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Forms of clinical presentation of acute myocardial infarction at Hospital Universitário Ciências Médicas de Minas Gerais

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ABSTRACT

Introduction: Cardiovascular diseases are the leading causes of morbidity and mortality in Brazil, with Acute Myocardial Infarction (AMI) being the most prevalent emergency pathological condition among these comorbidities. It is essential to understand the symptom profile of patients with AMI, as well as the main characteristics of the pathology for early diagnosis. **Objective:** To verify if there is a correlation between the symptoms presented by patients with angina and the diagnosis of AMI with and without STE admitted to Hospital Universitário Ciências Médicas de Minas Gerais between March and August 2022. **Method:** Retrospective cross-sectional study including 80 patients admitted to Hospital Universitário Ciências Médicas de Minas Gerais between March and August 2022 with a diagnosis of AMI. Medical records were analyzed to identify the symptoms presented by the patients, electrocardiographic changes and cardiac catheterization. **Results:** It was observed that the main symptoms of patients are, respectively, chest pain, dyspnea, sweating, nausea, vomiting, pallor and dizziness. There was a higher frequency of reports of sweating and vomiting in the context of AMI with STE and more complaints of nausea in the context of AMI without STE. The most relevant associations were reports of dyspnea and seeking early care (p-value of 0.048). **Conclusion:** The study concluded that chest pain is the most common symptom, but there is limited resolution regarding seeking care, with dyspnea being identified as an aggravating factor for seeking treatment.

Keywords: Myocardial Infarction; ST Elevation Myocardial Infarction; Non-ST Elevation Myocardial Infarction; Signs and symptoms; Electrocardiography.

INTRODUCTION

Since the 1960s, cardiovascular disease (CVD) has been the leading cause of morbidity and mortality in Brazil and worldwide1,2,3. Among the most prevalent CVDs is acute myocardial infarction (AMI). In 2021, there were 95,812 deaths from AMI in Brazil, of which 7,174 occurred in Minas Gerais[4,5].

Conceptually, AMI is characterized by a sudden decrease or absence of blood supply to the heart, generating signs and symptoms in the patient, and can also present as ST-segment elevation AMI (STEMI) or non-ST-seg-

ment elevation AMI (NSTEMI). ST-segment elevation refers to a specific type of alteration seen on the electrocardiogram (ECG) during a heart attack.

In STEMI, total occlusion of a coronary artery is typically observed. In contrast, STEMI generally results from partial obstruction of the affected coronary artery, which is not necessarily indicative of severity.

The primary assessment of the patient is done through an analysis of the clinical picture, physical examination, electrocardiogram (ECG) and measurement of markers of myocardial damage. Regarding the symptom profile already known for this disease, chest pain, heart failure, dyspnea and arrhythmia are the most prevalent signs and symptoms[1].

Considering the potential severity of AMI, delay in recognizing and treating the disease can result in serious complications, rapid decision-making is essential to avoid unfavorable outcomes[6-10]. In addition, it is known that the diagnosis of STEMI should not await the results of laboratory tests, so early diagnosis depends exclusively on clinical parameters such as chest pain and ECG to indicate treatment[11-14].

In this sense, there is a direct link between early identification of the clinical manifestations of AMI and a reduction in mortality associated with this disease. Therefore, it is essential to have a good understanding of the symptom profile, as well as the relevant clinical variations that aid in early diagnosis.

It is currently known that STEMI and NSTEMI have a long list of related signs and symptoms, such as chest pain, heart failure, dyspnea and arrhythmia1. Chest pain, which is the main symptom in a patient with suspected AMI, appears in around 4 million emergency patients with this complaint. Of these, in only half the cases is the diagnosis confirmed, and approximately 10% of patients are discharged without a diagnosis[15,16]. In this sense, chest pain is a subjective finding for both the patient and medical interpretation. However, there are distinct characteristics to this symptom that aid in distinguishing it from other causes of non-ischemic chest pain. Furthermore, there are cases in which this chest pain can occur atypically or be replaced by ischemic equivalents which can include epigastric pain, dyspnea, syncope, sweating, pallor and arrhythmias[1,11,12,17,18,19].

