Journal of Rare Cardiovascular Diseases
ISSN: 2299-3711 (Print) | e-ISSN: 2300-5505 (Online)
www.jrcd.eu
RESEARCH ARTICLE

Short-Term Clinical Outcomes and Predictors of Early Complications Among Acute Coronary Syndrome Patients Attending the Iraqi Center for Heart Disease: A Cross-Sectional Study

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Article History
Received: 10.04.2026
Revised: 24.04.2026
Accepted: 05.05.2026
Published: 18.05.2026

Abstract: ***Background:***Acute coronary syndrome (ACS) remains one of the leading causes of morbidity and mortality worldwide despite major advances in diagnostic and therapeutic strategies. Early identification of patients at increased risk for short-term complications is essential to improve outcomes and reduce mortality.***Aim:*** This study aimed to evaluate short-term complications and early clinical outcomes among patients with acute coronary syndrome admitted to the Iraqi Center for Heart Disease and to identify factors associated with poor prognosis.***Patients and Methods***: A hospital-based observational cross-sectional study was conducted at the Iraqi Center for Heart Disease from 1st January 2023 to 1st October 2025. A total of 178 patients diagnosed with ACS were enrolled. Data regarding demographic characteristics, cardiovascular risk factors, electrocardiographic findings, laboratory investigations, echocardiographic parameters, treatment modalities, and short-term complications during the first five days of admission were collected using a structured questionnaire. TIMI risk score was used for prognostic assessment. Statistical analysis was performed using SPSS version 26, and a p-value <0.05 was considered statistically significant.***Results:*** The mean age of patients was 56.80±12.40 years, and males constituted 81.46% of the study population. STEMI represented the most frequent ACS subtype (57.87%), followed by NSTEMI (24.16%) and unstable angina (17.98%). Smoking was reported in 55.06% of patients, while hypertension and diabetes mellitus were present in 63.48% and 46.63% of patients, respectively. Reduced ejection fraction was identified in 25.28% of patients. Short-term complications included arrhythmias (18.54%), acute heart failure (14.61%), recurrent ischemia (11.24%), cardiogenic shock (4.49%), and in-hospital mortality (1.12%). High TIMI score, elevated troponin level, reduced ejection fraction, diabetes mellitus, and delayed presentation were significantly associated with adverse outcomes (p<0.05).***Conclusion:*** Short-term complications among ACS patients remain common despite modern therapeutic interventions. STEMI was the predominant presentation, and reduced ejection fraction, elevated TIMI score, diabetes mellitus, and delayed admission were important predictors of poor early outcomes. Early risk stratification and timely intervention are essential to improve survival and reduce complications in ACS patients.

Keywords:Acute coronary syndrome; STEMI; NSTEMI; TIMI score; Short-term complications; Ejection fraction .

INTRODUCTION

Acute coronary syndrome (ACS) represents a group of clinical conditions resulting from sudden reduction in coronary blood flow due to rupture or erosion of atherosclerotic plaques with subsequent thrombus formation [1]. ACS includes ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina (UA), which differ in severity, electrocardiographic manifestations, and extent of myocardial injury [2]. ACS remains one of the major causes of hospitalization, disability, and cardiovascular mortality worldwide despite significant advances in preventive and therapeutic cardiology [3]. The pathophysiological basis of ACS involves endothelial dysfunction, inflammatory activation, plaque instability, platelet aggregation, and coronary thrombosis, which collectively lead to myocardial ischemia and necrosis [4]. STEMI commonly results from complete occlusion of a coronary artery, whereas NSTEMI and unstable angina are usually associated with partial occlusion and subendocardial ischemia [5]. Electrocardiography and cardiac biomarkers, particularly high-sensitivity troponins, are essential diagnostic tools used for early identification and classification of ACS [6]. Several non-modifiable and modifiable risk factors contribute to the development of ACS. Increasing age, male gender, and positive family history are considered non-modifiable risk factors, while hypertension, diabetes mellitus, smoking, dyslipidemia, obesity, sedentary lifestyle, and chronic stress are major modifiable determinants [7]. The prevalence of these risk factors has increased substantially in developing countries, contributing to the rising burden of ischemic heart disease [8]. Short-term complications following ACS remain clinically important and may occur during the first hours or days after hospital admission. These complications include arrhythmias, acute heart failure, cardiogenic shock,

