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ASSESSMENT OF LEFT VENTRICULAR FREE WALL RUPTURE IN ACUTE ANTERIOR AND INFERIOR WALL MYOCARDIAL INFARCTION: IMPACT ON EARLY HOSPITAL OUTCOME

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ABSTRACT

Background: Left ventricular free wall rupture (LVFF) is a rare but life-threatening complication that can occur following acute anterior and inferior wall myocardial infarction (MI). LVFF refers to the rupture of the left ventricular wall, which can lead to cardiac tamponade and hemodynamic instability. Early identification and management of LVFF are crucial to improve hospital outcomes and patient survival. **Objective:** In this study our main goal is to evaluate the LVFF of acute anterior & inferior wall MI & their early hospital outcome. **Method:** The cardiology clinic at Tertiary Hospital was the site of this prospective research. If clinical echocardiography revealed that 120 patients hospitalized with AMI had an LVEF of 40% or less, then they were qualified to participate in the research. According to the second and third universal definitions of myocardial infarction, an AMI was determined to be a medical emergency. Patients were split into two categories: those with anterior MI (n=60; n=23 with complications; n=37 without) and those with inferior MI (n=60; n=16 with complications; n=44 without) for the study. **Results:** The majority of participants were above the age of 50, and those who had an anterior MI with complications were older than those who experienced an anterior MI without complications (52.17 percent vs. 48.66 percent). In addition, males were more likely to have Anterior MI with Complication (91.30%) or Inferior MI with Complication (93.75%) or Total MI (100%) than females were. In addition, no abnormal symptoms were observed in any of the groups, although in others, such those with inferior MI with complications, 20% had crepitus in the lungs, 6% had a systolic heart murmur, and 6.25 percent had a soft 1st heart sound. Furthermore, diabetes was prevalent in populations where smoking was a norm. Furthermore, according to Body Mass Index (BMI), 37.5% of people with inferior MI with complications were overweight, whereas only 10.81% of those with inferior MI without complications were overweight. Inferior and internal MI were also strongly linked with the presence of risk factors such as body mass index, diabetes, hypertension, and smoking prevalence. There was a significant difference in the rate at which LVF occurred between the groups experiencing anterior and inferior MI complications (73.92% vs 93.75%). Also, the rate of mechanical complications was significantly higher in the inferior MI with complications group than in the anterior MI with complications group (87.5% vs. 47.82%). In addition, the Inferior MI without Complication group showed no signs of abnormalities. Lastly, there were no mass fatalities reported. **Conclusion:** According to our findings, there was a strong association between the incidence of inferior and interior MI and advanced age, male predominance, risk factors such body mass index, diabetes, hypertension, and smoking prevalence. Even while LVF was more common in the inferior MI with complications group than in the anterior MI with complications group, it did occur. However, people who have had an inferior MI with no complications are at little danger of developing any more issues.

KEYWORDS: Left ventricular free wall rupture (LVFF), acute myocardial infarction (AMI), Heart Disease.

INTRODUCTION

Acute myocardial infarction (AMI) of the anterior and inferior walls may cause an uncommon but significant complication known as left ventricular free wall rupture (LVFF). The incidence of LVFF is estimated to be 1-3% in patients with ST-segment elevation myocardial infarction (STEMI), making it a substantial source of morbidity and death despite advancements in the therapy of AMI. The prognoses of people with LVFF may be greatly improved with early diagnosis and treatment.

Myocardial infarctions (MIs) of the anterior and inferior walls are two prevalent forms of AMI that may cause LVFF. Infarctions of the anterior and inferior walls of

the heart are caused by blockages in the left anterior descending coronary artery and the right coronary artery or the left circumflex coronary artery, respectively.[1-3]

Myocardial damage's location and severity may affect how an anterior or inferior wall MI manifests. Pain in the chest or pain that spreads to the arms, neck, or jaw are common symptoms of an anterior wall MI. Dyspnea, nausea, vomiting, and excessive sweating may also occur. Pain in the chest or discomfort that spreads to the back, jaw, or right arm are common symptoms of an inferior wall MI. Bradycardia, hypotension, and dizziness are other possible side effects for patients.[4-6]