Given the complexity of symptoms and the imperative to enhance early diagnosis, further research is needed to better understand the symptom profile of patients with suspected AMI. This single-center study aims to investigate the potential correlation between AMI and the symptoms exhibited by patients diagnosed with this disease at the Hospital Universitário Ciências Médicas de Minas Gerais, which provides hospitalization, outpatient consultations, and complementary tests to patients from the Unified Health System (SUS) in Belo Horizonte, Minas Gerais, Brazil.

METHOD

Study design

This is a retrospective, single-center cross-sectional study carried out with patients admitted to the Hospital Universitário Ciências Médicas de Minas Gerais between March and August 2022. This study was approved by the Research Ethics Committee of the Faculdade de Ciências Médicas de Minas Gerais (CAAE: 54573421.2.0000.5134). The ethical principles were respected and are in accordance with Resolution 466/12 of the National Health Council. All participants signed the Free and Informed Consent Form (FICF) before the study began.

Sample

The study included 80 hospitalized patients diagnosed with STEMI and NSTEMI, with no restrictions on gender, age or race. The sample size was determined based on the number of inpatients with this diagnosis who

agreed to take part in the study during the period established for data collection. These patients were randomly invited to participate in the study and were provided with access to the informed consent form. Those who agreed to participate proceeded with the study, while patients who refused to sign the informed consent form were excluded.

Instruments and procedures

All the patients selected were assessed in terms of their structured medical history, and a retrospective analysis of each patient's medical records was carried out, analyzing the type of AMI, drug treatment used, symptoms and the main trigger for seeking care. The laboratory data assessed was the presence of troponin, total creatine kinase (CKT) and M and B subunit creatine kinase (CKMB), which are markers of tissue damage used to detect AMI. The electrocardiogram checked for rhythm, heart rate, QRS < or > 120ms, presence of ST-segment elevation and left and right bundle branch block. In the study, cardiac catheterization (CATE) was performed to assess thrombolysis, primary angioplasty, and the type of stent used. Following the selection process, a standardized questionnaire was administered to collect information on each patient's medical history, physical examination, laboratory tests, and observations from the electrocardiogram and catheterization.

Statistical analysis

The data collected was tabulated in a spreadsheet. Categorical variables were expressed as total number (percentage) and numerical variables were presented as mean ± standard deviation. The numerical variables were subjected to the Shapiro-Wilk Normality test. The Chi-square test was used to assess possible associations between categorical variables. A 5% significance level was used, and the data was analyzed using Minitab software.

RESULTS

Characteristics of the sample and patients' clinical alterations on admission

The average age of the sample was 64.35 years, with a predominance of males, representing 70% of all cases. There was also a predominance of NSTEMI cases, representing 65% of the total. The analysis showed a similar pattern of clinical presentations when comparing cases of STEMI and NSTEMI and the total number of cases. In all the analyses, there was a predominance of reports of chest pain and dyspnea, respectively. However, the most significant findings were the higher frequency of reports of sweating and vomiting in the context of STEMI and the higher frequency of reports of nausea in the context of NSTEMI. This information is shown in Table 1.

Table 1. Clinical characteristics observed in patients diagnosed with STEMI (n=28) and NSTEMI (n=52)–Hospital Universitário Ciências Médicas de Minas Gerais, de Belo Horizonte/2022.

Symptom	STEMI frequency	STEMI percentage	NSTEMI frequency	NSTEMI percentage
Chest pain	26	92,85%	47	90,38%
Dyspnea	15	53,57%	23	44,23%
Sweating	14	50,00%	15	28,84%
Vomiting	11	39,28%	14	26,92%
Pallor	10	35,71%	13	25,00%
Nausea	9	32,14%	19	36,53%
Dizziness	8	28,57%	12	23,07%
Sense of death	5	17,85%	9	17,30%
Syncope	3	10,71%	3	5,76%
Cyanosis	1	3,57%	0	0%
Cough	1	3,57%	1	1,92%
Fever	1	3,57%	0	0%
Fatigue	1	3,57%	0	0%
Palpitations	0	0%	3	6,76%
Tremors	0	0%	2	3,84%
Sialorrhea	0	0%	1	1,92%

Data presented in absolute numbers and percentages of the sample.

