Desafios Para o Diagnóstico de Infarto Agudo do Miocárdio sem Supradesnível de ST em Mulheres na Urgência.

Challenges in the Diagnosis of Non-ST-Segment Elevation Myocardial Infarction in Women in Emergency Care.

Desafíos para el Diagnóstico del Infarto Agudo de Miocardio sin Elevación del Segmento ST en Mujeres en el Servicio de Urgencias.

João Arthur de Castro[1], Poliana de Oliveira Melo Moura[2], Matheus Mendes Brito[3]

Como citar: *Castro JA, Moura POM, Brito MM.* Desafios Para o Diagnóstico de Infarto Agudo do Miocárdio sem Supradesnível de ST em Mulheres na Urgência. REVISA. 2026; 15(3): 87-103. Doi: https://doi.org/10.36239/revisa.v15.n3.p87a103.

REVISA

1. Acadêmico do curso de Medicina do Centro Universitário Atenas; https://orcid.org/0009-0001-0360-3515

2. Acadêmica do curso de Medicina do Centro Universitário Atenas; https://orcid.org/0000-0001-8302-6895

3. Docente do curso de Medicina do Centro Universitário Atenas. https://orcid.org/0000-0001-9498-6904

Recebido: 13/01/2026
Aprovado: 27/03/2026

RESUMO

Introdução: O Infarto Agudo do Miocárdio (IAM) é a principal causa de mortalidade cardiovascular no Brasil, com destaque para o IAM sem supradesnivelamento do segmento ST (IAMSST), que representa cerca de 70% das síndromes coronarianas agudas. Em mulheres, a apresentação atípica e o atraso no diagnóstico contribuem para pior prognóstico, sendo a doença subdiagnosticada e subtratada neste grupo. Trata-se de revisão bibliográfica realizada a partir de 16 literaturas científicas, utilizando os descritores "Infarto agudo do miocárdio sem supradesnivelamento de ST", "Infarto do miocárdio em mulheres" e "Cardiomiopatias em mulheres", com enfoque nas particularidades do IAMSST no sexo feminino. O IAMSST decorre da oclusão parcial ou intermitente das artérias coronarianas, com fisiopatologia aterosclerótica. As mulheres apresentam maior carga de comorbidades (hipertensão, diabetes, obesidade) e sintomas atípicos como dispneia e fadiga, dificultando o diagnóstico precoce. Fatores como diabetes gestacional, eclâmpsia e sobrecarga emocional elevam o risco. O estrogênio exerce efeito protetor até a menopausa, quando os índices aumentam. O atraso pré-hospitalar (>24h) é mais frequente em mulheres, associado a maior mortalidade em 3 anos. A dificuldade diagnóstica do IAMSST em mulheres no âmbito emergencial demanda maior conscientização profissional e populacional sobre os sintomas atípicos femininos, bem como estratégias que reduzam disparidades de gênero no atendimento, melhorando o prognóstico e reduzindo a mortalidade nesse grupo vulnerável.

Descritores: "Infarto do Miocárdio sem Supradesnível do Segmento ST"; "MINOCA" e "Síndrome Coronariana Aguda".

ABSTRACT

Introduction: Acute Myocardial Infarction (AMI) is the leading cause of cardiovascular mortality in Brazil, with emphasis on non-ST-segment elevation myocardial infarction (NSTEMI), which accounts for approximately 70% of acute coronary syndromes. In women, atypical presentation and delayed diagnosis contribute to a worse prognosis, as the disease is underdiagnosed and undertreated in this group. This is a literature review based on 16 scientific publications, using the descriptors "Non-ST-segment elevation myocardial infarction," "Myocardial infarction in women," and "Cardiomyopathies in women," with a focus on the particularities of NSTEMI in females. NSTEMI results from partial or intermittent occlusion of the coronary arteries, with atherosclerotic pathophysiology. Women have a higher burden of comorbidities (hypertension, diabetes, obesity) and atypical symptoms such as dyspnea and fatigue, making early diagnosis difficult. Factors such as gestational diabetes, eclampsia, and emotional stress increase the risk. Estrogen exerts a protective effect until menopause, when rates increase. Prehospital delay (>24 hours) is more frequent in women and is associated with higher 3-year mortality. The diagnostic difficulty of NSTEMI in women in the emergency setting demands greater professional and public awareness of female atypical symptoms, as well as strategies to reduce gender disparities in care, thereby improving prognosis and reducing mortality in this vulnerable group.

