

Reversing AV Block and Cardiogenic Shock in STEMI Care: A Case Report on Use of Fibrinolysis and Inotrope without PCI in Rural Nepal

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ABSTRACT

Atrioventricular block and cardiogenic shock are critical complications of inferior wall myocardial infarction with high mortality, especially in resource-limited settings lacking percutaneous coronary intervention. We report a 53-year-old male smoker presenting to a rural hospital with acute chest pain, dyspnea, and profound hemodynamic instability with electrocardiogram showing inferior wall ST-segment elevation myocardial infarction with Mobitz type I atrioventricular block. This case highlights reversal of atrioventricular block with return of hemodynamic stability using Streptokinase and inotropes in a rural setting. Therefore, timely fibrinolysis and inotropes in managing inferior wall myocardial infarction with atrioventricular block and cardiogenic shock in percutaneous coronary intervention -inaccessible regions and strengthening rural ST segment elevation myocardial infarction care networks is crucial.

KEY WORDS

Atrioventricular block, Fibrinolysis, Percutaneous coronary intervention, Rural health, Shock cardiogenic, ST elevation myocardial infarction

INTRODUCTION

Atrioventricular (AV) block and cardiogenic shock are life-threatening complications associated with acute inferior wall myocardial infarction, significantly escalating the risk of morbidity and mortality, particularly in resource-limited rural settings where percutaneous coronary intervention (PCI) is unavailable.¹⁻⁷ Their coexistence, though infrequent, hinders optimal care and poses unique diagnostic and management challenges in regions lacking advanced cardiac facilities and specialist expertise.^{2,6,8} We present the case of a 53-year-old male with ST elevation myocardial STEMI complicated by second-degree AV block and cardiogenic shock who was successfully managed with timely fibrinolysis and inotrope therapy in a rural hospital. This case highlights the potential of non-PCI interventions in acute care, and underscores the gaps in cardiovascular

resources in remote areas. Reporting such cases supports evidence-based modifications of guidelines for low-resource settings and provide valuable insight for clinicians facing similar challenges in rural practice.

CASE REPORT

A 53 years male from presented to emergency department (ED) of Karnali Academy of Health Sciences (KAHS), Jumla located in the country's mid-western region. He came with the chief complains of shortness of breath (SOB) and chest pain for four hours. SOB was acute in onset, progressive in nature and present even during rest. Chest pain was acute in onset, retrosternal, constricting, non-radiating, with profuse sweating, without any aggravating or relieving

factors and severe enough to compel him to visit ED at night. He is an active smoker with pack year of 40 and regular alcohol consumer with 6.75 units per day of local alcohol for 20 years.⁹ His family history, past medical and surgical history were insignificant.

On arrival to ED, he was dyspneic and drowsy with Glasgow Coma Scale Pupils score (GCS-P) of 12/15 (motor response-5, verbal response-4, eye opening-3 and pupil reactivity score-0). He had pulse rate (PR) of 40 beats per minute (bpm), respiratory rate (RR) 42 cycles per minute (cpm), blood pressure was not recordable and his peripheral oxygen saturation (SpO_2) showed 74% in room air. Acuity-based triage was done using Interagency Integrated Triage Tool (IITT)¹⁰ and the patient was categorized as red. He was then transferred to high acuity resuscitation area, high flow oxygen was delivered via face mask at rate of 15 liters per min (L/min). On general assessment of the patient, he was pale and his extremities were cold. Peripheral pulses were not palpable. An intravenous (IV) line was accessed with an 18 gauge IV canula, nasogastric (NG) tube of 16 French gauge (Fr) and foley's catheterization of 16 Fr was inserted. Systemic review of his respiratory system showed bilateral equal chest rise with increased work of breathing. On auscultation there was normal vesicular breath sounds with bilateral equal air entry. During his cardiovascular examination normal heart sounds (S1 and S2) were heard and murmur was not appreciated.

