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Exploring the Spectrum of Acute Coronary Syndromes: Clinical Variations and Management Strategies

Nik Ahmad Shaiffudin Nik Him[1,2*], Nik Arif Nik Mohamed[1,2], Mohd Lotfi Hamzah[3], Nurin Natasha Binti Mohd Razali[2], Nurul Aqilah Binti Mohd Nasir[2], Siti Nurizah Binti Ishak[2]

[1]Hospital Pengajar Universiti Sultan Zainal Abidin, Kampus Gong Badak, UniSZA, Kuala Nerus, Terengganu
[2]Faculty of Medicine, UniSZA Medical Campus 20400, Kuala Terengganu, Terengganu
[3]Jabatan Kecemasan & Trauma Hospital Sultanah Nur Zahirah,Kuala Terengganu, Terengganu

Corresponding author: nikshaiffudin@unisza.edu.my

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Abstract

Objective: To present a case series highlighting the diverse clinical presentations and management approaches in patients with Acute Coronary Syndromes (ACS). Methods: We conducted a retrospective analysis of four ACS cases, focusing on clinical history, examination findings, diagnostic tests, and treatment strategies. Results: The case series includes patients with unstable angina (UA), non-ST-elevation myocardial infarction (NSTEMI) with acute decompensated heart failure, and ST-elevation myocardial infarction (STEMI). Each case illustrates the importance of early recognition and individualized management. Discussion: ACS encompasses a broad spectrum of clinical presentations, requiring prompt diagnosis and risk stratification for appropriate intervention. These cases emphasize the critical role of tailored management in improving patient outcomes. Conclusion: ACS management should consider the heterogeneity of clinical presentations and prioritize accurate diagnosis and risk assessment.

Keywords
Acute Coronary Syndrome; Clinical Presentation; STEMI; Early Recognition

Introduction

Acute Coronary Syndromes (ACS) represent a spectrum of cardiovascular conditions, encompassing unstable angina (UA) and myocardial infarction (MI), with clinical presentations varying widely. Despite advancements in cardiovascular care, ACS remains a major global health concern, necessitating timely recognition, precise diagnosis, and personalized management.

The management of acute coronary syndromes (ACS) is vital for improving patient outcomes, relying on precise risk assessment and stratification. Multivariate risk prediction models, like the Thrombolysis in Myocardial Infarction (TIMI) risk score, outperform subjective clinical impressions [(1)]. The TIMI score integrates seven factors, aiding risk assessment for unstable angina and non-ST-segment elevation

myocardial infarction (NSTEMI) [2]. It was developed from the InTIME trial of 15,000 STEMI patients and was studying these patients for thrombolysis with an exclusion of cardiogenic shock and severe hypertension. Its primary endpoint was 30-day all-cause mortality. It is a prognostic risk stratification system used to categorize the risk of death and ischemic events in patients with unstable angina or non-ST elevation myocardial infarction (NSTEMI) [2]. For clinical application, the TIMI risk score helps guide decisions regarding early invasive vs. conservative management, antiplatelet therapy, and other interventions [2]. Additionally, the Braunwald classification considers clinical presentation and therapy intensity, while the New York Heart Association (NYHA) Classification gauges heart failure severity [3].

Routine risk score utilization enhances risk stratification, directing intensive therapies toward high-risk patients and necessitates embedding it into hospital systems [4]. This shift aims to expedite decisions for early revascularization and reduce unnecessary interventions, especially for higher-risk patients who are often undertreated.

Misclassification of ACS as ST-segment elevation myocardial infarction (STEMI) or NSTEMI is common due to evolving electrocardiogram [5,6]. Misdiagnoses are also prevalent, with some patients inappropriately discharged from the emergency department [7,8]. Factors like ECG misinterpretation, an overreliance on normal ECG results, and atypical symptoms contribute to these issues. In addition, prompt symptom recognition by patients and healthcare providers is paramount. Delays in treatment due to symptom misidentification may lead to larger infarctions and worse outcomes [9]. Young age and the absence of chest discomfort are predictors of missed diagnoses and inappropriate ED discharges [10].

Efforts to incorporate risk stratification into hospital practices are essential, encompassing prehospital, inter-hospital, and individual settings. These challenges notwithstanding, the importance of precise risk assessment cannot be overstated. Early risk stratification provides a foundation for defining care pathways, aligning with local and international ACS guidelines [4].

The management of ACS relies on accurate risk assessment and tailored intervention [12]. Therefore, this case series aims to elucidate the importance of early identification, risk stratification and individualized treatment strategies through the examination of four distinct ACS cases.

Methods

We conducted a retrospective case series study to analyse the clinical presentations and management strategies of four patients diagnosed with ACS presented at Emergency Department Hospital Sultanah Nur Zahirah. Detailed medical histories, clinical examinations, electrocardiograms (ECGs), cardiac biomarker levels, and radiological findings were meticulously examined to assess the variability in ACS presentations and the appropriateness of treatment approaches.

