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THE IMPACT OF COMORBIDITY ON CLINICAL OUTCOMES AND PROGNOSIS IN PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT Background: Acute coronary syndrome (ACS) is a major cause of cardiovascular mortality worldwide. The presence of concomitant chronic diseases may significantly complicate its clinical course and contribute to unfavorable hospital outcomes.

Objective: To evaluate the impact of comorbid conditions on clinical outcomes and in-hospital mortality among patients with acute coronary syndrome.

Materials and Methods: This retrospective observational study included 212 patients with ACS hospitalized between January 2022 and July 2024. Patients were divided according to hospital outcomes into two groups: 101 patients who died during hospitalization and 111 patients who survived and were discharged. Clinical and demographic characteristics, cardiovascular risk factors, comorbidities, laboratory parameters, electrocardiographic findings, echocardiographic measurements, and coronary angiography results were evaluated. Statistical analysis was performed using Statistica 10.0 and MedCalc 20.0.

Results: The study was designed to assess the relationship between comorbidity burden and in-hospital outcomes in patients with ACS. Particular attention was given to arterial hypertension, diabetes mellitus, chronic kidney disease, chronic heart failure, and previous cardiovascular events. Comparative and multivariable statistical analyses are required to establish the independent contribution of these conditions to mortality.

Conclusion: Comprehensive assessment of comorbid conditions may improve prognostic evaluation in patients with ACS. Incorporating comorbidity-related parameters into clinical risk stratification may facilitate the identification of high-risk patients and support individualized therapeutic management.

Keywords: acute coronary syndrome, comorbidity, in-hospital mortality, cardiovascular risk factors, prognosis, clinical outcomes.

Introduction

Acute coronary syndrome (ACS) represents a major clinical manifestation of coronary artery disease and remains a leading cause of cardiovascular mortality and hospitalization. Despite considerable progress in interventional cardiology, antithrombotic therapy, and emergency cardiovascular care, the prognosis of patients with ACS remains heterogeneous. Clinical outcomes are determined not only by the severity of myocardial ischemia but also by the patient's general health status and the presence of concomitant chronic diseases[4-6].

Comorbidity has increasingly become an important determinant of cardiovascular prognosis. Patients with ACS frequently present with several coexisting conditions, including arterial hypertension, diabetes mellitus, chronic kidney disease, chronic heart failure, obesity, and cerebrovascular disease. These disorders may interact through complex pathophysiological mechanisms, contributing to endothelial dysfunction, systemic inflammation, metabolic abnormalities, and impaired myocardial function[7].Diabetes mellitus is particularly important because it is associated with accelerated atherosclerosis, endothelial dysfunction, platelet hyperactivity, and an increased risk of recurrent cardiovascular events. Similarly, chronic kidney

disease contributes to cardiovascular risk through disturbances in mineral metabolism, oxidative stress, inflammation, and vascular calcification[3]. The coexistence of renal dysfunction and ACS may further complicate pharmacological treatment and increase the probability of adverse outcomes.Arterial hypertension is another major cardiovascular risk factor that contributes to structural and functional myocardial changes. Long-standing elevated blood pressure promotes left ventricular hypertrophy, increases myocardial oxygen demand, and may aggravate myocardial ischemia. In patients with ACS, the presence of hypertension together with other chronic conditions may significantly influence hemodynamic stability and treatment outcomes.

Chronic heart failure and reduced left ventricular ejection fraction are also associated with an unfavorable prognosis. Myocardial dysfunction following acute ischemic injury may lead to pulmonary congestion, arrhythmias, cardiogenic shock, and increased mortality. Consequently, echocardiographic assessment and evaluation of clinical comorbidities are essential components of comprehensive cardiovascular risk assessment.Although established prognostic systems such as GRACE and TIMI incorporate several important clinical parameters, the cumulative impact of multiple concomitant diseases requires further investigation in different patient populations. The Charlson Comorbidity Index may provide an additional approach to quantifying the overall burden of chronic disease and evaluating its relationship with mortality[1-2].Therefore, investigating the association between comorbidity and hospital outcomes may provide clinically relevant information for improving risk stratification and optimizing treatment strategies in patients with ACS.

Aim of the study: To investigate the influence of comorbid conditions on clinical outcomes and in-hospital mortality in patients with acute coronary syndrome and to identify the most important comorbidity-related prognostic factors.

Materials and methods

A retrospective observational study was conducted involving 212 patients diagnosed with acute coronary syndrome who were hospitalized in the Emergency Cardiology Department of the Regional Vascular Center between January 2022 and July 2024.

