

## Case Report

# Chemical Pneumonitis Secondary to Chlorine Dioxide Consumption in a Patient with Severe COVID 19

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## Abstract

In the context of the COVID 19 pandemic, chlorine dioxide treatment has been promoted as a treatment, however health authorities in several countries including Mexico have warned of serious adverse reactions that put the lives of people at risk they consume it. We report the case of a patient with COVID 19 infection who presents with respiratory failure secondary to oral and intravenous use of chlorine dioxide, requiring intubation, with multiple organ failure and ended with the death of the patient 5 days later.

**Keywords:** COVID 19; Chlorine dioxide; Poisoning; Pneumonitis

## Introduction

The FDA, The Pan American Health Organization (PAHO), Health Authorities of several countries joined efforts to prevent the use of products based on Chlorine Dioxide, Sodium Chlorite or their derivatives, as well as the presentation called "Miracle Mineral Solution (SMM, MMS or CDS)", which are marketed irresponsibly for the prevention and treatment of various diseases, including cancer and COVID-19, these products can be found for sale illegally on the internet and in some establishments of medical attention and whose main use is as an industrial disinfectant. On July 23 in Mexico, COFEPRIS launches a statement warning of adverse health effects after the use of this product. So far there have been no known cases in Mexico of adverse health effects after consumption and intravenous administration of chlorine dioxide.

Chlorine dioxide is a strong oxidizing agent that reduces to chlorite under oxidative stress. The strong oxidizing property makes it a very useful agent in water disinfection, textile bleaching, antimicrobial applications, reducing absorbable halogenated organic compound loads in effluent industries. Chlorine dioxide rapidly dissociates into chlorite and chloride, and to a lesser degree in chlorate [1,2].

Chlorine dioxide and sodium chlorite react rapidly in human tissues and, if ingested, can cause irritation of the mouth, esophagus and stomach, with a severe irritative digestive picture, with the presence of nausea, vomiting and diarrhea, in addition of serious hematological disorders (methemoglobinemia, hemolysis, etc.), cardiovascular and kidney. The decrease in blood pressure can lead to serious symptoms such as respiratory complications due to the modification of the

blood's ability to transport O<sub>2</sub>. Additionally, inhalation through nebulizers can cause pulmonary edema, bronchospasm, chemical pneumonitis and glottis edema, and even cause death if exposures are above the occupational exposure limit value. Long-term exposure can lead to chronic bronchitis and dental erosions.

Websites that sell chlorine dioxide products generally describe the product as a liquid that contains 28% sodium chlorite in distilled water. Product instructions instruct consumers to mix sodium chlorite solution with citric acid, such as lemon or lime juice, or another acid, such as hydrochloric acid, before drinking. In many cases, sodium chlorite is sold as part of a kit with a citric acid "activator". When the acid is added, the mixture turns into chlorine dioxide, a powerful bleaching agent that has caused serious and life-threatening side effects [3-9].

## Clinical Case

A 58-year-old female, hypertensive for 15 years, began a current condition approximately 14 days ago with general symptoms, asthenia, adynamia, non-productive cough, quantified thermal rises up to 39 degrees, for which she goes to a private physician who begins treatment for oseltamivir base + dexamethasone + azithromycin + ceftriaxone + enoxoparin + colchicine without referring specified time. RT PCR was performed for SARS COV2 on August 18, 2020, which was reported positive, as well as a private chest tomography with ground-glass image suggestive of atypical pneumonia with severe CORADS 5 disease (Figure 1), so continued treatment. On August 20, 2020, she presented dyspnea on exertion, which was exacerbating, for which she went to the emergency room of the General Hospital of Boca del Rio, Mexico where she received unspecified in-hospital treatment requesting voluntary discharge one day after hospitalization. Maintaining established treatment at home and oxygen saturation greater than 90% to be referred by relatives. On August 24, 2020, due to persistence of dyspnea and hypoxemia despite the use of supplemental oxygen at home, he decided to manage with complementary therapy of the type of carbon dioxide ingested orally and intravenously (it is unknown who administered the drug and under indication of which personnel of health) refers to oral intake of 1000 ml of chlorine dioxide solution plus intravenous administration of 500 ml of 0.9% saline solution with 28% sodium chlorite, presenting sudden respiratory deterioration, decreasing oxygen saturation up to

**Citation:** Andres Aguilar Silva. Chemical Pneumonitis Secondary to Chlorine Dioxide Consumption in a Patient with Severe COVID 19. Med Life Clin. 2020; 2(2): 1018.

