ONLINE VERSION: ISSN 1028-4818

RPNS-1853

Multimed 2025; 29: e3206

Original article

Clinical and hemodynamic characterization of acute unstable angina associated with metabolic syndrome

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SUMMARY

Introduction: Cardiovascular diseases are the main cause of morbidity and mortality worldwide. Metabolic syndrome is an important constellation of risk factors risk that increases the likelihood of acute cardiovascular events.

ONLINE VERSION: ISSN 1028-4818

RPNS-1853

Aim: To describe the clinical and hemodynamic characteristics of patients with angina Acute unstable with electrocardiographic changes associated with metabolic syndrome.

Methods:A descriptive cross-sectional study was conducted in 1912 patients admitted for angina. unstable acute in the Cardiology Service of the Carlos Manuel de Céspedes Hospital, Bayamo, Cuba between January 2020 and May 2022, where clinical, electrocardiographic data were collected, echocardiographic and biochemical. Descriptive statistical techniques were used. The data were statistically analyzed using SPSS 25.0.

Results:A prevalence of MS of 30.2% was identified. Men predominated (58.5 %) and the mean age was 62.1 ± 8.6 years. In women, age ≥ 65 years predominated, dyslipidemia, obesity, diabetes mellitus and left ventricular dysfunction, while the Smoking, left ventricular hypertrophy, and hypertensive heart disease were more common in men. The most common electrocardiographic abnormalities were mixed changes in the ST-T segment, T wave inversion and ST segment depression. The most common complications Common side effects included recurrence and refractoriness of pain and heart failure.

Conclusions: These results show the significant association of metabolic syndrome with a more complex clinical presentation and severe cardiovascular complications. recommends the implementation of comprehensive prevention strategies and the development of predictive tools to improve the clinical management and prognosis of these patients.

Keywords: Acute unstable angina; Metabolic syndrome; Risk factors cardiovascular; Cardiovascular complications; Risk stratification.

Abstract

Introduction: cardiovascular diseases are the leading cause of morbidity and mortality worldwide. Metabolic syndrome is an important cluster of risk factors that increases the likelihood of acute cardiovascular events.

ONLINE VERSION: ISSN 1028-4818

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Objective: to describe the clinical and hemodynamic characteristics of patients with unstable angina with electrocardiographic changes associated with metabolic syndrome.

Methods: a cross-sectional descriptive study was conducted in 1,912 patients admitted with unstable angina in the Cardiology service of Carlos Manuel de Céspedes Hospital, Bayamo, Cuba, between January 2020 and May 2022. Clinical, electrocardiographic, echocardiographic, and biochemical data were collected. Descriptive statistical techniques and SPSS 25.0 software were used for data analysis.

Results: the prevalence of MS was 30.2 %. Males predominated (58.5%) with a mean age of 62.1 ± 8.6 years. In females, the prevalence of age ≥ 65 years, dyslipidemia, obesity, diabetes mellitus, and left ventricular dysfunction was higher, whereas smoking, left ventricular hypertrophy, and hypertensive cardiopathy were more frequent in males. The most common electrocardiographic abnormalities were mixed ST-T changes, T wave inversion, and ST segment depression. The most frequent complications were recurrent and refractory chest pain and heart failure.

Conclusions: these results demonstrate a significant association between metabolic syndrome and a more complex clinical presentation with severe cardiovascular complications. Implementation of comprehensive prevention strategies and development of predictive tools are recommended to improve clinical management and prognosis in these patients.

Keywords: Unstable Angina; Metabolic Syndrome; Cardiovascular Risk Factors; Cardiovascular Complications; Risk Stratification.

Summary

Introduction: Cardiovascular diseases constitute the main cause of morbidity and I will die in the whole world. The metabolic syndrome is an important constellation of risk factors that increase the probability of acute cardiovascular events.

ONLINE VERSION: ISSN 1028-4818

RPNS-1853

Aim: to reveal the clinical and hemodynamic characteristics of patients with angina Acute illness with electrocardiographic alterations associated with metabolic syndrome.

Methods: A cross-sectional descriptive study was carried out in 1912 patients hospitalized for Acute instável angina at the Cardiology Service of the Carlos Manuel de Céspedes Hospital, Bayamo, Cuba, between January 2020 and May 2022, where clinical data are collected, electrocardiographic, echocardiographic and biochemical. Foram descriptive statistics techniques used. The data are statistically analyzed using SPSS 25.0.