Descriptors: "Non-ST-Segment Elevation Myocardial Infarction"; "MINOCA" and "Acute Coronary Syndrome".

RESUMEN

Introducción: El Infarto Agudo de Miocardio (IAM) es la principal causa de mortalidad cardiovascular en Brasil, con especial relevancia del IAM sin elevación del segmento ST (IAMSEST), que representa alrededor del 70% de los síndromes coronarios agudos. En mujeres, la presentación atípica y el retraso en el diagnóstico contribuyen a un peor pronóstico, siendo la enfermedad subdiagnosticada y subtratada en este grupo. Se trata de una revisión bibliográfica realizada a partir de 16 publicaciones científicas, utilizando los descriptores "Infarto agudo de miocardio sin elevación del ST", "Infarto de miocardio en mujeres" y "Cardiomiopatías en mujeres", con enfoque en las particularidades del IAMSEST en el sexo femenino. El IAMSEST es consecuencia de la oclusión parcial o intermitente de las arterias coronarias, con fisiopatología aterosclerótica. Las mujeres presentan una mayor carga de comorbilidades (hipertensión, diabetes, obesidad) y síntomas atípicos como disnea y fatiga, lo que dificulta el diagnóstico precoz. Factores como la diabetes gestacional, la eclampsia y la sobrecarga emocional elevan el riesgo. El estrógeno ejerce un efecto protector hasta la menopausia, momento en el que las tasas aumentan. El retraso prehospitalario (>24 h) es más frecuente en mujeres, asociándose a una mayor mortalidad a los 3 años. La dificultad diagnóstica del IAMSEST en mujeres en el ámbito de urgencias exige una mayor concienciación tanto profesional como poblacional sobre los síntomas atípicos femeninos, así como estrategias que reduzcan las disparidades de género en la atención, mejorando el pronóstico y reduciendo la mortalidad en este grupo vulnerable.

Descriptores: "Infarto de Miocardio sin Elevación del Segmento ST"; "MINOCA" y "Síndrome Coronario Agudo".

INTRODUCTION

Epidemiological transitions, together with socioeconomic, demographic, and nutritional changes over the past centuries, have resulted in significant changes in the morbidity and mortality profile of the global population, particularly with regard to non-communicable chronic diseases (BOSSUNS et al., 2022). In the Brazilian context, among cardiovascular diseases, acute myocardial infarction (AMI) stands out as the leading cause of mortality (OLIVEIRA et al., 2024).

Acute coronary syndromes (ACS), particularly AMI, represent the leading cause of death in Brazil and pose a major challenge to healthcare systems, constituting a serious public health problem due to their high rates of morbidity and mortality. Worldwide, the prevalence of cardiovascular diseases has increased, with AMI being particularly prominent because of its high incidence and severity. Acute myocardial infarction is characterized by the death of cardiac muscle cells and is a severe condition caused by the obstruction of blood flow, usually due to thrombi originating from another site. The most common associated symptoms include angina, dyspnea, and fatigue. Clinical manifestations may occur days before the event, a period known as the prodromal phase. In women, atypical symptoms are more frequent, making early diagnosis more challenging (PEREIRA et al., 2023; CAIRES et al., 2024). Furthermore, age has been shown to be significantly associated with mortality in women, as they experience AMI nearly five years later than men (JÚNIOR et al., 2025).

ACS can be classified into three forms according to the spectrum of clinical and laboratory presentations: Unstable Angina (UA), Non-ST-Segment Elevation Myocardial Infarction (NSTEMI), and ST-Segment Elevation Myocardial Infarction (STEMI). These conditions share chest pain as their principal clinical manifestation, which leads to a broad range of possible differential diagnoses (PEREIRA et al., 2023; ALMEIDA et al., 2024). The present study focuses specifically on non-ST-segment elevation myocardial infarction (NSTEMI).

Despite significant improvements in cardiovascular mortality among women over the past two decades, coronary artery disease remains under-investigated, underdiagnosed, and undertreated in this population (GUIDA et al., 2024). Consequently, women are adversely affected by the lack of awareness regarding sex-specific differences in clinical risk and disease presentation, as well as by temporal changes in their cardiovascular risk profile (BUCCI et al., 2024). In addition, the high levels of daily stress to which women are exposed may increase the incidence of cardiovascular events, particularly when genetic predisposition is present (CAIRES et al., 2024). In this context, the present study is based on the need to highlight the challenges associated with diagnosing NSTEMI in women in emergency care settings.

