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CASE REPORT

The Simultaneous Occurrence of Acute Myocardial Infarction and Acute Cerebrovascular Accident

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ABSTRACT

Hypovolemic shock is a life-threatening condition with high mortality, requiring urgent resuscitative therapy to restore perfusion and prevent irreversible organ damage alongside the definitive management. Current treatments, including fluid resuscitation with initially crystalloids and later blood or its components followed by vasopressors have certain limitations in effectively restoring hemodynamics and improving tissue perfusion besides some safety concerns. This review explores unique features of a novel first-in-class resuscitative agent centhaquine including unique mechanism of action, pure venoconstriction without arterial constriction and wide safety margin. The balanced modulation of venous return and arterial resistance allows centhaquine to increase cardiac output in patients with hypovolemic shock while maintaining the tissue perfusion without compromising microcirculatory flow, offering clinicians a more effective option to improve survival in these critically ill patients. Preclinical and clinical studies demonstrate that centhaquine significantly improves hemodynamic parameters, reduces vasopressor and fluid requirements, lowers blood lactate levels and improves survival in patients with hypovolemic shock. Centhaquine's renoprotective effects further highlight its potential in preventing organ failure following hypovolemic shock. The safety profile of centhaquine has been established across multiple phases of clinical trials and it is currently approved in India for the treatment of hypovolemic shock. Centhaquine represents a promising advancement in the management of shock, offering a novel approach to improving patient outcomes. Further research could evaluate the potential of centhaquine in managing other forms of shock such as neurogenic shock and septic shock.

KEYWORDS

• Centhaquine • Hypovolemic shock • Resuscitation therapy • Hemodynamic stability • Organ protection • Tissue perfusion • Multiorgan failure

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INTRODUCTION

Acute Myocardial infarction (ST elevation MI-STEMI) and acute cerebrovascular accident (CVA) are both life-threatening emergencies, which require immediate medical intervention. When both entities co-exist, as coined by Omar *et al.* is called as acute cardio-cerebral infarction[1]. While the occurrence of both these conditions is rare, the emergency physicians must be vigilant enough to address both these cases simultaneously, to prevent the mortality and morbidity in these patients[2]. The treatment modality in simultaneous occurrence of these conditions is challenging as treatment of any one condition can delay the treatment of another entity. Timely intervention with expert opinion is widely considered in management of these patients.

CASE

A 55 year old female patient was brought into the emergency department early this morning with complaints of inability to raise left arm with slurring of speech from 40 minutes back. As informed by the attendant, hse woke up in the morning, completed her morning chores. She complained of sharp chest pain and was sweating, suddenly became drowsy and developed weakness in left arm and speech disturbance. On arrival in the emergency, the patient was conscious and oriented but was unable to perform activities during the examination. Her vitals were stable. The electrocardiogram study was done and showed acute ST elevation in anterior leads (*Figure 1*). The patient was immediately diagnosed with acute STEMI. STEMI loading dose was given (ecosprin 325 mg, clopidogrel 300 mg, atorvastatin 80 mg). The attendants were keen in stroke management, hence, on patient request, the patient was shifted to MRI study at high risk.