Results: identificou-se uma prevalence of metabolic syndrome of 30.2%. Predominaram The men (58.5%) had an average age of 62.1 ± 8.6 years. Nas mulheres, predominaramidade ≥ 65 years, dyslipidemia, obesity, diabetes mellitus and left ventricular dysfunction, while or tabagism, left ventricular hypertrophy and hypertensive heart disease foram mais frequentes nos homens. The most common electrocardiographic alterations during moving Mixes in the ST-T segment, inversion of the T wave and depression of the ST segment. The complications The most common symptoms include recurrence and refractory pain and heart failure.

Conclusions: These results evidence a significant association between metabolic syndrome and A more complex clinical presentation and serious cardiovascular complications. Recommend- the implementation of comprehensive prevention strategies and the development of tools predictive measures to improve the clinical management and prognosis of these patients.

Keywords: Acute Instável Angina; Metabolic Syndrome; Cardiovascular Risk Factors; Cardiovascular Complications; Risco Stratification.

Received: 08/28/2025

Approved: 05/09/2025

Introduction

ONLINE VERSION: ISSN 1028-4818

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Cardiovascular diseases (CVC) maintain a high prevalence worldwide and They continue to be the main causes of disability and death, representing a burden growing for health systems and society in general.(1,2)

Acute coronary syndrome (ACS) is defined as the set of signs and symptoms that They cover the clinical, electrocardiographic and humoral spectrum of acute myocardial ischemia. This term allows immediate therapeutic conduct to be initiated before the definitive diagnosis and includes acute myocardial infarction with or without ST-segment elevation and unstable angina acute (AIA).

The pathophysiology is complex and multifactorial, involving cardiovascular risk factors classics such as extreme ages, female sex, previous history of coronary artery disease, dyslipidemia, obesity, high blood pressure, smoking and diabetes mellitus.(3,4)

Metabolic syndrome (MS) is a constellation of metabolic risk factors that significantly increase the risk of heart, kidney, cerebrovascular and other diseases Type 2 diabetes, increasing cardiovascular mortality up to fivefold. According to the study Framingham, the 10-year cardiovascular risk for men with MS is between 10.0 and 20.0%, and for women, below 10.0%.(5)This syndrome was initially described by Reaven(6) in 1988 and formally defined in 2001 by the Adult Treatment Panel III of the National Program of Cholesterol of the USA, which established clinical criteria for its diagnosis.(7)

The prevalence of MS is high and varies according to the definition used, increasing progressively. with age; it is characterized by abdominal obesity, hyperglycemia, proinflammatory state and prothrombotic, endothelial dysfunction, and atherogenic dyslipidemia. Dyslipidemia includes Elevated lipoproteins with apolipoprotein B, triglycerides, and very low lipoproteins density, and reduction of high-density lipoprotein (HDL) cholesterol, factors that contribute significantly to the genesis and progression of acute coronary syndrome, responsible for between 20.0 and 50.0% of cardiovascular deaths.(8.9)

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Studies confirm the association of MS with a significant increase in mortality coronary, cardiovascular and total mortality; mortality from acute myocardial infarction rises from 2.1 % without MS to 12.0% in its presence, consolidating MS as a risk factor major and independent cardiovascular disease.(10,11)

AIA is characterized by a worsening in the intensity, frequency, or duration of pain. Angina. Approximately 15.0% of cases progress to infarction with elevation of the ST, with a mortality of 10.0% in the first year after diagnosis, which underlines the need for early risk stratification and comprehensive therapeutic strategies.(12)

Despite therapeutic advances, risk prediction in patients with AIA remains a challenge. clinical challenge. The use of predictive scales that integrate clinical variables is recommended, electrocardiographic and laboratory tests, with the GRACE score being the most validated for estimating the risk of in-hospital mortality and guide clinical decision-making, although it is required regional validation due to geographic variations in patients and medical practices.(13,14)

Given the high morbidity and mortality associated with AIA in the context of MS and the lack of studies that clinically characterize this association in our health area, this

This research aims to describe the clinical and hemodynamic characteristics of patients with Acute unstable angina and electrocardiographic changes associated with metabolic syndrome in the Carlos Manuel de Céspedes Provincial General Hospital, in order to contribute to the clinical stratification that facilitates prevention and timely management, and that serves as a basis for future predictive studies and therapeutic strategies.

