Medical Research Archives

European Society of Medicine

OPEN ACCESS

Published: December 31, 2023

Citation: Amaratunga DT, Kosick T, et al., 2023. An Uncommon Association Between Hydroxycut® Supplement and Atypical Takotsubo Cardiomyopathy: A Case Report, Medical Research Archives, [online] 11(12). https://doi.org/10.18103/mra.v11i12.4883

DOI
https://doi.org/10.18103/mra.v11i12.4883

ISSN: 2375-1924

CASE REPORT

An Uncommon Association Between Hydroxycut® Supplement and Atypical Takotsubo Cardiomyopathy: A Case Report

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ABSTRACT

Hydroxycut®, an herbal supplement used for weight loss, is known to be associated with multiple side effects with cardiac dysrhythmias being amongst the rarer events. In this case, we report a 69-year-old female presenting after her first dose of Hydroxycut Max® supplement resulting in an atypical variant of Takotsubo cardiomyopathy. She presented with symptoms concerning acute coronary syndrome and rapid hemodynamic compromise. Her coronary angiogram showed no obstructive coronary artery disease. The left ventriculogram and transesophageal echocardiogram were suggestive of mid ventricular Takotsubo cardiomyopathy.

We further discuss, with the aid of current literature, how caffeine and robusta coffee bean extract, two ingredients in Hydroxycut® products can lead to increased sympathetic tone of the myocardium and decreased myocardial perfusion potentially triggering her cardiomyopathy. This will be the first reported case of Hydroxycut® induced Takotsubo cardiomyopathy in literature.

Introduction

Weight loss has become a keynote topic with the increased focus on health and wellness. While there are numerous methods of weight reduction, it is important to carefully assess the safety profile of these interventions. Hydroxycut® is an herbal supplement used for weight loss. There are multiple products available in the marketplace, each with varying herbal constituents and some shared ingredients[1]. *Coffea canephora robusta* in green coffee and caffeine anhydrous are two key ingredients found in all Hydroxycut® products. Additionally, yohimbe bark extract, apple cider vinegar, glucomannan, folic acid, biotin, ferrous gluconate, avocado oil, various fruit extracts, and probiotics are found in different preparations of Hydroxycut® products. The Food and Drug Administration (FDA) issued a warning in 2009 on Hydroxycut® regarding its ephedra-containing side effects. Since then, new ephedra-free formulations have been introduced to the market[2,3]. While acute liver toxicity is the most commonly reported side effect of this supplement[1-7], seizure activity[8], rhabdomyolysis[9,10], ulcerative colitis[11], and hypertensive retinopathy[12] have also been reported. Cardiac complications have rarely been reported, of which almost all are dysrhythmias[13-16]. Caffeine in weight loss supplements is a known trigger for cardiac side effects. We report a case of atypical Takotsubo cardiomyopathy (TCM) induced after consumption of Hydroxycut Max® supplementation. After an extensive search of the medical literature, we believe this is the first reported case of Hydroxycut® induced Takotsubo cardiomyopathy thus far.

Case presentation

A 69-year-old female with hypertension, left bundle branch block (LBBB), and type 2 diabetes mellitus presented with acute onset chest pressure, shortness of breath, diaphoresis, and vomiting. The symptoms started one hour after taking her first dose of Hydroxycut Max®; an over-the-counter weight loss supplement. She arrived approximately six hours thereafter. Initial electrocardiogram (ECG) showed a LBBB without ST segment changes. She was placed on 2 liters oxygen via nasal cannula and 324 mg of aspirin was given. Pain resolved with analgesics. During the acute course, the patient developed recurrence of chest pain. She also developed hypotension with a blood pressure of 84/58 mmHg and cold extremities. Repeat ECG showed LBBB with ST segment elevations in lead aVF. Her troponin was elevated at 1.73 ng/mL. She underwent emergency coronary angiogram and intra-aortic balloon pump (IABP) placement for presumed ST segment elevated myocardial infarction (STEMI) and cardiogenic shock.

The coronary angiogram revealed patent coronary arteries. The left ventriculogram demonstrated hypokinesis of the mid ventricular walls and hyperkinesis of the basal and apical segments suggestive of mid ventricular Takotsubo cardiomyopathy (Figure 1). The transthoracic echocardiogram additionally showed an ejection fraction of 25% and confirmed severe diffuse hypokinesis of the mid ventricular walls, and hyperkinesis in the basal inferolateral apical segments (Figure 2). Additional laboratory studies showed an NT-proB-type Natriuretic Peptide (NT-proBNP) of 629 pg/mL and lactic acid of 4.7 mmol/L.

