



# THE ROLE OF HFCWO IN POST COVID-19 DIAPHRAGMATIC PARALYSIS

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**INTRODUCTION:** COVID-19 is an infectious disease caused by the SARS-CoV-2 virus which predominately affects the respiratory system. However, it is considered a multi-system disease with neurological, digestive, and cardiovascular symptoms and complications. Unilateral paralysis of the diaphragm is emerging as a complication of COVID-19 in the acute and chronic stages. This case presents a patient, who was diagnosed with paralysis of the diaphragm as result of COVID-19 complications.

**CASE PRESENTATION:** An otherwise healthy 51-year-old female presented to outpatient clinic complaining of fatigue, shortness of breath, headaches, and dizziness where she was diagnosed with COVID-19 and prescribed antibiotics, steroids, and aspirin. Patient returned one week later complaining of ongoing shortness of breath. Her SpO<sub>2</sub> was 85% on room air and chest X-ray (CXR) showed mild bibasilar atelectasis with no signs of pneumonia. Patient was prescribed home oxygen at 2 LPM and was referred to a pulmonary clinic for further evaluation.

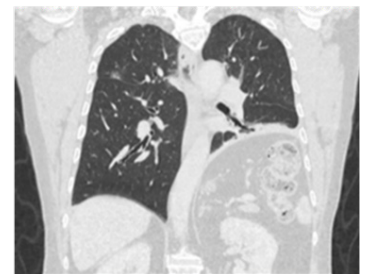
Patient was seen 3-weeks later at pulmonary clinic where follow up CXR showed elevated left hemidiaphragm. Spirometry showed restrictive lung disease and the patient was diagnosed with paralysis of the left diaphragm and post COVID-19 complications. She was prescribed LABA/ICS and SABA inhalers for shortness of breath/wheezing and continued on oxygen. For the next 6 months

the patient continued to complain of dyspnea, fatigue, dizziness, malaise, cough, weight gain and laryngitis and experienced 3 syncopal episodes with one hospital admission for pneumonia and hypoxia. Her maximal expiratory pressure (MEP) was 55 cmH<sub>2</sub>O, indicating respiratory muscle weakness. During this time, she had received multiple doses of oral steroids and antibiotics using continuous oxygen and bronchodilators with no resolution of her symptoms.

CXR 1 month post COVID-19



CT Scan 7 months post COVID-19



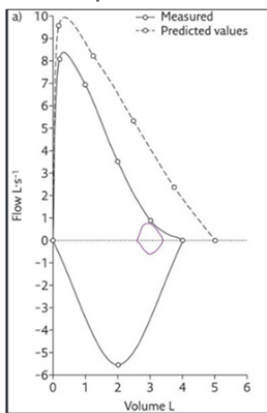
After 7 months, the patient presented to a new pulmonary clinic for evaluation of her ongoing medical problems. A chest CT and ultrasound of the diaphragm were performed which showed pneumonia and paralysis of the left diaphragm. She was prescribed oral antibiotics, a tapered dose of steroids, potassium, diuretics and HFCWO therapy using the SmartVest for airway clearance. Two weeks later the patient reported that her symptoms were improving. Thirty days later, she stated she was feeling much better, still had mild fatigue but no dyspnea with or without exertion.

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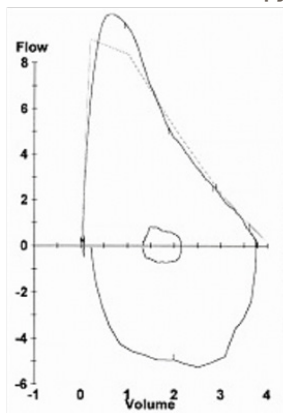
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Patient stated that HFCWO therapy caused “a lot of phlegm to come out,” and she noticed a huge difference in lung capacity when taking in a deep breath. She stated she was unable to take a deep breath in without coughing or feeling her airway was being restricted since first being diagnosed with COVID-19 over 8 months ago, until being prescribed HFCWO. At last follow-up, SpO<sub>2</sub> was 95% on RA, she had lost 20 lbs., and her lungs were clear to auscultation. She reported that headaches and dizziness had resolved. A follow-up CT showed no pneumonia and PFT results were within normal limits.

Spirometry 1 month post COVID-19



Spirometry 6 weeks post SmartVest therapy



**DISCUSSION:** Clinicians should be aware of diaphragmatic dysfunction as a possible complication of COVID-19 and possible underlying cause for persistent dyspnea. Utilizing HFCWO for airway clearance therapy has an important role when treating symptomatic patients with a weakened or paralyzed diaphragm which can help to minimize lung exacerbations requiring antibiotics.

**CONCLUSION:** This patient, who had ongoing dyspnea and COVID-19 complications for months, had complete resolution of her symptoms within 6-weeks after using SmartVest HFCWO therapy twice daily.

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