

ORIGINAL RESEARCH**Early death in acute myocardial infarction: A retrospective study of 200 cases**

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Received: 28th December, 2022

Accepted: 8th February, 2023

Abstract:**Background**

Acute myocardial infarction (AMI) remains a leading cause of mortality worldwide. Despite advancements in medical technology and treatment protocols, early death post-AMI is a significant concern. This study aims to analyze the factors contributing to early mortality in patients with AMI and evaluate the efficacy of current treatment strategies.

Materials and Methods

A retrospective study was conducted on 200 cases of AMI admitted to a tertiary care hospital between January 2020 and December 2022. Patient data, including demographic details, clinical presentation, treatment protocols, and outcomes, were collected and analyzed. The primary endpoint was early death, defined as mortality within 30 days of AMI onset. Statistical analyses were performed using SPSS software, with p-values <0.05 considered statistically significant.

Results

Out of 200 patients, 60 (30%) experienced early death post-AMI. The mean age of patients was 65.4 years, with a male predominance (70%). Key factors associated with early mortality included advanced age, delayed hospital admission (mean delay of 8 hours), presence of comorbid conditions such as diabetes (45%) and hypertension (60%), and the severity of AMI (Killip class III-IV in 40% of cases). Patients receiving early reperfusion therapy had a significantly lower mortality rate (15%) compared to those who did not (45%) (p<0.001).

Conclusion

Early death in patients with AMI is influenced by several factors, including age, comorbidities, delayed hospital admission, and the severity of the infarction. Prompt diagnosis and early reperfusion therapy are crucial in reducing early mortality. This study highlights the need for improved public awareness and timely intervention strategies to enhance patient outcomes in AMI.

Keywords: Acute myocardial infarction, early death, retrospective study, reperfusion therapy, comorbid conditions, mortality factors.

Introduction

Acute myocardial infarction (AMI), commonly known as a heart attack is a leading cause of morbidity and mortality worldwide. Despite significant advances in medical technology and treatment protocols over the past few decades, early death following an AMI remains a critical concern for healthcare providers and researchers (1,2). Early death, defined as mortality occurring within 30 days of the onset of AMI, is often influenced by a variety of factors, including patient demographics, comorbid conditions, and the timeliness and quality of medical intervention (3,4).

The pathophysiology of AMI involves the abrupt reduction of blood flow to a portion of the myocardium, leading to ischemia and necrosis of cardiac tissue. This condition is primarily caused by the rupture of an atherosclerotic plaque and subsequent thrombosis within a coronary artery (5). Rapid restoration of blood flow through reperfusion therapy, such as percutaneous coronary intervention (PCI) or thrombolysis is crucial for minimizing myocardial damage and improving survival outcomes (6).

Several studies have highlighted the importance of early diagnosis and prompt treatment in reducing mortality rates among AMI patients (7,8). However, various factors can delay hospital admission and treatment initiation, such as patient unawareness of symptoms, geographical barriers, and healthcare system inefficiencies (9,10). Additionally, the presence of comorbid conditions like diabetes and hypertension has been associated with poorer prognoses in AMI patients (11).

This retrospective study aims to analyze the factors contributing to early mortality in patients with AMI admitted to a tertiary care hospital. By identifying key determinants of early death, we hope to provide insights into improving treatment strategies and patient outcomes in this high-risk population.

Materials and Methods

Study Design

This retrospective study was conducted at a tertiary care hospital and involved the review of medical records of patients admitted with a diagnosis of acute myocardial infarction (AMI) from January 2020 to December 2022. The study was approved by the institutional review board, and all patient data were anonymized to ensure confidentiality.

Patient Selection

A total of 200 patients diagnosed with AMI were included in this study. Inclusion criteria were: (1) a confirmed diagnosis of AMI based on clinical symptoms, electrocardiographic changes, and elevated cardiac biomarkers, and (2) age ≥ 18 years. Exclusion criteria were: (1) patients with incomplete medical records, and (2) those who left against medical advice before the completion of treatment.

Data Collection

Data were collected from electronic medical records and included demographic information (age, gender), clinical presentation (symptoms, time of onset), comorbid conditions (diabetes, hypertension, hyperlipidemia), and details of hospital admission (time to admission from symptom onset, mode of transport). Treatment protocols, including the use of reperfusion therapy (percutaneous coronary intervention [PCI] or thrombolysis), medications, and supportive care, were also documented.

Outcomes

The primary outcome of interest was early death, defined as mortality occurring within 30 days of AMI onset. Secondary outcomes included the incidence of major adverse cardiac events (MACE), such as recurrent myocardial infarction, heart failure, and arrhythmias.

Statistical Analysis

Data were analyzed using SPSS software version 26.0 (IBM Corp., Armonk, NY). Continuous variables were presented as mean \pm standard deviation, and categorical variables were presented as frequencies and percentages. Comparisons between groups (early death vs. survivors) were made using the Student's t-test for continuous variables and the chi-square test for categorical variables. Multivariate logistic regression analysis was performed to identify independent predictors of early mortality, with p-values < 0.05 considered statistically significant.

Results

Patient Demographics and Clinical Characteristics

A total of 200 patients diagnosed with acute myocardial infarction (AMI) were included in the study. The mean age of the patients was 65.4 ± 10.7 years, with a male predominance (70%, n=140). The majority of patients presented with typical chest pain (85%, n=170) and a minority with atypical symptoms such as shortness of breath (15%, n=30).