Considering sudden onset of severe chest pain, an immediate 12 lead electrocardiogram (ECG) was performed which showed ST segment elevation in leads II, III and aVF with progressive PR interval prolongation indicating second degree Mobitz Type I AV block, followed by right sided ECG which showed ST segment elevation in chest leads V1-V4 (Fig. 1). Single dose of each Tab Aspirin 300 milligram (mg), Tab Clopidogrel 300 mg and Tab Atorvastatin 80

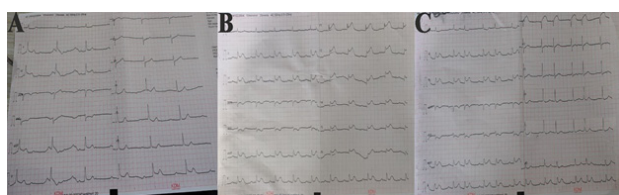


Figure 1. Pre fibrinolysis ECG. (A) 12 lead ECG showing ST elevation in leads II, III and aVF with progressive PR interval prolongation. (B) Right sided ECG showing ST elevation in V1-V4. (C) Posterior lead ECG showing ST elevation in leads II, III, aVF and V1 with AV block; ECG- electrocardiogram, AV- atrioventricular.

mg was administered via NG tube. Screening bedside echocardiography was performed in ED which showed right sided hypokinetic wall motion with good ejection fraction. His arterial blood gas analysis showed primary metabolic acidosis with respiratory compensation with pH 7.29, partial pressure of carbondioxide (pCO_2) 27 millimeters of mercury (mm of Hg), lactate 4.4 millimoles per liter (mmol/L), bicarbonate (HCO_3^-) 15.9 mmol/L and base deficit of -13.6 mmol/L. Qualitative Troponin I at

presentation was negative. Other laboratory evaluation including hemoglobin, total and differential count, platelet count, electrolytes (sodium, potassium and calcium), random blood sugar (RBS), renal function tests (RFT), liver function tests (LFT) and prothrombin time/international normalized ratio (PT/INR) were normal. After all the above mentioned assessments, working diagnosis of second degree Mobitz type I AV block with cardiogenic shock secondary to ST-elevation IWM was made. Meanwhile the patient party was informed about the disease condition and its poor outcome.

Initial assessment was followed by prompt fluid challenge test with a bolus of 250 milliliters (ml) of normal saline (NS) via peripheral line which did not show any improvement in his BP. Subsequently, Inj Noradrenaline was started at 0.025 microgram/kilogram/minute (mcg/kg/min), increasing upto a dose of 0.05 mcg/kg/min. His BP was still not recordable and Inj Dopamine 5 mcg/kg/min was added. According to the guidelines, percutaneous coronary intervention (PCI) is the preferred choice of revascularisation in such cases.^{2,7} Unfortunately, this center lacks PCI facilities and transportation being a huge barrier in the region, the patient party was counselled regarding the urgent need of fibrinolysis. After careful exclusion of the contraindications of using plasminogen activator and explaining the risk versus benefit of its use, a written informed consent was taken from his care taker. Inj Streptokinase 1.5 million units (MU) in 100 ml NS was then administered over 60 minutes (mins) and the patient was shifted to Intensive Care Unit (ICU).

Repeat Qualitative Troponin I came to be positive after four hours of presentation. Post-fibrinolytic ECG was obtained which showed reversal of heart block and decrease in height of ST-segment elevation (Fig. 2). In addition to changes in ECG there was also improvement in his symptoms with a GCS-P score of 15/15. His vitals after fibrinolysis were recorded as BP 90/60 mm of Hg, PR 80 bpm, SpO_2 94% with oxygen (O_2) via face mask at 8 L/min. His in-patient management included Inj Enoxaparin 60 units twice daily, Inj Pantoprazole 40 mg once daily (OD), Tab Aspirin 75 mg OD, Tab Clopidogrel 75 mg OD and Tab Atorvastatin 40 mg OD.

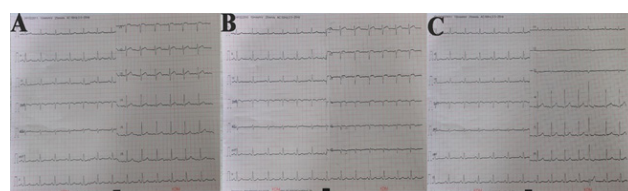


Figure 2. Post fibrinolysis ECG. (A) and (C) 12 lead and posterior ECGs showing reversal of atrioventricular block. (B) Right sided ECG showing decrease in height of ST elevation; ECG- electrocardiogram, AV- atrioventricular.

