JPSIM Journal of Pakistan Society of Internal Medicine

Case Report

Covid-19 in Patient with Myasthenia Gravis

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Abstract

A 78-year-old man known case of hypertension, ischemic heart disease, chronic obstructive pulmonary disease, and myasthenia gravis was brought into the emergency department with suspected myasthenia crisis. He presented with complaints of worsening shortness of breath and decreasing oxygen saturation. On presentation, he had a temperature of 38C, was tachypneic, with an SA02 of 90% on room air. Due to the ongoing COVID-19 pandemic, he was kept in isolation and tested for COVID 19. His COVID RT PCR came out positive. Based on his radiological and investigation findings he was diagnosed with moderate COVID pneumonia according to the Government of Pakistan guidelines for COVID 19. His condition continued to deteriorate, after the recommendation of the infectious disease team, he was managed with Tocilizumab and convalescent plasma. Both of which are at the time of administration are under clinical trial for the treatment of COVID pneumonia. The case demonstrates the possible need for early intubation in COVID-19 patients diagnosed with myasthenia gravis.

How to cite this:

Daudpota AA, Samar R, Arshad A. Covid-19 in Patient with Myasthenia Gravis. J Pak Soc Intern Med. 2021;2(4): 331-333

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Introduction

COVID-19 has affected more than 11.8 million people to date and affects all age groups. Given this widespread pandemic, more research has to be done to assess the impact of COVID 19 on various diseases. Typical features can include fever, cough, and shortness of breath which can mimic respiratory or neuromuscular disease.

In this case, we presented a myasthenia gravis patient with shortness of breath and decreasing saturation. Through history and clinical examination, we suspected myasthenia crisis but given the pandemic, we tested the patient for COVID 19 which was positive. Given the similar presentations of these two, we must make important decisions from the very beginning whether to intubate myasthenia gravis patients presenting with COVID 19.

Case Presentation

A 78-year-old gentleman was brought to the emergency department with a suspected myasthenia crisis, presenting with worsening shortness of breath and decreasing oxygen saturations since 3 days which was worse on exertion and while going to the washroom and relieved by lying down. He had no complaints of paroxysmal nocturnal dyspnea, cough fever, chest pain. His past medical history was significant for hypertension, ischemic heart disease, chronic obstructive pulmonary disease, and recently diagnosed myasthenia gravis. His current medications were tablet pyridostigmine 60mg every 6 hours, tablet Azathioprine 50mg every 12 hours, tablet prednisolone 5mg once a day, ipratropium inhaler once a day, and long term oxygen therapy.

On arrival his respiratory rate was 28 breaths per minute with an Sp02 of 90% on room air, temperature 38C, heart rate 94 beats per minute, blood pressure was 125/64 mm Hg. On examination his respiratory, cardiovascular, abdominal, and central nervous system examination was unremarkable. Due to the COVID pandemic, he was kept in isolation and was tested for COVID Real Time-Polymerase Chain Reaction primers (RT-PCR) which were positive. He was shifted to the COVID Ward for further management.

Investigation

At the time of arrival, his blood count demonstrated a normal white blood cell count (6.5 × 10^9/L) with a neutrophilia (91%) and lymphopenia (4.7%), hemoglobin (13.8g/dl) and platelets(204,000); biochemical markers demonstrated a raised C-reactive protein (38.5 mg/L) and Lactate dehydrogenase (582 IU/L). Chest X-ray showed inhomogeneous airspace shadowing involving both lower zones more on the left side with

interval development of patchy infiltrates in the right upper zones. Based on radiological and inflammatory markers he was diagnosed with moderate covid pneumonia.

In the evening he became tachypneic and hypoxic his saturations dropped to 85% for which he was put on 4-5L of oxygen. His arterial blood gas was done which showed PH 7.44, Carbon dioxide of 33.0mmhg arterial oxygen saturation 58.10mmhg, bicarbonate of 21.80 mEq/L, and SaO2 of 90.70%. He was shifted to the special care unit and required noninvasive ventilation support of 12/6, oxygen requirement increased to 30L. A repeat chest X-ray was ordered due to suspicion of pneumothorax, which showed extensor emphysematous changes in both lung fields with a re-demonstration of left lower lung lobe infiltrates. Subsequently, pneumothorax was ruled out. His inflammatory markers were repeated, which showed a raised C- reactive protein (132.58mg/L) and lactate dehydrogenase (447IU/L).

Differential Diagnosis

The possible differential diagnosis in our case can be Myasthenic crises, pneumothorax, and pulmonary embolism. Due to worsening of muscle weakness leading to respiratory failure Myasthenic crises was ruled out as our patient did not develop hypercapnic respiratory failure. Sudden onset of shortness of breath, persistent hypoxemia, and Non-invasive ventilation requirement, pneumothorax was also included in the differential diagnosis but serial chest X-rays were not suggestive. Well's score of our patient was less than 4 pulmonary embolism was highly unlikely.