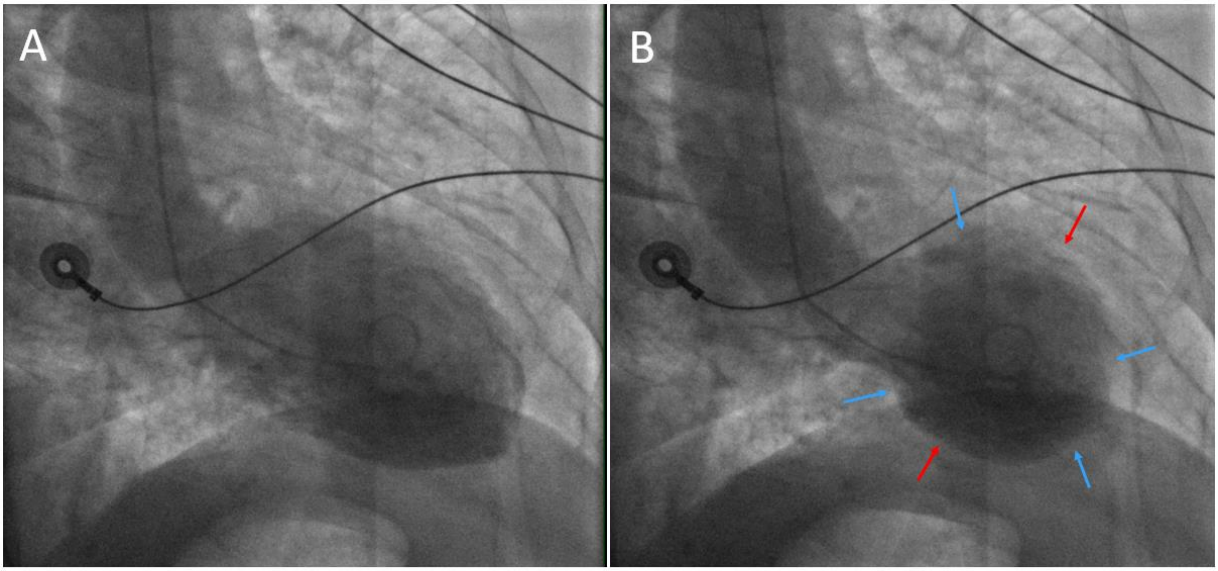

Figure 1: Left ventriculogram demonstrating left ventricular diastole (A) and systole (B). The mid ventricular wall segments are hypokinetic (red arrows). The basal and apical segments are hyperkinetic (blue arrows).

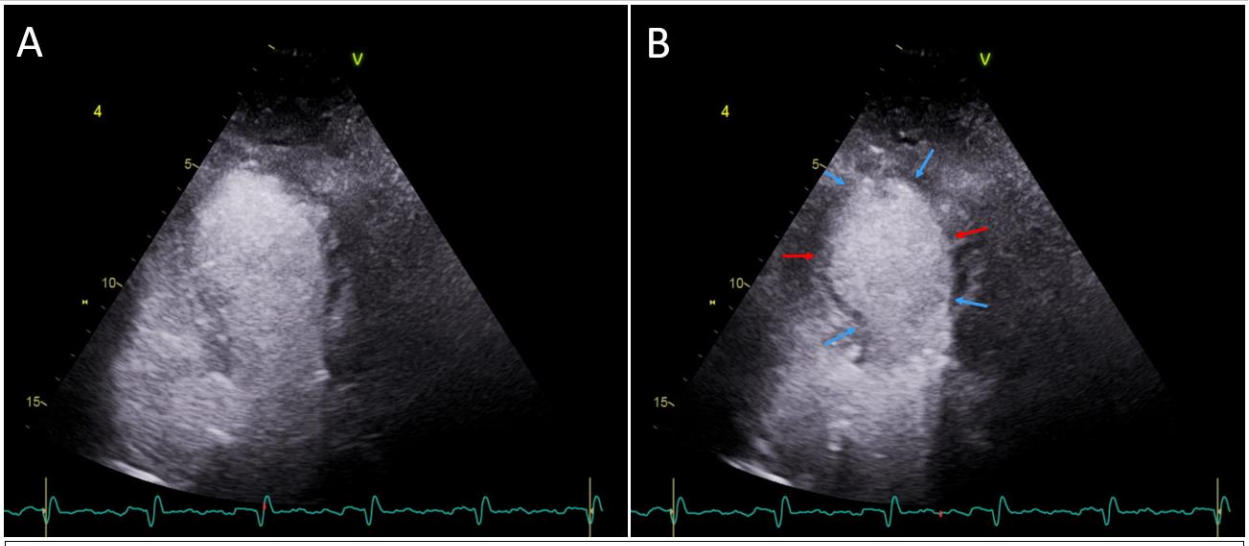

Figure 2: Four chamber view of the transthoracic echocardiogram demonstrating left ventricular diastole (A) and systole (B). The mid ventricular wall segments are hypokinetic (red arrows). The basal and apical segments are hyperkinetic (blue arrows).

