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CARBON MONOXIDE POISONING-INDUCED MYOSITIS

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ABSTRACT

Introduction: Carbon monoxide (CO) poisoning is common and potentially life-threatening. While neurological and systemic complications are well recognized, muscle involvement, such as myositis, is rare.

Case presentation: We report a 38-year-old man with no prior medical history who suffered CO poisoning after inhaling motorcycle exhaust in a closed garage, presenting in coma. He received intensive care and hyperbaric oxygen therapy. One month later, he experienced persistent right thigh myalgia and quadriceps weakness. Laboratory tests were normal, but magnetic resonance imaging (MRI) revealed T2 and fat saturation hypersignal with gadolinium enhancement in the vastus lateralis over 9 cm, consistent with active myositis. Electromyography and X-ray were unremarkable. Other causes, including drug-induced myositis, inflammatory myopathies, and endocrine disorders, were excluded. Treatment with anti-inflammatory medications and rest alleviated pain, though mild weakness persisted. Follow-up MRI at 4 months showed regression of the lesions.

Discussion: CO-induced myositis results from tissue hypoxia via the high affinity of CO for myoglobin and inhibition of cytochrome oxidases, sometimes exacerbated by compression during coma. Diagnosis relies on clinical history, elevated muscle enzymes, and MRI, which provides a non-invasive alternative to biopsy.

Conclusion: Myositis is a rare complication of CO poisoning. Early recognition and hyperbaric oxygen therapy are essential, with MRI serving as a valuable diagnostic tool to guide management and monitor recovery.

KEYWORDS

Carbon monoxide poisoning, myositis, hyperbaric oxygen therapy

LEARNING POINTS

- Carbon monoxide (CO) poisoning can, in rare cases, cause myositis: Doctors should consider muscle involvement in patients presenting with persistent myalgia or weakness after CO exposure.
- Magnetic resonance imaging is a key diagnostic tool: It provides a non-invasive method to detect muscle damage, monitor progression, and may reduce the need for biopsy.
- Early recognition and hyperbaric oxygen therapy are crucial. Timely intervention may limit muscle damage and improve patient outcomes.

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INTRODUCTION

Carbon monoxide (CO) poisoning is common and potentially fatal. CO is a colourless, odourless gas produced by the incomplete combustion of carbonaceous materials. The main conditions of exposure include fires, defective heating systems, and poorly ventilated spaces. Clinically, CO poisoning manifests itself through a wide range of symptoms, from headaches, dizziness, and nausea to serious systemic complications such as neurological, cardiovascular, and metabolic disorders[1]. However, muscle damage secondary to CO poisoning, particularly myositis or rhabdomyolysis, remains rarely described in the literature[1].

We present a rare case of a young person with myositis induced by CO poisoning.

CASE DESCRIPTION

A 38-year-old man with no known medical history, who worked as a truck driver suffered CO poisoning after inhaling exhaust fumes from his motorcycle in his closed garage in January 2024. The patient was found in a coma. He was hospitalized in intensive care for 24 hours, underwent hyperbaric oxygen therapy, and was then transferred to the endocrinology department after being diagnosed with decompensated diabetes. He reported myalgia in his right thigh, which on examination was found to be swollen but without local signs of inflammation. Laboratory tests revealed biological myolysis with creatine phosphokinase at 14,170 IU/l (74.5 normal) and lactate dehydrogenase at 10,100 IU/l (36 normal). Renal function tests were normal. He was hydrated with intravenous saline solution. His condition improved, with muscle enzymes returning to normal and the swelling in his thigh disappearing, but the muscle pain persisted. He was therefore admitted to the rheumatology department 1 month after the CO poisoning.

The osteoarticular examination revealed a flexible spine with no pain, myalgia on palpation of the right thigh, and the neurological examination revealed muscle weakness in the right quadriceps at 4/5. The rest of the examination was normal. Blood tests showed normal muscle enzymes and no inflammatory syndrome. Thyroid tests were normal, and a dot myositis test was requested but came back negative.

An X-ray of the right thigh was performed with no abnormalities *(Fig. 1)*. Magnetic resonance imaging (MRI) of the thigh showed signal abnormalities in the vastus lateralis muscle of the quadriceps and the middle part of the right thigh in T1 isosignal *(Fig. 2)*, hypersignal T2 *(Fig. 3)* and hypersignal fat saturation *(Fig. 4)* with homogeneous enhancement after gadolinium injection *(Fig. 5)*, extending over 9 cm in height, concluding active myositis of the vastus lateralis muscle of the right quadriceps.

We noted the presence of subfacial oedema. Electromyography (EMG) of both lower limbs was performed with no abnormalities.

