



Case Report

Pseudoparalytic shoulder in a CoViD-19-positive patient treated with CPAP: A case report

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ABSTRACT

The Authors report a case of a 46 years old man affected by severe acute respiratory syndrome caused by Novel Coronavirus 2019 and admitted to our hospital. The patient required continuous positive airway pressure therapy (CPAP) in the hospital ward and subsequently orotracheal intubation while in intensive care unit. The patient laid in lateral decubitus position for several hours every day while receiving CPAP therapy. During the hospitalization, he reported limitation of range of motion of the left upper limb, without any history of acute or previous trauma. The clinical appearance of the arm was suggestive of pseudoparalytic shoulder.

This case emphasizes the importance of proper body positioning during invasive and non-invasive mechanical ventilation in order to prevent peripheral nerve compression and further disability.

Introduction

Coronavirus Disease 2019 (CoViD-19) is an infectious disease caused by Severe Acute Respiratory Syndrome-CoronaVirus-2 (SARS-CoV-2), an extremely contagious pathogen. As CoViD-19 rapidly spread around the globe during the first months of 2020, the WHO has declared the CoViD-19 a pandemic [1].

Italy was the first European country to register a CoViD-19 epidemic; to date — April 15, 2020, the number of total CoViD-19 Italian cases is 162,488, with 21,067 deaths [2].

Approximately 15% of individuals with CoViD-19 develop moderate to severe pneumonia requiring hospitalization and oxygen support. In addition, 5% of the patients require admission to an Intensive Care Unit and invasive therapies such as Orotracheal Intubation (OTI) and mechanical ventilation [3].

A resolutive therapy for CoViD is unfortunately still unavailable. The pharmacological support given to CoViD patients includes antiviral agents, antibiotics, hydroxychloroquine and steroids when needed, but the most effective treatment, and currently the only one proven to ameliorate the patient's condition is oxygen supply. Respiratory support has different levels of invasiveness, from the least to greatest: high flow nasal cannula, Venturi mask, Continuous Positive Airways Pressure (CPAP), and eventually Orotracheal Intubation [4]. In patients with severe respiratory impairment, oxygen therapy is administered for many hours for many consecutive days. To enhance respiratory kinematics, patients in Intensive Care Unit (ICU) sometimes require to maintain a prone position while intubated [5]. The same principle is sometimes applied during CPAP therapy. Prone positioning has been used for many years to

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improve oxygenation: lung inflation is more homogeneous from dorsal to ventral than in the supine position, with more homogeneously distributed stress and strain. As blood perfusion of the lungs remains the same in both supine and prone postures, pronation usually improves oxygenation [6].

Caution must be taken when proning patients: pressure applied to specific body regions for prolonged time might cause lesions such as bedsores or nerve injuries [7]. Axillary nerve palsy is a neurological condition in which the axillary nerve has been damaged by a traumatic or compressive injury. A rare cause of axillary nerve palsy is lying in lateral position for several hours. Such condition has been documented after a prolonged labor on side-lying birthing position [8] or after sleeping for many hours in a lateral decubitus position in a quadriplegic patient [9].

We report a case of axillary nerve palsy in a patient affected by COVID-19 who kept a wrong decubitus position while receiving CPAP therapy.

Case report

We report a case of a 46 yo Caucasian male who was admitted to the Emergency Room (ER) of San Raffaele hospital, Milan, on March 9th, 2020, while Italy was facing the healthcare emergency of CoViD-19 pandemic. The patient had a history of 2-day high fever and shortness of breath. Physical examination revealed an alert and oriented man with shortness of breath. Vital signs collected at the time of admission were: body temperature 38 °C, blood pressure (BP) 130/80 mmHg, heart rate (HR) 100 beats per minute, respiratory rate (RR) 30 breaths per minute; oxygen saturation was 95% on room air. Past medical history was positive for type 2 diabetes.

Chest X-ray, blood tests, Arterial Blood Gas (ABG) assay and an oropharyngeal swab were immediately performed in the ER: as soon as the results were available, the diagnosis of CoViD was made and the patient was admitted to the internal medicine unit of the facility.

The patient spent 7 days in the aforementioned unit, where hydroxychloroquine 200 mg b.i.d. and lopinavir/ritonavir 200/50 mg b.i.d were administered, associated with ceftriaxone 2 g once a day and azithromycin 500 mg once a day; later it became necessary to suspend hydroxychloroquine for QT interval prolongation. He started Tocilizumab treatment on March 16th, 2020. Continuous Positive Airway Pressure Therapy was started on the 4th day after admission due to the low values of blood oxygen saturation and it was carried out from March 13th to March 17th, 2020. The patient received CPAP four times a day for 3 h each time, alternating with Venturi oxygen mask with 60% FiO₂ oxygen flow. As recent findings suggest prone decubitus ameliorates blood gas exchanges during Mechanical Ventilation and Non Invasive Ventilation, it was asked the patient to keep this body position. As during CPAP the patient was uncomfortable keeping a prone decubitus, he laid sideways instead, always on the left side, with his left arm adducted.

Due to deterioration of respiratory mechanics and hypoxia despite high flow oxygen therapy, he underwent oro-tracheal intubation and was admitted to Intensive Care Unit on March 17, 2020. He stayed in ICU for 12 days. While sedated and mechanically ventilated, he underwent 5 cycles of prone-supine positioning with progressive improvement of vitals, especially blood oxygenation.

On March 29, 2020 he was discharged from the ICU and readmitted to the general medicine ward. As soon as the patient was able to stand up and return to normal daily activities, he complained of impairment of abduction and elevation of the left upper limb. He denied any previous history of trauma.

An orthopaedic consult was asked to the surgeon on duty on April 3, 2020. On physical examination, Range of Motion (ROM) of the left shoulder was limited compared to the contralateral one. The right shoulder ROM was complete, while left shoulder abduction



Picture 1. Patient's left arm maximum abduction.



Picture 2. Patient's left arm maximum extension.

and extension were limited to 45° each; in addition, he used his scapula-thorax joint to compensate for the deficit (Pictures 1 and 2). The clinical appearance was suggestive of pseudoparalytic shoulder. A neurological consult was required as well; it reported a left deltoid muscle hyposthenia of $\frac{3}{4}$ on the Medical Research Council (MRC) scale, without sensitivity disturbances.

He was treated with a cycle of passive physical therapy, which started on the day after the diagnosis. As prescribed, the future diagnostic-therapeutic process includes daily physiotherapy and an Electromyography to be performed 30 days after the onset of symptoms [10]. The diagnostic hypothesis is an axillary nerve palsy due to prolonged lateral positioning.

Conclusions

The main and most effective therapy for CoViD patients is respiratory support, whether with nasal cannulae, Venturi mask, CPAP or mechanical ventilation. Patients requiring hospitalization for breathing support often keep prolonged fixed positions (prone position/lateral decubitus) during CPAP/mechanical ventilation treatment for many hours; for this reason special attention must be paid to proper body positioning of the patients.

This clinical case highlights an uncommon and not previously reported side effect that might occur while keeping the lateral decubitus for a long time during CPAP. Healthcare workers have to be aware of this possible complication and must implement proper precautions to prevent it. In order to avoid pseudoparalytic shoulders caused by axillary nerve compression, it's important to change the side of the lateral decubitus and to abduct the arm of the patients during CPAP sessions.

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