Methods

An observational, descriptive and cross-sectional study was conducted in patients with unstable angina. acute associated with metabolic syndrome, admitted to the Cardiology Department of the Hospital

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Provincial General Carlos Manuel de Céspedes of Bayamo, Granma, between January 11, 2020 and May 31, 2022.

Universe and sample: the universe consisted of all patients ≥ 18 years old admitted for non-ST elevation acute coronary syndrome (NSTE-ACS). Of a total of 6319 patients in the period, a probability sample of 1912 cases was selected that met the following criteria: inclusion criteria:

Patients ≥ 18 years old with a stay of more than 24 hours in the coronary care unit, pain Typical precordial with acute electrocardiographic changes (ST depression ≥ 0.5 mm and/or T wave inversion in ≥ 2 contiguous leads) and diagnosis of metabolic syndrome according to NCEP-ATP III criteria.(7)Informed consent and availability of complete medical history.

Exclusion criteria: history of congenital heart disease, systemic diseases that They will present with structural heart disease (thyroid, connective, inflammatory bowel disease), angina variant (Prinzmetal), pregnancy/puerperium or incomplete medical records.

Main variables

Explanatory: acute unstable angina with electrocardiographic changes (AIA C/CECG)

It was defined by the presence of oppressive, burning or stabbing chest pain or discomfort, with or without irradiation, related to effort or appearing at rest, lasting less than 20 minutes and possible relief with nitroglycerin, accompanied by electrocardiographic signs of coronary ischemia (depression or alterations of the ST segment and T wave in at least two contiguous derivations) in a compatible clinical context.

The types of unstable angina were considered according to Bertolasi: angina at rest, angina at rest, recent onset, progressive angina and post-infarction angina.

Metabolic syndrome: defined by the presence of at least 3 NCEP-ATP III criteria: obesity abdominal, (men ≥ 102 cm and women ≥ 88 cm), plasma glucose ≥ 110 mg/dL, index of

body mass (BMI ≥ 28.8 kg/m^2); triglycerides (≥ 150 mg/dL); lipoprotein cholesterol high density, (low HDL-c, - 40 mg/dL); blood pressure, (≥ 135/85 mmHg).

Covariates: classic risk factors (age, sex, high blood pressure, diabetes, dyslipidemia, smoking, obesity, comorbidity) and non-classical (electrocardiographic findings, echocardiographic, complications and biochemical parameters).

Data collection: interviews, physical examination, electrocardiogram and echocardiography performed by specialists, as well as standardized biochemical analysis. Data were obtained by direct review of medical records and recorded in a worksheet designed for the study.

Processing and analysis: the information was entered into an Excel database and analyzed with SPSS v.25.0. Absolute and relative frequencies were calculated for qualitative variables. (comparison with z), and means with standard deviation for quantitative variables (comparison with t Student's test). Statistical significance was assumed in $p<0.05$.

Bias control: consecutiveness in inclusion was guaranteed, standardized criteria of diagnosis, double clinical review, structured questionnaires and external verification of the data to minimize selection, information, classification and confusion biases.

Ethical aspects: The study complied with international and national ethical standards applicable to clinical research. It was approved by the Ethics Committee, the Scientific Council and the management hospital. Written and oral informed consent was obtained from the participants. They applied the foundations stipulated in the Nuremberg Code(15) of 1947 and the principles ethical standards for biomedical studies postulated in the 1989 Helsinki Declaration,(16) respecting the principles of autonomy, beneficence, non-maleficence, justice and equity.

Results

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The prevalence of metabolic syndrome in patients with acute unstable angina with changes electrocardiographic data during the study period was 30.2% (1912 of 6319 patients). The general characteristics of the sample are shown in Table 1. The absolute frequency was higher in men, representing 58.5% (1117/1912). The mean age was 62.1 ± 8.6 years with a median of 60 years. A predominance was observed in women with a median age significantly older (63.5 ± 9.2 years) compared to men (60.7 ± 8.1 years); the difference of the means was 2.8 years (95% CI: 2.02–3.58; t = 7.03, p = 0.0001) (Table 1)

Table 1. Distribution of patients according to the general variables of the study.

