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Case Report

Home Mechanical Ventilation Following SARS-Cov-2 Infection and Vaccination

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Abstract

In-hospital use of mechanical ventilation for COVID-infection or its complications has already been well described. The effects of COVID-19 on patient's already using home mechanical ventilation have also been reported. However, to our knowledge the use of home mechanical ventilation for post-COVID conditions has not been published yet. We describe two patients who needed home mechanical ventilation, one for diaphragm hemiparesis following COVID-19 pneumonia and the other for Guillain Barré syndrome two weeks after vaccination against SARS-CoV-2.

Introduction

Acute respiratory insufficiency has been reported following both SARS-CoV-2 vaccination and infection. However, chronic respiratory insufficiency is rare. We describe two patients who required home mechanical ventilation, one for diaphragm hemiparesis following COVID-19 pneumonitis and the other for Guillain Barré syndrome two weeks after vaccination against SARS-CoV-2.

Case 1

A 68-year-old male with a BMI of 34 kg/m2 was seen at the emergency department with orthopnea and confusion for two weeks. He was hospitalized with a COVID-19 pneumonitis in the pulmonology department and received high doses of corticosteroids. Under high flow oxygen therapy, he developed hypercapnic respiratory failure with a PaCO2 of 100,7 mmHg. He was admitted to the ICU, intubated and mechanically ventilated. After extubation, and reduction of oxygen flow, he was readmitted to the pulmonology department one week following his admission to the ICU. Further workup for the hypercapnia with echography of the thorax revealed a paresis of the right hemidiaphragm. Lung function showed a severe restriction (VC 1.53L (37% of predicted), FEV1 1.52 (48%), TLC 4.22L (61%)) and reduced inspiratory and expiratory force (MIP 42%, MEP 57%). EMG showed bilateral denervation of the shoulder region which is compatible with a bilateral Parsonage Turner syndrome. An EMG of the diaphragm was not performed because of fear of the patient. Eventually he was discharged with an oxygen concentrator (1L/min).

After one month he needed no supplementary oxygen during daytime anymore (PaO2 63 mmHg and PaCO2 47 mmHg), but he was unable to lie down completely and slept in half sitting position with oxygen 2L/min. Polysomnography demonstrated an AHI of 4.3/h with a mean respiratory rate of 25.1/min and a mean SpO2 of 84.1% with a nadir of 60.0%. Lung function showed a slight improvement of the restriction (VC 2.22L (53%), FEV1 1.86L (59%)), with a significant deterioration of minus 63% in supine position (VC 0.83L (20%), FEV1 0.65L (21%)). This is compatible with diaphragm paresis and he was referred to a university hospital for domiciliary ventilation. Nocturnal transcutaneous oxycapnography (without supplemental oxygen) at home showed a mean SO2 of 85% (57-95%) and PCO2 of 50 mmHg (43-58mmHg). Nocturnal non-invasive ventilation was started (BIPAP S/T, IPAP 15, EPAP 6, BPM 18, Ti 1.3 s, ST 3) and this resulted in a remarkable improvement of his symptoms. He was able to

completely lie down again, and his sleeping quality improved significantly. No supplemental oxygen was needed anymore. Transcutaneous oxycapnography during ventilation showed no hypercapnia with a mean PCO2 of 39 mmHg (20-45 mmHg) and a mean SO2 of 92% (85-97%). At present, 13 months following his COVID-19 pneumonitis, he is still ventilated nocturnally.

Case 2

A 50-year-old male presented to the neurologist with tingling in his right hand and numbness in his left hand and both feet for three days. He was hospitalized for further investigation. In the following days he subsequently developed a progressive and ascending weakness of his legs and dyspnea with exertion. Clinical examination showed absence of deep tendon reflexes in both legs and hypesthesia. EMG revealed a pattern compatible with an acute inflammatory demyelinating polyradiculoneuropathy. Analysis of the CSF showed no signs of infection and an elevated protein count. The diagnosis of Guillain Barré syndrome was made. There had been no infections in the preceding weeks, but he had been vaccinated for the first time against COVID-19 (AstraZeneca) 14 days before. Other than this, no other causes for his Guillain Barré syndrome were identified.

Therapy with intravenous gammaglobulines during 5 days was started. Unfortunately, his muscle weakness ascended further during the following days. Subsequently he developed upper body muscle weakness, oropharyngeal weakness indicative of cranial nerve involvement and dyspnea at rest, suggesting diaphragmatic involvement. He was transferred to the ICU of a university hospital. Because of respiratory insufficiency he was intubated and mechanically ventilated. A second course of intravenous gammaglobulines during 5 days was started. His disease was further complicated by a ventilator associated pneumonia. Because of prolonged ventilator dependency he underwent tracheotomy. An EMG was repeated and showed no improvement. Therefore, a third course of immunoglobulins during 5 days was initiated. During the following weeks a very slow improvement was seen in his upper body muscle strength and short ventilator free intervals were possible. Extensive sputum production necessitated multiple bronchoscopies for aspiration.

Despite initial improvement, a new deterioration with again complete paraplegia and facial paralysis occurred. A fourth course of intravenous immunoglobulins improved his bulbar symptoms but not his paraplegia and, therefore, the deterioration was regarded as a flare up of the Guillain Barré syndrome combined with critical illness polyneuropathy. After more than 3 months in the ICU he was dismissed to the pulmonology ward, where his ventilator time was further diminished until he only needed nocturnal ventilation. His tracheostomy could be closed and after 6 months of hospitalization he was transferred with nocturnal non-invasive ventilation to a rehabilitation center for further recovery. Three months later his home mechanical ventilation could be stopped. At present he has nearly completely recovered. He is only bothered by slight muscle weakness of his hands.

