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Simultaneous Acute Cardio-Cerebral Infarction: A Rare Case Report Experience In Type C Hospital In Indonesia

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ABSTRACT

Background: Cardiocerebral infarction (CCI), defined as the simultaneous occurrence of an acute ischemic stroke and myocardial infarction, is an infrequently encountered but life-threatening medical emergency. Consequently, we aimed to provide an overview of the available treatment option for patients in type c hospital in order to guide the similar cases.
Case Description: We report the case of a 50-year-old man who presented with chest pain, acute right-sided weakness, and slurred speech. The patient had a history of hypertension and an active smoker. The patient had a left hemiparesis. The patient's electrocardiogram showed ST segment elevation in leads V3 and V4. A non-contrast head CT-scan showed infarct in the right occipital region. Echocardiogram showed regional wall motion abnormality. The patient was admitted to the hospital, administered DAPT, statin, anticoagulant and discharged after relief of symptoms. Intravenous alteplase followed by primary PCI is the gold standard therapy. However, due to limitation, anticoagulants were chosen and showed clinical improvements.
Conclusion: In summary, the goal for treat CCI is to achieve more efficacy therapy while minimising the risk of bleeding. Despite the limitations, patient outcome was good.

Keywords: Anticoagulant, Cardio-cerebral infarction, Hypertension , PCI, STEMI

Introduction

Both ST-elevation myocardial infarction (STEMI) and acute ischemic stroke (AIS) are serious life-threatening medical condition with a terrible prognosis if left untreated (Akinseye et al., 2018). The risk of this disease increases in the age group over 50 years. The development of endothelial dysfunction, which leads to the build-up of LDL and macrophages in the coronary arteries, is the first step in the pathophysiology of occlusion in these arteries. There are several causes for this endothelial dysfunction, including smoking, diabetes mellitus, hypertension, and hyperuricemia (Nowbar et al., 2019).

ST-elevation myocardial infarction (STEMI) and AIS occurring at the same time is an extremely rare phenomenon and may be linked to significant morbidity and mortality. This phenomenon could be classified as Cardio Cerebral Infarction (CCI) (Omar et al., 2010). Early identification and adequate therapy of patients with CCI will certainly result in better patient outcomes.

STEMI and AIS are at risk for each other, however there are very few reports of concurrent STEMI and AIS. This concurrent emergency conditions required a precise balance in treatment due to the conflicting needs of managing both STEMI and the risk of haemorrhagic complications from the stroke. Consequently, we aimed to provide an overview of the available treatment options for patients in type c hospital in order to guide the future care in similar cases.

Case Description

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A 50-year-old male patient presented to the emergency department of type C hospital experiencing chest discomfort for about one hour prior to arrival. Chest pain felt like being hit by a heavy weight on the left side and the pain did not migrate, leading to cold sweats. Patient also complained of headache for one hour before entering the hospital. While in the emergency room, the patient suddenly felt weakness in the left limbs and speech impairment. Both the patient himself and the patient's family said there was no previous history of cardiovascular disease or stroke. However, the patient had a history of hypertension and an active smoker. The patient did not have health insurance.

Physical examination showed that the patient was conscious, his Glasgow Coma Scale (GCS) score was 15. Cardiovascular examination revealed a regular heart rate of 76 bpm, blood pressure of 90/60 mmHg, and a respiratory rate of 20 breaths per minute with an oxygen saturation of 94% on room air. Neurologically, he exhibited right-sided hemiparesis and facial drooping, along with expressive aphasia. Neurological examination showed that the score of motoric strength of the left extremity was 4 out of 5.

Electrocardiographic (ECG) examination showed sinus rhythm, 5 mm ST segment elevation in leads V3 and V4, as well as the presence of left ventricular hypertrophy (LVH), left atrial enlargement (LAE), and right atrial enlargement (RAE) (Figure 1). Laboratory examination showed a Troponin I value of 0.02, and an uric acid level of 14.66 mg/dL.