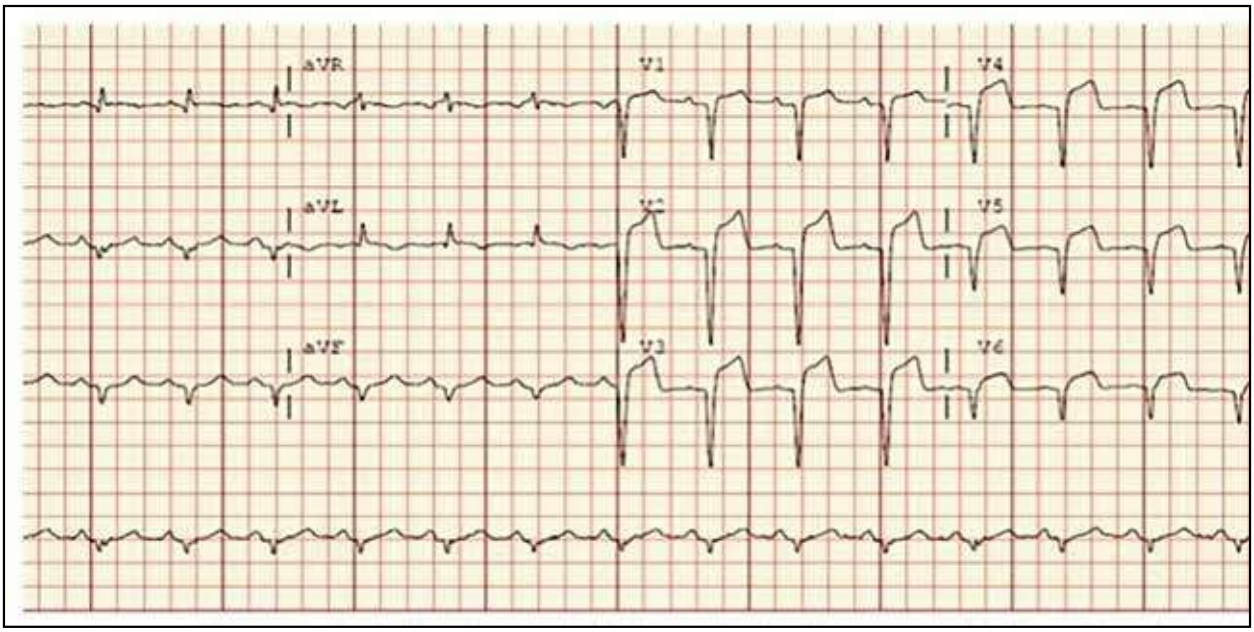

Figure 1: Ref: Max Hospital, Shalimar Bagh, Emergency Medicine Department

Fortunately, the MRI study was uneventful and revealed a large area of infarct in the left lobe of brain (the involvement of left Middle cerebral artery).

The past history of the patient was significant for coronary artery disease 8 years back, post stenting status. The patient has not undergone any recent blood investigations for the last 2 years.

After brief discussion with the interventional cardiology team and interventional neurology team and reviewing of literature extensively, it was decided that the patient will be taken for coronary angiography followed by thrombolysis therapy.

The coronary angiography revealed critical LAD stenosis (>90% stenosis), stenting was done. As the window period still persisted

for stroke (2.5 hours now, from the onset of disease), thrombolysis therapy was done for stroke components with injection alteplase (fibrinolytic therapy). The family was explained in detail regarding the high risk of bleeding from alteplase therapy following PCI but they agreed for the same after brief explanation and discussion.

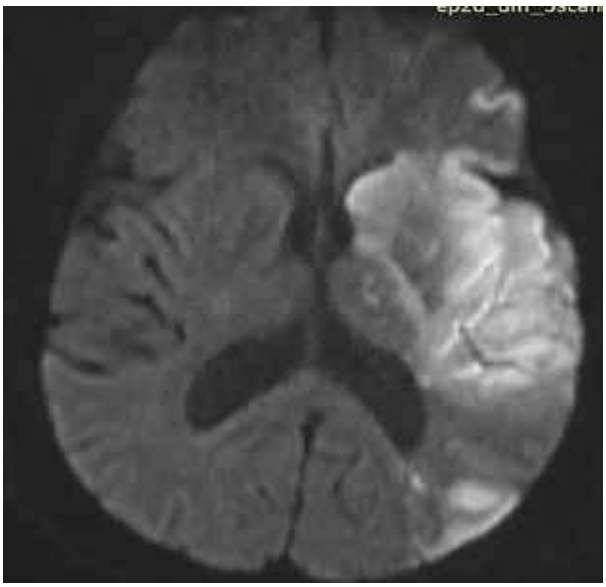

Figure 2: Ref: Max Hospital Shalimar Bagh, New Delhi

The patient was shifted to the intensive care unit for further care and observation. The post procedure period for the patient was critical but it turned out well for this patient. Physiotherapy was carried out well for this patient in view of post-ischemic stroke care.

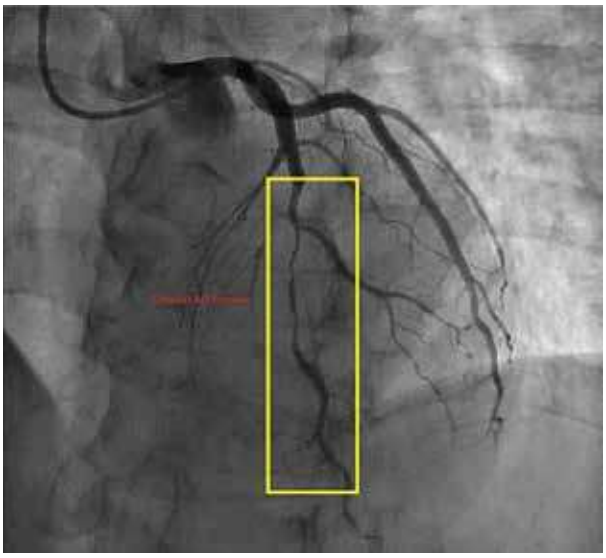

Figure 3: Image reference-Max Shalimar Bagh CathLab records

The patient was discharged after 5 days of hospitalization. Her hemiparesis has improved to satisfactory level, slurred speech improved and her ECG also resolved, echocardiography showing no LV clot. During her routine follow-up, she was well and her recovery was faring well along with continuous physiotherapy and continued blood thinners. The patient recovered well by the timely, correct decision and prompt intervention by the medical team and her family members.

