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RESEARCH ARTICLE (ORIGINAL)

Frequent Coronary Lesions and Left Ventricular Ejection Fraction in Patients With Stemi: An Observational Study

Lesões Coronárias Frequentes e Fração de Ejeção Ventricular Esquerda em Pessoas com EAMcST: Estudo Observacional

Lesiones coronarias frecuentes y fracción de eyección ventricular izquierda en personas con IAMcST: estudio observacional

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Abstract

Background: Coronary artery disease is the leading cause of death among adults, and ST-segment elevation myocardial infarction (STEMI) represents its most severe clinical manifestation.
Objective: To identify the coronary arteries most frequently affected and the left ventricular ejection fraction (LVEF) values in patients with STEMI.
Methodology: Observational, quantitative, retrospective study. All patients with STEMI treated at a hospital in Portugal between 2014 and 2024 were included.
Results: The sample comprised 1,420 patients. The right coronary artery had the highest frequency of occlusion in 2014 (47.8%), whereas the left anterior descending artery predominated in 2015 (50.8%). The most significant variations occurred in the right coronary and left anterior descending arteries (2014-2015), whereas the obtuse marginal and posterolateral branches peaked in 2020 and 2024, respectively (p<.001). The highest proportion of severe LVEF at discharge was observed in 2019 (6.3%).
Conclusion: The left anterior descending artery was the most frequently obstructed, followed by the right coronary artery. Severe and moderate LVEF values decreased at discharge.

Keywords: myocardial infarction; coronary vessels; ejection fraction

Resumo

Enquadramento: A doença coronária representa a principal causa de morte nos adultos e o Enfarte Agudo do Miocárdio com supra ST é a sua manifestação mais letal.
Objetivo: Identificar as artérias coronárias mais frequentemente lesadas e os valores de Fração de Ejeção do Ventrículo Esquerdo em pessoas nesta população.
Metodologia: Estudo observacional, quantitativo e retrospetivo. Foram incluídos todos os doentes com EAMcST atendidos num Hospital de Portugal entre 2014 e 2024.
Resultados: Amostra de 1420 doentes. A artéria coronária direita teve o maior valor em 2014 (47,8%) e a artéria descendente anterior em 2015 (50,8%). As variações mais significativas ocorreram nas artérias coronária direita e descendente anterior (2014-2015), enquanto as artérias oblíquas marginal e póstero-lateral apresentaram picos em 2020 e 2024, respetivamente (p<0,001). Os valores mais elevados de Fração de Ejeção do Ventrículo Esquerdo grave à alta clínica ocorreram em 2019 (6,3%).
Conclusão: A artéria descendente anterior foi a mais frequentemente obstruída, seguida da coronária direita. Valores de Fração de Ejeção do Ventrículo Esquerdo grave e moderada reduziram à alta.

Palavras-chave: enfarte agudo do miocárdio; vasos coronários; fração de ejeção

Resumen

Marco contextual: La enfermedad coronaria es la principal causa de muerte en adultos y el infarto agudo de miocardio con elevación del segmento ST es su manifestación más letal.
Objetivo: Identificar las arterias coronarias más frecuentemente lesionadas y los valores de fracción de eyección del ventrículo izquierdo en personas de esta población.
Metodología: Estudio observacional, cuantitativo y retrospectivo. Se incluyeron todos los pacientes con IAMcST atendidos en un hospital de Portugal entre 2014 y 2024.
Resultados: Muestra de 1420 pacientes. La arteria coronaria derecha tuvo el valor más alto en 2014 (47,8 %) y la arteria descendente anterior en 2015 (50,8 %). Las variaciones más significativas se produjeron en la arteria coronaria derecha y descendente anterior (2014-2015), mientras que la arteria oblicua marginal y posterolateral presentaron picos en 2020 y 2024, respectivamente (p < 0,001). Los valores más altos de fracción de eyección del ventrículo izquierdo grave al alta clínica se produjeron en 2019 (6,3 %).
Conclusión: La arteria descendente anterior fue la más frecuentemente obstruida, seguida de la coronaria derecha. Los valores de fracción de eyección del ventrículo izquierdo grave y moderada se redujeron al alta.

