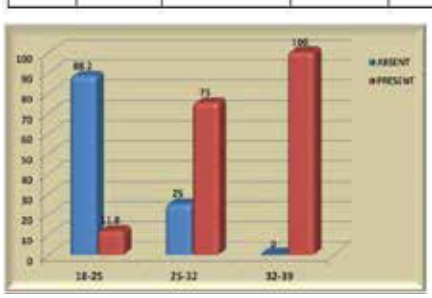
heart failure and	diastolic indices like	E/A ratio, left
ventricular end	diastolic volume index and	left
ventricular end	systolic volume index.	

DISTRIBUTION LAVI AMONG PATIENTS

ACCORDING TO PRESENCE AND

ABSENCE OF HEART FAILURE (HF)

LAVI (ml/m²)	ABSENT	PERCENTAGE (%)	PRESENT	PERCENTAGE (%)
18-25	30	88.2	04	11.8
25-32	06	25.0	18	75.0
32-39	00	00	03	100



The above table shows the distribution of LAVI among patients according to presence or absence of heart failure,

Only 11.8% patients had heart failure with a LAVI in range of 18-25ml/m² and 75% patients had heart failure whose LAVI was in range of 25-32ml/m² and

¢ 100% patients had heart failure whose LAVI was in range of 32-39ml/m², signifying a strong association between increasing value of LAVI and development of heart failure
BASELINE CHARACTERISTICS OF

LAVI IN COMPARISON TO OTHER VARIABLES

	LAVI (ml/m²)		
	<=24	>25	P-VALUE
Diabetes Mellitus			
present	24	09	0.04*
absent	10	18	
Hypertension			
present	30	23	0.726
absent	04	04	
LOCATION			
anterior	21	25	0.003**
inferior	13	02	
Diastolic grade			
0	29	04	
I	07	20	0.001
II	00	04	
III	00	01	

ASSCOIATION BETWEEN KILLIP AND LAVI

	LAVI (ml/m²)		CHI SQUARE	P VALUE
	<=24	>24		
ABSENT	30	06	27.11	< 0.00001**
PRESENT	04	21		
TOTAL	34	26		

ODDS RATIOS FOR LEFT ARTERIAL VOLUME INDEX (LAVI) AND EF

PREDICTING HEART FAILURE

Variables	Odds ratio	p-value
LAVI ≥28ml/m²	37.91	0.009
EF ≤ 45%	2.7	0.0140

DISCUSSION

In our study, we analyzed the role of echocardiographic indices to predict in hospital heart failure in patients with first ST elevation myocardial infarction.

¢ 61 patients included in our study were analyzed to compare various echocardiographic indices to predict in hospital heart failure.

Out of 61 patients, 25 patients developed in hospital heart failure(killip>II) associated risk factors were also analyzed in co relation with development of in hospital heart failure.

The various studies have shown a co relation between various echocardiographic indices like ejection fraction, Left atrial volume, E/A ratio and deceleration time in assessing the myocardial function which helps to predict going to failure following myocardial infarction.

SUMMARY

¢ 61 patient with first ST elevation MI admitted to basaveshwar teaching and general hospital attached to M R Medical college gulbarga from a period of jan 2014 to may 2015

The study was conducted to analyze the role of left atrial volume compared to other conventional parameters of systolic and diastolic left ventricular function in patients with first ST elevation MI in predicting early heart failure during in hospital evolution by echocardiography

1)of the 61 patient with ST elevation MI studied 25 patient developed in-hospital heart failure(killip > II)

2)The mean age of the patient in our study was 58.5 yrs and mean age of the patient who developed heart failure(killip> II) was 64.12 yrs which was statistically significant

ô3)risk factor like hypertension was present in 5 patient who developed heart failure and was not significant where as

diabetes mellitus was present in 28 patient and 18 of them developed heart failure which was statistically significant

4)of 61 patient 46 patients had involvement of anterior wall and of 46 patients 24 had heart failure which was highly significant

5)Deceleration time was found to be significant with development of heart failure(p0.002) where as E/A ratio, left ventricular end systolic volume, left ventricular end diastolic volume were not found to be significant with heart failure

6)left atrial volume index was significantly associated with development of in-hospital failure with a mean of 25.96 ml/m2 in patient with killip> II compared to that of 22.58ml/ M2 in that patient with killp < II

7)there was significant association between increasing left atrial volume index and anterior location of infarction, 25 patient of 46 with anterior wall involvement had a left atrial volume index >25ml/m2

8)There was no significant association between increasing

value of left atrial volume index and hypertension and DM

9)Ejection fraction showed a very significant association between with heart failure (killip> II) and was strong predictor of in-hospital heart failure

CONCLUSION

In our study of patients with STEMI, there was increase in incidence of Heart failure in elderly patients(>60yrs) and in diabetic individuals

There was significant increase in incidence of Heart failure in patients with infarction of anterior wall

Ejection fraction<35% was significantly associated with increased incidence of Heart failure and a strong predictor of In-hospital Heart failure

¢ Left atrial volume index was also significant predictor of in-hospital Heart failure in our study and a Left atrial volume index>28ml/m^2 was associated with a high incidence of In-hospital Heart failure

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