recurrent myocardial ischemia, thromboembolic events, mechanical complications, and sudden cardiac death [9]. Early detection of high-risk patients requiring intensive monitoring and urgent intervention is essential for improving clinical outcomes [10]. Risk stratification systems such as the Thrombolysis in Myocardial Infarction (TIMI) score are widely used to estimate mortality risk and adverse cardiovascular events in ACS patients [11]. Echocardiographic evaluation of left ventricular ejection fraction (LVEF), serum troponin levels, renal function tests, and electrocardiographic changes also provide valuable prognostic information [12]. The introduction of reperfusion therapies, particularly primary percutaneous coronary intervention (PCI), dual antiplatelet therapy, statins, and modern intensive cardiac care, has significantly reduced mortality rates among ACS patients [13]. Nevertheless, short-term complications continue to represent a major challenge, especially in low- and middle-income countries where delays in diagnosis and treatment are common [14]. In Iraq, ACS remains a major public health problem due to increasing prevalence of cardiovascular risk factors and limitations in healthcare resources. However, local studies evaluating short-term outcomes and predictors of complications among ACS patients are still limited [15]. Therefore, the current study was conducted to evaluate early complications and short-term outcomes among ACS patients attending the Iraqi Center for Heart Disease.

Patients and Methods

This observational cross-sectional study was conducted at the Iraqi Center for Heart Disease over a period extending from 1st January 2023 to 1st October 2025. The study included 178 patients diagnosed with acute coronary syndrome who were admitted to the coronary care unit (CCU) during the study period.

Inclusion Criteria

- Adult patients aged ≥18 years.
- Patients diagnosed with STEMI, NSTEMI, or unstable angina according to international cardiology guidelines.
- Patients admitted within the first 24 hours of symptom onset.

Inclusion Criteria

Adult patients aged 18 years and older who were admitted to the coronary care unit with a confirmed diagnosis of STEMI, NSTEMI, or unstable angina were included in the study. Only patients presenting within the first 24 hours from the onset of symptoms were considered eligible for enrollment in order to ensure accurate assessment of early clinical outcomes and short-term complications during hospitalization.

Exclusion Criteria

Patients with previously diagnosed chronic heart failure, chronic cardiac arrhythmias, advanced hepatic failure, severe renal insufficiency, or those who refused participation were excluded from the study. Exclusion of these conditions was intended to minimize confounding factors that could independently influence short-term cardiovascular outcomes and mortality.

Clinical Assessment and Data Collection

Data collection was carried out prospectively using a specially designed structured questionnaire prepared by the researchers. Information was obtained through direct patient interviews, detailed clinical examination, review of medical records, laboratory investigations, electrocardiographic evaluation, echocardiography, and coronary angiographic reports when available.

Demographic characteristics including age and gender were recorded for all enrolled patients. Detailed assessment of cardiovascular risk factors was performed, including history of hypertension, diabetes mellitus, dyslipidemia, smoking status, obesity, and positive family history of ischemic heart disease. Clinical presentation was carefully evaluated with emphasis on the nature of chest pain, associated symptoms, and duration of symptoms prior to hospital admission.

Electrocardiographic and Laboratory Evaluation

Twelve-lead electrocardiography (ECG) was performed immediately after admission for all patients and interpreted by specialized cardiologists. Patients were classified into STEMI, NSTEMI, or unstable angina according to electrocardiographic criteria and cardiac biomarker findings. Cardiac troponin levels were measured using standardized laboratory assays and were utilized as a diagnostic and prognostic marker of myocardial injury.

Laboratory investigations included complete lipid profile assessment, consisting of serum cholesterol, triglycerides, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and very-low-density lipoprotein (VLDL). Glycemic status was evaluated using glycated hemoglobin (HbA1c) measurements. Renal function assessment included serum creatinine and blood urea levels. Additional laboratory investigations were performed according to the clinical condition of each patient.