Palabras clave: infarto agudo de miocardio; vasos coronarios; fracción de eyección

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Introduction

An acute ST-segment elevation myocardial infarction (STEMI) is a critical and prevalent cardiovascular condition, with a significant impact on patients' quality of life and high associated morbidity and mortality. Given its high incidence and the complexity of its clinical management, it is essential to analyze the most frequently affected coronary arteries and left ventricular ejection fraction (LVEF) values in patients with STEMI (Guarnieri et al., 2024). Early recognition of clinical signs and symptoms, together with prompt interventions such as hemodynamic stabilization, ventilatory support, medication administration, and monitoring of vital parameters, is essential to prevent serious complications (Ahmed et al., 2022). The study of STEMI and coronary arteries directly influences the quality of care by enabling the development of clinical and technical skills required for rapid decision-making in high-pressure and complex prehospital and emergency department settings, while respecting the principles of patient safety, care quality, and humanized care (Zayat et al., 2021; Guarnieri et al., 2024). The presence of an occluded coronary artery is a serious clinical condition that compromises myocardial blood supply and is closely associated with cardiac function, particularly LVEF. Although the general principles of STEMI treatment remain consistent, the diagnostic approach using electrocardiograms (ECG) and nurse-led therapeutic interventions may vary depending on the coronary artery involved (Ahmed et al., 2022). Clinical diagnosis is based on the early detection of signs and symptoms, as well as ECG data, which are procedures predominantly within the nursing scope of practice. Nurses are an integral part of prehospital and emergency teams, particularly during initial triage processes (Zaboli et al., 2023).

Background

An acute myocardial infarction (AMI) is characterized by myocardial injury, defined by elevated cardiac troponin levels (with at least one value above the 99th percentile of the upper reference limit) associated with a clinical presentation consistent with myocardial ischemia (World Health Organization, 2020). The term STEMI is commonly used to describe patients with persistent chest pain or other symptoms suggestive of ischemia, accompanied by ST-segment elevation in at least two contiguous leads, indicating the need for immediate treatment, such as reperfusion therapy. Beyond this classification, AMI can be categorized based on its pathological and prognostic characteristics, reflecting differences in recommended therapeutic approaches (Ibanez et al., 2017).