Results

Case Report 1: A 49-year-old Malay male presented to the Emergency Department (ED) with worsening epigastric pain radiating to the left shoulder, arm, back, and neck. The pain, characterized as pricking in nature, aggravated by physical activity, limit him from walking more than two meters, and partially relieved by rest. Since the pain increases in intensity and frequency, he came to seek treatment at ED.

On examination, he was anxious with pain score at rest of 5/10 and no local tenderness at epigastric region. His body mass index was 26. Initial blood pressure was 130/90 mmHg and the heart rate 95 beat per minute. Clinically, no evidence of heart failure. The initial ECG showing no significant ST changes and no progression noted in the repeat ECG after 15 minutes duration. His chest radiograph was normal. The troponin cardiac biomarker was negative. He was managed as Acute Coronary Syndrome (Unstable Angina). Sublingual glyceryl trinitrate (GTN), 300 mg tablet clopidogrel (Plavix), and 300 mg subcutaneous

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fondaparinux administered as definitive treatment. The patient subsequently referred to the cardiology department for further evaluation and management. While in medical ward, patient managed for UA and completed treatment with significant improvement in clinical presentation. The repeat ECG and cardiac biomarkers in ward came as normal. He was discharge with stress test appointment and plan for early conservative therapy.

Case Report 2: A 65-year-old Malay male with a known history of ischemic heart disease, hyperlipidemia and obesity presented to the ED with central chest pain of one-day duration. The pain subsequently radiated to his back and left shoulder. It was described as sudden in onset, and heaviness in nature, lasting approximately 5-6 minutes during rest and relieved by nitroglycerin (GTN) administration. Initial blood pressure was 160/100 mmHg with the heart rate of 120 beat per minute. The patient also reported fatigue, shortness of breath, paroxysmal nocturnal dyspnea, and orthopnea.

Initial assessment exhibited clinical signs of acute decompensated congestive cardiac failure. His initial ECG displayed sinus tachycardia with ST depression in lead V5 and V6, along with T-wave inversion in lead V4 and V6. A chest radiograph indicated cardiomegaly, opacity in the lower lung zones, and blunting of the costophrenic angle, consistent with pleural fluid accumulation. Cardiac biomarker results revealed elevated creatine kinase (CK) and CK-MB levels, further supporting the diagnosis of non-ST-elevation MI (NSTEMI).

The patient received oxygen therapy, pain medication, double antiplatelet therapy (aspirin and clopidogrel), intravenous furosemide (Lasix), and intravenous heparin. Subsequently, he was referred to the medical specialist ward for CCU admission and further management. Patient's clinical status improved after one week of hospitalisation and as clinically no obvious contraindications to coronary revascularization, he was then plan for early invasive management strategies by cardiologist.

Case Report 3: A 61-year-old Malay male an active smoker with a 45-pack-year history, presented with a history of chest pain lasting three days and worsening on the day of presentation. The patient described the pain as throbbing, primarily located on the left side, and radiating to the left shoulder, arm, and back, with each episode lasting 3-4 minutes. The pain was exacerbated by exertion and relieved by rest and sublingual GTN. Additional symptoms included palpitations, profuse sweating, shortness of breath, nausea, orthopnea, paroxysmal nocturnal dyspnea, dizziness, and reduced effort tolerance. The patient's medical history was significant, including diagnoses of diabetes mellitus, hypertension, hypercholesterolemia, obesity, and underlying chronic stable ischemic heart disease. Despite this extensive medical history, the patient remained non-compliant with prescribed medications.

On assessment, the patient displayed normal vital signs, except for mild hypertension (BP 147/80mmHg) and tachycardia (110 beat per minute). An ECG revealed premature ventricular contractions in leads II and III and ST elevation in leads V1-V5. A chest radiograph showed redistributive pulmonary vessels without cardiomegaly but evidence of kerley B lines in the right lower lung zone. Cardiac biomarkers were positive, consistent with an acute myocardial infarction (AMI).

Initial management included aspirin, clopidogrel, and subcutaneous fondaparinux administration, followed by continuous vital sign monitoring and cardiology referral. Patient was decided not for thrombolytic therapy by medical team as the pain had maximally started three days ago and repeat ECG showed no progression. In fact, he responded well to the current therapy rendered. He admitted to Coronary Care Unit (CCU) for further management strategies.