DISCUSSION

This case report highlights a unique case of concurrent occurrence of acute myocardial infarction and acute ischemic stroke in a patient. This is a rare occurrence but review of literature has shown that the simultaneous occurrence is not uncommon. The mechanisms of simultaneous occurrence of cardio-cerebral infarction are as follows:[3,4]

- Brain and cardiac axis disorder or cerebral infarction can lead to myocardial injury. The insular cortex has an important role in the autoregulation of the central autonomic nervous system. Pathological changes of the insular cortex are related to atrial fibrillation, myocardial injury, activation of cardiac sympathetic nerves and interruption of the circadian rhythm.
- Concomitant thrombosis of coronary and brain arteries, such as AF, type I aortic dissection involving coronary arteries and common carotid artery results in coronary and cerebral artery spasm.
- Stroke caused by cardiovascular disorder, such as intraventricular thrombosis, patent foramen ovale (complicated with right heart infarction), and cardiac shock after myocardial infarction.

The main reason the physicians are concerned are related to bleeding complications after any interventional therapy, especially for patients with cerebrovascular accident after thrombolytic therapy. Ischemic cerebrovascular accident is one of the serious complications after myocardial infarction[5]. The independent risk factors for ischemic stroke in myocardial infarction patients includefemale, age, heart failure, diabetes,history of stroke, CABG, AF, STEMI[6].

In the acute stages of stroke, serum troponin levels in some patients might increases along

with ST-T changes in the ECG[7], thus, bringing difficulty in the diagnosis of stroke-myocardial infarction. *Kijpaisalratana et al.* proposed a management method based on hemodynamic state, and named "**hyperacute simultaneous cardiocerebral infarction**" for the patients with onset less than 4.5 h. For patients with cardio-cerebral infarction with hemodynamic instability, emergency PCI was performed first, followed by intravascular treatment for stroke with large vascular occlusion[4]. For patients with stable hemodynamics, rt-PA thrombolytic therapy was selected according to the standard dose of stroke, followed by vascular therapy for stroke and PCI for myocardial infarction according to the situation.[4]

