Case Report

Simultaneous acute cardio-cerebral infarction associated with isolated left ventricle non-compaction cardiomyopathy

Ishak Ahmed Abdi a,*, Mesut Karataş a, Ahmed Elmi Abdi a, Mohamed Sheikh Hassan b, Mohamed Farah Yusuf Mohamud c

a Department of Cardiology, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia
b Department of Neurology, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia
c Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

ARTICLE INFO

Keywords: Acute ischemic stroke Acute myocardial infarction Simultaneous acute cardio-cerebral infarction Non-compaction cardiomyopathy

ABSTRACT

Introduction and importance: The co-occurrence of acute ischemic stroke and acute myocardial ischemia; cardio-cerebral infarction (CCI) has been linked to increased morbidity and mortality. The incidence of these conditions to occur simultaneously has been reported to be less than 1% according to the published data. Left Ventricular Non-Compaction (LVNC), on the other hand, is characterized by large left ventricular (LV) trabeculae, a thin compacted layer, and deep intertrabecular recesses. In the inter-trabecular recesses, where blood flow is slow, cardiac mural thrombi may form, which can lead to systemic embolization.

Case presentation: In this report, we describe a 51-year-old male patient with a history of hypertension and diabetes who developed a non-ST segment elevated myocardial infarction and an acute ischemic stroke that were thought to be related to left ventricular hypertrocalulation.

Clinical discussion: Although it is rare, the simultaneous occurrence of myocardial infarction and an acute ischemic stroke can be fatal. There are numerous potential mechanisms for CCI, including cardiac thrombo-embolism, hypoperfusion during AMI. Both conditions have a narrow therapeutic window and management is very crucial.

Conclusion: To the best of the author’s knowledge, this is the first reported case of cardiocerebral infraction (CCI) in the setting of non-compaction left ventricle. Early and precise diagnosis is critical to the successful management of these conditions.

1. Introduction

Acute ischemic stroke (AIS) and acute myocardial ischemia (AMI) are the leading reasons of morbidity and mortality worldwide. The occurrence of AIS and AMI within 48 hours, known as Cardio-Cerebral Infarction (CCI), is relatively rare and has been linked to increased morbidity and mortality [1]. The incidence of myocardial infarction among patients with transient ischemic attack or ischemic stroke during treatment in the stroke unit was reported to be 1% in the Austrian stroke unit registry [2]. Considering the expanding global burden of cardiovascular disease (CVD), there are growing worries about the economic burden of the CVD. The World Heart Federation estimates that the worldwide cost of CVD in 2010 was roughly US$863 billion, and that cost would likely surpass US$1 trillion by 2030. The cost of IHD is close to 1% to 1.5% of the gross domestic product (GDP) in nations like the United States, with expenditures per episode of IHD exceeding $5000 [3, 4]. Notably, the median total cost of IHD care in low and middle-income countries (LMIC) represented 10% of the overall healthcare spending for each individual nation [5].

Left ventricular non-compaction (LVNC) is an uncommon cardiomyopathy marked by large trabeculae and deep intertrabecular recesses communicating with the left ventricular cavity, as well as a thin and compacted epicardial layer [6]. LVNC has an incidence of 0.05% in adults and men are more commonly affected than women [6].

We present a very unique case who presented with acute ischemic stroke and acute myocardial infarction at the same time very likely due to LVNC cardiomyopathy that was discovered during workup.

* Corresponding author. Department of Cardiology, Mogadishu Somali-Turkish Training and Research Hospital, Second Street, Black Sea, Hodan district, Mogadishu, Somalia.
E-mail address: isakabdi70@gmail.com (I.A. Abdi).

https://doi.org/10.1016/j.amsu.2022.104172
Received 25 May 2022; Received in revised form 7 July 2022; Accepted 10 July 2022
Available online 16 July 2022
2049-0801/© 2022 The Authors. Published by Elsevier Ltd on behalf of LJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
2. Case presentation

51 years old right-handed male with positive history of hypertension and Diabetes who was diagnosed as non-ST elevation MI (NSTEMI) before 2 days in another facility was transferred to our hospital with sudden onset right hemiplegia and aphasia. He was smoker and no family history of ischemic cardiac disease. He was on metformin 500mg BID and ramipril 5mg once. At presentation the patient was a febrile, blood pressure (BP) was 165/92 mmHg with no discernible difference between the right and left arms, heart rate (108 bpm), respiratory rate (RR) 20 breaths per minute, oxygen saturation was 95% on room air and blood glucose of 277 mg/dl. On neurological examination he was confused, global aphasic, no facial asymmetry, Glasgow Coma Scale score was 11 (E4V3M4), Motor strength was 5/5 on the left side and 3/5 in the right arm and leg and normal cranial nerve assessment. His National Institutes of Health Stroke Scale score (NIHSS) was 20, no audible cardiac murmur and no signs of heart failure. Other physical examination was unremarkable.

