



ACUTE MYOCARDIAL INFARCTION IN A YOUNG ADULT TREATED SUCCESSFULLY WITH PRIMARY PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY

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ABSTRACT

Acute myocardial infarction (AMI) is a rare disease in young adults. Although rare, AMI should be considered in anyone presenting with chest pain. This case report details a case of a 30 year-old gentleman who presented with epigastric pain radiating towards chest and bilateral shoulders, lasting 60 minutes. A diagnosis of AMI was established based on the patient's clinical presentation, ST segment elevation in leads II, III and aVF on electrocardiogram and hypokinesia of the left ventricle wall along the territory of the left circumflex artery on transthoracic echocardiography. A successful primary percutaneous coronary intervention (PCI) was performed in the left circumflex artery at 90 minutes post-presentation.

KEYWORDS: Acute myocardial infarction: young adult: epigastric pain: primary percutaneous coronary intervention (PCI).

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death in the West. Acute myocardial infarction (AMI) among young adults is relatively uncommon, yet it is still an important problem for both the patient and the treating physician, as these patients have different risk factors, clinical presentations and prognoses compared to older patients.^[1] AMI in young adults can be divided into two groups: those with angiographically normal coronary arteries and those with diseased coronary arteries. The causes of AMI in young patients with normal coronary arteries include arteritis, thrombosis, embolisation and vasospasm. Coronary thrombosis can be seen in patients with underlying hypercoagulable states, such as protein C and protein S deficiency, antiphospholipid syndrome or nephrotic syndrome.^[2] Coronary artery vasospasm can cause AMI in patients who abuse cocaine and alcohol.^[3] In those with diseased arteries, AMI mostly occurs as a result of atherosclerotic processes, starting in early childhood.^[4]

Cardiovascular risk factors for ischemic heart disease and AMI are also on the rise in the Nepalese population. Recent observations have shown a significant rise in the incidence of AMI in younger patients, however, there is currently very little data in the Nepalese population.^[5] Early identification and prompt management is still a

challenging problem in developing countries like Nepal where there are limited coronary intervention centers.^[6]

CASE REPORT

A 30 year-old gentleman from Kathmandu presented to our tertiary care center with epigastric pain. The pain commenced 60 minutes prior, while he was having breakfast. It began suddenly, and was continuous, squeezing and severe. It radiated to the chest and both shoulders, and was associated with diaphoresis and shortness of breath. The patient denied any palpitation, cough or orthopnoea. There was no prior background of hypertension nor diabetes, nor any family history of coronary artery disease and sudden cardiac death. He was a known smoker and drank alcohol regularly.

On physical examination, the patient's blood pressure measured 150/110mmHg and his pulse rate was regular at 88 beats/min. Heart sounds were dual and there were no added heart sounds, murmurs or pericardial rub. Examination of the chest, abdomen and central nervous system was unremarkable.

The patient was initially treated with an injection of pantoprazole in keeping with a provisional diagnosis of peptic ulcer disease. However, his pain only increased in intensity. An electrocardiogram (ECG) showed normal

sinus rhythm with ST segment elevation in leads II, III and aVF and reciprocal ST segment depression in leads V1 to V4 (Fig 1). Transthoracic echocardiography revealed hypokinesia of the left ventricular wall along the distribution of the left circumflex artery. There was also moderate left ventricular systolic dysfunction (left ventricular ejection fraction of 40-45%) but no intracardiac thrombus or mass. At workup, the patient had a white cell count of 11910/cmm, hemoglobin 15.8 gm/dl and platelets 176000/cmm, random blood sugar 98 mg/dl, creatinine 1.08 mg/dl, sodium 141 mEq/L, potassium 3.9 mEq/L, serum troponin-I 0.057 (Positive for > 0.120), creatine phosphate kinase myocardial band (CPK-MB) 73 U/L (Normal = 0-25 U/L) and lipid profile was within normal range.