Treatment

He was started on 40mg Methyl prednisone every 8 hourly and 40mg enoxaparin once daily and Piperacillin tazobactam 4.5mg every 6 hours, however, his condition did not improve. The patient's attendants were informed about the need for elective intubation due to the patient's high oxygen requirement and other options such as tocilizumab vs convalescent plasma exchange for his COVID pneumonia. The patient himself refused the plan of intubation. After discussion with the Infectious disease team intravenous Tocilizumab 480mg was administered on the 20th of June, he initially responded well but later his condition deteriorated. On the recommendation of the infectious disease team and consent of the patient, we administered convalescent plasma on the 21st of June.

Outcome and Follow-Up

After the patient received tocilizumab, he became tachypneic and his oxygen requirement increased to 30L. The pulmonology team was called in; they assessed the patient and decided to change his Bi-level Positive Airway Pressure (BIPAP) to continuous positive airway pressure airway (CPAP). Furosemide was administered due to suspicion of pulmonary edema, he responded well and his oxygen requirement gradually declined to 13L.

The following day his shortness of breath worsened, the patient accepted the need for mechanical ventilation, he was electively intubated secondary to hypoxic respiratory failure, post-intubation patient developed unstable atrial fibrillation for which he was cardioverted and was diagnosed with NSTEMI based on electrocardiogram and elevated troponin (3.80ng/ml). The patient developed septic shock, lactate acid (9.4mmol/L) secondory to hospital-acquired pneumonia for which he was started on norepinephrine and vasopressors, his tracheal culture was positive for aspergillusflavus hence antifungal started. He developed acute kidney injury and high anion gap acidosis secondary to septicemia. The patient's clinical condition was continuously deteriorating, even though he was on high ventilatory support and inotropes. He was not maintaining blood pressure on maximum support. The family was informed about the poor condition on maximum treatment, they opted to keep the patient's code do-not-resuscitate. The patient gradually became pulseless and was declared dead on the 26th of June 2020.

Discussion

Myasthenia gravis is an autoimmune disorder in which antibodies are formed against acetylcholine receptors leading to skeletal muscle weakness. Patients with myasthenia gravis are on immunomodulatory and immunosuppressive agents making them susceptible to infections. COVID-19 has become a global pandemic affecting the elderly population, patients with comorbid conditions, and immunosuppression.

Little is known about the impact of COVID-19 on myasthenia gravis. Common precipitating factors include infections, sepsis, rapid tapering of immunomodulating agents, corticosteroid treatment, exposure to drugs like azithromycin. Anand et al presented the clinical course of 5 hospitalized patients with COVID-19 and myasthenia gravis.[1] Among them, two patients required intubation for hypoxemic respiratory failure, while one required significant supplemental oxygen. One patient with previously stable Myasthenia gravis had a myasthenic exacerbation. One patient treated with tocilizumab for COVID-19 was successfully extubated. Two patients were treated for Myasthenia gravis with intravenous immunoglobulin without thromboembolic complications. Ramaswamy et al presented a patient with myasthenia gravis and on multiple immunosuppressive medications, had COVID-19. The patient was quaran-

tined for 14 days with no exacerbation or crises. No changes to her immunosuppressive were made.[2] Delly et al presented a case with myasthenia crises and COVID-19. Her immunosuppressive medications were continued and received IVIG during treatment.[3]

Coronavirus is not documented to causes myasthenia crises however infections usually lead to myasthenia exacerbation. Delly et al proposed the mechanism of autoimmunity with augmentation of T cell signaling causing a pro-inflammatory environment due to a hyper-reactive antiviral immune response, epitope spreading, and due to the effects of fever on neuromuscular junction function cytokine dysregulation which promotes the increase of pro-inflammatory cytokines and chemokines that attack organ systems, particularly the lungs which can result in acute respiratory distress syndrome.[3]

Our case is similar to the above-mentioned case. Treatment should be individualized. Drugs like hydroxychloroquine (previously used in COVID-19), azithromycin is known to cause myasthenia exacerbation.[4,5] Likewise, the use of pyridostigmine leads to increased bronchial secretions. Additionally, a complication of Intravenous immune globulin leads to widespread thrombosis, and thrombosis itself is a complication of critically ill COVID-19 patients.[5,6,7] Clinical course and outcomes of patients with COVID-19 and myasthenia gravis are highly variable therefore care should be according to individual patients.

Take Home Messages

- Patients with myasthenia gravis are usually on multiple immunosuppressive therapies which makes them at a greater risk of contracting infections that can complicate the management.
- The presentation of patients with COVID-19 and myasthenia gravis are highly variable, hence care should be according to individual needs.
- We must consider early intubation in patients unable to maintain oxygen saturations despite the use of non-invasive ventilatory support measures.

Conflict of Interest None

Funding Source None

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