Acute coronary syndrome results from irreversible myocardial necrosis caused by a sudden reduction or interruption of blood flow to an area of the heart. The main symptom is chest pain, and an ECG is crucial for diagnosis (Bhuyan et al., 2024; Ibanez et al., 2017). In cases of STEMI, which usually indicate total occlusion of a coronary artery, immediate treatment is essential and is usually performed through primary percutaneous coronary intervention or fibrinolytic therapy (Zhang et al., 2024). Its diagnosis is based on the patient's medical history, physical examination, ECG findings, and measurement of high-sensitivity troponin levels. Coronary artery disease can be asymptomatic; chest pain is usually described as a sensation of pressure or heaviness radiating to the left arm, neck, or jaw and is often accompanied by cold sweats, nausea, or fainting (Zhang et al., 2024). A study by Bhuyan et al. (2024) reported a mean age of 55.75 ± 12.5 years among patients with STEMI, with a predominance of male patients (75%). These findings indicate a higher prevalence of STEMI among older men, which is consistent with existing literature on cardiovascular disease. Similarly, a retrospective cross-sectional study conducted between March 2020 and March 2021 with 661 AMI patients recruited from two hospitals in Najran, Saudi Arabia, found that 82.9% were male, with a mean age of 40.3 ± 13.7 years and a higher prevalence in the 55–64 age group. Most cases (55.4%) presented with STEMI, with the left anterior descending artery identified as the most frequently involved artery in both STEMI and NSTEMI patients (Guarnieri et al., 2024). LVEF is a key indicator of heart function, representing the percentage of blood volume ejected from the left ventricle in each cardiac cycle. LVEF often decreases in patients with coronary artery occlusion, reflecting left ventricular dysfunction due to impaired blood flow and oxygen supply to heart cells (Marchi et al., 2024). Studies have shown that reduced LVEF is associated with a poorer clinical prognosis, including an increased risk of congestive heart failure, arrhythmias, and sudden death (Kurisu et al., 2024). The severity and location of coronary occlusion can directly influence LVEF. For example, occlusion of the left anterior descending artery tends to have a greater impact on left ventricular systolic function than occlusion of more peripheral branches, which can still cause a significant, albeit less pronounced, reduction in LVEF in case of heart failure (Kurisu et al., 2024; Marchi et al., 2024; Mendes et al., 2023). Understanding the relationship between coronary artery occlusion and LVEF is essential for comprehending the pathophysiology of heart failure and the overall impact of coronary lesions on cardiac function. Early identification of coronary occlusion and assessment of LVEF are essential for guiding therapeutic decisions, including the choice between invasive treatments such as primary percutaneous coronary intervention and pharmacological strategies to optimize cardiac function (Mendes et al., 2023). In emergency department triage and prehospital clinical settings, nurses are required to make rapid clinical judgements in situations of high uncertainty and urgent decision-making demands (Recognition-Primed Decision Model; Reay & Rankin, 2013). The diagnosis of STEMI requires rapid assesment, pattern recognition (signs, symptoms, and ECG), and urgent decision-making.

Research question

What are the most frequently obstructed coronary arteries in patients with STEMI? What are the LVEF values at hospital admission and discharge in patients with STEMI?

Methodology

This study followed the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines (Elm et al., 2008).

Study design, inclusion criteria

An observational, quantitative, retrospective study was conducted with a sample of patients diagnosed with STEMI from two districts in northern Portugal between 2014 and 2024. The inclusion criteria comprised patients aged 18 years or older who were diagnosed with STEMI and admitted to the Cardiology Inpatient Unit. Patients admitted to the Cardiology Intensive Care Unit but not transferred to the Cardiology Inpatient Unit, those transferred directly to the Cardiothoracic Unit for revascularization surgery, those transferred between hospitals who underwent only catheterization, those who died in the hemodynamics unit, and those admitted with suspected AMI who were subsequently diagnosed with Takotsubo cardiomyopathy and/or myocardial infarction with non-obstructive coronary arteries (MINOCA) were excluded A non-random convenience sampling strategy was adopted. The following clinical data were ollected: occluded artery (right coronary artery, left anterior descending artery, posterior descending artery, obtuse marginal branch, posterolateral branch, circumflex artery, ramus intermedius or intermediate branch, left main coronary artery, or multiple arteries) and LVEF values (at hospital admission and discharge). Reference values for left ventricular systolic function are defined as follows: normal function to values equal to or greater than 55%; mild dysfunction to values between 44 and 54%; moderate dysfunction to values between 30 and 44%; and severe dysfunction corresponds to values below 30% (Libby et al., 2022).

Data collection instrument and methodological procedure

Data were collected through a review of the clinical records of patients admitted to the Cardiology Department between 2014 and 2024. The research team developed a data collection tool specifically for this study to gather clinical variables in addition to age and gender. These variables included the occluded artery (right coronary artery, left anterior descending artery, posterior descending artery, obtuse marginal branch, posterolateral branch, circumflex artery, ramus intermedius or intermediate branch, left main coronary artery, multiple arteries) and LVEF values at hospital admission and discharge.

Data analysis

Data analysis was performed using IBM SPSS Statistics for Windows, version 28.0. Categorical variables were expressed as absolute frequencies and percentages (%), whereas continuous variables were presented as means (M) and standard deviations (±). The chi-square test was used to assess associations between variables. A significance level of $p < .05$ (95% CI) was considered statistically significant.