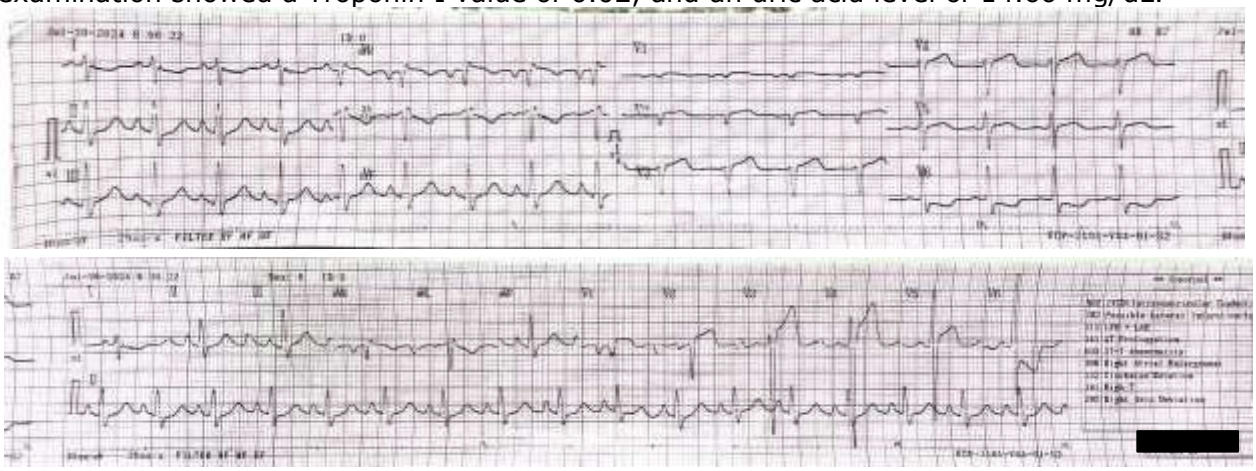

Figure 1. ECG examination showed ST segment elevation in lead V3-V4, LVH, LAE, and RAE

Chest X-ray revealed a lateral downward apex of the heart showing the enlargement of left ventricle (LV) and left main bronchus elevation which is the sign of enlargement of left atrium (LA) (Figure 2). Non-contrast head CT-scan examination showed hypodense lesion in the right occipital region suspected of ischemic stroke (Figure 3). Echocardiogram result showed LA and LV dilatation, eccentric LVH, regional wall motion abnormality (RWMA), decreased LV systolic function ejection fraction (EF) 22%, diastolic disfunction, decreased RV systolic function, and mild mitral regurgitation.

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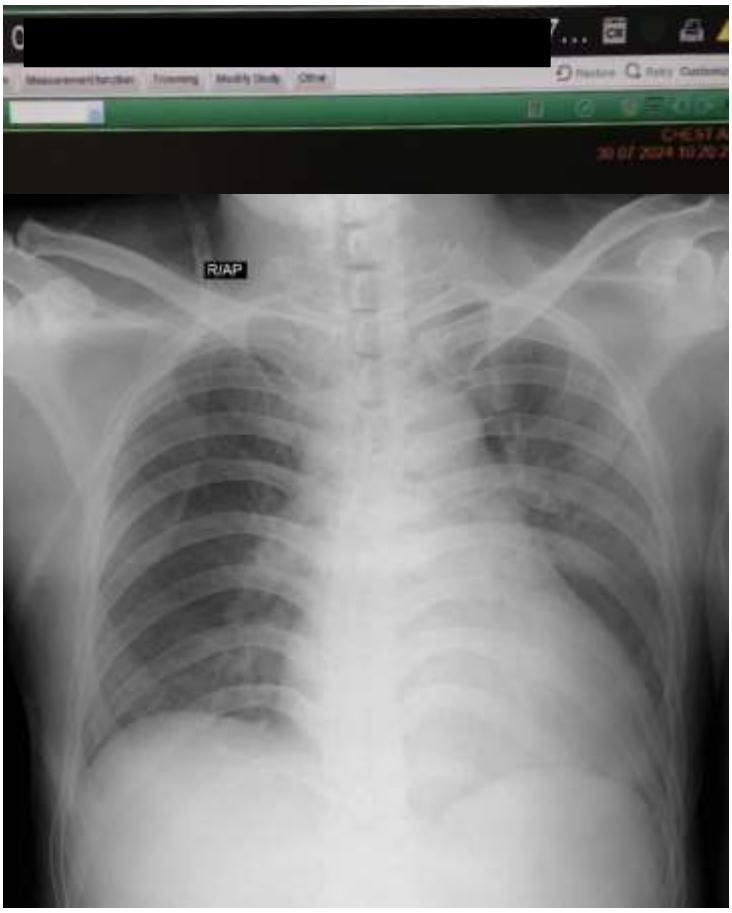