Patients with acute anterior and inferior wall MI benefit greatly from early diagnosis and timely reperfusion treatment. Depending on the patient's clinical state and available resources, reperfusion may be performed with either primary percutaneous coronary intervention (PCI) or fibrinolytic treatment. In addition to anticoagulants, beta-blockers, and angiotensin-converting enzyme inhibitors are often used for patients with AMI.[7-10]

Patients with acute anterior and inferior wall MI may still develop LVFF despite these treatments. Old age, female sex, diabetes mellitus, hypertension, and delayed reperfusion treatment are all risk factors for LVFF. Rapid intervention, such as pericardiocentesis, surgical repair, or careful surveillance, is necessary for patients who develop LVFF. 11 Early diagnosis and therapy of LVFF is crucial due to the poor early hospital outcomes of patients with LVFF, including high rates of death and morbidity.

Objective

In this study our main goal is to evaluate the LVFF of acute anterior & inferior wall MI & their early hospital outcome.

METHODOLOGY

The cardiology division of a tertiary care hospital is where this prospective research was conducted. If clinical echocardiography revealed that 120 patients hospitalized with AMI had an LVEF of 40% or less, then they were qualified to participate in the research. According to the second and third universal definitions of myocardial infarction, an AMI was determined to be a medical emergency. Patients were randomly assigned to one of two groups during the trial. There were a total of 60 patients with an anterior MI (23 with complications and 37 without), and 60 patients with an inferior MI (16 with complications and 44 without).

A research cardiologist with experience in echocardiography assessed all clinical echocardiograms of individuals who could be eligible and verified that the LVEF was really 40% using the modified Simpson biplane technique. Patients were not included if their life expectancy was less than one year, if informed permission could not be obtained, or if more than eight days had occurred following the AMI.

Commercially available equipment using a conventional phased-array 2.5 MHz multifrequency transducer was used for the echocardiogram. The modified Simpson biplane formula was used to determine LVEF. Contrast agent (SonoVue, Bracco Imaging) was administered if less than eighty percent of the endocardial boundary could be seen clearly.

Patients were included if they presented within five days after the beginning of symptoms with isolated acute anterior or inferior wall myocardial infarction.

There was zero ageism and sexism. Myocardial infarction was diagnosed when two out of the following four (4) conditions were met: An acute Ml of the anterior or inferior leads on the electrocardiogram. elevated cardiac enzyme levels, ii.

Excluded from the research were the following types of patients: i. Patients with a history or electrocardiogram indicating a prior myocardial infarction. Patients receiving any other kind of Ml or who delayed medical attention for more than five days after serious symptoms began. Patients with non-Q wave MI or mixed anterior and inferior wall MI in addition to a history of AMI.

Isolated pericardial disease, extensive valvular heart disease, and inflammatory heart disease all independently reduce EF, hence patients with these illnesses were excluded; however, the presence or absence of LVF symptoms was not. We used a mean LVEF at baseline of 30% and a standard deviation of 10% to determine the required sample size. After 3 months, there should be no change in LVEF, the alternative hypothesis being that there should be a difference of >10 percentage units in LVEF. Assuming a 20% attrition rate, we determined that 100 patients would be needed to achieve 80% power to detect a difference of at least 10% in LVEF. The sample size was determined using IBM SPSS Sample Power 2.0. When applicable, we showed continuous data as meanSD or medianrange. Number of occurrences (percentage) is used to represent nominal data. Categorical variables were compared using the Fisher exact test, while continuous variables were compared using the student paired t test over time with the assumption of normal distribution. Shapiro-Wilk plots and the test ensured that data were normally distributed.

RESULTS

The majority of patients in each of the four subgroups shown in Table-1 are over the age of 50: those with anterior MI with complication (52.17 percent), those with anterior MI (48.66 percent), those with inferior MI (37.5 percent), and those with inferior MI (68.19 percent). In addition, males were more likely to have Anterior MI with Complication (91.30%) or Inferior MI

with Complication (93.75%) or Total MI (100%) than females were.

