


SHORT COMMUNICATION

Chronic severe methanol intoxication after repeated mask cleansing due to fear of COVID-19: A new risk of coronaphobia

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Abstract

Background: Disproportionate fear of contracting COVID-19 (coronaphobia) may result in inappropriate use of preventive measures that could, in turn, result in severe harm to the patient.

Objective: To describe a patient with subacute parkinsonism and cognitive dysfunction and magnetic resonance imaging (MRI) evidence of bilateral deep white matter and basal ganglia damage.

Case presentation: A 56-year-old female presented with a 4-week history of insomnia, cognitive decline, and parkinsonism. Brain MRI revealed a bilateral lesion of both globus pallidus, deep white matter, and cerebellar hemispheres. Her son reported that, for the previous month, she had been cleaning her facial mask three times a day with a pure methanol solution as a disinfectant due to an intense fear of acquiring COVID-19. Previously, she had used 97% isopropyl alcohol and had inadvertently switched to methanol. After the exposure ended, she slowly improved but 4 months later she remains severely disabled.

Conclusions: The repeated exposure to methanol vapor, the MRI findings, and the absence of other etiologies for her cognitive and parkinsonian features led to the diagnosis of chronic methanol intoxication with severe central nervous system damage. Misinformation is a likely contributory factor to such scenario. Efforts should be made by the scientific community to educate the general public on avoiding self-damaging behaviors as a result of coronaphobia.

KEYWORDS

coronaphobia, methanol, intoxication, COVID-19, Parkinsonism

INTRODUCTION

The COVID-19 pandemic is generating new medical challenges such as coronaphobia, a disproportionate fear of catching COVID-19 that may result in collateral damage including excessive exposure to sanitizing products [1,2]. The United States Food and Drug Administration

has recently published a list of hand sanitizers containing methanol that should be avoided (see www.fda.gov, 27 August 2020).

We present the case of a woman with rapid cognitive impairment, parkinsonism, and magnetic resonance imaging (MRI) evidence of bilateral deep white matter and basal ganglia damage as a result of chronic inhalation of methanol on a facial mask due to

inadvertent, repetitive mask cleansing with a methanol-containing product on account of coronaphobia.

CASE REPORT

A 56-year-old female with no relevant medical history was admitted to our department because of rapid cognitive decline.

Her son had noticed a 4-week history of progressive difficulties in her daily activities, decrease in speech, emotional indifference with loss of initiative, insomnia, blurred vision, and slowness. As a consequence, the patient had given up her job as a shop assistant. She had a sore throat and mild cough 3 months previously and developed a marked fear of contracting COVID-19.

Physical examination showed an alert patient with executive dysfunction, marked apathy, hypomimia, and hypophonia. Memory function, praxis examination, and naming were preserved, whereas verbal fluency was decreased. She had bilateral symmetrical bradykinesia with marked slowness and small amplitude of movement while finger tapping, together with severely impaired rapid alternating movements of the hands. She also presented abnormal trunk reflex with pronounced retropulsion and incapacity to walk because of severe gait freezing and blocking. Liquid dysphagia and solid dysphagia were detected also. No rigidity or tremor was observed. Cranial nerve, reflexes, sensory, and cerebellar examination were normal. There were no xanthomas or other skin lesions.

Brain MRI showed bilateral T2-hyperintensity of both globus pallidus and deep white matter, and cerebellar hemispheres (Figure 1). The optic nerves showed no diffusion restriction; however, visual evoked potentials showed a bilateral delayed response.

Due to this radiological pattern and the progressive symptoms, a toxic-metabolic etiology was suspected, although other least probable causes were considered such as neoplastic, degenerative, inflammatory, infectious, and vascular injuries.

Blood chemistry, hematological parameters, and pH were normal, as was an extensive work-up for paraneoplastic and autoimmune antibodies. Ethanol, methanol, and carboxyhemoglobin blood levels were undetectable. Vitamin B12 levels were normal (1124 pg/ml). Cerebrospinal fluid examination was normal. Nasopharyngeal reverse transcriptase-polymerase chain reaction (RT-PCR) for and antibodies to SARS-CoV-2 were repeatedly negative. Neck and chest computed tomography (CT) scans were normal. Bronchoscopy showed pharyngeal mucosal irritation. Electroencephalogram showed generalized intermittent slowing with normal baseline activity and no epileptic discharges.

During admission, she was pretreated with domperidone (20 mg) and received an oral dose of 500 mg levodopa without any improvement in her motor symptoms. After discharge she was treated with a transdermal dopaminergic agonist (rotigotine 4 mg daily) for 3 months, again without clinical benefit.

Her family reported a recent intense fear about COVID-19 that led her to the iterative use of 97% alcohol as a cleaning agent for her facial mask during the first peak of the pandemic. When the