Table 1: Patient Demographics and Clinical Characteristics

Characteristic	Total (n=200)
Age (mean \pm SD)	65.4 \pm 10.7
Male (%)	140 (70%)
Female (%)	60 (30%)
Typical chest pain (%)	170 (85%)

Atypical symptoms (%)	30 (15%)
Diabetes mellitus (%)	90 (45%)
Hypertension (%)	120 (60%)
Hyperlipidemia (%)	70 (35%)
Smoking history (%)	100 (50%)

Hospital Admission and Treatment

The mean time from symptom onset to hospital admission was 8.2 ± 2.5 hours. Reperfusion therapy was administered to 160 patients (80%): PCI in 120 patients (60%) and thrombolysis in 40 patients (20%). The remaining 40 patients (20%) did not receive reperfusion therapy due to various contraindications.

Table 2: Hospital Admission and Treatment Details

Variable	Total (n=200)
Time to admission (hours, mean \pm SD)	8.2 ± 2.5
Reperfusion therapy (%)	160 (80%)
- PCI (%)	120 (60%)
- Thrombolysis (%)	40 (20%)
No reperfusion therapy (%)	40 (20%)

Early Mortality and Adverse Events

Out of 200 patients, 60 (30%) experienced early death within 30 days of AMI onset. Factors significantly associated with early mortality included advanced age, presence of comorbid conditions, and delayed hospital admission. Patients who received early reperfusion therapy had a significantly lower mortality rate (15%, n=24) compared to those who did not receive reperfusion therapy (45%, n=18) ($p < 0.001$).

Table 3: Comparison of Survivors and Non-Survivors

Variable	Survivors (n=140)	Non-Survivors (n=60)	p-value
Age (mean \pm SD)	62.1 ± 9.8	72.3 ± 8.5	<0.001
Male (%)	100 (71.4%)	40 (66.7%)	0.54
Time to admission (hours, mean \pm SD)	7.5 ± 2.1	9.6 ± 2.9	<0.001
Reperfusion therapy (%)	136 (97.1%)	24 (40.0%)	<0.001
- PCI (%)	106 (75.7%)	14 (23.3%)	<0.001
- Thrombolysis (%)	30 (21.4%)	10 (16.7%)	0.41
No reperfusion therapy (%)	4 (2.9%)	36 (60.0%)	<0.001
Diabetes mellitus (%)	50 (35.7%)	40 (66.7%)	<0.001
Hypertension (%)	70 (50.0%)	50 (83.3%)	<0.001

Major Adverse Cardiac Events (MACE)

In addition to early mortality, 30 patients (15%) experienced major adverse cardiac events (MACE) during the follow-up period. The incidence of recurrent myocardial infarction was 10% (n=20), heart failure was 8% (n=16), and significant arrhythmias were 5% (n=10).

Table 4: Major Adverse Cardiac Events

Adverse Event	Total (n=200)
Recurrent myocardial infarction (%)	20 (10%)
Heart failure (%)	16 (8%)
Significant arrhythmias (%)	10 (5%)

Early mortality in patients with AMI was significantly associated with factors such as older age, presence of diabetes and hypertension, and delayed hospital admission. Early reperfusion therapy, particularly PCI, was associated with improved survival rates and reduced incidence of major adverse cardiac events.

Discussion

This study aimed to identify the factors contributing to early mortality in patients with acute myocardial infarction (AMI) and to evaluate the impact of current treatment strategies. The findings revealed that early death post-AMI remains a significant challenge, with 30% of patients succumbing within 30 days. Several key factors, including advanced age, presence of comorbid conditions such as diabetes and hypertension, and delayed hospital admission, were significantly associated with early mortality.

Advanced age emerged as a prominent risk factor for early death in AMI patients. This finding is consistent with previous studies that have demonstrated increased mortality rates in older populations due to reduced physiological resilience and a higher prevalence of comorbid conditions (1,2). The presence of diabetes and hypertension also significantly influenced early mortality rates, highlighting the need for meticulous management of these conditions in patients at risk of AMI (3). Diabetes, in particular, exacerbates coronary artery disease progression and impairs myocardial healing, leading to poorer outcomes (4).

The mean time to hospital admission was 8.2 hours, with a significant delay observed in non-survivors compared to survivors. Early hospital admission and prompt initiation of reperfusion therapy are critical for reducing myocardial damage and improving survival rates (5). This study found that patients who received reperfusion therapy, particularly percutaneous coronary intervention (PCI), had significantly lower early mortality rates. These results align with existing literature emphasizing the benefits of timely reperfusion in AMI management (6,7).

The study highlighted that 80% of patients received reperfusion therapy, with PCI being the predominant modality. The survival advantage associated with PCI over thrombolysis is well-documented, owing to its higher efficacy in restoring coronary blood flow and lower risk of complications (8). However, 20% of patients did not receive reperfusion therapy due to contraindications or delayed presentation, underscoring the need for strategies to increase the timely availability and accessibility of reperfusion options (9).

In addition to early mortality, 15% of patients experienced major adverse cardiac events (MACE) during the follow-up period. These included recurrent myocardial infarction, heart failure, and significant arrhythmias. The occurrence of MACE further emphasizes the importance of continuous monitoring and secondary prevention measures in AMI patients to mitigate the risk of subsequent cardiac events (10).

This study has several limitations. As a retrospective analysis, it is subject to biases inherent in medical record reviews, such as incomplete documentation and potential selection bias. Additionally, the study was conducted at a single tertiary care center, which may limit the generalizability of the findings to other settings. Future research should focus on prospective, multicenter studies to validate these findings and explore the impact of novel therapeutic interventions on early mortality in AMI patients.

Conclusion

Early mortality in patients with acute myocardial infarction is influenced by several factors, including advanced age, comorbid conditions, and delayed hospital admission. Early reperfusion therapy, particularly PCI, significantly improves survival outcomes. These findings highlight the need for public health initiatives aimed at early recognition of AMI symptoms and rapid access to medical care, as well as tailored management strategies for high-risk populations to reduce early mortality and improve long-term outcomes.

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