Labs revealed troponin of 9.346ng/mL (0.02–0.06ng/mL) and EKG showed ST depression and T wave inversions in lateral leads. (Fig. 1), no abnormalities on chest ro-enterogram. He was admitted to the hospital with an ongoing ischemic cardiac disease and recent complaints of significant right-side weakness. An ischemia infracts evolving the left middle cerebral artery territory was identified on a computed tomography, and brain magnetic resonance imaging later suited it (Fig. 3).

Echocardiogram revealed EF of 40%, apical akesia and basal anteroseptal hypokinesia, mild dilated left chambers, numerous prominent left ventricle trabeculations with deep crypts. Color- Doppler blood flow displayed flow within the intertrabecular zones. No thrombus and patent foramen ovale Fig. 2. The patient was diagnosed as isolated Non compaction left ventricle and classified as mid reduced ejection fraction heart failure with cardiogenic emboli.

The patient was transferred to the intensive care unit (ICU) immediately and thereafter multidisciplinary discussion about how to balance the risk of bleeding with the preservation of brain and cardiac tissue happened, subsequently the patient was loaded with dual antiplatelet therapy; aspirin and clopidogrel, 6000 unit of heparin subcutaneously and statin plus a dose of alteplase 0.5mg/kg. The following days, the patient was followed in the ICU with the regression of the neurologic symptoms and no further complication occurred.

The occlusions of the left middle cerebral artery and coronary arteries were thought to have happened almost at the same time with cardio-emboli due to left ventricle hyper trabeculations as most likely cause. Due to hemodynamic stability of the patient, low GRACE score 81 points, Killip class 1, downtrend of troponin and no dynamic ST segment changes he wasn’t offered to angiography.

During his hospital stay he became stable with residual right-hand weakness otherwise the patient was fine. He was discharged on the seventh hospital day with dual antiplatelet, beta-blocker, sacubitril/valsartan, dapagliflozin, high-intensity statin and warfarin with international ratio 2–3 life long for secondary stroke prevention. No new insults were recorded throughout the follow-up period, which included five visits to the cardiology and neurology outpatient clinics. He only presented with persistent right-hand weakness, but other than that, everything was well. His treatment plan an indefinite course of anti-coagulation was include. The case has been reported in line with the SCARE criteria [7].

3. Discussion

The incidence of acute ischemic stroke and myocardial infarction at the same time is uncommon, but it can be fatal. It’s difficult to manage because both disorders necessitate prompt diagnosis and treatmen. The term “cardio-cerebral infarction (CCI)” was coined in 2010 by Omar et al. and it describes the simultaneous occurrence of acute ischemic stroke and acute myocardial infarction [2]. There are several potential mechanisms of CCI, these include thrombo-embolism from the heart, hypoperfusion during AMI, the aforementioned hypoperfusion in the setting of critical coronary and intracranial atherosclerotic disease, arrhythmias triggered by insular infarcts and paradoxical emboli among

Fig. 1. EKG revealed ST depressions and T wave inversions in multiple leads suggesting the NSTEMI.
others, with rarer causes being aortic dissection involving the ascending aorta, coronary ostia and carotid arteries [8].

Echocardiographic or CMR findings of segmental LV myocardial thickening consisting of two layers: a thin, compacted epicardium and a thickened endocardium with significant trabeculations and deep recesses are considered expert opinions in the diagnosis of left ventricular non-compaction (LVNC). The ratio of non-compressed to compacted myocardium, which is frequently more than 2:1, is an objective parameter [9].

While some patients with left ventricular non-compaction have no symptoms of left ventricular dysfunction, others experience severe systolic and diastolic heart failure, arrhythmias, and thromboembolic events [9]. Our case report aims to present, to the best of the author’s knowledge, the first ever occurrence of simultaneous CCI in a patient with ventricular non-compaction.