OBJECTIVES

The present study aims to describe the pathophysiological aspects related to the occurrence of **non-ST-segment elevation myocardial infarction (NSTEMI)** in women, in comparison with male individuals.

Specific Objectives

a) To identify the pathophysiological mechanisms and comorbidities associated with NSTEMI;

b) To understand how age and sex are associated with the occurrence of NSTEMI;

c) To describe how social and psychological factors are associated with poorer prognosis before and after myocardial infarction.

Methodology

This article meticulously describes the methodology employed to conduct a literature review on **acute myocardial infarction (AMI)**, **acute coronary syndromes (ACS)**, **non-ST-segment elevation myocardial infarction (NSTEMI)**, and **AMI in women**. The review process was conducted in several stages, beginning with the careful selection of information sources. A comprehensive search was performed in academic databases, including **SciELO**, **PubMed**, **Google Scholar**, digital libraries, and scientific journal catalogs.

The selection of keywords played an important role in this study. The search strategy included terms such as "*acute myocardial infarction,*" "*non-ST-segment elevation myocardial infarction,*" "*acute coronary syndromes,*" and "*unstable angina in women.*" Each selected source underwent a critical appraisal to identify relevant information, data, conclusions, and arguments to support this study.

During the analysis of the selected publications, particular attention was given to identifying gaps in the existing literature, highlighting areas that require further investigation as well as topics for which the available evidence presents conflicting findings.

Results

Following the initial literature search, **154 studies** were identified across the selected databases. After assessing their relevance to the proposed topic, **16 studies** were included in this literature review. The remaining studies were excluded because they were not sufficiently related to the research topic, did not provide adequate information on **non-ST-segment elevation myocardial infarction (NSTEMI)**, were published outside the predefined time frame, were incomplete, or were not freely accessible.

Data collection was carried out through an exploratory reading of the selected studies to assess their relevance and systematically extract the information considered pertinent to this review.

The selected studies are summarized in **Table 1**, organized according to an identification number (1–16), reference, study design, and their contribution to the development of the present research.

Table 1. Studies included in the literature review.

No	REFERÊNCIA	MODELO DE ESTUDO	CONTEÚDO
1	BOSSUNS et al., 2022. Risk Factors Associated with Acute Myocardial Infarction: A Systematic Review.	Systematic Review	This study provides a comprehensive synthesis of traditional and non-traditional risk factors for acute myocardial infarction (AMI). It serves as a foundation for discussing the unique cardiovascular risk profile of women, who more frequently present with conditions such as diabetes, hypertension, and psychosocial stress.
2	OLIVEIRA et al., 2024.	Literature Review	The study is useful for establishing a clear distinction

	ST-Segment Elevation Myocardial Infarction: A Review of Diagnosis, Pathophysiology, Epidemiology, Morbidity, Mortality, Complications, and Treatment.		between the two main types of acute coronary syndromes (ST-segment elevation and non-ST-segment elevation), highlighting the fundamental differences in clinical presentation, urgency of reperfusion, and initial management that are crucial for differential diagnosis in the emergency department.
3	PEREIRA, et al., 2023. Clinical and Epidemiological Profile of Acute Myocardial Infarction in a Referral Hospital.	Literature Review	It describes the real-world clinical and epidemiological profile of patients admitted with acute myocardial infarction (AMI) to a referral hospital. It was used to characterize the local/regional population, identify the proportion of women treated, and describe the predominant cardiovascular risk factors observed in routine clinical practice.
4	CAIRES, et al., 2024. Prevalence of Acute Myocardial Infarction in Women and Associated Risk Factors.	Observational Study	The study specifically focuses on the female population, investigating the prevalence of AMI and its associated risk factors. It serves as a direct source for characterizing the epidemiology and sex-specific predisposing factors in women, which constitute a

			central aspect of this review.
5	ALMEIDA, el al., 2024. Non-ST-Segment Elevation Acute Myocardial Infarction: A Case Report.	Case Report	It demonstrates the diagnostic challenges and atypical presentation commonly observed in women with non-ST-segment elevation myocardial infarction (NSTEMI), providing a practical example for discussing clinical suspicion and initial electrocardiographic findings in the emergency setting.
6	BUCCI, et al., 2024. Five-year risk of all-cause death and cardiovascular events in women with gestational diabetes and hypertensive disorders of pregnancy.	Cohort Study	The study highlights female-specific cardiovascular risk factors, such as gestational diabetes mellitus and hypertensive disorders of pregnancy, which are associated with an increased long-term cardiovascular risk. These findings are essential to support the need for a more comprehensive and sex-specific medical history assessment in emergency care.
7	SASSO, et al., 2024. Acute Myocardial Infarction and Its Management in the Cardiology	Systematic Review	It directly addresses the management of acute myocardial infarction in the cardiology emergency setting, allowing discussion of initial treatment protocols, patient