Case Report 4: A 36-year-old Malay male, a known case of ischemic heart disease, hypertension, hyperlipidemia, and diabetes mellitus, presented with severe chest pain occurring three hours prior to

admission. The pain developed during sleep and was described as heavy in nature, radiating to the left shoulder, jaw, and back. The patient rated the pain as 9/10 on the pain scale and reported that it was continuous, with increasing intensity. Sublingual GTN medication provided no relief. The pain was exacerbated by breathing and accompanied by shortness of breath, profuse sweating, orthopnea, and paroxysmal nocturnal dyspnea. Unlike previous cases, this patient had no palpitations, nausea, or vomiting. Importantly, the patient reported no limitations in physical activities previously. The patient's medical history included diagnoses of ischemic heart disease, hypertension, hyperlipidemia, and diabetes mellitus, with a history of repeated hospitalizations. Presently, he was on multiple medications but remained non-compliant, further compounded by active smoking (23 pack-years) and a history of drug abuse.

Upon examination, the patient displayed normal vital signs except for mild hypertension (BP 134/80mmHg) and the heart rate was 110 beat per minute. The ECG revealed ST elevation in anterior leads, confirming a diagnosis of ST-elevation MI (STEMI). A chest radiograph indicates cardiomegaly without evidence of pulmonary oedema.

Initial treatment included intravenous streptokinase, aspirin, clopidogrel, sublingual GTN, and tramadol. The patient subjected to continuous vital sign monitoring and referred to the medical department for admission. Patient admitted to CCU for further management after been seen by the cardiologist and subsequently plan for early conservative therapy and cardiac rehabilitation.

Discussion

The diverse clinical presentations of Acute Coronary Syndromes (ACS) depicted in these four cases emphasise the complexity of diagnosing and managing this critical condition. ACS encompasses a spectrum of manifestations, ranging from unstable angina (UA) to non-ST-elevation myocardial infarction (NSTEMI) and ST-elevation myocardial infarction (STEMI). Each case offers valuable insights into the challenges faced by emergency healthcare providers when confronting ACS and reinforces the importance of early recognition, accurate risk stratification, and individualized treatment strategies.

Case Report 1: This case report elucidates the clinical manifestation and therapeutic management of Unstable Angina (UA) in a 49-year-old Malay male. It portrays a patient who initially presented with epigastric pain, mimicking a gastrointestinal issue, rather than a cardiac event. The pain increased in intensity and frequency and was partially relief with rest. Despite an initial and repeat electrocardiogram (ECG), showing no significant ST changes and normal cardiac biomarkers, the patient's symptomatology, characterized by worsening epigastric pain radiating to the left shoulder, arm, back, and neck, prompted a diagnosis of UA. This atypical presentation highlights the need for a high index of suspicion among healthcare providers, particularly in the emergency department setting [11]. In cases like these, where symptoms are non-specific, and initial diagnostic tests, including electrocardiograms (ECGs) and cardiac biomarkers, yield inconclusive results, clinical judgment remains paramount [11]. Higher rates of atypical symptoms or presentations, such as abdominal pain, shortness of breath, and congestive heart failure, might contribute to missed diagnoses [4]. Hence, accurate recognition of the symptoms of MI by both patients and physicians is crucial. The patient's inability to recognize MI symptoms will inevitably lead to delay in receiving timely therapy, which in turn may lead to a larger infarct and worse prognosis [10].

The decision to administer sublingual glyceryl trinitrate (GTN) and antiplatelet therapy in this case guided by clinical acumen and an understanding of the potential gravity of the situation. Notably, the TIMI risk score for STEMI was 2 points, which carries about 2.2% risk of all-cause mortality at 30 days. This case serves as a reminder that ACS presentations at ED may manifest in diverse ways, necessitating vigilance and a comprehensive diagnostic approach especially accelerated diagnostic pathway e.g. combination of cardiac biomarkers (troponin) and risk score. Routine use of validated risk scores may enhance risk

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stratification and facilitate more appropriate tailoring of intensive therapies toward high-risk patients [1]. The implementation of routine systems of care is challenging, but essential to minimise deficits in care [4].

Furthermore, the patient's referral to the cardiology department for specialized assessment emphasise the importance and nature of quality cardiovascular care. Throughout the patient's hospitalization, emphasis was on symptom alleviation, risk assessment, and the implementation of early conservative therapy. The subsequent amelioration in clinical status and the arrangement of a stress test appointment post-discharge indicates the efficacy of comprehensive management strategies in mitigating recurrent ischemic events.

Case Report 2: A 65-year-old Malay male with a history of ischemic heart disease, hyperlipidaemia, and obesity presented with central chest pain and signs of heart failure, highlighting the complexities of treating such comorbid conditions. No doubt, the intricate interplay between acute decompensated congestive heart failure (ADCCF) and non-ST-elevation myocardial infarction (NSTEMI) poses significant challenges in clinical management. The TIMI score of 12 points and a 35.9% risk of all-cause mortality at 30 days underscore the severity of the patient's condition and the urgency of intervention. In such, a holistic approach to patient care is paramount.