When hyperacute simultaneous cardio-cerebral infarction occurs, the American Heart Association/American Stroke Association (AHA/ASA) recommends starting intravenous tissue plasminogen activator (tPA) alteplase at a dose appropriate for cerebral ischemia, followed by percutaneous coronary angioplasty, and this approach is considered reasonable. Both diseases have a high death rate and a short treatment window. Delaying treatment for one over the other could cause irreparable damage [2].

When given early after the onset of symptoms, IV tPA has been proven to be more effective than placebo in treating myocardial infarction.) Despite the fact that some recommendations suggest that an AMI during the past three months is a relative contraindication for IV tPA treatment in acute stroke, IV tPA remains the first-line therapy for patients with AIS and AM [8]. In our patient he was received alteplase a dose 0.5mg/kg as he was in therapeutic window of ischemic stroke.

Some experts advise routine anticoagulation in all patients with LVNC for primary thrombo-embolic prevention, whereas others advise anticoagulation in individuals with additional risk factors such as systolic dysfunction (EF 40%), atrial fibrillation, or visible intracardiac thrombus [9].

Our case report highlights that early and precise diagnosis is critical to the successful management of disorders, sonographers and clinicians generate suspicion non-compaction cardiomyopathy in the event of a single or concordance of these disease.

Ethics approval

Based on the regulations of the review board of the Mogadishu Somali Turkish Training and Research Hospital, institutional review board approval is not required for case reports.

Funding resources

We declared that we have not received any financial support.

Author Contributions

All authors performed substantial contributions to the case sections. Took part in drafting the case or revising it critically for important

Fig. 2. (A&B): Panel A. 2D TTE apical 4 chamber showing hypertrabeculated left ventricle with deep intertrabecular recesses. Panel B. 2D TTE showing possible tiny cardiac thrombi lodging during systole (yellow arrow).

Fig. 3. (A&B): ADC and diffusion weighted sequences in the axial plane showing with Diffusion restriction in the parasagittal area of the left ACA territory.
intellectual content and gave final approval of the version to be published.

**Trial registry number**

1) Name of the registry: **Not Applicable**
2) Unique Identifying number or registration ID: **Not Applicable**
3) Hyperlink to your specific registration (must be publicly accessible and will be checked): **Not Applicable**.

**Consent for publication**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Guarantor**

Ishak Ahmed Abdi

**Provenance and peer review**

Not commissioned, externally peer-reviewed.

**Highlights** (For Review).

**Declaration of competing interest**

The authors declare that there is no competing interest related to the study, authors, other individuals, or organizations.

**References**

1. E. Ibekwe, H.A. Kamdar, T. Strohm, Cardio - Cerebral Infarction in Left MCA Strokes: a Case Series and Literature Review. Neurol Sci, 2022, https://doi.org/10.1007/s10072-021-05628-x, 2413–22.
2. R. Eskandarani, S. Sahli, S. Sawan, A. Alsaeed, Simultaneous Cardio-Cerebral Infarction in the Coronavirus Disease Pandemic Era, 2021;4(January).
3. S. Barquera, A. Pedroza-Tobias, C. Medina, L. Hernández-Barrera, K. Bibbins-Domingo, R. Lozano, A.E. Moran, Global overview of the epidemiology of atherosclerotic cardiovascular disease, Arch. Med. Res. 46 (5) (2015 Jul 1) 328–338.
4. Institute for Health Metrics and Evaluation (IHME), GBD Compare, 2017. http://vizhub.healthdata.org/gbd-compare. (Accessed 1 December 2019).
5. Gheorghe A, Griffiths U, Murphy A, Legido-Quigley H, Lamptey P, Perel P. The Economic Burden of Cardiovascular Disease and Hypertension in Low-And Middle-Income Countries: a Systematic.
6. L. Nobel, F. Massari, R.A. Carandang, A.J. Connell, Left ventricular noncompaction cardiomyopathy as a potential cause of bilateral posterior cerebral artery stroke, a Rare and Unique Clinical Occurrence (2021) 1–6.
7. R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.
8. N.H. Group, C. Sia, Simultaneous Cardiocerebral Infarctions: a Five-Year Retrospective Case Series Reviewing Natural History, 2021;(April).
9. A. Martinez, M. Omar, F. Kandah, J. Ruiz, A. Niazi, Left Ventricular Non-compaction Presenting as Cardio-Embolic Stroke, 2020;(October).