	Emergency Department.		triage, differential diagnosis, and stabilization of individuals with suspected AMI, all of which are fundamental determinants of prognosis.
8	NICOLAU, et al., 2021. Brazilian Society of Cardiology Guidelines on Unstable Angina and Non-ST-Segment Elevation Acute Myocardial Infarction.	Guideline	The study establishes the current gold standard for the management of NSTEMI, including risk stratification, pharmacological therapy, and indications for coronary intervention. It provides the reference framework for evaluating whether women receive guideline-recommended management in emergency clinical practice.
9	MITSIS, et al., 2021. ST-Segment Elevation and Non-ST-Segment Elevation Acute Myocardial Infarction: A Contemporary Reappraisal of Similarities and Differences.	Literature Review	This study provides a direct comparison between ST-segment elevation myocardial infarction (STEMI) and NSTEMI, emphasizing their pathophysiological, clinical, and therapeutic differences. It is essential for contextualizing the subtype addressed in this review (NSTEMI) and justifying the need for specific management strategies.
10	VIEIRA, et al., 2022.	Literature	It provides a comprehensive

	Prevalence of Risk Factors in Patients with Acute Myocardial Infarction: A Literature Review.	Review	synthesis of the prevalence of the classical cardiovascular risk factors associated with AMI. It is a valuable source for compiling well-established evidence on hypertension, diabetes mellitus, dyslipidemia, and smoking, thereby providing the epidemiological background required before discussing the sex-specific and atypical risk factors that are particularly relevant in women.
11	MECHANIC, et al. 2022. Acute Myocardial Infarction.	Literature Review	This study is valuable because it provides the fundamental definitions and initial clinical context that support the more specific and complex arguments developed throughout this review.
12	BRATT, et al. 2022. Diagnosis and Treatment of Acute Coronary Syndromes: A Review.	Literature Review	It presents an updated overview of acute coronary syndrome by integrating current concepts regarding diagnosis, classification, and treatment.
13	GAO, et al. 2021. Sex-Specific Clinical Characteristics and Long-Term Outcomes in Patients With	Retrospective Cohort Study	The study provides sex-specific evidence regarding clinical characteristics and long-term outcomes in patients with myocardial infarction with

	Myocardial Infarction With Non-obstructive Coronary Arteries.		non-obstructive coronary arteries (MINOCA), a subtype that is more prevalent among women. It is fundamental for discussing atypical pathophysiological mechanisms and the distinct outcomes of NSTEMI in the female population.
	GUIDA, et al. 2024. Risk Factors, Management, and Outcomes After a First Acute Myocardial Infarction: A Real-World Study Comparing Female and Male Cohorts in the TriNetX Network.	Retrospective Cohort Study	The study provides updated real-world data directly comparing women and men after a first acute myocardial infarction, evaluating cardiovascular risk factors, clinical management, and outcomes. It is essential for highlighting potential disparities in emergency treatment and their impact on clinical outcomes among women.
	CHA, et al. 2022. Clinical outcomes in patients with delayed hospitalization for non–ST-segment elevation myocardial infarction.	Retrospective Cohort Study	It specifically examines the impact of delayed hospitalization in patients with NSTEMI. This is particularly relevant to the present review because delays in symptom recognition, diagnosis, and hospital presentation are more common among women and are associated with worse

			clinical outcomes, enabling discussion of barriers to timely emergency care.
16	**JUNIOR, et al., 2025.** *Middle-Aged Women and Post–Myocardial Infarction Mortality: A Vulnerable Group? Real-World Evidence from a Brazilian Public Health System Cohort.*	Retrospective Cohort Study	This study, based on data from the Municipal Health Department of Curitiba, Paraná, Brazil, provides evidence regarding cardiovascular health in women compared with men. It associates the occurrence of acute myocardial infarction with patient age and further examines post-myocardial infarction mortality, contributing important evidence on sex-related differences in cardiovascular outcomes.