Echocardiographic and Angiographic Assessment

Transthoracic echocardiography was performed for all patients during hospitalization by experienced cardiologists using standardized echocardiographic techniques. Assessment included evaluation of left ventricular systolic function, regional wall motion abnormalities, and measurement of left ventricular ejection fraction (LVEF). Reduced ejection fraction was considered an important indicator of myocardial dysfunction and adverse prognosis.

Coronary angiography findings were reviewed for patients who underwent invasive coronary evaluation.

The extent and severity of coronary artery disease, culprit vessel involvement, and the need for coronary intervention were documented.

Risk Stratification and Treatment Modalities

Risk stratification was performed using the Thrombolysis in Myocardial Infarction (TIMI) risk score for all patients at the time of admission. Patients were categorized into low-, intermediate-, and high-risk groups according to standard TIMI scoring criteria. Therapeutic interventions, including pharmacological management, thrombolytic therapy, and percutaneous coronary intervention (PCI), were documented in detail.

Assessment of Short-Term Outcomes

Patients were closely followed during the first five days of hospitalization to evaluate short-term clinical outcomes and complications. The assessed complications included cardiac arrhythmias, acute heart failure, recurrent ischemia, cardiogenic shock, reduced ejection fraction, and in-hospital mortality. Clinical progression and response to treatment were monitored throughout the hospitalization period.

Ethical Considerations

Ethical approval for the study was obtained from the Scientific and Ethical Committee of the relevant health authorities prior to data collection. Oral informed consent was obtained from all participants before enrollment. Confidentiality and privacy of patient information were strictly maintained throughout the study in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 26. Continuous variables were expressed as mean ± standard deviation, whereas categorical variables were presented as frequencies and percentages. Chi-square test and Fisher's exact test were used to evaluate associations between categorical variables. A p-value of less than 0.05 was considered statistically significant throughout the statistical analysis

RESULTS

The study showed that the age group of 50–59 years represented the highest proportion of acute coronary syndrome patients (31.46%), followed by the age group of 60–69 years (24.16%). Male patients constituted the majority of cases (81.46%), while females accounted for 18.54% of patients. The mean age of the study population was 56.80±12.40 years. Elderly age groups demonstrated relatively higher frequencies of adverse short-term outcomes compared with younger age groups; however, the association did not reach statistical significance (p=0.08). Male gender showed a higher prevalence of ACS than female gender, but no significant association with mortality was observed (p=0.09).

Table 1: Demographic Characteristics of Acute Coronary Syndrome Patients

Variable	No.	Percentage (%)
Age <40 years	20	11.24%
Age 40–49 years	34	19.10%
Age 50–59 years	56	31.46%
Age 60–69 years	43	24.16%
Age ≥70 years	25	14.04%
Male	145	81.46%
Female	33	18.54%
Total	178	100.00%

Mean age = 56.80±12.40 years.

The study showed that hypertension was the most common cardiovascular risk factor among acute coronary syndrome patients (63.48%), followed by positive family history (61.24%) and current smoking (55.06%). Diabetes mellitus was present in 46.63% of patients, while obesity was observed in 29.21% of cases. Smoking and diabetes mellitus were significantly associated with increased short-term complications and poorer prognosis among ACS patients(p=0.0p=0.003,respectively). Hypertension and dyslipidemia also demonstrated positive associations with adverse clinical outcomes, although these associations were not statistically significant (p>0.05).

Table 2: Clinical Characteristics and Risk Factors of Acute Coronary Syndrome Patients

Variable	No.	Percentage (%)
Hypertension	113	63.48%
Diabetes mellitus	83	46.63%
Current smoking	98	55.06%
Obesity	52	29.21%
Positive family history	109	61.24%
Dyslipidemia	76	42.70%

The study showed that ST-segment elevation myocardial infarction (STEMI) represented the most frequent type of acute coronary syndrome (57.87%), followed by non-ST-segment elevation myocardial infarction (NSTEMI) (24.16%) and unstable angina (17.98%). STEMI patients demonstrated significantly higher rates of short-term complications, including arrhythmias, heart failure, and cardiogenic shock, compared with NSTEMI and unstable angina patients ($p<0.001$). The frequency of adverse outcomes was lower among unstable angina patients.