Discussion

This report describes two cases of rare neurological disorders following SARS-CoV-2 infection and vaccination. The first patient developed Parsonage Turner syndrome with paresis of his right hemidiaphragm after a COVID-19 pneumonitis, while the second patient presented with neurological symptoms suggestive of Guillain Barré syndrome 14 days following his first vaccination against COVID-19.

Respiratory symptoms in the context of neurological disorders such as Guillain Barré syndrome and Parsonage Turner syndrome are well described. About 30% of patients with Guillain Barré syndrome develop severe respiratory failure, requiring invasive mechanical ventilation and admission to the intensive care unit [1]. Chronic non-invasive ventilation, such as BiPAP, is primarily used as a tool to wean from invasive ventilation [2,3]. Approximately 8-10% of patients with Parsonage Turner syndrome develop involvement of the phrenic nerve with diaphragmatic paralysis causing respiratory symptoms. Treatment is mainly supportive, using respiratory physiotherapy and non-invasive rather than invasive mechanical ventilation [4-6].

The use of mechanical ventilation in the hospital setting for COVID-infection or its complications has already been well described. Reviews about the effects of COVID-19 on patients already using NIV at home may also be found. In contrast, and to the best of our knowledge, the use of non-invasive ventilation at home for post-COVID conditions has not been reported yet.

COVID-19 vaccines are widely used to fight against a deadly pandemic. Although they have proven to be effective and safe, a wide spectrum of side effects is continuously being reported. Neurological adverse events following vaccination have been described as well. Most symptoms are mild and transient, for example fever, myalgia, arthralgia, headache, and fatigue. More serious post-vaccination complications are cerebral venous sinus thrombosis and acute transverse myelitis [7]. In addition, Guillain-Barré syndrome and Parsonage Turner syndrome have been described in several case reports as an adverse event following vaccination against SARS-CoV-2 [8,9]. Notably, these disorders have been associated with SARS-CoV-2 infection as well [10,11]. However, just like in our cases, it is hard to prove a causal association between the origin of the disorder and vaccination or infection, despite the absence of other possible triggers or causes.

Respiratory symptoms following SARS-CoV-2 vaccination or infection can be very severe and should not be underestimated.

Physicians should stay alert to the development of these symptoms at all times. With this case report we want to emphasize the effectiveness of non-invasive ventilation in supporting these respiratory difficulties, both in and outside the hospital. Therefore, we would certainly encourage physicians to consider the use of home mechanical ventilation in post-COVID conditions with chronic respiratory failure.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. Shang P, Zhu M, Baker M, Feng J, Zhou C, et al. (2020) Mechanical ventilation in Guillain–Barré syndrome. Expert Review of Clinical Immunology, 16: 1053-1064.
2. Craig VJ, Ford V, Chakrabarti B, Parker R, Duffy N, et al. (2017) Non Invasive Ventilation In The Weaning Of Patients With Acute Guillain Barre Syndrome Requiring Invasive Ventilation. In B50. CRITICAL CARE: BEYOND THE VENTILATOR-NON-INVASIVE VENTILATION, HIGH FLOW OXYGEN, AND NON-CONVENTIONAL VENTILATION. American Thoracic Society. 195: A3691.
3. Cheng MCF, Murphy PB, Hart N, Evans MRB, Spillane JE, et al. (2021) Prolonged Ventilatory Support for Patients Recovering From Guillain-Barré Syndrome. Neurology Clinical practice, 11: 18–24.
4. IJspeert J, Janssen RM, & van Alfen N (2021) Neuralgic amyotrophy. Current Opinion in Neurology, 34: 605-612.
5. McEnery T, Walsh R, Burke C, McGowan A, Faul J, et al. (2017) Phrenic nerve palsy secondary to parsonage–turner syndrome: a diagnosis commonly overlooked. Lung, 195: 173-177.
6. Van Eijk JJ, Groothuis JT, Van Alfen, N (2016) Neuralgic amyotrophy: an update on diagnosis, pathophysiology, and treatment. Muscle & nerve, 53: 337-350.
7. Garg RK and Paliwal VK (2022) Spectrum of neurological complications following COVID-19 vaccination. Neurological Sciences, 43: 1-40.
8. Finsterer J, Scorza FA and Scorz, CA (2021) Post SARS-CoV-2 vaccination Guillain-Barre syndrome in 19 patients. Clinics, 76: e3286.
9. Mitry MA, Collins LK, Kazam JJ, Kaicker S, & Kovanlikaya A (2021) Parsonage-turner syndrome associated with SARS-CoV2 (COVID-19) infection. Clinical imaging, 72: 8-10.
10. Queler SC, Towbin AJ, Milani C, Whang J, & Sneag, DB (2022) Parsonage-Turner syndrome following COVID-19 vaccination: MR neurography. Radiology, 302: 84-87.
11. Uncini A, Vallat JM, & Jacobs BC (2020) Guillain-Barré syndrome in SARS-CoV-2 infection: an instant systematic review of the first six months of pandemic. Journal of Neurology, Neurosurgery & Psychiatry, 91: 1105-1110.