Source: Prepared by the authors, 2026.

Development

The pathophysiology of acute myocardial infarction (AMI) is caused by the narrowing of the coronary arteries resulting from the accumulation of atherosclerotic plaques ("fatty plaques"), leading to an inadequate oxygen supply to myocardial cells and, consequently, myocardial tissue necrosis. The coronary arteries are responsible for supplying the myocardium with oxygen and nutrients necessary to maintain normal cardiac function. In rare cases, myocardial infarction may occur due to coronary artery spasm, which interrupts blood flow (SASSO et al., 2024; OLIVEIRA, 2024; BOSSUNS et al., 2022).

The process begins with endothelial injury to the coronary arteries, resulting in the deposition of low-density lipoprotein (LDL) cholesterol particles, fibroblasts, and inflammatory cells within the intimal layer of the vessel wall. Inflammatory mediators and signaling molecules promote the migration of monocytes into the arterial wall, where they differentiate into macrophages capable of phagocytosing LDL particles,

giving rise to foam cells. Simultaneously, T lymphocytes stimulate the migration of vascular smooth muscle cells into the intima, where they cover the accumulated material and contribute to the formation of the atherosclerotic plaque. As atherosclerosis progresses, smooth muscle cells also participate in the production of extracellular matrix, promoting plaque enlargement. Furthermore, inflammatory mediators contribute to the formation of a fibrous cap covering the atheroma. A thin fibrous cap increases plaque vulnerability to rupture, triggering thromboembolic events that ultimately result in myocardial infarction (ALMEIDA et al., 2024).

In this context, acute coronary syndromes (ACS) encompass several acute manifestations of coronary artery disease (CAD), including non-necrotic myocardial ischemia, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) (OLIVEIRA et al., 2024).

Patients presenting with ST-segment elevation acute coronary syndrome typically experience acute chest pain accompanied by persistent ST-segment elevation or new or presumed new left bundle branch block (LBBB), a condition generally associated with complete coronary occlusion requiring immediate reperfusion therapy. Conversely, patients with non-ST-segment elevation acute coronary syndrome may present with acute chest pain without persistent ST-segment elevation, accompanied or not by other electrocardiographic findings suggestive of myocardial ischemia across a broad spectrum of severity. These findings include transient ST-segment elevation, transient or persistent ST-segment depression, T-wave inversion, other nonspecific T-wave abnormalities (flattening or pseudonormalization), or even a normal electrocardiogram (ECG). This group includes patients with unstable angina (UA), characterized by the absence of elevated myocardial necrosis biomarkers, and those with non-ST-segment elevation myocardial infarction (NSTEMI), in whom myocardial necrosis biomarkers are elevated (NICOLAU et al., 2021).

The management of STEMI and NSTEMI differs substantially. Immediate reperfusion therapy is recommended for STEMI, whereas in NSTEMI, risk stratification is mandatory to determine the patient's level of risk and subsequently guide the timing of coronary angiography (MITSIS et al., 2021).

Several risk factors are strongly associated with AMI, including genetic predisposition, sex (with a higher prevalence among men), age, and race (VIEIRA et al., 2022). Lifestyle-related risk factors include physical inactivity, diets rich in trans fats and refined carbohydrates, cigarette smoking, diabetes mellitus, dyslipidemia, arterial hypertension, obesity, peripheral vascular disease, and elevated homocysteine levels. Additional etiological factors include heart failure (HF), coronary artery abnormalities, cocaine-induced coronary vasculitis, coronary artery embolism, and aortic dissection (MECHANIC et al., 2022).

Non-ST-segment elevation acute coronary syndromes (NSTE-ACS) account for approximately 70% of all ACS cases. They are generally caused by partial or intermittent coronary artery occlusion and are associated with electrocardiographic findings such as ST-segment depression (approximately 31% of cases), T-wave inversion (approximately 12%), combined ST-segment depression and T-wave inversion (16%), or neither of these abnormalities (approximately 41%) (BRATT et al., 2022).