Ethical considerations

This study was conducted as part of the *Nursing Care for People with Cardiopulmonary Disease* project: CP4D - *Investigating and Innovating to Train and Care*, registered with the Health Sciences Research Unit: Nursing. It received a favorable opinion from the Ethics Committee on 17 January 2025 (reference number 5601 B 09/2024). An authorized service manager provided the anonymized data. Data confidentiality was ensured and protected by professional secrecy. To ensure patient anonymity, each record was assigned a unique identification code without personal identifiers. Data were stored securely and only accessible to the researcher. All data will be deleted 12 months after publication. In accordance with Articles 106 and 107 of the Code of Ethics, the researcher is legally responsible for protecting patient privacy.

Results

This study comprised 1,420 patients with STEMI, of whom 74.3% were male. The highest number of cases was recorded in 2024, with 176 patients, representing 12.4% of the total sample. The most represented age group was 66–80 years (38.2%; $n = 542$), followed by the 51–65-year age group (34.3%; $n = 487$). Patient ages ranged from 25 to 100 years, with a mean age of 65.45 years (± 13.07; Table 1).

Table 1

Sociodemographic characterization of the sample

	Frequency	
Variables	*n* (1420)	% (100.0)
Year		
2014	92	6.5
2015	118	8.3
2016	125	8.8
2017	135	9.5
2018	138	9.7
2019	115	8.1
2020	127	8.9
2021	147	10.4
2022	111	7.8
2023	136	9.6
2024	176	12.4
Age	Minimum and maximum: 25-100 years Mean: 65.45 ± 13.07 years	
< 50 years	199	14.0
51-65 years	487	34.3
66-80 years	542	38.2
> 80 years	192	13.5
Gender		
Male	1055	74.3
Female	365	25.7

Note. n = Sample size; % = Percentage.

In 2014, occlusion of the right coronary artery was the most frequently observed in patients with STEMI, followed by occlusion of the left anterior descending artery. However, in subsequent years, this pattern reversed, with occlusion of the left anterior descending artery becoming more prevalent than occlusion of the right coronary artery. As shown in Table 2, the highest proportions of occlusion were observed in the right coronary artery in 2014 (47.8%) and in the left anterior descending artery in 2015 (50.8%). Overall, the most significant variations occurred in the right coronary and left anterior descending arteries, with higher values at the beginning of the study period (2014–2015). In contrast, the obtuse marginal and posterolateral branches had more recent peaks in 2020 and 2024, respectively. Statistically significant variation was observed across the years ($p < 0.01$).

Table 2

Occluded arteries per year (2014-2024)

Artery	Right Coronary		Left anterior descending		Posterior descending		Obtuse Marginal		Posterolateral		Circumflex		Intermediate branch		Left main coronary		Multiple	
	%	VR	%	VR	%	VR	%	VR	%	VR	%	VR	%	VR	%	VR	%	VR
Year																		
2014	47.8	2.7	34.8	-1.5	0.0	-1.0	9.8	0.7	0.0	-1.2	5.4	-1.0	0.0	-0.8	1.1	0.3	1.1	-0.9
2015	38.1	0.7	50.8	1.9	0.0	-1.2	5.1	-1.2	0.8	-0.5	3.4	-2.0	0.0	-0.9	0.8	0.0	0.8	-1.3
2016	28.0	-1.7	52.8	2.4	0.0	-1.2	11.2	1.4	0.8	-0.5	7.2	-0.4	0.0	-0.9	0.0	-1.1	0.0	-1.9
2017	36.3	0.3	37.0	-1.3	2.2	1.4	10.4	1.1	0.0	-1.4	11.9	1.7	0.7	0.2	0.0	-1.1	1.5	-0.9
2018	36.2	0.3	44.2	0.4	0.0	-1.3	7.2	-0.3	0.7	-0.7	5.8	-1.0	0.0	-1.0	2.2	1.8	3.6	0.8
2019	39.1	1.0	38.3	-1.0	1.7	0.7	8.7	0.3	1.7	0.4	6.1	-0.8	0.9	0.3	0.9	0.0	1.7	-0.6
2020	31.5	-0.9	42.5	0.0	1.6	0.6	4.7	-1.4	0.0	-1.4	4.7	-1.5	2.4	2.6	0.0	-1.1	12.6	7.4
2021	32.0	-0.8	47.6	1.3	1.4	0.4	6.8	-0.5	2.0	0.8	7.5	-0.3	1.4	1.2	1.4	0.7	0.0	-2.1
2022	33.3	-0.4	40.5	-0.4	1.8	0.8	11.7	1.6	1.8	0.4	9.0	0.4	0.0	-0.9	0.0	-1.0	1.8	-0.6
2023	32.4	-0.7	41.9	-0.1	0.7	-0.4	5.1	-1.2	2.9	1.7	9.6	0.7	0.7	0.2	1.5	0.8	5.1	2.0
2024	34.7	-0.1	36.4	-1.7	1.7	0.9	7.4	-0.3	2.8	1.9	14.8	3.5	0.6	-0.1	1.1	0.5	0.6	-1.8
p									***< .001***									