After refining the provisional diagnosis to inferior wall ST elevation myocardial infarction (STEMI), the patient received a loading dose of aspirin 300mg, clopidogrel

600mg and rosuvastatin 20mg and was immediately shifted to a cardiac catheter lab for Primary Percutaneous Coronary Intervention (PPCI), approximately 90 minutes from the onset of symptoms. Coronary artery angiography showed 100% thrombotic occlusion of the proximal left circumflex artery (LCX). The right coronary (RCA), left main coronary and left anterior descending (LAD) arteries were all patent and right dominant (Fig 2). Primary percutaneous transluminal coronary angioplasty was performed in the proximal-mid LCX and Plain Old Balloon Angioplasty (POBA) to ostial Obtuse Marginal 1 (OM1) (Fig 3). After intervention, there was 0% residual stenosis with Thrombolysis in MI (TIMI) 3 flow. The patient was then discharged after 10 days and prescribed aspirin 300mg once daily, clopidogrel 75mg twice daily, rosuvastatin 20mg daily and ramipril 2.5mg daily. At outpatient follow-up, the patient was asymptomatic and otherwise well.

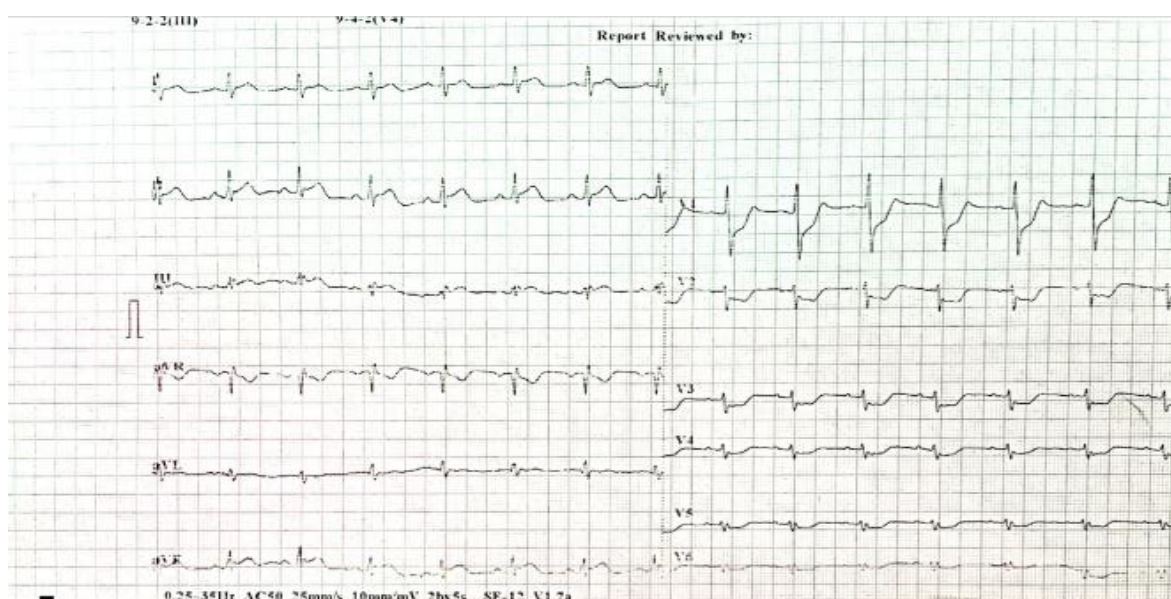


Fig 1: ECG showing ST segment elevation in leads II, III and aVF with reciprocal ST segment depression in leads V1, V2, V3 and V4.



Fig 2: Coronary angiogram: 100 % thrombotic occlusion of proximal LCX artery with normal LAD artery, RCA not visible in this figure.



Fig 3: Coronary Angiogram: the arrow shows the occlusion of the Obtuse Marginal (OM1) branch of the Left Circumflex Artery (LCX): POBA was done to ostial Obtuse Marginal 1 (OM1).

