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Special article

Rhabdomyolysis due to nutritional supplements intake: Case report

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ABSTRACT

Rhabdomyolysis is a condition characterized by the destruction of muscle cells and subsequent release of it's intracellular contents. It is typically asymptomatic, with moderate creatine kinase elevation. Severe cases can involve disseminated intravascular coagulation, liver failure, or acute kidney injury, with a mortality rate of up to 50 %. Nutritional supplements containing compounds such as synephrine, caffeine, and clenbuterol have been reported to precipitate rhabdomyolysis. This case describes a 26-year-old male who, after consuming a full jar of fat burners, developed severe abdominal pain, choluria, myalgias, and muscle weakness. He was diagnosed with rhabdomyolysis and acute renal failure, requiring intensive care unit admission. The unregulated use of nutritional supplements may be an underestimated risk factor for rhabdomyolysis, especially given the fact that many cases are underdiagnosed.

Introduction

Rhabdomyolysis is a condition characterized by the destruction of muscle cells and subsequent release of intracellular contents into the bloodstream. These include proteins such as myoglobin, and enzymes such as creatine kinase (CK), lactate dehydrogenase (LDH), aspartate aminotransferase (AST), and alanine aminotransferase (ALT), as well as electrolytes like sodium, potassium, and calcium.[1,2]

The clinical presentation tends to be asymptomatic, with moderate elevation of CK. In mild to moderate cases, symptoms include myalgias, muscle weakness, and choluria. These symptoms are referred to as the classic triad of rhabdomyolysis; however, all three components are present simultaneously in fewer than 10 % of patients.[1,2] Other reported symptoms include abdominal pain, nausea, fever, and palpitations.[1]

Despite this, severe cases can pose true medical emergencies, with complications such as disseminated intravascular coagulation, arrhythmias, liver failure, and acute kidney injury (AKI) .[1,3] AKI is the most common complication, occurring in up to 50 % of patients,[2,4] with mortality rates ranging from 15 to 50 % in severe cases.[1-3]

Drug-induced rhabdomyolysis is the leading cause of non-traumatic rhabdomyolysis.[5] Among implicated drugs, statins are the most common, followed by benzodiazepines, opioids and antipsychotics.[2] Notably, antipsychotics are responsible for up to 10 % of cases.[2,5] Additionally, high doses of nutritional supplements containing compounds such as caffeine, clenbuterol, synephrine and other sympathomimetics have been reported to facilitate or even trigger rhabdomyolysis.[4,5] These components are usually found in thermogenic supplements, commercialized as fat burners. Both antipsychotics and thermogenic supplements can induce a hyperadrenergic response, leading to ATP depletion, membrane dysfunction and finally myocyte destruction.[3-5]

Despite a few reports linking rhabdomyolysis to supplement consumption, there are no documented cases involving extreme overdoses of thermogenic agents. This case highlights the severe clinical consequences of such an overdose, providing a unique example of how excessive supplement intake can result in rhabdomyolysis.

Case presentation

We present the case of a 26-year-old male with a history of morbid obesity, substance abuse (ceased one year prior), and schizophrenia, with irregular adherence to olanzapine therapy. After ingesting all the capsules from a bottle of thermogenic supplements (approximately 60 capsules of Lipo 6 Hardcore), he developed diarrhea, vomiting, and intense, non-radiating, oppressive abdominal pain. Over the next hours, he experienced dark, foamy urine, generalized myalgias, muscle weakness, and a sensation of impending death.

Twelve hours after symptom onset, he presented to the emergency

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department at Hospital de Puerto Montt. Upon admission, he appeared in poor general condition, with a heart rate of 150 bpm and a blood pressure of 100/45 mmHg. Physical examination revealed epigastric tenderness and choluria, with no signs of jaundice or other notable findings. The patient was alert, lucid, and without sensory perception abnormalities. He reported no olanzapine use or engagement in physical activity within the past 48 h.

Initially, acute pancreatitis with dehydration secondary to vomiting and diarrhea was considered. However, given the history of myalgias and muscle weakness, clinical suspicion shifted towards drug-induced rhabdomyolysis. Laboratory tests revealed amylase 41 U/L, CK 7746 U/L, C-reactive protein (CRP) 2.73 mg/dL, creatinine 1.33 mg/dL, blood urea nitrogen (BUN) 68.1 mg/dL, and leukocytosis of 30,600/mm^3 with neutrophilic predominance. A contrast-enhanced abdominal computed tomography (CT) scan showed no significant findings.