According to hospital outcomes, patients were divided into two groups:

Main group: 101 patients (47.6%) who died during hospitalization.Control group: 111 patients (52.4%) who survived and were discharged from the hospital.The inclusion criteria comprised patients aged 18 years and older with a confirmed diagnosis of ST-segment elevation acute coronary syndrome (STE-ACS) or non-ST-segment elevation acute coronary syndrome (NSTE-ACS).Patients with acute myocardial infarction occurring as a complication of percutaneous coronary intervention or coronary artery bypass grafting were excluded.

The following clinical and demographic characteristics were assessed: age, sex, blood pressure, heart rate, clinical presentation, and time from symptom onset to admission.

Particular attention was given to the presence of concomitant diseases, including:

Arterial hypertension;

Diabetes mellitus;

Chronic kidney disease;

Chronic heart failure;

Previous myocardial infarction;

Cerebrovascular disease;

Obesity and other documented chronic conditions.

Laboratory assessment included complete blood count and biochemical parameters. Electrocardiographic examination focused on ST-segment changes, T-wave inversion, and

pathological Q waves. Transthoracic echocardiography was used to assess left ventricular systolic function and ejection fraction. Coronary angiography findings were evaluated to characterize the severity and extent of coronary artery disease.

The Charlson Comorbidity Index may be calculated retrospectively when sufficient medical documentation is available.Statistical analysis was performed using Statistica version 10.0 and MedCalc version 20.0. Distribution normality was assessed using the Shapiro–Wilk test. Quantitative variables were presented as mean ± standard deviation or median and interquartile range, depending on their distribution. Categorical variables were expressed as absolute numbers and percentages.Between-group comparisons were performed using Student's t-test or the Mann–Whitney U test for quantitative variables and the chi-square test or Fisher's exact test for categorical variables.Multivariable logistic regression and ROC curve analysis were planned to evaluate independent predictors and their discriminatory performance. Statistical significance was established at $p < 0.05$.

Results

A total of 212 patients with ACS were included in the analysis. Of these, 101 patients (47.6%) died during hospitalization, while 111 patients (52.4%) survived and were discharged.

The comparative analysis was designed to evaluate the prevalence and prognostic significance of major comorbid conditions in both groups.The planned comparative assessment will establish whether the cumulative burden of comorbid conditions differs between patients who died and those who survived hospitalization.Further multivariable analysis will determine which comorbid conditions remain independently associated with mortality after adjustment for age, sex, hemodynamic parameters, and other relevant clinical variables.

Discussion

The relationship between comorbidity and cardiovascular outcomes is an important aspect of contemporary ACS research. Patients with multiple chronic conditions represent a particularly vulnerable population because the interaction of several pathophysiological processes may aggravate myocardial ischemia and increase the risk of complications.

Diabetes mellitus may contribute to adverse outcomes through endothelial dysfunction, accelerated coronary atherosclerosis, and abnormalities in platelet activation. In addition, diabetic patients may present with atypical ischemic symptoms, potentially delaying diagnosis and reperfusion treatment[7].Renal dysfunction is another important prognostic consideration. Reduced kidney function is associated with systemic inflammation, oxidative stress, anemia, and disturbances in fluid and electrolyte balance. These abnormalities may increase the risk of arrhythmias, heart failure, and hemodynamic instability.The presence of chronic heart failure may further worsen the prognosis of ACS. Reduced myocardial contractility and impaired ventricular reserve can limit the ability of the cardiovascular system to compensate for acute ischemic injury. Consequently, assessment of left ventricular ejection fraction is particularly relevant in patients with multiple comorbidities.The combined presence of arterial hypertension, diabetes mellitus, and chronic kidney disease may represent a particularly unfavorable clinical profile. However, the independent contribution of each condition should be established using multivariable statistical methods rather than inferred from unadjusted comparisons.An important aspect of this research is the potential use of a cumulative comorbidity assessment, such as the Charlson Comorbidity Index, alongside conventional cardiovascular risk assessment[8]. This approach may provide additional prognostic information and support more individualized management strategies.

Conclusion

Comorbid conditions represent important clinical characteristics that should be considered during the assessment of patients with acute coronary syndrome. A comprehensive evaluation of concomitant diseases, cardiovascular risk factors, laboratory parameters, and left ventricular function may improve the identification of patients at increased risk of adverse hospital outcomes.

The integration of comorbidity assessment into conventional prognostic models may provide additional information for clinical decision-making and facilitate individualized treatment strategies.The independent prognostic significance of individual comorbidities and their cumulative burden should be confirmed through multivariable regression and ROC curve analysis using the actual patient-level data.

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