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A RETROSPECTIVE OBSERVATIONAL STUDY ON THE ATYPICAL PRESENTATION OF MYOCARDIAL INFARCTION: AN ECG BASED APPROACH

Emergency Medicine

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ABSTRACT

Background: - Although chest pain is the hallmark symptom of acute myocardial infarction, many patients present with atypical or no symptoms, leading to diagnostic challenges and potential delays in medical care, increasing morbidity and mortality. **Sample Design:** - Retrospective observational study **Purpose:** - This study aims to diagnose atypical myocardial infarction in patients presenting to the emergency medicine department of a tertiary care hospital based on ECG findings, clinical presentation, study associated factors and highlight the importance of heightened awareness among healthcare providers. **Methods:** - This ECG-based retrospective study in a Maharashtra tertiary care hospital analyzed records of 120 acute myocardial infarction patients presented over 12 months period, focusing on clinical presentation, demographics, and risk factors like diabetes mellitus & hypertension. Atypical cases which presented without chest pain but with symptoms like dyspnea or dizziness, were identified based on ECG findings and results were analyzed using descriptive statistics. **Results:** - Among 120 acute myocardial infarction cases, 25 (20.8%) had atypical symptoms, most frequently in the 65-74 age group (36%) and more common in females (56%). Shortness of breath was the predominant symptom followed by giddiness, epigastric pain. **Conclusion:** - Our study highlights that a significant proportion (20.8%) of acute myocardial infarction patients present with atypical symptoms, particularly in older adults and females. Shortness of breath as the most common atypical symptom. The findings emphasize the need for increased clinical vigilance and early ECG evaluation in patients with apparently non cardiac symptoms, especially those with risk factors such as diabetes mellitus & hypertension to prevent delayed diagnosis and reduce morbidity and mortality associated with atypical myocardial infarction.

KEYWORDS

Atypical presentation of myocardial infarction, chest pain, ECG, emergency, heart attack, acute myocardial infarction.

INTRODUCTION

Coronary artery disease (CAD) and myocardial infarction (MI) are on rise, posing significant public health challenges.[1] Although chest pain is the classical presentation of MI, nearly 43.6% of NSTEMI and 27.1% of STEMI patients present without it, exhibiting atypical symptoms such as dyspnea, fatigue, syncope or gastrointestinal discomfort.[5] In India, ischemic heart disease(IHD) remain a leading cause of death, particularly in individual aged 50 and above, with ICMR data from 2016 showing mortality rate of 22.06% and 21.97% in the 50-69 and above 70 age groups, respectively.[2,3] This divergence from classical presentation often leads to missed or delayed diagnosis and adversely impacts patient outcomes.[1]

Patients with acute coronary syndrome (ACS) who lack chest pain are frequently under recognized and underrated, resulting in higher in-hospital morbidity and mortality. Raising clinical awareness of these atypical patterns is essential to improve early recognition and timely intervention in emergency settings to reduce morbidity and mortality associated with it.[4,6,7]

This study aims to characterize the atypical clinical presentation of MI among patients presented to emergency medicine department (EMD) and intensive care unit (ICU) at government medical college (GMC) Miraj, to observe associated risk factor. The information obtained will help to highlight the need among clinicians to enhance early detection, guide prompt referral, and reduce morbidity and mortality associated with MI.

Typical chest pain is retrosternal or left-sided, crushing or pressure-like, radiating to the arm, neck, or jaw, and may be accompanied by diaphoresis, dyspnea, nausea, or vomiting. [2,3] while, atypical presentation is defined as the absence of chest pain before or during admission and may include gastrointestinal or respiratory symptoms, fatigue, syncope, palpitations or even no symptoms at all. [5]

MATERIAL AND METHODS OF STUDY:

Study Design: Retrospective observational study.
Study Duration: 12 months.

Study Settings: The study was carried out in the EMD and ICU of GMC Miraj, a tertiary care hospital in Maharashtra, India.

Inclusion Criteria: Patients were included if they fulfilled the following criteria:

1. Patients with atypical MI presentation coming to EMD over a period of 12 months.
2. Age > 18 years.

Exclusion Criteria:

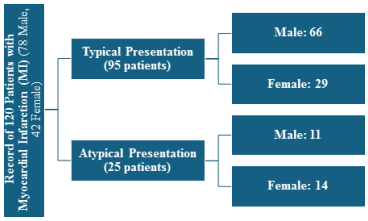
1. Patients with typical MI presentation.
2. Age < 18 years.
3. Pregnant females.

Ethics Statement:
The study was reviewed and approved by the institutional ethic committee of GMC Miraj, Maharashtra. All identifying patient data were anonymized.

This study analyzed records of 120 acute MI patients presented over 12 months period, focusing on clinical presentation, demographics, and risk factors like DM & HTN after applying the inclusion and exclusion criteria. Atypical cases, presented without chest pain but with symptoms like dyspnea or dizziness, were identified based on ECG finding and results were analyzed using descriptive statistics.

RESULTS:

We studied records of 120 patients with acute MI came to EMD and ICU.



Out of the 120 acute MI cases included in the study, 25 (20.8%) presented with atypical symptoms. The most frequently affected age group was 65-74 years, accounting for 36% of cases, with females being more commonly affected (56%). HTN was the most prevalent comorbidity, observed in 60% of patients, followed by DM in 36% of cases.

The table1, represents the distribution of atypical symptoms in patients with acute MI. Shortness of breath (36%) and giddiness (28%) are the most common atypical symptoms.