Table 3: Distribution of Types of Acute Coronary Syndrome

ACS Type	No.	Percentage (%)
STEMI	103	57.87%
NSTEMI	43	24.16%
Unstable angina	32	17.98%
Total	178	100.00%

The study showed that reduced ejection fraction was the most common short-term complication among acute coronary syndrome patients (25.28%), followed by arrhythmias (18.54%) and acute heart failure (14.61%). Recurrent ischemia was reported in 11.24% of patients, while cardiogenic shock and in-hospital mortality were observed in 4.49% and 1.12% of patients, respectively. Reduced ejection fraction and cardiogenic shock were highly associated with poor short-term outcomes and mortality ($p<0.001$). Arrhythmias also showed a significant association with increased morbidity during hospitalization ($p=0.02$).

Table 4: Short-Term Complications of Acute Coronary Syndrome Patients

Complication	No.	Percentage (%)
Arrhythmia	33	18.54%
Acute heart failure	26	14.61%
Recurrent ischemia	20	11.24%
Cardiogenic shock	8	4.49%
Reduced ejection fraction	45	25.28%
In-hospital mortality	2	1.12%

The study showed that 48.88% of acute coronary syndrome patients were classified as intermediate-risk according to the TIMI risk score, while 45.51% were low-risk and 5.62% were high-risk patients. Patients with high TIMI scores demonstrated markedly increased frequencies of arrhythmias, reduced ejection fraction, heart failure, and mortality compared with low-risk patients. A highly significant association was identified between high TIMI score and increased short-term complications and mortality ($p<0.001$).

Table 5: TIMI Risk Score Distribution Among Acute Coronary Syndrome Patients

TIMI Risk Category	No.	Percentage (%)
Low risk	81	45.51%
Intermediate risk	87	48.88%
High risk	10	5.62%
Total	178	100.00%

The study showed that abnormal echocardiographic findings were detected in 59.55% of acute coronary syndrome patients, while reduced ejection fraction was observed in 25.28% of patients. Patients with abnormal echocardiographic findings demonstrated significantly higher frequencies of acute heart failure, cardiogenic shock, and recurrent ischemia compared with patients having normal echocardiography ($p<0.001$). Reduced ejection fraction was strongly associated with adverse short-term outcomes and prolonged hospitalization.

Table 6: Echocardiographic Findings of Acute Coronary Syndrome Patients

Variable	No.	Percentage (%)
Normal echocardiography	72	40.45%
Abnormal echocardiography	106	59.55%
Normal ejection fraction	133	74.72%
Reduced ejection fraction	45	25.28%
Total	178	100.00%

The study showed that percutaneous coronary intervention (PCI) was performed in 47.19% of acute coronary syndrome patients, while thrombolytic therapy was administered in 14.04% of cases. Conservative management was followed in 38.76% of patients. Patients who underwent PCI demonstrated significantly lower rates of short-term complications and

better survival outcomes compared with patients receiving conservative management or thrombolytic therapy alone (p<0.001). PCI was associated with improved myocardial function and lower mortality rates during hospitalization.

Table 7: Treatment Modalities Among Acute Coronary Syndrome Patients

Treatment Modality	No.	Percentage (%)
PCI performed	84	47.19%
Thrombolytic therapy	25	14.04%
Conservative treatment	69	38.76%
Total	178	100.00%

The study showed that elevated troponin levels were detected in 83.15% of acute coronary syndrome patients. High HbA1c levels were observed in 47.75% of patients, while dyslipidemia was reported in 42.70% of cases. Elevated troponin levels demonstrated a highly significant association with severe ACS presentation, reduced ejection fraction, and increased short-term complications (p<0.001). High HbA1c levels were significantly associated with recurrent ischemia and heart failure (p=0.01). Elevated serum creatinine and blood urea levels were more common among patients with poor clinical outcomes, although the association was borderline significant (p=0.05).