Variables	Results	
	No.	%
Gender: men*	1117/1912	58.5
women	795/1912	41.5
Average age + SD (years)	62.1 ±8.6	
Median (years)	60.0	
Average age + SD (years) Men	60.7 ±8.1	
Women	63.5 ±9.2	
(Difference of means 2.8; 95% CI: [2.02 - 3.58]; t 7.03 p= 0.0001)		
Metabolic syndrome and ACS	1912/6319	30.2
High blood pressure	931/1912	48.7
Diabetes Mellitus	315/1912	16.5
Comorbidity	227/1912	11.9
Body surface area (m_2)	1.8 ±0.04	
Glomerular filtration rate (mL/min/1.73 m_2)	78.7 ±31.6	
Smoking	415/1912	21.7
Dyslipidemia	600/1912	31.4
Obesity	539/1912	28.2
Left ventricular hypertrophy	948/1912	49.5
Hypertensive heart disease ≥ grade 2	625/1912	32.7

* Prevalence ratio 1.19; 95% CI: [1.07-1.17] Katz) / * X_2= 21.3520 OR 1.29; 95% CI: [1.16-1.44];*p*=0.000

Legend: SD standard deviation; ACS acute coronary syndrome

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When evaluating the classic cardiovascular risk factors, an incidence of arterial hypertension (HBP) in 48.7% of patients, diabetes mellitus (DM) in 16.5%, comorbidities in 11.7%, smoking in 21.7%, dyslipidemia in 31.4% and obesity in 28.2%.

When comparing by sex (Table 2), smoking had a significantly higher prevalence in men (z = 9.91, p = 0.000), while age ≥ 65 years (z = 9.07, p = 0.000), dyslipidemia (z = 7.50, p = 0.000), obesity (z = 3.54, p = 0.000), comorbidity (z = 3.31, p = 0.000) and diabetes mellitus (z = 2.19, p = 0.028) significantly predominated in women.

Table 2. Sex distribution of classic cardiovascular risk factors.

Factors of risk classic cardiovascular	Men n = 1117 No. %	Women n = 795 No. %	Total n = 1912 No. %	z	p*
Smoking	331/ 29.6	84/ 10.5	415/ 21.7	9.91	0.000
Age ≥ 65 years	441/ 39.4	482/60.6	923/ 48.2	9.07	0.000
Dyslipidemia	275/ 24.6	325/ 40.8	600/ 31.3	7.50	0.000
Obesity	280/ 25.0	259/ 32.5	539/28.1	3.54	0.000
Comorbidity	109/ 9.75	118/ 14.8	227/ 11.8	3.31	0.000
DM	166/ 14.8	149/ 18.7	315/ 16.4	2.19	0.028
HBP	524/ 46.9	407/ 51.1	931/ 48.6	1.80	0.071

* Comparison of proportions for independent samples.

Legend: DM diabetes mellitus, HBP arterial hypertension

Regarding non-classical cardiovascular risk factors (Table 3), ventricular hypertrophy left ventricular ejection fraction was present in 49.5% and grade ≥ 2 hypertensive heart disease in 32.7%. Left ventricular dysfunction (LVEF ≤ 44%) was more prevalent in women (z = 2.8, p = 0.004),

while left ventricular hypertrophy (z = 2.5, p = 0.010) and hypertensive heart disease (z = 2.5, p = 0.012) prevailed in men.

Other factors such as atrial fibrillation, glomerular filtration rate ≤ 60 mL/min/1.73 m2 and depression Persistent ST segment syndrome showed a higher prevalence in women, although without significance statistics (p > 0.05).

Table 3 Non-classical cardiovascular risk factors according to their sex distribution.