Figure 2. Chest X-Ray showed enlargement of LA and LV

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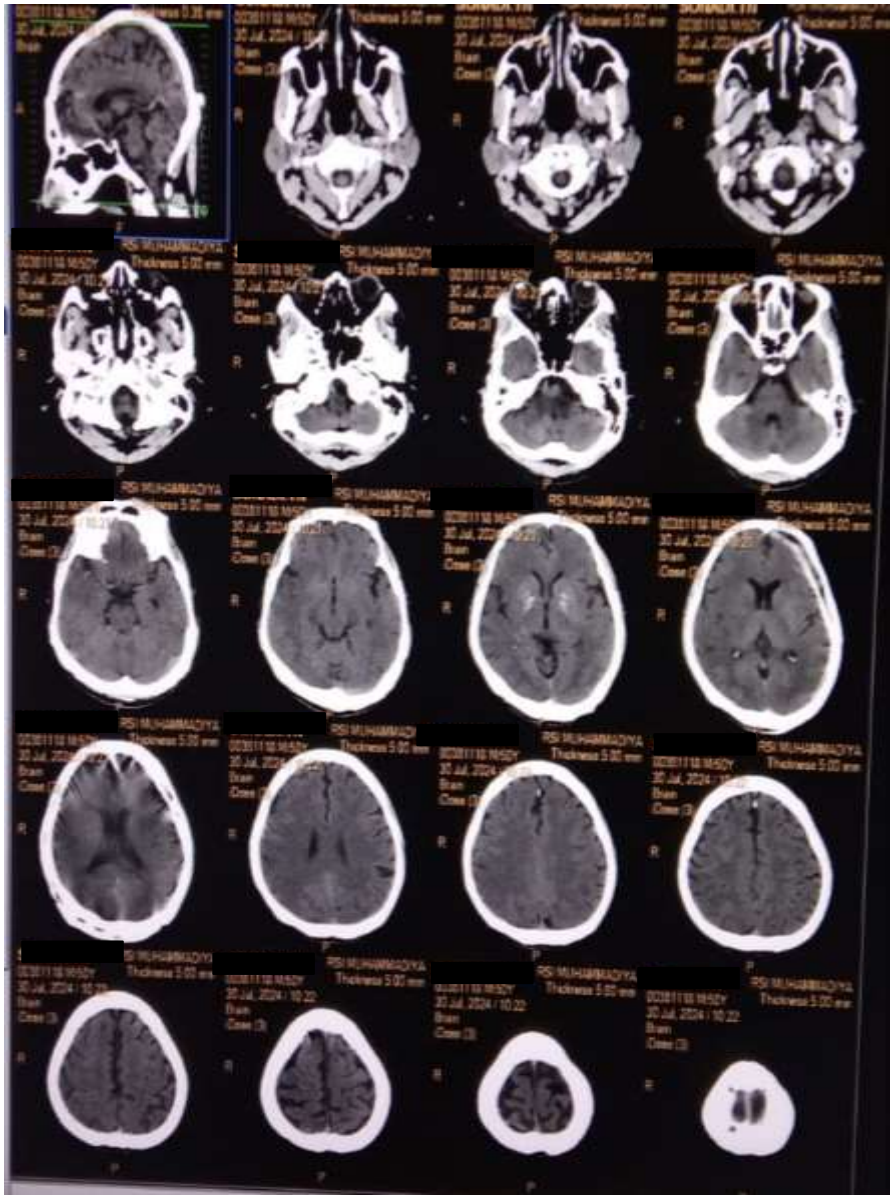

Figure 3. Head non-contrast CT-Scan showed infarct in right occipital region.

We diagnosed the patient with cardiogenic shock secondary to anterior ST-segment elevation (STEMI) and acute ischemic stroke based on the information previously provided. We administered Aspirin 160 mg, Clopidogrel 300 mg, Atorvastatin 20 mg, Ranitidine IV injection 50 mg, Piracetam IV injection 1 g, Citicoline IV injection 500 mg, and subcutaneous injection Fondaparinux 2.5 mg. Then, we admitted the patient to the ICU. On the second day, we added 300mg of Allopurinol.

The patient had a seven-day hospital stay before being discharged after adequate mobilization and symptom alleviation. The patient takes home medication such as Aspirin 80 mg once daily (OD), Clopidogrel 75 mg OD, Ramipril 2.5 mg OD, Isosorbide Dinitrate 5 mg three times daily, Atorvastatin 20 mg OD, Allopurinol 300 mg OD, Spironolactone 25 mg OD, Citicoline 500 mg two times daily, Piracetam 1200 mg three times daily, and Mecobalamin 1 g two times daily.

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Discussion

A 50-year-old man presented with chest pain typical of angina as well as left hemiparesis. The patient used to have hypertension and an active smoker. Laboratory examination showed a Troponin I value of 0.02, and an uric acid level of 14.66 mg/dL. The patient's electrocardiogram showed ST segment elevation in leads V3 and V4. A non-contrast head CT scan showed hypodense lesion suspected of ischemic stroke. Echocardiogram result showed regional wall motion abnormality (RWMA) and decreased LV systolic function ejection fraction (EF) 22%. Patient was diagnosed with cardiogenic shock secondary to acute STEMI anterior and acute ischemic stroke.

Simultaneous occurrence of acute ischemic stroke and acute myocardial infarction, known as cardio-cerebral infarction (CCI) (Omar et al., 2010), is an uncommon but critical clinical condition that requires immediate recognition and intervention. The underlying pathophysiology often involves shared risk factors and mechanisms, such as atherosclerosis, atrial fibrillation, or embolic phenomena. In this case, it is plausible that an embolus originating from the heart or large vessels contributed to both cerebral and coronary arterial occlusions.

