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CASE REPORT

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Hypothyroidism Induced Rhabdomyolysis in a Young Male after a Single Intramuscular Injection: A Case Report

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ABSTRACT

Hypothyroidism is a common endocrine disorder resulting from the inability of the thyroid gland to produce sufficient thyroid hormone for the metabolic demands of the body. Clinical symptoms and signs are often non-specific and subtle. Muscular symptoms are frequently reported.

Rhabdomyolysis is a life-threatening condition caused by necrosis of muscles and leakage of toxic intracellular components into the blood circulation. Hypothyroidism induced rhabdomyolysis, represents an unusual clinical occurrence. This is a case of a middle-aged man, who presented with severe myalgias, following an intramuscular injection. After laboratory work-up, he was diagnosed with rhabdomyolysis. Laboratory and ultrasound tests disclosed primary hypothyroidism of auto-immune etiology.

Keywords: hypothyroidism, thyroiditis, auto-immune, rhabdomyolysis.

INTRODUCTION

Hypothyroidism represents a common pathological condition resulting from the deficiency of thyroid hormones (1). The disorder is characterized by a broad and non-specific spectrum of clinical symptoms (1). Myalgias, or muscle tenderness, are common complaints among patients with hypothyroidism (1). Other clinical symptoms of myxedema include cold intolerance, mental slowness, dry skin, hoarse voice, and constipation (2).

Rhabdomyolysis is a complex clinical entity characterized by a 10-fold elevation in serum CK levels (3). It is defined as necrosis of the muscle tissue and release of the intracellular components into the circulation. These components include electrolytes, purines, enzymes (such as creatine kinase), and myoglobin (3). Common causes include trauma, alcohol, drugs (methadone), medications (statins), infections, and strenuous exercise (3).

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Rhabdomyolysis secondary to hypothyroidism is unusual. Furthermore, intramuscular injections cause significant elevations of serum CK levels (4). Certain medications have been reported, such as haloperidol, papaverine, paraldehyde; hydralazine, promethazine, and methotrexate (4).

We report a case of rhabdomyolysis in a young male after receiving hydroxocobalamin by intramuscular injection. Diagnostic work up disclosed primary hypothyroidism. ❑

CASE REPORT

A 45-year-old male presented to his primary care physician due to excessive fatigue and myalgias for one month before admission. His past medical history was unremarkable, except for B12 deficiency for which he was prescribed intramuscular injections of hydroxocobalamin 1 mg every four weeks. He had received a single intramuscular injection four weeks before admission.

He denied smoking, alcohol, and drug abuse. His vital signs on admission were as follows: body temperature 36.8°C; blood pressure 130/75 mm Hg; pulse 76 *per* minute; oxygen saturation 98% on ambient air. The patient's history was negative for dry skin, thinning of hair, diplopia, temperature intolerance and constipation.

Physical examination showed diffuse mild muscle tenderness with normal motor strength in the upper and lower extremities. A non-pitting edema was present in the lower extremities. Electrocardiography showed sinus rhythm with no abnormal findings.

Initial laboratory investigations included complete blood count, renal and liver function tests, thyroid function tests, urine analysis, metabolic profile, and electrolytes. Patient's laboratory results are shown in Table 1.

He presented an elevated serum creatinine kinase (CK) of 4760 U/L (reference range 0-190 U/L), his urine was dark red in appearance and positive for myoglobin. Thyroid function tests showed ab-

TABLE 1. Laboratory values on admission

	Reference values	Day 1	Day 2	Day 3	Day 4	Day 5
Aspartate aminotransferase	0-38 U/L	17 U/L				
Alanine aminotransferase	4-36 U/L	16 U/L				
Creatine kinase	0-190 U/L	4760 U/L	2670 U/L	1180 U/L	650 U/L	240 U/L
Glucose	60-115 mg/dL	115 mg/dL				
Creatinine	0.7-1.2 mg/dL	0.9 mg/dL				
Chloride	97-107 mmol/L	104 mmol/L				
Sodium	138-146 mmol/L	140 mmol/L				
Potassium	3.4-5 mmol/L	4.8 mmol/L				
Calcium	8.4-10.2 mmol/L	9.4 mmol/L				
Hb	11.5-15.5 g/dL	13.7 g/dL				
Hct	35-47%	41.4%				
WBC	4-11 K/µL	5.6 K/µL				
Platelet	150-450K/µL	289 K/µL				
TSH	0.35-4.67 µIU/mL	95 µIU/mL				
TChol	130-200 mg/dL	235 mg/dL				
Anti-thyroglobulin antibodies	0-115 IU/mL	1655 IU/mL				
Anti-thyroid peroxidase antibodies	0-34 IU/mL	450 IU/mL				