DISCUSSION

The majority of studies use age 45 as a cut-off for defining 'young patients' with CAD and AMI.^{[7], [8]}

Coronary artery disease (CAD) predominantly manifests in older individuals, and can have devastating consequences for an otherwise healthy person, including disability and death. When the afflicted individual is younger 45 years, the tragic consequences for family, friends and occupation are particularly catastrophic and unexpected. Fortunately, the incidence of AMI and symptomatic CAD in young adults is low; most studies show that only 1.2% of all CAD cases occur in this age range.^[8] Ethnic wise south Asians especially Indians are more vulnerable to have CAD in young age group with a prevalence of 5% to 10%.^[8] The clinical presentation of younger patients differs from that of older patients. In the majority of young cases, a sudden myocardial infarction or unstable angina is the first manifestation of CAD.^[9] Angiographic studies also report major differences between the age groups, with a higher incidence of normal coronary arteries,^[10] mild luminal irregularities, and single vessel coronary artery disease in the young adults compared to older patients with AMI.^[11] In a prospective observational study in Nepal, Tamrakar et al. showed that out of young patients with AMI (n=115), 64.3% were smokers, 27.8% were hypertensive, 15.65% were diabetic and 9.6% had a history of dyslipidemia. There was a history of recreational drug abuse in 4.3% of patients. This study suggests that smoking is the single most important risk factor for AMI in the younger population.^[5] The patient in this case report was a known smoker; however he did not have any history of hypertension, diabetes nor any recreational drug abuse. Numerous other studies have also found high rates of tobacco use among young patients with AMI, with percentages ranging from 70% to >90%.^{[12], [13]} Smoking is known to cause increased fibrinogen concentrations and platelet aggregability, along with impaired fibrinolytic activity, decreased coronary flow reserve, and increased vasospasm.^{[14], [15]} Recurrent exposure to cigarettes with subsequent catecholamine surges damage endothelial cells, leading to endothelial dysfunction and injury of the vascular intima. Autopsy studies in young adults have shown a larger burden of fatty-streak lesions in the coronary arteries of smokers compared to non-smokers.^[16] Prospective cross-sectional studies conducted in Nepal at different tertiary care centers by Tamrakar R, Bhatt YD et al, Laudari S et al. and Adhikari CM et al. on AMI in young adults showed that STEMI was more common than NSTEMI or unstable angina.^{[12], [5], [6]} This is consistent with our reported case, who was diagnosed with a STEMI of 100% thrombotic occlusion of the left circumflex artery (LCX). AMI in young adults can present as obstructive or nonobstructive stenosis.^[17] According to Malik et al. (n=266), significant coronary artery disease was found in 83.04% patients, 7.39% patients had normal coronaries and involves, in order of frequency, the LAD, LCX, and RCA.^[18] Young patients tend to have a better prognosis and lower

mortality rates when suffering from an acute coronary insult than elderly patients, because they have fewer comorbidities. Nevertheless, sudden occlusion of an epicardial vessel in a young patient could lead to enormous infarction if revascularization is not performed immediately, and as such this may precipitate a cardiac arrest (ventricular arrhythmia which may degenerate to fibrillation). This complication results from the non-development of the collateral system, which is usually stimulated by preceding repetitive ischemic signals, as occurs insidiously in the atherosclerotic vessels of elderly patients. Early complete revascularization improves survival, but AMI in young patients may also indicate an aggressive atherosclerotic process if coronary vasospasm is excluded.^[19]

CONCLUSION

The prevalence of acute coronary syndromes (ACS) is increasing in the younger population, contributing towards significant morbidity and mortality in Asia. While smoking is the most important reversible risk factor in this young group, it is important to evaluate non-atherosclerotic aetiologies, including coagulation disorders, vasculitis and drug abuse. This is to ensure timely diagnosis and prompt treatment, thus minimising the risk of serious life-threatening complications and mortality.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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