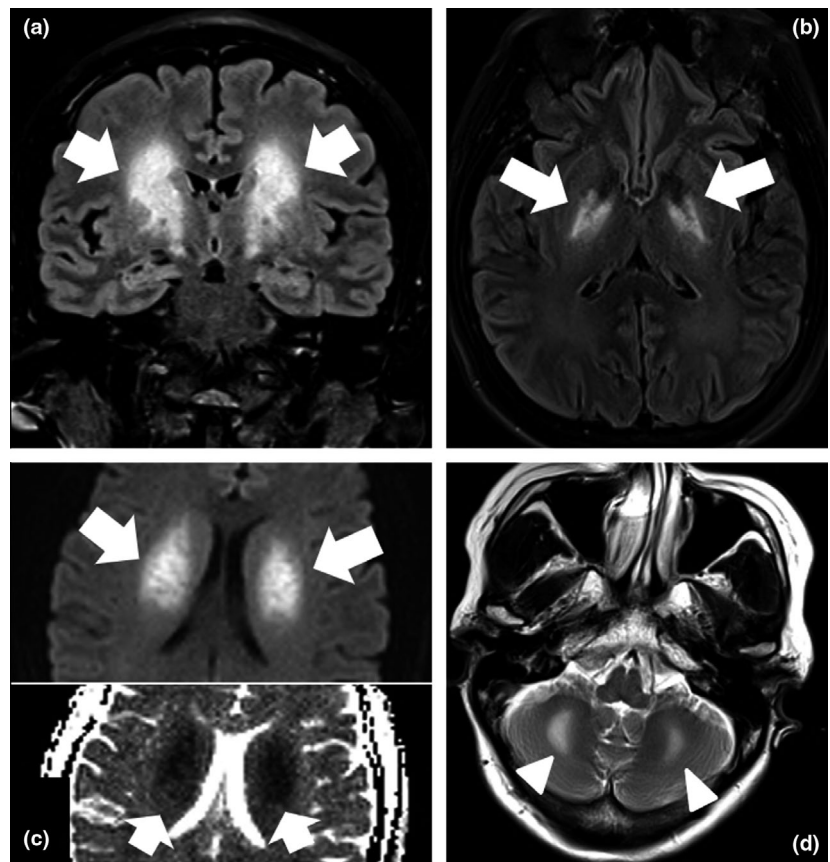


FIGURE 1 Brain magnetic resonance imaging (MRI) findings. Coronal FLAIR (a), axial FLAIR (b) and diffusion (c) and axial T2 (d) weighted sequences of brain MRI. T2-FLAIR hyperintensity, restricted diffusion and swelling of bilateral globus pallidus and deep white matter are present extending symmetrically along both semioval centra and anterior limbs of internal capsules (arrows), and also over both cerebellar hemispheres (arrowheads). Findings are consistent with a toxic-metabolic encephalopathy

product ran out, she mistakenly replaced it with another product containing 75% methanol (methylated spirit), which she applied on the inner surface of her facial mask three times a day and wore it for 10–12 hours daily. After 2 months of repeated exposure, the current symptoms commenced. She was diagnosed with severe toxic encephalopathy due to sustained methanol inhalation, establishing a strong link to coronaphobia.

At 4 months follow-up, there was a slight improvement of the symptoms, although the patient still needed continuous supervision due to cognitive impairment and parkinsonism, being unable to walk unassisted, and needing a nasogastric tube.

DISCUSSION

The clinical and radiological features of this patient are consistent with severe methanol intoxication after repeated exposure due to her iterative cleansing of her face mask with inappropriate products containing this toxin.

Although oral ingestion has been the most frequent route of intoxication, the prevalence of inhalation intoxication is likely underestimated [3]. The intoxication in our case was induced by an inadvertent behavior prompted by an extreme fear of contracting COVID-19.

In contrast to most common methanol intoxications that present with acute encephalopathy and metabolic acidosis, the patient only showed a delayed neurological syndrome with severe parkinsonism, an uncommon sequel [4,5]. This presentation is explained by the low dose of methanol that she inhaled daily. It was not until the cumulative dose was high enough that she developed neurological disturbances. Interestingly, her first symptom was refractory insomnia, perhaps reflecting the role of basal ganglia in sleep control [6]. Our case resembles that of a young physicist who developed a delayed neurotoxic effect after long-term exposure to methanol with no episodes of acute intoxication and without putaminal involvement on MRI [7]. A possible role of vitamin B12 deficiency in our patient was ruled out in the presence of normal serum values [8,9]. The reported cases of parkinsonism secondary to methanol intoxication have been summarized in a Table (see Table S1).

MRI findings in methanol intoxication show a predilection for bilateral putaminal involvement with hemorrhagic necrosis and confluent white matter injury, cerebellar and occipito-parietal lesions, and optic neuritis [10–13]. Bilateral globus pallidus lesions, as in our patient, have been described in a patient with COVID-19, but with no evidence of intoxication [14]. Despite the absence of prominent putaminal involvement, the sustained toxic exposure together with clinical–radiological findings and visual pathway lesions makes methanol intoxication the most likely diagnosis.

Although basal ganglia injury may induce an abnormal behavior with obsessive–compulsive traits [15,16] in this patient the opposite was more likely: her repeated cleansing action resulted in toxic basal ganglia damage.

The general population should be made aware of the common sources of methanol such as fuels, windshield washer fluids, gas line

antifreezers, carburetor cleaners, copy machine fluids, perfumes, paints, and some sanitizing products like hand sanitizers [1,2].

This case exemplifies how anamnesis remains a fundamental diagnostic tool in neurology and illustrates the risk of inadequate behaviors that are incorrectly aimed at preventing contagion. Physicians should be aware of this possible issue, and should educate patients about these potential toxic effects.

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CONFLICT OF INTERESTS

None declared.

AUTHOR CONTRIBUTION

Markel Erburu-Iriarte: Conceptualization (equal); Writing-original draft (equal). **Patricia Rodrigo-Armenteros:** Conceptualization (supporting); Investigation (supporting). **Iñigo Oyarzun-Irazu:** Conceptualization (supporting); Investigation (supporting). **Inés Aranzabal-Alustiza:** Conceptualization (equal); Methodology (supporting). **Saul Silvarrey-Rodríguez:** Conceptualization (supporting); Methodology (supporting). **Lander Antón Méndez:** Data curation (supporting); Investigation (supporting). **Juan Carlos García-Monco:** Conceptualization (lead); Writing-original draft (lead); Writing-review & editing (lead).

PATIENT CONSENT FOR PUBLICATION

Consent was signed by the patient's son due to the patient's inability to do so in her current situation.

DATA AVAILABILITY STATEMENT

Data are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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