Table 8: Laboratory Findings Among Acute Coronary Syndrome Patients

Laboratory Variable	No.	Percentage (%)
Elevated troponin	148	83.15%
High HbA1c	85	47.75%
Dyslipidemia	76	42.70%
Elevated serum creatinine	12	6.74%
Elevated blood urea	15	8.43%
Total	178	100.00%

DISCUSSION

The present study evaluated short-term complications and early outcomes among ACS patients admitted to the Iraqi Center for Heart Disease. The mean age of patients was 56.80 years, with male predominance accounting for more than four-fifths of the study population. These findings are consistent with previous regional and international studies reporting higher ACS prevalence among middle-aged and elderly males due to increased exposure to cardiovascular risk factors and hormonal differences [1,2]. STEMI represented the most common subtype of ACS in the current study. Similar findings were reported in studies conducted in Middle Eastern and developing countries where delayed hospital presentation and poor control of cardiovascular risk factors increase the incidence of STEMI [3,4]. In contrast, some Western registries demonstrated higher rates of NSTEMI due to earlier diagnosis and widespread use of high-sensitivity troponin assays [5]. Smoking, hypertension, and diabetes mellitus were highly prevalent among the studied patients. These findings agree with reports demonstrating that smoking remains one of the strongest preventable risk factors for coronary artery disease and ACS [6]. Hypertension and diabetes mellitus accelerate endothelial dysfunction and atherosclerosis, thereby increasing the risk of plaque rupture and thrombosis [7,8]. Reduced ejection fraction was observed in approximately one-quarter of patients and was significantly associated with adverse outcomes. Similar observations were reported by several investigators who identified impaired left ventricular systolic function as an important predictor of mortality and heart failure following ACS [9,10]. Echocardiographic evaluation remains an essential tool for risk assessment in ACS patients. Arrhythmias were the most common short-term complication observed in this study, followed by acute heart failure and recurrent ischemia. These complications commonly occur during the early phase after myocardial infarction due to electrical instability and impaired myocardial perfusion [11]. Previous studies similarly reported ventricular arrhythmias and heart failure as leading causes of early morbidity among ACS patients [12,13]. Cardiogenic shock was observed in a smaller proportion of patients but remained strongly associated with poor prognosis. Cardiogenic shock continues to represent one of the most severe complications of ACS despite advances in reperfusion therapy [14]. Early revascularization and intensive hemodynamic support significantly improve survival rates in these patients [15]. The present study demonstrated a significant association between elevated TIMI score and poor short-term outcomes. Similar findings were reported in several international studies validating the prognostic value of the TIMI score in predicting mortality and adverse cardiovascular events among ACS patients [16,17]. Risk stratification systems remain essential in identifying high-risk patients requiring aggressive management and close monitoring. Elevated troponin levels were also associated with unfavorable outcomes in the current study. Troponin is considered the most sensitive and specific biomarker for myocardial injury and has major prognostic importance

in ACS [18]. Persistent elevation reflects larger infarct size and increased risk of complications and mortality [19]. PCI was associated with better outcomes compared with conservative management and thrombolytic therapy. This finding is consistent with studies demonstrating that early coronary intervention reduces infarct size, improves myocardial salvage, and decreases mortality rates [20,21]. Contemporary guidelines strongly recommend early PCI whenever feasible in ACS patients, particularly STEMI cases [22]. The in-hospital mortality rate in the present study was relatively low compared with some regional studies. This may reflect improvements in emergency cardiac care, earlier diagnosis, increased use of PCI, and better pharmacological management [23]. However, delayed presentation and inadequate risk factor control remain major challenges in Iraqi cardiac centers. Diabetes mellitus and delayed hospital admission were significantly associated with adverse outcomes. Hyperglycemia contributes to endothelial dysfunction, oxidative stress, inflammation, and impaired coronary perfusion, thereby worsening myocardial injury [24]. Delayed presentation limits the effectiveness of reperfusion therapy and increases the likelihood of irreversible myocardial damage [25]. The findings of this study emphasize the importance of early diagnosis, aggressive risk factor control, and timely intervention in reducing short-term complications of ACS. Public awareness programs, smoking cessation strategies, diabetes control, and expansion of PCI-capable cardiac centers may further improve ACS outcomes in Iraq [26-30]..

CONCLUSION

While not all associations reached statistical significance, this study demonstrates a clear trend linking vitamin D deficiency with adverse cardiac remodeling in essential hypertension, especially posterior wall thickness. Together with existing literature, these findings suggest that vitamin D deficiency may accelerate hypertensive target organ damage. Monitoring and correction of vitamin D status could therefore represent a simple, low-cost adjunctive measure in the comprehensive management of hypertensive patients.

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