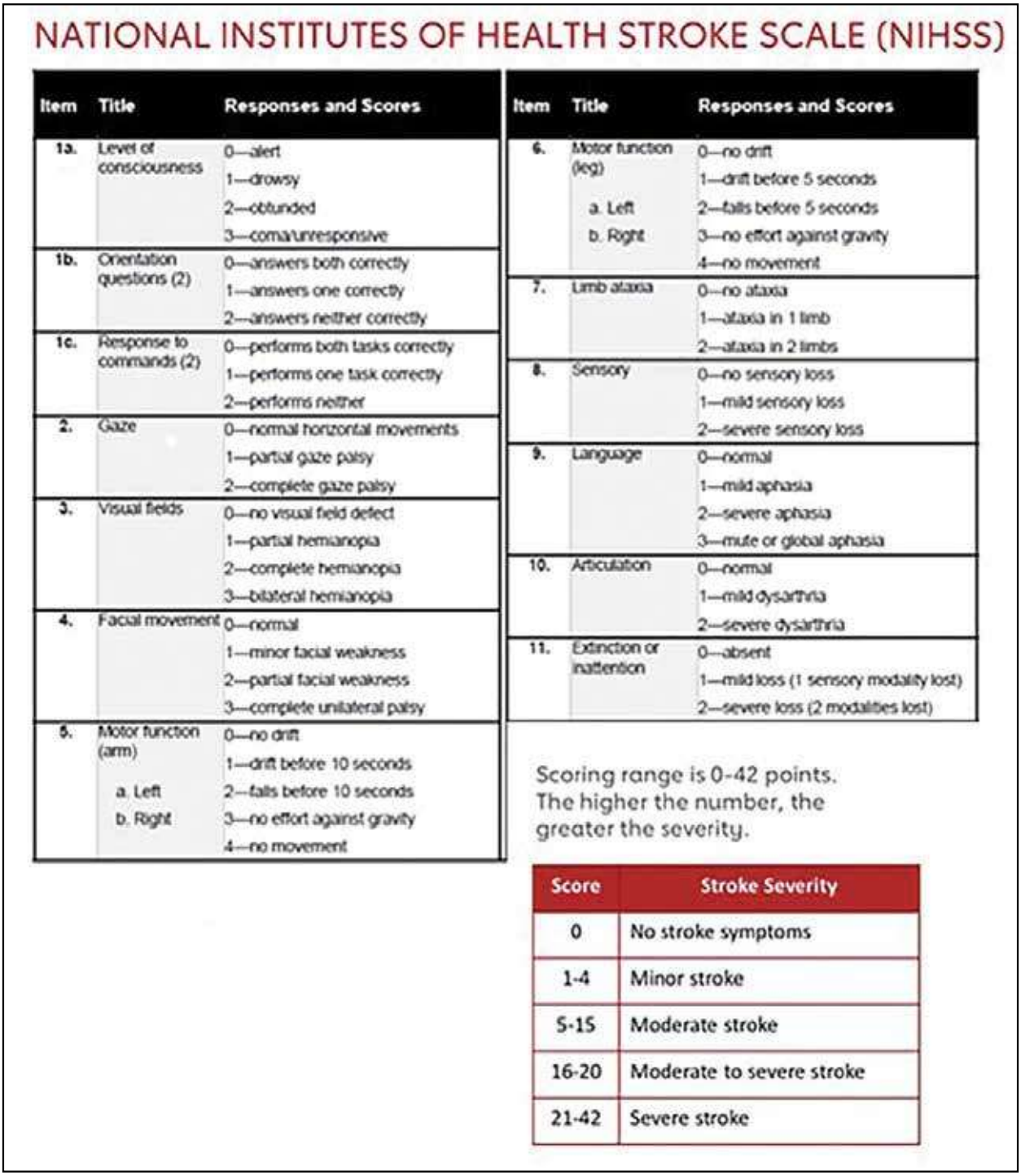

Figure 4: ***Ref:*** Google Image/Tintinalli Textbook of Emergency Medicine

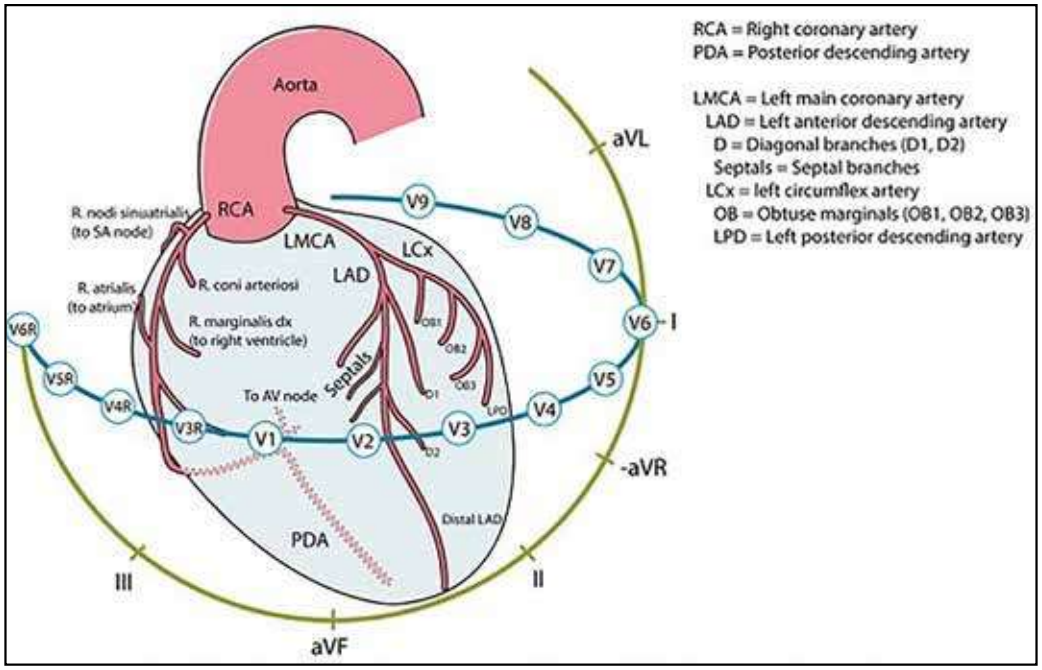

Figure 4: Heart blood supply and ECG leads for Myocardial Infarction

Some scholars suggested that for patients with acute myocardial infarction-acute stroke within 4.5 h of onset, especially for patients of anterior wall MI with reduced LVEF, rt-PA can be given according to the doses of STEMI thrombolysis, followed by PCI[8]. The 2018/AHA/ASA recommended that patients with concurrent cardiocerebral infarction within 4.5 h should be given rt-PA at stroke dose, followed by PCI (Class IIa; C)[9]. 2021/ESO guidelines suggested that in the uncommon case scenario of an acute stroke complicating an acute myocardial infarction (< 6 h), alteplase may be administered if there are no other contraindications to intravenous thrombolysis. Mechanical thrombectomy may be an effective therapy in patients with large vessel occlusion and recent myocardial infarction.[10]

CONCLUSION

Occurrence of acute ischemic stroke and acute myocardial infarction is not uncommon. In our case, the patient was taken up for coronary angiography with PCI followed by thrombolysis for stroke. There are very limited studies in establishing accurate treatment guidelines for adequate therapy of concurrent occurrence of stroke and myocardial ischemia. The treatment goal is to ultimately reduce the mortality and morbidity for the patient and the family member.

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