When analyzing the total number of cases, the most commonly reported symptoms, present in at least a quarter of the individuals interviewed, are chest pain, dyspnea, sweating, nausea, vomiting, pallor and dizziness, respectively (Table 2). These are therefore the clinical alterations that showed the strongest association with AMI in this study, as shown in the table below.

Table 2. Clinical characteristics reported in the 80 patients diagnosed with AMI–Hospital Universitário Ciências Médicas de Minas Gerais, de Belo Horizonte/2022.

Symptom	Frequency	Percentage
Chest pain	73	91,25%
Dyspnea	38	47,50%
Sweating	29	36,25%
Vomiting	28	35,00%
Pallor	25	31,25%
Nausea	23	28,75%
Dizziness	20	25,00%
Sense of death	14	17,50%
Syncope	6	7,50%
Cyanosis	3	3,75%
Cough	2	2,50%
Fever	2	2,50%
Fatigue	1	1,25%
Palpitations	1	1,25%
Tremors	1	1,25%
Sialorrhea	1	1,25%

Data presented in absolute numbers and percentages.

Laboratory parameters of patients on admission

Finally, the pattern of laboratory, electrocardiographic and catheterization alterations is shown in Table 3. In this table, troponin elevation, CATE obstruction and ECG alterations other than ST-segment elevation (STSE) account for more than 50% of the cases, proving to be more relevant and present in the patients studied than CKMB and CKT elevation, which accounted for less than half of the cases. The presence of occlusion during cardiac catheterization (CATE) was used as an evaluation parameter because, in clinical practice, this condition, when associated with STSE, is indicative of an AMI diagnosis.

Table 3. Changes in myocardial necrosis markers (increased troponin, CKMB and CKT), ECG and CATE in 80 patients diagnosed with AMI–Hospital Universitário Ciências Médicas de Minas Gerais, Belo Horizonte/2022.

Alteration	Frequency	Percentage	Frequency of cases not reported/ procedure not carried out	Percentage of uninformed
Troponin elevation	76	95%	4	5%
Obstruction to CATE	57	71,25%	0	0%
ECG alterations other than SST elevation	54	67,50%	1	1,25%
CKMB	38	47,50%	20	25%
CKT	33	41,25%	25	31,25%

Data presented in absolute numbers and percentages. CATE = coronary angiography; ECG = electrocardiogram; SST = ST segment; CKMB = creatine kinase MB fraction; CKT = total creatine kinase.

Clinical changes and early demand for care

Statistical analysis revealed a significant association between the symptom dyspnea and early seeking of care among patients, with a p-value of 0.048. In contrast, the other symptoms and alterations did not exhibit a significant association with early seeking of care, despite their absolute and relative frequencies of occurrence. Thus, the presence of dyspnea was identified as the sole factor capable of reducing the time between the onset of clinical symptoms and seeking medical attention in the studied sample. Among the

analyzed patients, 43.75% experienced a delay of more than an hour before receiving specialized care.

DISCUSSION

This study showed the main symptoms identified in the anamnesis of patients diagnosed with AMI admitted to the Hospital Universitário Ciências Médicas de Minas Gerais. The most frequent symptoms were chest pain, dyspnea, sweating, nausea, vomiting and dizziness. These results are corroborated by recent scientific literature[1,13,21,22,23].

Though chest pain is the most important symptom in AMI, there is great agreement that other symptoms can be present in this disease. This study shows that chest pain is the most frequently observed symptom; however, it can be associated with other complaints. It is important to emphasize that there are also atypical manifestations, corroborated by the current literature[1,13,21,22,23], the identification of which can help in the early diagnosis of AMI and in improving the care of these patients.

Although the primary objective of this study was not to differentiate AMI symptoms based on gender and age, the results revealed a predominance of males aged over 60. The observed demographic profile aligns with the national profile of AMI patients[24], making it an important factor to be studied and understood to ensure more effective care for these patients.