The patients' hemodynamics improved and IABP was removed successfully the following day. The treatment regimen was focused on medical optimization of her cardiomyopathy. Lisinopril and metoprolol succinate were initiated as guideline directed medical therapy. She was discharged on day 5 with an external cardioverter defibrillator. She was strongly advised to discontinue Hydroxycut Max®. Tachyarrhythmia as a cause of cardiomyopathy was ruled out in the outpatient setting. Repeat echocardiogram 2 months later showed a normal left ventricular systolic function with an ejection fraction of 60% and no regional wall motion abnormalities.

Discussion

Our patient developed stress induced cardiomyopathy, also known as Takotsubo cardiomyopathy, after taking the first dose of Hydroxycut Max®. Mid-ventricular TCM is an atypical variant of TCM where hypokinetic wall motion is confined to the mid left ventricular wall with hyperkinesis of basal and apical wall segments. Mid-ventricular TCM is a rare occurrence with approximately 14.6% of all types of TCMs in literature[17].

Takotsubo cardiomyopathy is commonly triggered by physical or emotional stress. Refeeding syndrome[18], eating disorders and severe malnutrition[19,20], malignancy[21], and intracranial hemorrhage[22,23] are some of the few reported associated conditions. A systematic literature review by Gervais, et al. reports 10 cases of reverse takotsubo cardiomyopathy caused by pheochromocytoma[24]. Medications that are known to cause reverse TCM are amphetamines, epinephrine, and dobutamine[25,26].

While uncommon, Hydroxycut® supplements have been noted to cause cardiac side effects. A 37-year-old healthy male with recurrent sinus node arrests induced by Hydroxycut Hardcore®[13] and paroxysmal atrial fibrillation in a 63-year-old female due to two weeks of Hydroxycut® therapy[16] have been described. Inayat, et al. report a patient who developed ventricular fibrillation and cardiac arrest following Hydroxycut® and Metaboost® consumption[14]. Hydroxycut® gummies induced ventricular tachycardia in a young female is another documented incident[15]. Currently, Hydroxycut® induced atypical TCM has not been reported in literature.

Pathogenesis of TCM is currently not well understood, however, catecholamine mediated myocardial stunning, coronary artery spasm, coronary microvascular impairment, and estrogen deficiency are some of the proposed mechanisms[17,22,25,27,28]. Caffeine and robusta coffee bean extract are two common shared ingredients in all Hydroxycut® products including in Hydroxycut Max® for women[1]. Hydroxycut® further contains additional ingredients other than those that appear on its label[13].

Caffeine is a substance known to cause cardiac manifestations. A case of reverse TCM in a 24-year-old male following consumption of an energy drink containing caffeine and 1,3-dimethylamylamine has been previously documented[29]. Dai, et al. report another case of atypical TCM following consumption of a weight loss supplement containing caffeine and

amphetamine-like stimulants[30]. In the previously reported case of Hydroxycut® induced paroxysmal atrial fibrillation, the authors state that caffeine and Epigallocatechin (EGCG) are the likely causative components[16]. Caffeine is known to increase the sympathetic tone of the myocardium, which is a potential trigger for TCM[30]. It is shown to cause a rise in intracellular calcium in myocytes, in addition to its antagonist effect on adenosine receptors A1 and A2A in the myocardium, hence the avoidance prior to myocardial perfusion imaging[29,31,32]. A prospective analysis of 105 patients undergoing adenosine perfusion cardiac MRI, comparing those who consumed caffeine vs those who did not, supports that caffeine intake could decrease myocardial blood flow at rest and during exercise[31]. Reversible vasoconstriction has further been noted in the brain in a patient taking Hydroxycut® with citalopram combination[33].

Takotsubo cardiomyopathy has an excellent prognosis if diagnosed and managed in a timely manner with avoidance of re-exposure to triggering factors. Similar to other forms of TCM, the majority of patients with mid-ventricular TCM will have normalized left ventricular function within days to two months [17]. Our patient's two month follow up echocardiogram showed complete recovery of left ventricular function.

Conclusion

Atypical TCM is a rare occurrence among patients presenting with typical chest pain. Its association with weight loss supplementation such as Hydroxycut® has not been previously reported. The catecholaminergic surge and decreased myocardial perfusion induced by the caffeine component in this supplement could be a potential trigger. Given the wide use of weight loss supplements, it is important to understand a possible association of these with TCM.

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