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**Publisher Name:** Medtext Publications LLC

**Manuscript compiled:** Sep 30th, 2020

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60%. She was transferred to the emergency room where hypertensive uncontrolled was documented with TA 183/88, tachypnea with 38 bpm, tachycardia of 121 bpm, with SatO<sub>2</sub> of 60%, being intubated on the second attempt by means of direct video laryngoscopy initiating invasive mechanical ventilation after sedation, her SOFA of Admission was 13 points, APACHE II 26 points, NEWS 2 11 points, with blood gas reporting PH 7.28, PCO<sub>2</sub> 58, PO<sub>2</sub> 136, HCO<sub>3</sub> 24.4, FIO<sub>2</sub> 100. Within the physical examination, excoriations at the level of the lips, diffuse bilateral rales, with dullness to percussion, hippocratic fingers, the patient developed within the first hours fluid-refractory hypotension for which norepinephrine was started. anticoagulation, broad spectrum antibiotic, steroid with hydrocortisone 50 mg IV every 6 hours, as well as data of acute liver failure with elevation in total bilirubin, and transaminases and DHL, with marked leukocytosis, a chest tomography was performed after ingestion of carbon dioxide. chlorine reporting diffuse bilateral alveolar pattern (Figure 2) suspecting secondary aspiration pneumonitis, likewise airway injury generating pneumomediastinum, (Figures 3 and 4), there was an increase in fluid intake, however the patient presented acute kidney injury AKIN III, renal replacement therapy was requested, however due to the severity of the patient, was reported no candidate (Table 1). Death presented 5 days after the ingestion of chlorine dioxide.



Figure 2: Tomography of the chest after ingestion of chlorine dioxide with images with a bilateral diffuse alveolar pattern.

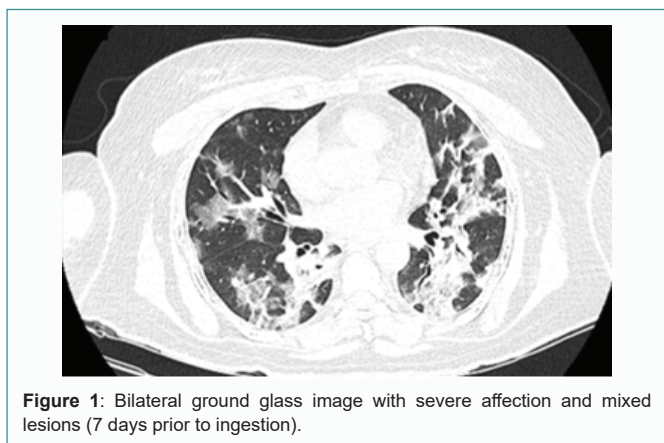


Figure 1: Bilateral ground glass image with severe affection and mixed lesions (7 days prior to ingestion).

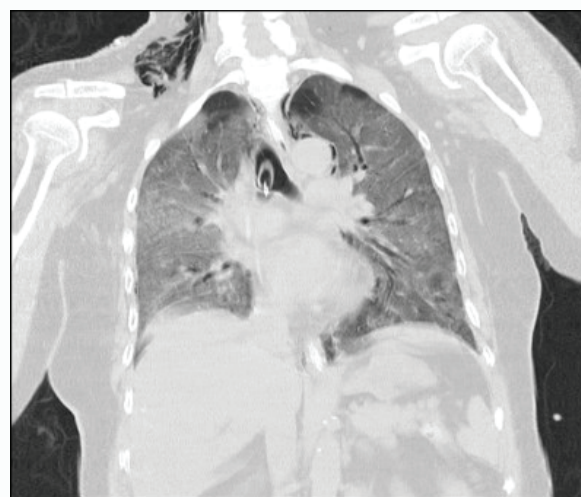


Figure 3: Chest tomography with the presence of air in the right supraclavicular area with increased density diffused throughout the lung parenchyma.

Table 1: Biochemical evolution of patient.

	Biochemical evolution of patient			
	(24.08.20)	(25.08.20)	(27.08.20)	(28.08.20)
Hb/leucocytes	15.8/17,990	13.6/ 20,100	12.7/18.78	12.1/27,480
Platelets	280,000	234,000	261,000	280,000
Glucose	215	149	105	215
Urea/ Creatinine	24.28/0.5	51.4/1.3	105/3.1	199/6.1
Na+ / K+	136/4.8	141/4.5	145/6.1	142/6.6
BT/BD	2.65/1.42	1.66/1.6	1.6/1.5	1.5/1.4
AST/ALT	131/122	112/102	80/74	58/47
DHL	1441	1064	942	827
D dimer	2023			5974
BNP	30.7	156		264
Arterial blood gas	pH 7.28	pH 7.06	pH 7.22	pH 7.22
	pCO <sub>2</sub> 58	pCO <sub>2</sub> 112	pCO <sub>2</sub> 58	pCO <sub>2</sub> 58
	pO <sub>2</sub> 136	pO <sub>2</sub> 88	pO <sub>2</sub> 31	pO <sub>2</sub> 31
	Hco <sub>3</sub> -24.4	Hco <sub>3</sub> -20.9	Hco <sub>3</sub> -23.7	Hco <sub>3</sub> -23.7
	BE 0.6	BE-4.7	BE-4.7	BE-4.7
	FiO <sub>2</sub> 99%	SO <sub>2</sub> 88%	RI 11.6	RI 11.6
		A-aDO <sub>2</sub> 271	PaO <sub>2</sub> /PAO <sub>2</sub> 391	PaO <sub>2</sub> /PAO <sub>2</sub> 391 mmHg
		PaFi 110	FiO <sub>2</sub> 65%.	FiO <sub>2</sub> 65%.
	FiO <sub>2</sub> 70			
SOFA	13 points (50% to 60% mortality)			
APACHE II	26 points (55% mortality)			



**Figure 4:** Chest tomography with the presence of air in the right supraclavicular area with increased density diffused throughout the lung parenchyma.

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