Table 1 Atypical Symptoms Of Patients With Myocardial Infarction

Shortness of breath	9(36%)
Giddiness	7(28%)
Epigastric pain	3(12%)
Loose motion & vomiting	3(12%)
Back pain	3(12%)
Generalized weakness	2(9%)
Restlessness	2(9%)
No symptoms	0(0%)
Total*	**29(106%)**

***Note**: As some patient having multiple symptoms, so the total count does not add up to 25(& frequency is more than 100%)

Inferior MI (table 2) was the most common type, accounting for 52% of cases and anterolateral (8%), inferior-lateral MI (4%), are less frequent.

Table No. 2 Types Of Myocardial Infarction

Type of Myocardial Infarction	Number of patients (frequency%)
Inferior	13(52%)
Lateral	5(20%)
Anterior	3(12%)
Antero-inferior	2(8%)
Antero-lateral	2(8%)
Inferior-lateral	1(4%)
Total**	**26(104%)**

****Note**: Since some patients have MI involving multiple walls, the total number of cases does not sum to 25, and the frequency exceeds 100%.

DISCUSSION

Acute MI is commonly associated with classic chest pain; however, a significant number of patients, particularly those with comorbidities such as HTN and DM, present with atypical symptoms like shortness of breath, giddiness, nausea, or fatigue. These atypical presentations pose a challenge in clinical diagnosis, often leading to delays in treatment and poorer outcomes.

Out of the 120 acute MI cases included in this study, 25 (20.8%) presented with atypical symptoms, a finding consistent with studies conducted in Reykjavik and by Holay MP et al.[9,10]

The highest prevalence of acute MI with atypical presentation was observed in the 65–74 age group, accounting for 36% of cases in our study, which is in agreement with the studies by Sarker Shanchay MS et al (28.57%).[5] The most frequently reported atypical symptom was shortness of breath (36%) which is similar to the findings of Sarker Shanchay MS et al (36.36%) .[5] These findings highlight the varied presentation of acute MI beyond classic chest pain. Large registries such as Global Registry of Acute Coronary Events (GRACE)[12] (8.4%) and National Registry of Myocardial Infarction-2 (NRMI-2) (33%) have also documented a significant prevalence of atypical presentations.[13]

HTN and DM are well-known cardiovascular risk factors that not only contribute to the development of CAD but also influence the way acute MI manifests. Chronic HTN leads to vascular remodelling, endothelial dysfunction, and arterial stiffness, which may alter ischemic pain perception. Additionally, left ventricular hypertrophy, commonly seen in hypertensive patients, can cause diastolic dysfunction, leading to symptoms like dyspnoea rather than chest pain. On the other hand, DM is strongly linked to autonomic neuropathy, which blunts pain perception and leads to silent or atypical MI. Diabetic patients often experience breathlessness, dizziness, or fatigue due to impaired neural responses and diffuse microvascular ischemia. Atypical MI in DM is influenced by altered pain thresholds, less severe ischemia, and atherosclerosis, with autonomic and sensory dysfunction playing a key role in unrecognized ischemia. [14-16] The Framingham[14] study and research by John G. Canto[13] similarly reported a higher prevalence of HTN and DM in patients with atypical MI, aligning with the observations in the present study.

The type of MI also plays a role in symptom presentation. Inferior MI, which accounted for 52% of cases in this study, is frequently associated with atypical symptoms due to vagus nerve activation. A statistically significant finding in this study was that 52% of inferior wall MI patients presented with atypical symptoms. This observation corresponds with the Honolulu Heart Program study, which reported a similar trend, noting that 51% of patients with inferior wall MI experienced painless infarctions.[15] Patients with inferior MI often experience nausea, vomiting, or abdominal discomfort, which can be mistaken for gastrointestinal issues, leading to misdiagnosis and delayed treatment. In contrast, lateral and anterior MIs, though less frequent in this study, are more commonly associated with classic chest pain. However, in elderly, hypertensive, or diabetic individuals, even these infarctions may present atypically. More complex infarcts, such as anteroinferior, anterolateral or inferior-lateral MIs, may display a combination of typical and atypical symptoms, particularly in cases of multi-vessel disease where ischemia is widespread.

Inferior wall MI is typically caused by occlusion of the right coronary artery or, in some cases, the left circumflex artery. Additionally, reciprocal ST-segment depression in leads I and aVL further supports the diagnosis of a true infarction pattern. This condition may also be associated with right ventricular involvement, necessitating urgent medical intervention, including reperfusion therapy, to restore myocardial perfusion and prevent severe complications.

Patients presenting with atypical symptoms tend to have worse survival outcomes due to delays in recognition and intervention. Studies indicate that these patients experience prolonged door-to-balloon times as their symptoms are not immediately recognized as cardiac in origin.[18] This delay increases the risk of complications, including heart failure, cardiogenic shock, and life-threatening arrhythmias. Research suggests that mortality was high among the patients who presented with atypical symptoms, increasing age, and who presented lately[17], emphasizing the need for heightened clinical awareness. Elderly and diabetic patients, in particular, face an increased risk of adverse outcomes due to both delayed diagnosis and underlying comorbidities that complicate recovery.[19,20]

CONCLUSION:

Our study highlights that a significant proportion (20.8%) of acute MI patients present with atypical symptoms, particularly in older adults and females with shortness of breath as the most common atypical symptom. The findings emphasize the need for increased clinical vigilance and early ECG evaluation in patients with atypical presentations, especially those with risk factors such as DM and HTN, so as to prevent delayed diagnosis and reduce morbidity and mortality associated with atypical MI.

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