Table 1: Demographic distribution among groups.

Age group	Anterior MI		Inferior MI	
	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication, n=44
30-45 years	7, 13.05%	7, 18.91%	5, 31.25%	4, 9.09%
46-50 years	8, 34.78%	12, 32.43%	5, , 31.25%	10, 22.72%
>50 years	12, 52.17%	18, 48.66%	6, 37.5%	30, 68.19%
Gender	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication, n=44
Male	21, 91.30%	36, 97.30%	15, 93.75%	44, 100%
Female	2, 8.97%	1, 2.7%	1, 6.25%	

Figure-1a and 1b shows clinical symptoms in patients, where among different groups, ischemic type of chest pain breathlessness, anemia were common.

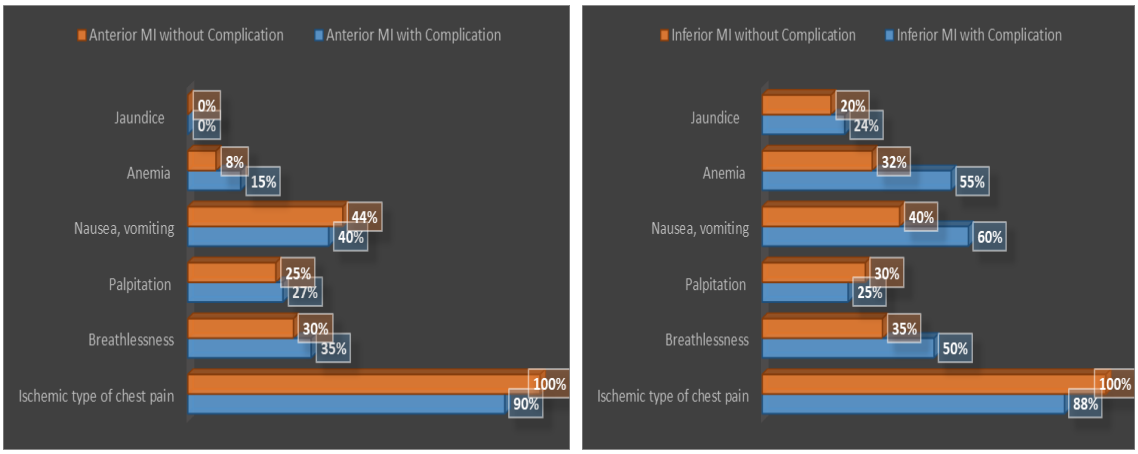

Figure 1a and 1b: Clinical symptoms in patients.

Table 2 illustrates the results of the patients' physiological and systemic examinations, which revealed no abnormal conditions across the board except for a subset of patients with disorders such as inferior MI with complications (20% of whom exhibited crepitus in their lungs, 6% of whom exhibited systolic heart murmur, and 6.25 % of whom exhibited soft 1st heart sound).

Table 2: Physiological and Systemic examination of the patients.

Physiological Examination	Anterior MI		Inferior MI	
	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication, n=44
Cyanosis	0%	0%	0%	0%
Clubbing	0%	0%	0%	0%
Koilonychia	0%	0%	0%	0%
Leuconychia	0%	0%	0%	0%
Edema	0%	0%	0%	0%
Dehydration	0%	0%	0%	0%
Tyroid Gland	0%	0%	0%	0%
Systemic Examination	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication,

				n=44
1st Heart sound ✓ Normal ✓ Loud ✓ Soft	100%	100%	15, 93.75% 1, 6.25%	100%
2nd heart sound: A2: ✓ Normal ✓ Loud ✓ Soft P2: ✓ Normal ✓ Loud ✓ Soft	100% 100%	100% 100%	100% 100%	100% 100%
Murmur: ✓ Systolic ✓ Diastolic ✓ No	5% 95%	100%	6% 94%	100%
Base of the lungs: ✓ Crepitating ✓ Present ✓ Absent	20% 50% 30%	100%	20% 80%	`100%

The prevalence of diabetes and smoking in various populations is shown in Table 3. Furthermore, according to Body Mass Index (BMI), 37.5% of people with inferior MI with complications were overweight, whereas only 10.81% of those with inferior MI without complications were overweight. Inferior and internal MI were also strongly linked with the presence of risk factors such as body mass index, diabetes, hypertension, and smoking prevalence.