According to de Castillo et al (2021), hypertension, smoking and diabetes are three risk factors that have the most influence on CCI. In this patient, two risk factors for CCI were found, which are a history of hypertension and an active smoke (de Castillo et al., 2021). Another study shows an increased risk of CCI in individuals who are a smoker, obese, and old (Gregson et al., 2019). Hypertension is widely recognized as a major contributor to the development of ST-elevation myocardial infarction (STEMI). Persistently elevated blood pressure can compromise vascular integrity and cardiac function, promoting the formation of atherosclerotic plaques. These plaques may progressively narrow coronary arteries, reducing myocardial perfusion and predisposing the heart to infarction (Poznyak et al., 2022). Similarly, tobacco use is a well-established risk factor for STEMI. Research indicates that smokers are more likely to experience inferior wall infarctions than non-smokers (Toluey et al., 2019). Furthermore, smoking has been associated with a significantly increased risk—up to 3.71 times higher—of myocardial infarction (Elkhader, Abdulla, and Ali Omer, 2016). In the case presented, the patient's active smoking status likely contributed to his cardiovascular condition, consistent with established associations between smoking and heart disease (Roy et al., 2017).

According to the 2018 guidelines issued by the American Heart Association and American Stroke Association (AHA/ASA), administering intravenous (IV) alteplase at the dosage appropriate for ischemic stroke is considered a reasonable initial approach for patients presenting with both acute ischemic stroke and STEMI, followed by primary percutaneous coronary intervention (PCI) if indicated (Hasan et al., 2018). Among the most effective interventions for acute ischemic stroke is the administration of recombinant tissue plasminogen activator (TPA), delivered intravenously. The two commonly used formulations of TPA are alteplase and tenecteplase (Powers et al., 2018). Unfortunately, in our facility, neither of these agents was available at the time of the patient's presentation.

Primary percutaneous coronary intervention (PCI) remains the standard of care for managing ST-elevation myocardial infarction (STEMI) (Ibanez et al., 2018). Several studies have reported that the incidence of stroke following PCI is relatively low, ranging between 0.18% and 0.44% (Varmdal et al., 2017). Research conducted in Qatar indicated no significant increase in stroke risk among patients who underwent coronary angiography (CAG), with or without PCI, compared to those who did not receive these procedures (Shehadeh et al., 2024). Similarly, an investigation by Zeus and colleagues evaluated the safety of performing PCI in individuals with coexisting acute coronary syndrome and ischemic stroke, finding no meaningful difference in stroke occurrence between the PCI and non-PCI groups (Zeus et al., 2016). Collectively, these findings support the continued use of PCI as a

safe and effective intervention for patients experiencing STEMI, even when complicated by concurrent ischemic stroke.

Managing simultaneous CCI was challenging (Obaid *et al,* 2019). The challenge of treating CCI highlights the need for quick decisive action while still carefully considering the risks and benefits of each intervention (Lasica et al., 2022). The complexity of balancing the treatment protocols for STEMI and AIS, combined with the urgency due to cardiogenic shock made it even more challenging. However, for some reason in this case PCI was not performed due to patient did not agree to undergo PCI.

Due to limitation, anticoagulants were chosen and showed clinical improvements. Managing CCI case using fondaparinux, a selective factor Xa inhibitor, has shown promise due to its favourable safety profile and reduced bleeding risks compared to traditional anticoagulants like unfractionated heparin (UFH) (Luca et al., 2021). Practitioners need to be aware of the treatment plans that allow for quick mechanical reperfusion to the brain and myocardium and the possibility of myocardial rupture or cardiac tamponade with intravenous thrombolytic therapy (Ibekwe et al., 2022).

In acute STEMI, fondaparinux (2.5 mg OD) also reportedly decreases mortality rate and reinfarction for those not undergoing primary PCI (Bauersachs, 2023). Given that fondaparinux decreased the risk of death or reinfarction without worsening severe bleeding, it might serve as a new benchmark anticoagulant medication in this situation. In STEMI patients not receiving reperfusion therapy, fondaparinux 2.5 mg subcutaneously once daily was reported to lower mortality and cardiac re-infarction (Khan et al., 2022). Fondaparinux was administered in patient for three days, and showed clinical improvements. This is in line with the research of Rigual *et al* (2024) that according to multivariate analysis, the group of patients with AIS who were given continued anticoagulants had better functional outcomes when they went home (Rigual *et al,* 2024).

Conclusion

In summary, the goal for treat CCI is to achieve more efficacy therapy while minimising the risk of bleeding. Despite the limitations, patient was only given DAPT, statin, and anticoagulant, patient outcome was remain good

Ethical Considerations

The study has received approval from the ethical committee.

Conflict Of Interest

All authors declare that they have no conflicts of interest.

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