The clinical presentation of AMI can vary according to the characteristics of the population studied. In the prospective study performed by Ferry et al. in an emergency department, it was shown that from the evaluation of 1941 patients with suspected acute coronary syndrome, the predominance of reports of chest pain (93% of patients) and nausea (34% of patients) was identified. The integrative review by Passinho et al. analyzed 122 articles published between 2010 and 2014 and, looking for phenomena related to AMI (signs, symptoms and complications), identified dyspnea, sweating, nausea and vomiting as the most frequent symptoms, in addition to chest pain[1,22]. In this sense, it is important to consider that the presentation patterns of AMI can vary. Therefore, the findings of this study should be analyzed while acknowledging its limitations within broader contexts. Nevertheless, the obtained results are representative and align with scientific research conducted on a global scale.

Another significant contribution of this study was the exploration of potential clinical manifestations that may prompt patients to seek early medical attention, an area that has received limited attention in the existing scientific literature. In this analysis, the patient's complaint of dyspnea was found to have a positive correlation with the shortening of the time between the onset of clinical manifestations and seeking health care, even with a higher frequency of occurrence of chest pain. This association was statistically significant, with a p-value of 0.048, indicating that the complaint of dyspnea has a positive association with seeking early care in cases of AMI. However, dyspnea may be associated with a more severe presentation of the disease, which could be an external factor influencing this analysis[22,23].

It was observed that patients with chest pain associated with sweating had more severe alterations visualized on CATE. In this analysis, chest pain was associated with the presence of alterations on CATE and ECG. The presence of symptoms, even atypical ones, should motivate health professionals to investigate the possibility of acute myocardial infarction[25].

Clinical research in the cardiovascular field primarily concentrates on technologies and methodologies for treating cardiac pathologies. Nevertheless, this retrospective study demonstrated that the primary symptoms experienced by patients do not significantly differ concerning unilateral pain in the upper limb.

Therefore, it can be concluded that the findings already consolidated in the literature on the AMI clinic are of great value in the assessment and management of patients, and corroborate the data found in this study. However, it is possible to improve the stratification of patients to achieve an earlier diagnosis of this disease[10,12,14,23,25], since some literature still recommends signs, symptoms and complications of AMI which, as well as being unspecific, were also found less frequently in this study, such as syncope, palpitations, cough, tremors, fever, fatigue, cyanosis and sialorrhea.

In this perspective, the symptoms of AMI found in this study are important for the early identification of the disease and could contribute to reducing the risk of morbidity and mortality in the adult population living in the municipality where the work was carried out. However, there were certain limitations observed in this study, including the relatively small number of participants analyzed, the restriction of the analysis to a specific population, age group, and region, as well as the challenge of accurately assessing the duration of patient wait times from hospital admission to the performance of the ECG. Furthermore, it was not possible to assess the existence of a possible relationship between signs and symptoms of NSTEMI that differentiate the clinic from a STEMI, such as obstruction to CATE.

CONCLUSION

This study found that chest pain is the most frequent symptom in patients with AMI. However, other symptoms may be present in isolation or associated with chest pain, such as dyspnea, sweating, nausea, vomiting and dizziness. Dyspnea was the main symptom that led patients to seek medical help, showing a positive correlation between the presence of the symptom and seeking early care.

Therefore, it is crucial that patients presenting with symptoms such as chest pain, dyspnea, sweating, nausea, vomiting, and dizziness are promptly referred to initiate the Acute Coronary Syndrome protocol, which is internally established by each healthcare institution. Raising awareness about the signs and symptoms of AMI, particularly within the healthcare community, remains essential and fundamental in reducing the occurrence of negative outcomes. This is because early identification of the disease is widely recognized as a significant contributor to reducing the risk of morbidity and mortality.

However, it is important to carry out more studies on the subject, to delve deeper into factors that may interfere even more positively in the diagnosis of AMI.

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THE AUTHORS DECLARE THAT THERE IS NO CONFLICT OF INTERESTS IN RELATION TO THIS ARTICLE.