Table 3: Risk factor between groups.

Risk factor	Anterior MI		P value	Inferior MI		P value	Anterior MI vs Inferior MI, P value
	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37		Inferior MI with Complication n=16	Inferior MI without Complication, n=44		
Smoking	15, 65.22%	14, 37.84%	1.21	4,25%	13, 29.55%	1.20	0.001
Hypertension	10, 43.47%	9, 24.32%	1.20	5,31.25%	11, 25%	1.00	0.001
Diabetes Mellites	11, 47.82%	10, 27.03%	1.24	6, 37.5%	11, 25%	2.31	0.001
Dyahpidaemia	7, 30.43%	2, 5.04%	1.23	6, 37.5%	11, 25%	1.32	2.31
Family history of IHD	6, 26.08%	5, 13.51%	.211	5,31.25%	13, 29.55%	1.21	1.20
Sedentary Lifestyle	0	1, 2.70%	1.23	4,25%	0%	2.345	5.67
BMI: -<25 =≥25	 20, 86.95% 3, 13.05%	 33, 89.19% 3,10.81%	0.001	 10, 62.5% 6, 37.5%	 31, 70.45% 13, 29.55%	0.001	0.001

The laboratory profile of patients with pulmonary hypertension is shown in Table-4; in the Anterior MI with Complications group, 95.65% of patients had pulmonary hypertension, whereas in the Anterior MI without Complications group, 100% of patients did. Serum creatinine levels were within acceptable ranges across the board. However, in the Anterior MI with Complications group, serum troponin was elevated in every single case, as well as in the Anterior MI without Complications group (94.59%) and the Inferior MI with Complications group (12.5%). In addition, the Inferior MI group without complications showed no signs of abnormalities.

Table 4: Laboratory profile of the patients.

Laboratory profile	Anterior MI		Inferior MI	
	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication, n=44
RBS: Diabetic Raised Normal	 4, 17.39% 4, 17.39% 15, 65.21%	 5, 13.51% 4, 10.81% 28,75.68%	 4, 25% 3, 18.75% 9, 56.25%	 5, 11.37% 4, 9.09% 35, 79.54%
X-ray Chest P / A: -Normal -pulmonary hypertension: - Yes -No	 22, 95.65% 1, 4.35%	 37, 100%	 16, 100%	 0%
S. creatinine: -Normal -Raised	 21, 91.30% 2, 8.7%	 35, 94.59% 2, 5.41%	 14, 87.5% 2, 12.5%	 0%
S. Troponin l: -Raised -Normal	 23, 100%	 35, 94.59% 2, 5.41%	 2, 12.5% 14, 87.5%	 0%
Total Cholesterol: -Dyslipidemia -Normal	 6, 26.09% 17,73.91%	 10, 27.02% 27, 72.98%	 5, 31.25% 11, 68.75%	 0%
LDL: -Normal -Raised	 21, 91.30% 2, 8.7%	 36, 97.30% 1, 2.7%	 14, 87.5% 2, 12.5%	 0%
HDL: Normal Decreased	 21, 91.30% 2, 8.7%	 36, 97.30% 1, 2.7%	 13, 81.25% 3, 18.75%	 0%
TG: -Normal -Raised	 23, 100%	 36, 97.30% 1, 2.7%	 14, 87.5% 2, 12.5%	 0%

Table 5 demonstrates that the incidence of LVF was higher in the group suffering from inferior MI with complications (93.75%) than it was in the group suffering from anterior MI with complications (73.92%). Also, the rate of mechanical complications was significantly higher in the inferior MI with complications group than in the anterior MI with complications group (87.5% vs. 47.82%). In addition, the Inferior MI without Complication group showed no signs of abnormalities.