Note. VR = Residual Value; % = Percentage; *p* = Significance level.

As shown in Table 3, the highest proportions of severe LVEF at discharge were observed in 2015 and 2018 (5.1% each) and in 2019 (6.3%). Moderate LVEF was most frequent in 2018 (24.1%) and 2024 (23.3%), whereas mild LVEF predominated in 2020 (39.8%) and 2017 (39.7%). Normal LVEF showed the highest percentages across all 10 years, particularly in 2022 (50%) and 2015 (45.8%).

Table 3

LVEF at discharge per year (2014-2024)

LVEF	Severe		Moderate		Mild		Normal	
	%	VR	%	VR	%	VR	%	VR
Year								
2014	3.3	-0.3	21.1	0.5	32.2	-0.6	43.3	0.3
2015	5.1	0.7	16.1	-0.8	33.1	-0.6	45.8	0.9
2016	2.4	-0.9	19.4	0.1	37.1	0.4	41.1	-0.2
2017	3.2	-0.4	20.6	0.5	39.7	1.1	36.5	-1.3
2018	5.1	0.8	24.1	1.6	33.6	-0.5	37.2	-1.2
2019	6.3	1.4	17.0	-0.6	35.7	0.1	41.1	-0.2
2020	3.3	-0.4	18.7	-0.1	39.8	1.1	38.2	-0.9
2021	3.0	-0.6	16.3	-0.8	33.3	-0.5	47.4	1.4
2022	3.1	-0.4	12.5	-1.7	34.4	-0.2	50.0	1.7
2023	4.8	0.5	16.7	-0.7	34.1	-0.3	44.4	0.6
2024	3.1	-0.5	23.3	1.5	35.2	0.0	38.4	-0.9

Note. VR = Residual Value*; %* = Percentage.

Table 4 shows the results related to the occluded artery, procedure duration, LVEF at admission and discharge, and length of hospital stay. The left anterior descending artery was the most frequently obstructed artery, accounting for 42.5% of cases, followed by the right coronary artery (35.0%). Occlusion of the intermediate branch was

observed in only 0.6% of patients. Procedure duration ranged from 3 to 309 minutes, with a mean duration of 40.68 ± 23.81 minutes. Regarding procedure duration, 20.6% of patients (*n* = 292) underwent procedures lasting less than 30 minutes, 27.9% (*n* = 396) between 30 minutes and 1 hour, and 6.2% (*n* = 88) between 1 and 2 hours. Only 0.6% of patients (*n* = 9) underwent procedures lasting more than 2 hours.