Acute myocardial infarction (AMI) is diagnosed when at least two of the following criteria are met: symptoms of myocardial ischemia; new ST-segment changes or new left bundle branch block (LBBB); the presence of pathological Q waves on the electrocardiogram (ECG); a new regional wall motion abnormality detected by cardiac imaging; and/or the presence of an intracoronary thrombus identified by angiography or autopsy (MECHANIC et al., 2022). The differential diagnosis between ST-segment

elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI) depends exclusively on the presence or absence of persistent ST-segment elevation on the ECG. In contrast, the distinction between NSTEMI and unstable angina (UA) is based on the presence (NSTEMI) or absence (UA) of elevated myocardial necrosis biomarkers (ALMEIDA et al., 2024).

Other important clinical manifestations of AMI include severe chest pain or pressure radiating to the back, shoulders, neck, jaw, or arms, often accompanied by presyncope or syncope, dyspnea, persistent dry cough, epigastric pain, nausea, vomiting, and excessive sweating, frequently occurring after physical exertion. Approximately 50% of deaths related to AMI occur before the patient reaches the emergency department. Notably, AMI mortality has declined over the past decade, decreasing from approximately 10% to 5%. However, mortality remains approximately four times higher among patients older than 75 years compared with younger individuals (SASSO et al., 2024; OLIVEIRA, 2024).

Sex-related differences in the clinical presentation, treatment, and outcomes of patients with AMI have been investigated for decades. In general, women with AMI present with a greater burden of comorbidities and are more likely to exhibit atypical symptoms than men. Women also tend to experience longer delays before reperfusion therapy and are less likely to undergo cardiac catheterization. Several studies have reported higher unadjusted mortality rates among women following AMI, largely attributable to differences in age, comorbidities, and adherence to guideline-directed medical therapy (GAO et al., 2021). Furthermore, non-ST-segment elevation myocardial infarction (NSTEMI) is more common in women than ST-segment elevation myocardial infarction (STEMI).

Women more frequently present with atypical signs and symptoms, making early diagnosis more challenging. The most common risk factors associated with AMI in women include gestational diabetes mellitus, eclampsia, hormone replacement therapy, smoking, physical inactivity, and emotional stress (CAIRES et al., 2024; BUCCI et al., 2024). In addition, the high levels of stress experienced by many women may contribute to the development of cardiovascular disease, particularly when combined with other risk factors such as a positive family history and unhealthy lifestyle habits.

Women also exhibit higher rates of comorbidities such as hypertension, diabetes mellitus, overweight, and obesity, which may partially explain the poorer prognosis observed in comparison with men (GUIDA et al., 2024). Although many cardiovascular risk factors are shared between the sexes, the underlying pathophysiological mechanisms differ. For example, diabetes mellitus has been shown to increase the risk of acute myocardial infarction by approximately twofold more in women than in men (CAIRES et al., 2024).

The retrospective cohort study conducted by GUIDA et al. (2024) demonstrated that women exhibited a clinical profile characterized by greater morbidity and a higher long-term risk of adverse cardiovascular outcomes following a first AMI. Women also experienced a higher incidence of the composite outcome of all-cause mortality, recurrent AMI requiring hospitalization, myocardial revascularization procedures, and heart failure during the five-year follow-up period after hospital discharge. Advanced age contributes to the poorer post-AMI prognosis observed among women compared with men. Nevertheless, women in early middle age also showed an increased risk of mortality, identifying this population as a particularly vulnerable group requiring targeted clinical attention (JUNIOR et al., 2025).