Table 5: Hospital outcomes of the patients.

Hospital Outcome	Anterior MI		Inferior MI	
	Anterior MI with Complication, n=23	Anterior MI without Complication, n=37	Inferior MI with Complication n=16	Inferior MI without Complication, n=44
Failure: -LVF -Developing LVF -Absent	 17, 73.92% 4, 17.40% 2, 8.68%	 23,100%	 15, 93.75% 1, 6.25%	 0
Arrythmia	0%	0%	14, 87.5%	0%
Mechanical Complication	11, 47.82%	0%	14, 87.5%	0%
Pericardial Complication	1, 4.34%	0%	0	0%

Figure 2 Shows mortality of the patients where no death cases were noticed in groups.

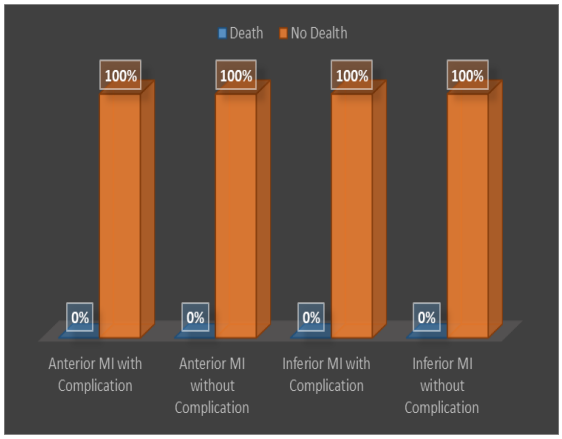

Figure 2: Mortality of the patients.

DISCUSSION

Significant morbidity and death may result from acute myocardial infarctions (AMI), of which there are two types: those affecting the anterior and inferior walls. The causes, clinical manifestations, and treatments for these two forms of MI are different.

Blockage of the blood supply to the anterior wall of the left ventricle, the left anterior descending coronary artery (LAD), causes an anterior wall MI. Inferior wall MI, on the other hand, is caused by a blockage in the blood supply to the base of the left ventricle, either the right coronary artery (RCA) or the left circumflex coronary artery (LCX).[11-12]

Pain in the chest or pain that spreads to the arms, neck, or jaw are common symptoms of an anterior wall MI. Dyspnea, nausea, vomiting, and excessive sweating may also occur. Inferior wall MI, on the other hand, often manifests itself as chest pain or discomfort radiating to the back, jaw, or right arm. Bradycardia, hypotension, and dizziness are other possible side effects for patients.

Arrhythmias, left ventricular dysfunction and failure (LVFF), cardiogenic shock, and heart failure are all possible outcomes after a myocardial infarction (MI), a research found. Up to 40% of patients with an anterior wall MI and 20% with an inferior wall MI develop LVFF, a very severe consequence. Extensive injury to the myocardium causes LVFF by reducing the heart's capacity to contract and pump blood efficiently. The result may be a drop in cardiac output, low blood pressure, or even cardiogenic shock.[13]

Timing of reperfusion treatment, degree of myocardial damage, and presence of comorbidities all have a role in the early hospital prognosis of acute anterior and inferior wall MI. Patients with AMI have been demonstrated to fare better when they get early reperfusion treatment, either by primary percutaneous coronary intervention (PCI) or fibrinolytic therapy. Some patients, however, may still have problems such as LVFF, cardiogenic shock, or arrhythmias despite these therapies, which may have devastating effects on their prognoses. High mortality and morbidity rates among individuals with LVFF highlight the need of early diagnosis and treatment of this condition.[12]

The need of diagnosing and treating acute anterior and inferior wall MI is emphasized. Both forms of MI have comparable risk factors and associated consequences, although having different clinical presentations and therapeutic techniques. Timely diagnosis and care of problems like LVFF are critical for improving the prognosis of patients with AMI, although early reperfusion therapy remains the cornerstone of treatment.