It should be noted that LVEF values at admission and/or discharge were not available for all clinical records. At hospital admission, 9.7% of patients (*n* = 16) presented with severe LVEF, 20.6% (*n* = 292) with moderate LVEF, 27.2% (*n* = 386) with mild LVEF, and 30.9% (*n* = 428) with normal or preserved LVEF. At discharge, the distribution was as follows: 3.7% (*n* = 52) remained with severe LVEF, 18.0% (*n* = 255) had moderate LVEF, 33.5% (*n* = 476) had mild LVEF, and 39.6% (*n* = 563) had normal or preserved LVEF. Length of hospital stay ranged from 1 to 63 days, with a mean duration of 6.67 ± 4.61 days. Overall, 50.8% (*n* = 722) of patients were discharged within 5 days, 38.1% (*n* = 541) between 6 and 10 days, and 11.1% (*n* = 157) after more than 10 days of hospitalization.

Table 4

Clinical data

Category	Frequency (n)	%	Category	Frequency (n)	%
Occluded artery			LVEF at admission		
Right coronary	497	35.0	Severe	16	9.7
Left anterior descending	603	42.5	Moderate	292	20.6
Posterior descending	15	1.1	Mild	386	27.2
Obtuse marginal branch	112	7.9	Normal/Preserved	428	30.9
Posterolateral branch	19	1.3	LVEF at discharge		
Circumflex	115	8.1	Severe	52	3.7
Intermediate branch	9	0.6	Moderate	255	18.0
Left main coronary	12	0.8	Mild	476	33.5
Multiple	37	2.6	Normal/Preserved	563	39.6
Duration of procedure			Length of hospital stay		
Less than 30 minutes	292	20.6	Less than 5 days	722	50.8
Between 30 minutes and 1 hour	396	27.9	Between 6 and 10 days	541	38.1
Between 1 hour and 2 hours	88	6.2	More than 10 days	157	11.1
More than 2 hours	9	0.6	Mean	6.67±4.61 days	
Mean	40.68±23.81 minutes		Minimum and maximum	1-63 days	
Minimum and maximum	3-309 minutes				

Note. n = Sample size; % = Percentage.

Table 5 shows the results illustrating the association between clinical data and patient age group, including the distribution of occluded arteries and LVEF at discharge by age group. The analysis revealed that the distribution of occluded arteries was not significantly associated with age (X^2 = 25.553; p = .543). Among patients aged ≤ 50 years, the highest proportion of occlusions involved the obtuse marginal branch (17.0%). In the 51–65-year age group, occlusion of the left main coronary artery was most frequent. Among patients aged 66–80 years, the circumflex artery was the most frequently affected (42.6%), whereas in patients aged over 80 years, a higher prevalence of left main coronary artery occlusion was observed (33.3%). The analysis of LVEF at discharge revealed a statistically significant association with age (X^2 = 38.816; p < .001). Among patients aged under 50 years, the majority presented with normal or preserved LVEF (18.7%). In the 51-65-year age group, severe LVEF was observed in 36.5% of patients, while 35.3% had normal LVEF. Among patients aged 66–80 years, moderate LVEF was most frequent (43.5%), followed by mild LVEF (37.2%). In patients aged over 80 years, 26.9% had severe LVEF, while 18.0% had moderate LVEF. The results indicate a tendency for LVEF to deteriorate with increasing age, highlighting age as a relevant variable for monitoring patients' health at hospital discharge.