ABG repeated on the next day showed reversal of metabolic acidosis with pH 7.45, pCO_2 35 mm of Hg, lactate 1.2 mmol/L, HCO_3^- 24.3 mmol/L and base deficit of 0.3

mmol/L. On following admission days in ICU, serial ECGs were performed showing normal sinus rhythm with no new changes and inotropes were gradually tapered according to his vital parameters (Table 1). Inj Noradrenaline was decreased to 0.025 mcg/kg/min on 1st day, 0.01 mcg/kg/min on 2nd day and discontinued on 3rd day. Similarly Inj dopamine was tapered to 2.5 mcg/kg/min on 1st day, 1 mcg/kg/min on 2nd day and then stopped on 3rd day.

Table 1. Daily assessment of patient's condition after fibrinolysis.

Admission day	BP (mm of Hg)	PR (bpm)	RR (cpm)	SpO2 (%)
1 st Day	112-127/69-72	90-96	18-22	93-97 in 6 L/min O ₂
2 nd Day	110-119/74-79	75-83	14-20	95-98 in 2 L/min O ₂
3 rd Day	90-117/68-80	82-93	16-22	94-96 in 2 L/min O ₂

On 3rd day of admission he was shifted to ward. He was comfortable and hemodynamically stable throughout his stay. He was referred to cardiac center on 4th day of admission for detailed evaluation and further management. The patient follow-up was only possible via phone call and medical records of his detailed cardiac evaluation could not be obtained as he had temporarily shifted his residence for feasibility of regular follow-up.

DISCUSSION

This case underscores the challenges of identifying and managing life-threatening cardiac emergencies like inferior wall STEMI complicated by AV block and CS in rural, resource-limited settings. While similar cases in high-income settings typically resolve with PCI and advanced monitoring, our patient's outcome hinged on the use of fibrinolysis and inotrope due to systemic barriers.^{2,7}

ECG findings were the sole indicators prompting the diagnosis of this case as echocardiography by an expert was not available. ECG driven revascularization was initiated despite negative troponin levels- a decision supported by European Society of Cardiology (ESC) guideline.¹¹ PCI definitely offers better outcomes and lower mortality rates than thrombolytics in STEMI with complications.^{2,7} However, the mortality advantage of PCI diminishes as delay between patient presentation and the PCI procedure increases.¹² Considering the decreased benefit with increased delay to invasive procedure, the patient was immediately revascularized with streptokinase resulting in

a positive outcome in this case. Similar outcomes were also demonstrated in other reports without the use of PCI.^{13,14} American Heart Association (AHA) and ESC also advocate for the prompt use of any available reperfusion therapy, despite the lack of specific data on efficacy of streptokinase in STEMI, which alligns with the traetment strategy of this case.^{7,8,12} As PCI facility was not accessible from this center within the recommended time, the use of streptokinase with timely reperfusion was extremely crucial for the patient.

Second degree type I AV block and CS augmented the clinical and ethical challenges faced by rural emergency physicians in this case. High degree AV blocks (HAVB) which includes second degree type II and third degree AV block, secondary to STEMI demands for pacemaker implantation.^{7,15} Literature also states that second degree type I AV block rarely cause hemodynamic compromise, but the authors encountered a second degree type I AV block with unstable hemodynamics adding to the difficulty in management as there was paucity of information.⁷ Norepinephrine and Dopamine enhance the automaticity of pacemakers in high degree AV blocks due to the positive chronotropic and inotropic effects on heart muscles.¹⁶ So, the authors opted for using these inotropes to restore cardiac output in this rural scenario, as Sandjojo et al had mentioned in their case report.¹⁷ Use of these drugs was very helpful in this case to stablize patient's hemodynamic status and prevent poor outcomes.

Fibrinolytic therapy is not the final step; early angiography and rescue PCI, if needed, are recommended after thrombolysis to reduce reinfarction and recurrent ischemia.¹⁸ Referral to a cardiac center was only possible on day 4 of admission due to the lack of a well-organised STEMI network with a standard transfer protocol.

Jumla, a remote district in Karnali province, Nepal is an exemplar of healthcare disparities faced by rural population. With no cath lab, healthcare providers are compelled to rely on fibrinolytic therapy to manage STEMI complications. Geographical isolation, coupled with inadequate road networks and seasonal disruptions in transportation, delay timely transfer to appropriate facility often exceeding window for rescue PCI. These barriers amplify the urgency of optimizing interventions as demonstrated in this case report. It has further hilghted the importance of fibrinolysis and inotropes in initial stabilisation of high-risk IWMI cases. A well-structured care system with clear protocols and transfer mechanisms focusing in rural healthcare would enhance the quality of STEMI care in resource-limited setting.

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