Patients with acute anterior and inferior wall MI have been the subject of several research looking at their clinical characteristics, prognosis, and therapy options. Patient outcomes after primary percutaneous coronary intervention for anterior vs inferior wall myocardial infarction were compared in a research published in the Journal of the American College of Cardiology in 2019. A lower left ventricular ejection fraction and a greater risk of in-hospital death were seen in individuals with anterior wall MI compared to those with inferior wall MI.[14]

Patients with acute anterior wall myocardial infarction with diabetes mellitus: a systematic review and meta-analysis, published in the Journal of the American Heart Association in 2018. Major adverse cardiovascular events and duration of hospital stay were observed to be significantly greater in diabetes individuals with anterior wall MI compared to non-diabetic patients.[15]

Furthermore, the influence of LVFF on the outcomes of patients with acute MI receiving primary PCI was assessed in a research published in the European Heart Journal in 2019. Patients with LVFF were shown to have a greater risk of in-hospital mortality, heart failure, and cardiogenic shock than those without LVFF, according to the research.[16]

This research emphasizes the significance of understanding the differences between anterior and inferior wall MI in terms of clinical presentation and consequences, as well as the influence of comorbidities such diabetes mellitus and LVFF on outcomes. In addition, the studies show that patients with acute MI fare better when complications are identified and treated quickly.

Patients with acute anterior and inferior wall MI who had primary percutaneous coronary intervention (PCI) were studied, and their effects of age were analyzed. A greater risk of death during hospitalization, heart failure, and cardiogenic shock was seen among the elderly, the research revealed. Comorbidities such as hypertension, diabetes mellitus, and chronic renal disease were more common among individuals aged 65 and above, which may explain why they fared so poorly.[17]

These results highlight the need to take age into account while treating acute MI, especially in older patients who may have a greater prevalence of co-morbidities and worse outcomes. It also emphasizes the need of tailoring the treatment of acute MI to each individual patient by considering their unique medical history and other risk factors.

Primary percutaneous coronary intervention (PCI) is a method used to unblock coronary arteries, and the researchers analyzed data from individuals who had undergone this operation.

Patients over the age of 65 with acute MI had a greater risk of death during hospitalization, heart failure, and cardiogenic shock than younger patients with the same diagnosis. Comorbidities, such as hypertension, diabetes mellitus, and chronic renal disease, were more common among patients aged 65 and above, which may explain why they had worse results. Which was borne up by our analysis, where the majority of patients were above the age of 50.

These results emphasize the need to take age into account in the diagnosis and treatment of acute MI. In order to minimize complications and improve outcomes, older individuals with acute MI may need a different therapeutic strategy and more intense care. It also highlights the need of tailoring treatment for patients with acute MI by considering their unique characteristics and medical conditions.

In 2019, researchers looked into the link between smoking and the risk of acute MI in individuals with and without diabetes mellitus, and their findings were published in the Journal of the American College of Cardiology. The research indicated that individuals with diabetes mellitus had a greater risk of acute MI when they smoked. Smoking was also related with an increased incidence of anterior wall MI compared to inferior wall MI, the research revealed. [17]

Our findings showed that risk factors such as body mass index, diabetes, hypertension, and smoking prevalence were strongly linked to the development of inferior and internal MI.

These results emphasize the need to treat cigarette smoking as a modifiable risk factor in the prevention of acute MI, especially in individuals with diabetes mellitus. These findings not only point to a possible causal relationship between smoking and anterior wall MI, but also raise the possibility that preventative efforts should focus on this particular subset of the population.

These studies show that detecting and treating risk factors for acute anterior and inferior wall MI, including as age, smoking, diabetes mellitus, and LVFF, may significantly enhance treatment results and reduce the likelihood of adverse events.

CONCLUSION

According to our findings, there was a strong association between the incidence of inferior and interior MI and advanced age, male predominance, risk factors such body mass index, diabetes, hypertension, and smoking prevalence. Even while LVF was more common in the inferior MI with complications group than in the anterior MI with complications group, it did occur. However, people who have had an inferior MI with no complications are at little danger of developing any more issues.

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