Factors of risk non-classical cardiovascular diseases	Men n=1117 No. %	Women n=795 No. %	Total n=1912 No. %	z	p*
LVD (LVEF ≤ 44%)	27/ 2.4	39/ 4.9	66/ 3.5	2.8	0.004
LVH	582/ 52.1	366/ 46.0	948/ 49.5	2.5	0.010
Hypertensive heart disease ≥ grade 2	391/35.0	234/ 29.4	625/ 32.7	2.5	0.012
Atrial fibrillation	67/ 5.9	50/ 6.2	117/6.1	2.4	0.869
Glomerular filtration ≤ 60 mL/min/1.73 m_2	95/ 8.50	89/11.1	184/ 9.6	1.8	0.059
Persistent ST depression	90/8.1	82/ 10.3	172/ 9.0	1.6	0.105
More than 6 leads affected on the ECG	77/ 6.9	93/ 11.7	170/ 8.9	0.9	0.343
Heart failure	252/ 22.6	188/ 23.6	440/ 23.0	0.5	0.615

Legend: *Comparison of proportions for independent samples, LVH left ventricular hypertrophy, LVD ventricular dysfunction left, LVEF left ventricular ejection fraction.

The mean systolic (138.8 ± 17.9 mmHg) and diastolic (84.5 ± 13.7 mmHg) blood pressures were slightly elevated compared to normal values (120/80 mmHg), without significant differences between sexes (p > 0.05). In anthropometric variables, men showed waist-hip ratios (0.94 ± 0.08) and abdominal circumferences (112.6 ± 11.2 cm) significantly larger than women (0.92 ± 0.06 and 107 ± 7.0 cm, respectively; p < 0.01).

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The average body mass index was 30.2 ± 18.1 kg/m², being higher in women (31.5 ± 6.7 kg/m²), which indicates obesity ($p < 0.001$). The most common electrocardiographic changes Frequent were mixed ST-T changes (31.8%), T wave inversion (29.3%) and depression ST segment (24.3%).

The average values of the hemodynamic variables evaluated by echocardiography were presented in Table 4. A left atrial area of 13.5 ± 1.8 cm was observed.2and an index left atrial volume of 21.3 ± 2.9 mL/m2. Ventricular ejection fraction

left ventricular fibrillation (LVEF) was 64.2 ± 9.1%, with a mean systolic pulmonary pressure of 19.5 ± 8.3 mmHg and estimated left atrial pressure of 9.9 ± 0.6 mmHg, values within ranges normal.

The left ventricular diastolic pattern presented an E/A ratio of 0.9 ± 1.4 cm/sec and a E/e' ratio of 12.8 ± 2.1, showing a predominance of diastolic dysfunction. The mass index left ventricular was 118 ± 7.5 gr/m2, slightly higher than the reference value, confirming the predominance of left ventricular hypertrophy.

Table 4. Mean values and standard deviation of hemodynamic variables.

Variables	Mean value / SD
Left atrial area (cm2)	13.5 ± 1.8
Left atrial volume index (mL/m2)	21.3 ± 2.9
Left ventricular end-diastolic diameter (mm)	51.2 ± 5.3
Left ventricular end-diastolic volume (mL)	94.6 ± 21
Stroke volume (mL)	68.2 ± 11.3
Left ventricular ejection fraction (%)	64.2 ± 9.1
Mean systolic pulmonary pressure (mmHg)	19.5 ± 8.3
Left ventricular diastolic pattern (E/A ratio) (cm/sec)	0.9 ± 1.4
Left cavity filling pressures (E/e' ratio)	12.8 ± 2.1

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Estimated left atrial pressure (mmHg)	9.9 ± 0.6
Left ventricular mass index (g/m2)	118 ± 7.5

Source: own elaboration

Legend: SD (standard deviation)/

The most frequent complications among patients with AIA C/CECG and SM were recurrence and pain refractoriness (66.2%), heart failure (23%), cardiorenal syndrome type 1 (7.4%) and acute pulmonary edema (6.7%) (Table 5). Among the electrical complications, reported ventricular tachycardia/fibrillation (4.3%), atrioventricular block (3.3%) and others arrhythmias and conduction disorders (2.4%).

Table 5. Frequency of complications in patients with AIA C/CECG and SM.

Complications n=1912	No.	%
YO. Clinics		
- Recurrence and refractoriness of pain	1277	66.2
- Heart failure	440	23
- Cardiorenal syndrome	141	7.4
- Acute pulmonary edema	128	6.7
- Cardiogenic shock	55	2.9
- Strokes	17	0.9
Hemorrhagic complications due to therapy anticoagulant	16	0.86
II. Electric		
- Ventricular tachycardia / fibrillation	82	4.3
- Atrioventricular block	63	3.3
Other arrhythmias and conduction disorders	46	2.4

Source: own elaboration

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Discussion

Cardiovascular diseases continue to be the leading cause of hospitalization and mortality in Cuba and in European and Western countries, due to the high prevalence of factors cardiovascular risk factors (CVRF), among which MS plays a central role.(17-19)This condition is characterized by a proinflammatory and prothrombotic state that facilitates the atherosclerosis, endothelial dysfunction and insulin resistance, factors that multiply substantially the risk of developing type 2 diabetes mellitus, coronary heart disease and cerebrovascular complications.