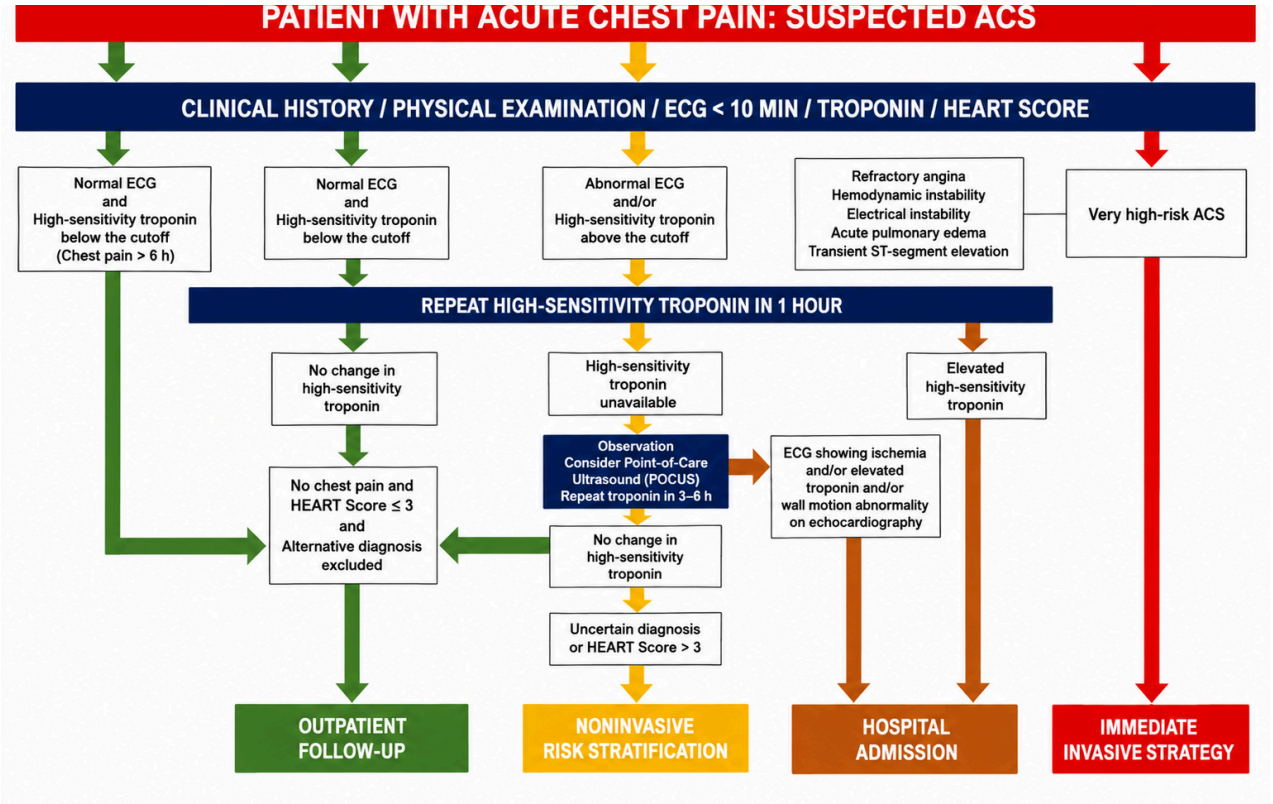
Young women have a lower prevalence of acute myocardial infarction (AMI) due to the cardioprotective effects of estrogen. However, following menopause, the incidence

of AMI increases as estrogen production declines. This hormone contributes to the maintenance of normal blood pressure by regulating cholesterol metabolism and promoting vasodilation, thereby improving blood circulation. In addition, estrogen is associated with a greater proportion of fibrous tissue within atherosclerotic plaques compared with men, contributing to plaque stabilization and reducing the likelihood of rupture (CAIRES et al., 2024).

The case report published by ALMEIDA et al. (2024) highlights the importance of a thorough medical history and physical examination in the evaluation of patients with suspected acute myocardial infarction. A detailed assessment of chest pain—the principal symptom of AMI—including its quality, intensity, character, location, duration, radiation, precipitating factors, relieving and aggravating factors, and clinical progression, is essential because it represents one of the strongest predictors of coronary artery disease. The study also emphasizes the importance of investigating cardiovascular risk factors, including smoking, diabetes mellitus, and a positive family history of cardiovascular disease. Furthermore, the clinical interview serves as a guide for requesting complementary diagnostic tests, such as cardiac troponin I measurement and electrocardiography (ECG), thereby reducing the time required to establish the diagnosis, a critical factor in patients with suspected AMI. In the reported case, elevated myocardial necrosis biomarkers, symptoms suggestive of myocardial ischemia, pathological Q waves, and T-wave abnormalities on the ECG in the absence of persistent ST-segment elevation supported the diagnosis of non-ST-segment elevation myocardial infarction (NSTEMI).

In patients with NSTEMI, the first clinical decision concerns whether to perform coronary angiography, which determines whether conservative medical management should be continued or myocardial revascularization should be undertaken by either percutaneous coronary intervention or coronary artery bypass grafting. This decision is based on a comprehensive evaluation of the coronary anatomy. Several clinical risk scores and prognostic indices assist physicians in selecting the most appropriate treatment strategy; however, there is still no universal consensus regarding the optimal therapeutic approach for all clinical scenarios. In the case reported by ALMEIDA et al. (2024), coronary angiography revealed findings that led to surgical myocardial revascularization as the preferred treatment strategy. Figure 1 presents a diagnostic flowchart illustrating the triage process, formulation of diagnostic hypotheses, complementary investigations, and diagnostic pathway for patients presenting with acute chest pain in the emergency department.