The diagnosis of this myositis was CO poisoning after ruling out other differential diagnoses, particularly drug-related causes such as statins, inflammatory myositis, and endocrine



Figure 1. X-ray: posteroanterior view of the right thigh, showing no abnormalities.

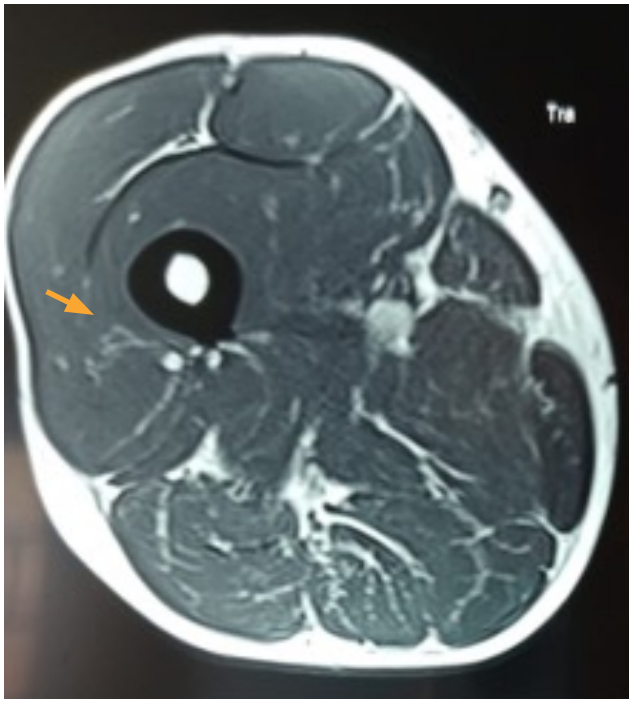


Figure 2. Magnetic resonance imaging: axial section of the right thigh in T1 sequence showing a T1 isosignal in the vastus lateralis muscle of the muscle of the quadriceps (arrow).

causes such as dysthyroidism or long-standing diabetes. Our patient showed no signs of long-standing diabetes: no vascular complications, in particular no diabetic retinopathy on ophthalmological examination, and no signs of diabetic neuropathy on EMG. In terms of treatment, he was prescribed anti-inflammatory medication and painkillers, along with rest. His condition improved in terms of pain, but muscle weakness persisted. A follow-up MRI was performed in April 2024, 4 months after CO poisoning, showing a clear regression of the lesions *(Fig. 6)*.

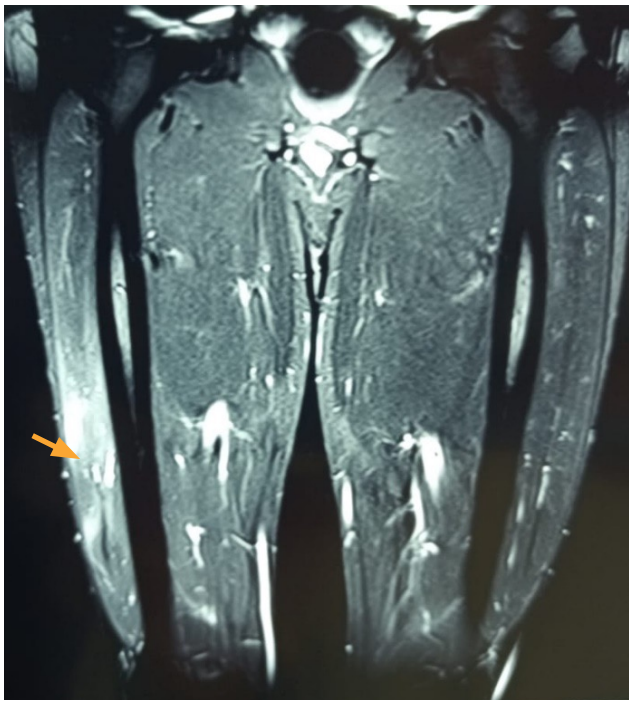


Figure 3. Magnetic resonance imaging: sagittal section of the right thigh in T2 sequence showing a T2 hypersignal in the vastus lateralis muscle of the quadriceps (arrow).