Upon clinical assessment, including electrocardiography (ECG), cardiac biomarker investigation, and chest radiography, the patient's clinical picture confirmed NSTEMI complicated with features indicative of acute heart failure. Immediate initiation of treatment was crucial to reduce symptoms and stabilize the patient's condition. Oxygen therapy, dual antiplatelet therapy (aspirin and clopidogrel), diuretics (furosemide), and anticoagulation (heparin) promptly administered to address both myocardial ischemia and congestion. Following stabilization, the patient was transfer to the medical ward for continued monitoring and optimization of medical therapy. The decision for early invasive management strategies, including coronary revascularization, highlight the importance of aggressive intervention in high-risk patients with ADCCF and NSTEMI.

This case emphasises the significance of integrated management strategies in optimizing outcomes for patients with complex cardiovascular conditions. The successful management of ADCCF with NSTEMI requires a multidisciplinary approach that prioritizes coordinated care, evidence-based interventions, and individualized treatment plans [14]. Through effective collaboration and adherence to best practices, clinicians can navigate the complexities of dual cardiac pathology and improve patient outcomes in the acute care setting.

Case Report 3: This case illustrates the detrimental impact of delay emergency treatment and medication non-compliance on the management and outcomes of acute coronary syndrome (ACS), specifically ST-segment elevation myocardial infarction (STEMI). The patient's presentation with chest pain, sweating, and ST-segment elevation on ECG warranted a diagnosis of STEMI (13). The patient's history of cardiovascular risk factors coupled with a pattern of non-adherence to prescribed medications accentuate a ubiquitous challenge in cardiovascular care. The calculated TIMI score of 9 points, with a corresponding 35.9% risk of all-cause mortality at 30 days, give emphasis to the gravity of the patient's condition and draw attention to the urgent need for effective intervention. Furthermore, failure to adhere to prescribed medications not only compromises treatment efficacy but also heightens the risk of disease progression, recurrent cardiac events, and adverse outcomes.

In response to this challenge, healthcare providers must engage in comprehensive patient education, emphasizing the critical importance of medication adherence in preventing ACS complications and improving long-term outcomes. Patients must understand the rationale behind prescribed regimens, potential consequences of non-compliance, and strategies to overcome barriers to adherence. Therefore, healthcare systems must implement robust strategies to monitor and support medication adherence

among at-risk populations. This may entail leveraging technology, implementing reminder systems, providing access to medication assistance programs, and fostering partnerships with community resources. Emergency care providers, patients, caregivers, and healthcare systems must work together to promote medication adherence, optimize treatment outcomes, and reduce the burden of ACS on individuals and society.

This case it serves as a reminder of the critical need to address medication non-compliance in ACS management via collaborative and patient-cantered approach. By prioritizing patient education, support, and system-level interventions, we can strive to enhance medication adherence, improve cardiovascular health outcomes, and mitigate the devastating impact of ACS on individuals and healthcare systems alike.

Case Report 4: This case highlights the critical intersection of cardiovascular risk factors and patient outcomes, particularly in the context of acute coronary events. The patient, despite being relatively young, faced multiple risk factors, including non-compliance with medications. The TIMI risk score, a valuable tool in risk assessment, indicated 6 points, which give 16.1% substantial risk of all-cause mortality at 30 days, emphasizing the gravity of the patient's condition.

Moreover, the case illustrates the detrimental impact of lifestyle choices, notably smoking and substance abuse, on cardiovascular health. The patient's history of active smoking, a substantial pack-year history, and drug abuse all contributed to heightened cardiovascular risk [15]. Importantly, the presentation of a ST-segment elevation myocardial infarction (STEMI) in a relatively young patient gives a warning call to emergency care provider of the need for comprehensive risk assessment beyond age alone.

This case emphasizes the significance of addressing not only the acute event but also the broader context of the patient's cardiovascular health. It stresses the obligatory actions for healthcare providers to conduct thorough evaluations of risk factors, including lifestyle choices, in assessing acute coronary syndrome (ACS) risk. Furthermore, it highlights the importance of implementing strategies for risk factor modification and long-term management to optimize patient outcomes and mitigate the risk of recurrent cardiovascular events.

Conclusion

This case series vividly illustrates the clinical diversity inherent in ACS presentations. The cases serve as a poignant reminder that ACS does not adhere to a one-size-fits-all paradigm and requires individualized care based on accurate risk stratification and clinical judgment. The cases emphasize the need for early recognition, comprehensive evaluation, and timely intervention, as well as the critical role of patient education and adherence to medications. Future research and healthcare initiatives should focus on optimizing risk assessment, improving patient compliance, and tailoring interventions to enhance ACS outcomes in both the acute and chronic settings. As the understanding of ACS continues to evolve, these cases underscore the importance of adapting clinical practices and guidelines to reflect the nuanced nature of this complex cardiovascular condition.

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Conflict of Interest

The authors declare no conflicts of interest.

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