Figure 1. Diagnostic flowchart for the evaluation of patients presenting with acute chest pain in the emergency department. hs: high-sensitivity; TTE: transthoracic echocardiography.



Fonte: NICOLAU, et al. 2021

Resting chest discomfort is the most common symptom of acute coronary syndrome (ACS), affecting approximately 79% of men and 74% of women. However, nearly 40% of men and 48% of women present with nonspecific symptoms, such as dyspnea, either in isolation or, more commonly, in combination with chest pain (BHATT et al., 2022). The fact that many women fail to recognize the onset of ACS or acute myocardial infarction (AMI) is largely attributable to limited awareness of warning signs, including chest pain at rest and dyspnea. In addition, these symptoms are often attributed to common daily events or less serious conditions, contributing to delays in seeking medical care and, consequently, worsening clinical outcomes.

The impact of delayed hospital presentation in patients with suspected non-ST-segment elevation myocardial infarction (NSTEMI) has been demonstrated to be associated with symptom progression and adverse clinical outcomes. Approximately 30% of patients seek medical attention more than 24 hours after symptom onset. Factors associated with earlier prehospital presentation include advanced age (>75 years), female sex, atypical chest pain, dyspnea, and diabetes mellitus. Conversely, prolonged prehospital delay is associated with an increased risk of all-cause mortality over a three-year follow-up period among patients with NSTEMI (CHA et al., 2022). Consistent with these findings, women are less likely than men to undergo diagnostic procedures, including exercise stress testing, myocardial perfusion scintigraphy, and ventriculography. Furthermore, they are less frequently treated with antiplatelet therapy,

highlighting persistent sex-related disparities in the management of acute coronary syndromes (GUIDA et al., 2024).

Conclusão

Based on a comprehensive analysis of the pathophysiology, clinical manifestations, and particular features of acute myocardial infarction (AMI), it can be concluded that this acute coronary syndrome represents one of the greatest challenges in contemporary cardiovascular medicine. The complexity of its pathophysiological mechanism, which begins with endothelial dysfunction and progresses to the formation and possible rupture of an atherosclerotic plaque, culminating in thromboembolic events and myocardial necrosis, requires a high degree of clinical suspicion and prompt diagnosis. The crucial distinction between ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI) determines different therapeutic approaches, with immediate reperfusion being the cornerstone of treatment in the former and careful risk stratification in the latter, highlighting the need for well-defined and individualized clinical protocols.

A particularly noteworthy finding is the significant influence of sex on the epidemiology, clinical presentation, and prognosis of acute myocardial infarction (AMI). Although AMI is more prevalent in men, women, particularly after menopause, exhibit a greater burden of comorbidities and are more likely to present with atypical symptoms, making early diagnosis more challenging and contributing to a poorer long-term prognosis, characterized by a higher incidence of composite cardiovascular events and increased mortality. This situation is further exacerbated by longer prehospital delays, a lower likelihood of undergoing invasive diagnostic procedures, and less frequent use of guideline-recommended therapies. These findings underscore the urgent need for awareness strategies targeting both women and healthcare professionals to improve the recognition of atypical warning signs and reduce disparities in the management of AMI.

Finally, the effective management of acute myocardial infarction (AMI) extends beyond acute hospital intervention and depends on an integrated approach that includes a thorough medical history, careful interpretation of the electrocardiogram (ECG) and myocardial necrosis biomarkers, and therapeutic decision-making based on coronary anatomy. The syndromic approach, which distinguishes unstable angina from AMI, together with the identification of modifiable cardiovascular risk factors, such as smoking, dyslipidemia, and physical inactivity, is essential not only for the treatment of the acute event but also for secondary prevention and mortality reduction. In summary, addressing AMI requires continuous efforts in research, health education, and the optimization of emergency healthcare systems, with particular emphasis on achieving sex equity, to ensure that all patients, regardless of sex or age, have access to timely diagnosis and effective treatment, thereby improving clinical outcomes and quality of life.

Acknowledgments

This study was funded by the authors themselves.

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Autor correspondente:
João Arthur de Castro.
Rua Clarinto Melo Franco, 30, Santa Lucia, 38600-356, Paracatu-MG.
34) 99916-1390
turecacastro@gmail.com