The patient was admitted to the intensive care unit (ICU) with a diagnosis of rhabdomyolysis and acute renal failure. On ICU admission, CK levels had increased to 9915 U/L, creatinine to 3.49 mg/dL, and BUN to 83.4 mg/dL. His treatment included aggressive intravenous hydration, analgesia, antiemetics, and proton pump inhibitors.

After 24 h, the patient showed significant clinical improvement, with CK levels reduced to 3289 U/L and creatinine to 0.99 mg/dL, accompanied by decreasing CRP. He was then transferred to the internal medicine department, where intravenous fluids were gradually tapered and creatinine and electrolyte levels were monitored daily. A psychiatric evaluation ruled out suicidal intent.

By the fifth day of hospitalization, CK levels had decreased to 3593 U/L, and creatinine to 0.84 mg/dL. With no remaining symptoms and stable laboratory values, he was considered clinically recovered. He was discharged the following day, on the sixth day of hospitalization.

Discussion

Although rhabdomyolysis has been associated with drug use, only a limited number of cases have been linked to nutritional supplements.[4,6-9] Particularly, sympathomimetic amines can exacerbate this by increasing adrenergic activity and therefore muscle activity and energy expenditure. The primary mechanisms include direct myocyte injury, which leads to membrane disruption, and a deficit in ATP supply to the cells, resulting in an excessive influx of calcium and protease activation. Both processes culminate in cellular injury and allow the release of enzymes and electrolytes, contributing to systemic complications.[9,10] Some studies suggest that nutritional supplements may also pose a greater risk of inducing rhabdomyolysis due to interactions with the cytochrome P450, similar to the mechanism seen with statins.[7,8,11]

These compounds are not limited to fat burners but are also found in various alternative medicine products. In the USA, Chile and Latin America, such supplements are sold as nutritional products, bypassing the regulatory standards applied to pharmaceuticals.[9,10,12] One in five adults in the USA reports using herbal supplements, and 58 % do not disclose their usage to their primary care doctor, leading to an underestimation of the true incidence of rhabdomyolysis and other adverse reactions.[9,10]

In this particular case, the ingested supplement contained, per 100 g, 26.437 mg of caffeine, 22.989 mg of yerba mate extract, 14.368 mg of green tea extract, 2.299 mg of choline bitartrate, 11.494 mg of potassium iodide, and 11.494 mg of chromium picolinate, among other excipients. We suggest that the hyperadrenergic and sympathomimetic effect is mainly given from caffeine, as it is also found in green tea and yerba mate. Usual doses for nutritional supplements are one pill a day, containing no more than 40 mg of caffeine, and the maximum daily dose recommended by the U.S. Food & Drug Administration is about 400 mg of caffeine.[13] The patient, however, ingested approximately 1.8 g of caffeine, far beyond the recommended limit. This type of pathological behavior, whether involving a medication or a nutritional supplement, significantly increases the risk of developing severe adverse reactions. Olanzapine might have also played a role, as it is known to induce metabolic and muscular side effects that can increase the risk of rhabdomyolysis,[5] even at normal doses and with a delayed onset.[14,15] There are some reported cases in which the initiation of a supplement led to rhabdomyolysis,[4] but to our knowledge, this is the first case of an extreme overdose of nutritional supplements leading to rhabdomyolysis.

The unregulated use of nutritional supplements may be an underestimated risk factor for rhabdomyolysis, especially considering that a significant proportion of rhabdomyolysis cases may go undetected.[1] This case highlights the importance of proper regulation and awareness of the risks associated with nutritional supplements, particularly regarding improper use and overdosing. It is essential that both healthcare professionals and patients are informed of the potential risks these products pose in triggering serious complications. Early and aggressive hydration remains a key treatment strategy for rhabdomyolysis, regardless of the cause, to minimize renal complications and improve patient outcomes.

Ethical considerations

This case report was conducted in accordance with hospital protocols, ensuring patient privacy and confidentiality. The patient provided informed consent.

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Conflicts of interest

Nothing to declare.

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