MS is present in approximately 40% of adults over 60 years of age and is associated with a significant increase in cardiovascular mortality, estimated at an increase of relative risk greater than 1.3 in both sexes.(20)

The high prevalence of MS in patients with acute coronary syndrome (ACS), especially in those with acute unstable angina, coincides with multiple international reports which show greater severity of coronary artery disease, ventricular dysfunction left and need for urgent interventions, significantly increasing the risk of major cardiovascular events and death.(8,12,14)

This clinical metabolic condition is fully identified as a predictor independent of left ventricular failure, left ventricular hypertrophy and diastolic dysfunction, non-classical cardiovascular factors that contribute to the increase in morbidity and mortality in these patients.

In accordance with the literature, the present research finds a significant association between the prevalence of risk factors with the presence of MS, with particular predominance in women and in patients over 60 years of age.

This characterization could be useful to guide targeted preventive and therapeutic strategies. to reduce the micro and macrovascular complications associated with this condition.

Various studies, including (Santilli F(21)and Bergmark BA(22)show greater severity of coronary artery disease, left ventricular dysfunction, recurrent angina, reinfarction, need for urgent revascularization and mortality in patients with MS.

However, there remains controversy regarding the ability of SM to predict events. coronary compared to individual factors such as type 2 diabetes mellitus or high blood pressure alone, and the impact of treatments on the regression of the cardiac structural alterations still require further evidence.

Despite these controversies, MS should be recognized as a major determinant of risk. cardiovascular: promotes hypertrophy and ventricular dysfunction, accelerates progression towards heart failure and multiplies the occurrence of coronary and arrhythmic events. Its Early identification and comprehensive management are essential to reduce morbidity and mortality. associated.

Therefore, it is essential to continue research to improve knowledge of the pathophysiological mechanisms and accuracy in risk stratification in patients with MS and associated cardiovascular disease.

Contribution of this research

This study provides updated and specific data on the prevalence and clinical characterization and hemodynamics of patients with acute unstable angina and MS in a local Cuban context, a area with little previous literature. The inclusion of clinical, electrocardiographic, Echocardiographic and analytical data provide a comprehensive view that can serve as a basis for development of predictive algorithms and individualized management strategies.

Limitations

Limitations include the observational design, which prevents establishing relationships direct causes, in addition to the possible heterogeneity in individual therapeutic management that was not intervened by the researchers. Furthermore, the lack of longitudinal data limits the evaluation of the long-term impact of MS on the clinical course of the patients studied.

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Conclusions

In patients with acute unstable angina with electrocardiographic changes in the context of metabolic syndrome, a higher prevalence was observed in ages equal to or greater than 65 years, dyslipidemia, obesity, diabetes mellitus and left ventricular dysfunction in women, while In men, smoking, left ventricular hypertrophy and heart disease were prominent. hypertensive.

The most frequent electrocardiographic alterations were mixed segment changes. ST-T, T wave inversion and ST segment depression.

The high prevalence of complications such as recurrence of anginal pain and heart failure Cardiac disease confirms metabolic syndrome as a relevant determinant of morbidity cardiovascular in this clinical context.

Recommendations

Consider the clinical, electrocardiographic and hemodynamic characteristics identified for design analytical studies that allow establishing prognostic factors of mortality in patients with acute coronary syndrome and metabolic syndrome.

Develop and validate predictive risk indices specific to this population, incorporating clinical and laboratory variables, which facilitate risk stratification and individualization of therapy.

Strengthen programs for the prevention and control of cardiovascular risk factors, with special attention emphasis on metabolic syndrome, to reduce the incidence of complications and improve the long-term forecast.

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Declaration of conflicts of interest

The authors declare that there are no financial, personal or professional conflicts of interest. that may have influenced the performance or interpretation of the results of this study.

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ONLINE VERSION: ISSN 1028-4818

RPNS-1853

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