HCT: hematocrit; WBC: white blood cell; Hb: hemoglobin

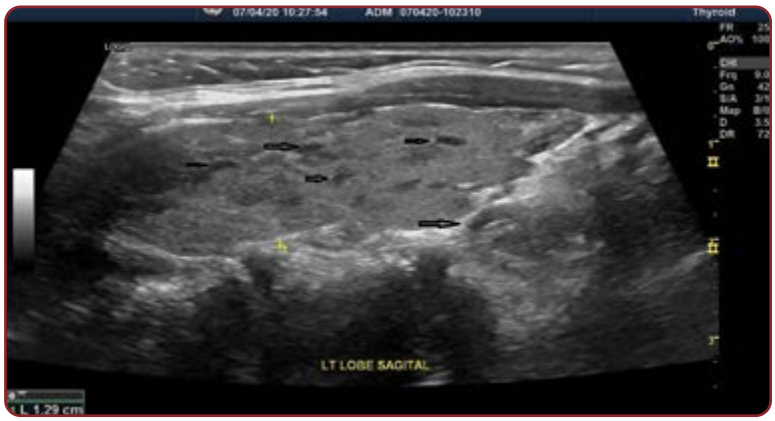

FIGURE 1. Sagittal ultrasound view of the left thyroid lobe, showing hypoechoic micro-nodules (arrows) with surrounding echogenic septations

normal elevation of thyroid stimulating hormone and anti-thyroid antibodies (Table 1). Total cholesterol and triglycerides levels were also elevated; 235 mg/dL (reference range 130-200 mg/dL) and 260 mg/dL (reference range 0-150 mg/dL), respectively. Vitamin B12 level was 511 ng/L (range 187-883 ng/L).

The patient was diagnosed with rhabdomyolysis and hypothyroidism of autoimmune etiology and was referred to a secondary care center for hospitalization and management. Following hospital admission, intravenous administration of fluids and oral levothyroxine at 150 mcg/daily was initiated. Findings revealed by thyroid ultrasound examination were compatible with chronic autoimmune thyroiditis Hashimoto (Figure 1). Daily monitoring of CK levels and renal function were performed. After five days, the patient reported improvement of muscular weakness. His CK levels had a remarkable decrease during his hospital stay (Table 1). He was informed about the future risk of intramuscular injection for triggering acute rhabdomyolysis and was discharged home in good clinical condition. Measurement of TSH and FT4 was suggested every 4-6 weeks. ❑

DISCUSSION

This is an unusual case of undiagnosed hypothyroidism manifested with rhabdomyolysis. The diagnosis was based on muscular symptoms and elevation in serum CK level. After excluding other etiologies, a diagnosis of clinical hypothyroidism was suggested. Abnormal thyroid function tests and ultrasound findings confirmed the diagnosis. It was also remarkable that the patient had no concomitant predisposing factors that could trigger a muscular breakdown. The only contributing factor to the raised serum CK levels was the intramuscular injection administrated four weeks before admission.

Hypothyroidism is characterized by a broad spectrum of clinical symptoms (1). Complaints from skeletal muscles are frequently reported in patients with hypothyroidism (1). Hypothyroidism has been rarely reported as a triggering factor for myolysis (5-7). In the majority of cases, rhabdomyolysis is precipitated by intense exercise or traumatic injury (7). Other causes include electrolyte abnormalities secondary to diuretic misuse (primarily hypokalemia and hyponatremia) or secondary to endocrine diseases such as diabetes (8), primary hyperaldosteronism (9), primary adrenal insufficiency (10), central diabetes insipidus (11), postpartum hypernatremia (12), and pituitary dysfunction (13). The prognosis of rhabdomyolysis depends on its complications (3).

Although skeletal muscle biopsy was not considered, it has been reported to assist diagnosis in ambiguous cases (14). A methodological analysis of the muscle biopsies on a case by case basis and collaboration between clinician and pathologist is required. Patho-physiological mechanisms implicated in the etiology of hypothyroidism induced myopathy include changes of glycol-genolytic and oxidative metabolism, altered expression of contractile proteins, and neuro-mediated damage (15).

It is also remarkable that our patient had a past positive history of B12 deficiency. There is a well-known association between pernicious anemia and autoimmune thyroiditis (16). For this reason, a systematic clinical and laboratory investigation for autoimmune disorders (vitiligo, adrenal insufficiency) is suggested in patients with pernicious anemia (16).

Prompt recognition of non-traumatic rhabdomyolysis represents a clinical challenge (17). Timely diagnosis is crucial for the appropriate management (3). In the acute phase, treatment aims to preserve the renal function through aggressive fluid resuscitation with isotonic saline at the rate of 100 to 200 mL/h (3, 6). Metabolic abnormalities such as hyperkalemia, hyperphosphatemia, hypocalcemia, hyperuricemia should be corrected (3). Close monitoring of CK levels and urine output is essential to monitor the therapeutic response and adjust fluid administration (3, 6).

Fluid repletion should be continued until CK levels fall below 5000 U/L (6).

Rhabdomyolysis is a rare but potentially severe clinical manifestation of hypothyroidism. Physicians should be aware of the hypothyroidism induced rhabdomyolysis and include the condition in the differential diagnosis of patients with non-specific muscular symptoms and a history of intramuscular injection. They have to maintain a high index of clinical suspicion and screen patients with raised muscle enzymes for hypothyroidism. Furthermore, they have to carefully examine patients with pernicious anemia for a diagnosis of autoimmune thyroiditis. Early diagnosis and prompt treatment of hypothyroidism induced rhabdomyolysis are essential to prevent potentially fatal complications. ❑

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