Table 5

Association between clinical data and age

Age	≤ 50 years		51-65 years		1-80 years		> 80 years		X^2	p
	%	VR	%	VR	%	VR	%	VR		
Occluded artery										
Right coronary	14.3	0.2	34.2	-0.1	37.8	-0.2	13.7	0.1		
Left anterior descending	13.9	-0.1	33.0	-0.9	39.3	0.8	13.8	0.2		
Posterior descending	13.3	-0.1	33.3	-0.1	33.3	-0.4	20.0	0.7		
Obtuse marginal branch	17.0	0.9	41.1	1.6	33.0	-1.2	8.9	-1.5	25.553	0.543
Posterolateral branch	10.5	-0.4	42.1	0.7	42.1	0.4	5.3	-1.1		
Circumflex	13.9	0.0	32.2	-0.5	42.6	1.0	11.3	-0.7		
Intermediate branch	11.1	-0.3	44.4	0.6	33.3	-0.3	11.1	-0.2		
Left main coronary	8.3	-0.6	50.0	1.2	8.3	-2.1	33.3	2.0		
Multiple	8.1	-1.0	32.4	-0.2	37.8	0.0	21.6	1.5		
LVEF at discharge										
Severe	9.6	-1.0	36.5	0.3	26.9	-1.6	26.9	2.8		
Moderate	6.7	-3.9	31.8	-1.0	43.5	2.3	18.0	2.2	38.816	<0.001
Mild	13.9	-0.4	34.9	0.2	37.2	-0.1	14.1	0.3		
Normal/Preserved	18.7	3.8	35.3	0.5	35.7	-1.1	10.3	-3.1		

Note. VR = Residual Value; % = Percentage; X^2 = Chi-square test; p = Significance level.

Analysis of occluded arteries did not reveal a statistically significant association with gender (X^2 = 8.671; p = 0.468). The intermediate branch was most frequently occluded in men (88.9%), whereas the posterior descending artery was most frequently affected among women (33.3%). Analysis of LVEF at discharge showed a similar distribution between sexes; however, this association was not statistically significant (X^2 = 7.525; p = 0.057). Among men, the most prevalent LVEF categories were severe and normal/preserved LVEF (76.9% and 23.1%, respectively), followed by moderate LVEF (73.3%). Among women, the most prevalent category was mild LVEF (30.5%), followed by moderate LVEF (26.7%; Table 6).

Table 6

Association between clinical data and gender

Gender	Male		Female		X^2	*p*
	%	VR	%	VR		
Occluded artery						
Right coronary	75.1	0.5	24.9	-0.5		
Left anterior descending	71.5	-2.1	28.5	2.1		
Posterior descending	66.7	-0.7	33.3	0.7		
Obtuse marginal	77.7	0.9	22.3	-0.9	8.671	.468
Posterolateral	84.2	1.0	15.8	-1.0		
Circumflex	76.5	0.6	23.5	-0.6		
Intermediate branch	88.9	1.0	11.1	-1.0		
Left main coronary	83.3	0.7	16.7	-0.7		
Multiple	83.8	1.3	16.2	-1.3		
LVEF at discharge						
Severe	76.9	0.6	23.1	-0.6		
Moderate	73.3	-0.1	26.7	0.1	7.525	.057
Mild	69.5	-2.5	30.5	2.5		
Normal/Preserved	76.9	2.3	23.1	-2.3		

Note. VR = Residual Value; % = Percentage; X^2 = Chi-square test; *p* = Significance level.

Discussion

This study identified the coronary arteries most frequently affected, as well as LVEF values, in patients with STEMI over the past 10 years. The findings indicate that the right coronary artery had the highest occlusion rate in 2014, followed by the left anterior descending artery in 2015. Overall, the right coronary artery and the left anterior descending artery showed the most significant variations, with higher peaks at the beginning of the study period (2014–2015). In contrast, the obtuse marginal and posterolateral branches exhibited peak occlusion rates in 2020 and 2024, respectively. The analysis revealed statistically significant variations over time ($p < .001$), indicating changes in the profile of coronary lesions associated with STEMI. More specifically, the results showed that the left anterior descending artery was the most frequently occluded vessel, followed by the right coronary artery, whereas occlusion of the intermediate branch was the least frequent. These findings corroborate evidence from previous studies reporting a higher frequency of occlusion of the right coronary artery and the left anterior descending artery. These occlusions are often associated with poorer prognosis and higher mortality rates (Fontes-Carvalho et al., 2021). This trend is relevant for nursing practice because it underscores the need for early diagnosis and treatment strategies due to the high prevalence of clinically significant coronary occlusions (Regitz-Zagrosek et al., 2023).