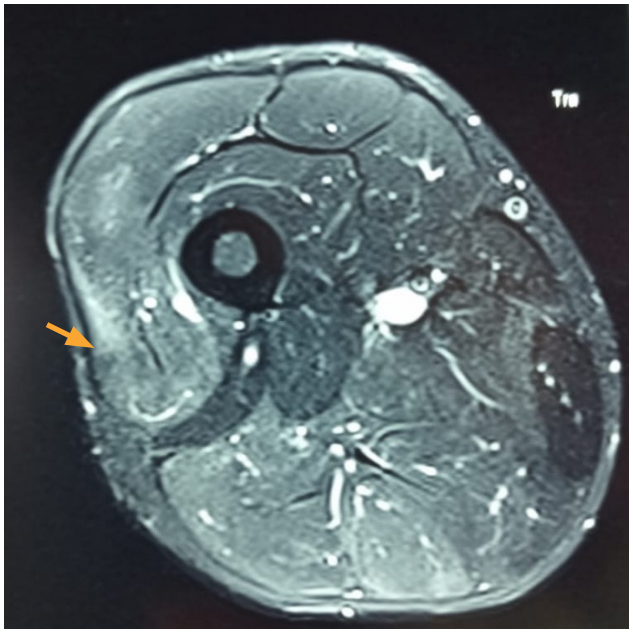


Figure 4. Magnetic resonance imaging: axial T2 fat saturation sequence showing hypersignal in the vastus lateralis muscle of the muscle of the quadriceps (arrow).

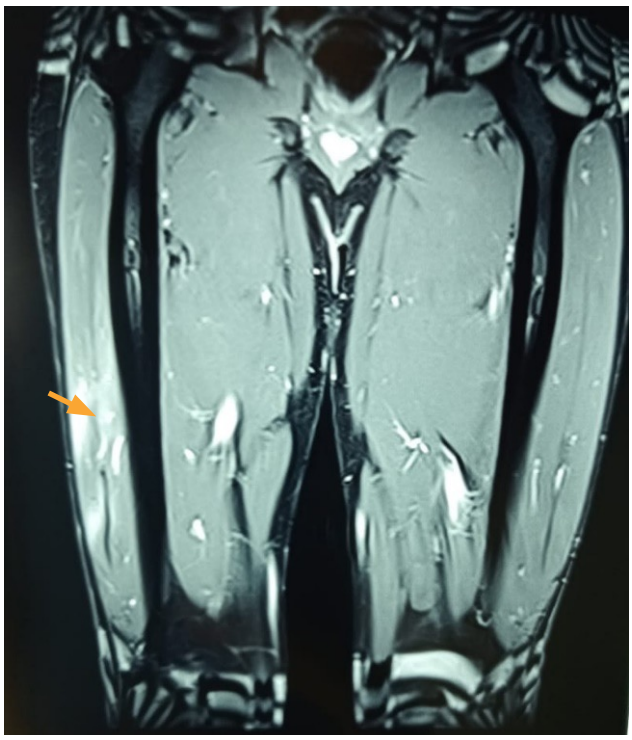


Figure 5. Magnetic resonance imaging: sagittal T1-weighted sequence showing enhancement after gadolinium injection in the vastus lateralis muscle of the quadriceps (arrow).

DISCUSSION

Myositis is a rare manifestation of CO poisoning that may result from muscle tissue hypoxia[2]. It can be explained on the one hand, by the inhibition of cytochrome oxidases by CO, enzymes that are essential for maintaining aerobic respiration in muscle cells, and, on the other hand, by the strong affinity of CO for myoglobin, which is greater than that of oxygen[3].

Two main mechanisms can explain this muscle damage. In cases of coma, prolonged compression of muscle masses by body weight can lead to local vascular occlusion, causing compartment syndrome and muscle ischemia. The second cause of muscle damage is directly related to the action of CO itself, which induces tissue hypoxia responsible for diffuse muscle damage[4]. This latter mechanism may explain the delayed onset of myositis through an inflammatory-mediated process[2].

In addition, myositis can also be caused by diabetes, particularly in patients with long-standing diabetes complicated by vascular problems[5], with renal failure also being a risk factor[5]. In our case, the diabetes was recently discovered and without vascular complications, making this aetiology less likely.

The diagnosis of myositis secondary to CO poisoning is based on medical history, laboratory tests showing elevated CPK and LDH levels, and imaging, which confirms muscle damage. A computed tomography scan may reveal muscle hypodensity. MRI shows muscle hypersignal in T2 and fat saturation sequences, often accompanied by subfascial oedema, reported in almost all cases, including ours. EMG, when performed, may show myogenic damage. Muscle



Figure 6. Magnetic resonance imaging: sagittal T2 sequence showing regression of the hypersignal in the vastus lateralis muscle of the quadriceps.

biopsy is generally not necessary, as it does not provide diagnostic specificity[3].

The functional prognosis is often guarded, with complete recovery of muscle function being rare. In our case, we noted persistent muscle weakness. Treatment is based primarily on oxygen therapy hyperbaric. Early intervention could limit the onset of myositis, although its preventive role has not yet been clearly established[3].

CONCLUSION

Myositis associated with CO poisoning is a rare condition. Knowledge of this entity is essential in order to initiate hyperbaric oxygen therapy early. The diagnosis is based on medical history, elevated muscle enzyme levels, and MRI to confirm myositis. Imaging is a non-invasive alternative to muscle biopsy.

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