Regarding LVEF at discharge, highest proportions of severe dysfunction were observed in 2015, 2018, and 2019, whereas moderate dysfunction was more prevalent in 2018 and 2024. The highest proportions of mild LVEF were recorded in 2020 and 2017, while normal LVEF values accounted for the highest percentages over the 10-year period, with notable peaks in 2022 and 2015. A comparative analysis between admission and discharge revealed an overall improvement in LVEF. Severe and moderate LVEF values decreased at discharge, while mild and normal/preserved LVEF values increased. These improvements suggest recovery of ventricular function during hospitalization, which had a mean duration of 6.67 ± 4.61 days. Half of the individuals were hospitalized for less than five days. Other studies have emphasized the importance of early interventions for improving ventricular function following an AMI. Fontes-Carvalho et al. (2021) demonstrated that early reperfusion improves left ventricular function and that continuous monitoring of LVEF throughout hospitalization is essential to optimizing patient prognosis. The higher percentage of patients with normal or preserved LVEF at discharge in this sample suggests that the treatments implemented, including primary percutaneous coronary intervention, were effective. This finding is consistent with the literature highlighting the effectiveness of early treatment in recovering ventricular function.

The analysis of coronary occlusions did not reveal a statistically significant association with age group ($p > .5$). This finding corroborates the study by Oliveira et al. (2020), which indicates that coronary occlusions, particularly those involving the right coronary artery and the left anterior descending artery, are frequent across different age groups.

Nevertheless, in older patients, the characteristics of AMI may be more complex. In contrast, analysis of LVEF at discharge showed a statistically significant association with age ($p < .001$), indicating a progressive deterioration of ventricular function with increasing age, particularly among patients older than 80 years. This finding is consistent with studies by Pereira et al. (2024) and Santos et al. (2021), which emphasize that older patients are at a higher risk for severe LVEF impairment. Therefore, close monitoring of ventricular and hemodynamic function in older adults is essential to optimize long-term outcomes. Other studies have not shown a significant influence of factors such as gender or age group on coronary occlusions or post-treatment LVEF (Santos et al., 2021). Effective initial management, early reperfusion, and timely treatment of STEMI remain fundamental to improving ventricular function and patient prognosis. Rapid diagnosis, referral, and primary percutaneous coronary intervention play a decisive role in recovery outcomes. Evidence indicates that patients who undergo primary percutaneous coronary intervention within six hours of symptom onset have significantly higher LVEF at follow-up than those treated later (Jan et al., 2024). Timely nursing interventions, particularly in the recognition of signs and symptoms and the rapid use and interpretation of ECGs, are essential for early diagnosis and improved outcomes in patients with STEMI (Zughaft et al., 2014).

The results of this study underscore the importance of proactive nursing care in the initial screening and continuous monitoring of patients with STEMI, emphasizing the need for ongoing training and updated protocols to optimize early diagnosis and post-hospital care.

A primary limitation of this retrospective study is that data were collected from existing clinical records, without active intervention or control over the variables. This study may have been affected by information bias, given that data accuracy depends on the quality and consistency of the clinical records. Notably, some records lacked LVEF data at admission and/or discharge, which may have compromised the results.

Conclusion

This study identified the coronary arteries most frequently affected and described LVEF values in patients with STEMI over the past 10 years. The right coronary artery had the highest occlusion rate in 2014, followed by the left anterior descending artery in 2015. Overall, the right coronary artery and the left anterior descending artery had the most significant variations, with peaks at the beginning of the study period (2014–2015). The highest proportions of severe LVEF at discharge were observed in 2015, 2018, and 2019, whereas moderate LVEF values were more prevalent in 2018 and 2024. A comparative analysis between hospital admission and discharge revealed an overall improvement in LVEF. Nurses play a decisive role in the early diagnosis of STEMI by promptly assessing clinical signs and obtaining ECGs, thereby contributing to improved clinical outcomes.

Authors' contributions

Conceptualization: Costa, A., Gama, F., Alves, C., Mota, M.
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