



## **Complications of Spinal Cord Injury can Hide Fever and Cough Associated to COVID-19**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors BK, AA, FY and BD were responsible for designing the clinical protocol and collecting clinical and analytical data. Author BK was responsible for conducting the research, analyzing data, interpreting results and writing the paper. Author BD was responsible for identifying bibliographic resources, analyzing data, interpreting results and writing the paper. Author BA was responsible for designing the clinical protocol and conducting the research. All authors read and approved the final manuscript.*

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**Case Report**

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### **ABSTRACT**

**Aim:** Coronavirus disease (COVID-19) is a lower respiratory tract infectious disease. This new coronavirus responsible for severe acute respiratory syndrome, higher level of illness and death. Comorbid health conditions are highly important in clinical course of Coronavirus disease. Patient with spinal cord injury (SCI) may have numerous comorbidities like respiratory muscle weakness, tendency to coagulation caused by immobilisation, autonomic dysreflexia accompanied by hypertension, urinary tract infection, SCI-induced immune suppression etc.

**Case of Presentation:** A 43 year-old male patient is affected by ASIA A, T7 level paraplegia. After the COVID-19 outbreak, he acquired severe dorsal pain with recurrent submaximal fever at night. The patient was considered primarily as a urinary tract infection. He was evaluated covid-19 on the development of dyspnoea and cough in the following periods. Due to SCI complications, it is late in diagnosis and treatment.

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**Discussion:** SCI patients are vulnerable individuals of our society in having respiratory infections. Comorbidities caused by the spinal cord injury lay the ground for this. The importance of this sensitive condition should be emphasized in the COVID-19 pandemic. SCI patients may not come with symptoms such as fever, cough and dyspnoea, which are typical symptoms of covid-19 in initial hospital admissions.

**Conclusion:** Complications of SCI can cover COVID-19 infections. Evaluating SCI patients in terms of infection, this should be known and cautious. In this way, there is no delay in the treatment of SCI patients and less mortality can be observed.

*Keywords: Coronavirus; infections; spinal cord injuries.*

## 1. INTRODUCTION

Coronavirus disease (COVID-19) is a lower respiratory tract infectious disease, first detected in Wuhan, China in late December 2019 and spread throughout the World. This epidemic is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. The World Health Organization declared Covid-19 pandemic on March 11, 2020. On May 20, 2020, there were over 5 million cases with 326,242 deaths worldwide. This new coronavirus is responsible for severe acute respiratory syndrome, higher level of illness and death [2]. Older patients and their comorbidities appear to be at higher risk for severe illness. Some studies found that cardiovascular disease, diabetes mellitus, hypertension, chronic respiratory disease etc. increase the severity of this infectious disease [3]. Due to these confounding factors, comorbid health conditions are highly important in the clinical course of the Coronavirus disease.

Patients with spinal cord injury (SCI) may have numerous comorbidities like respiratory muscle weakness, tendency to coagulation caused by immobilisation, autonomic dysreflexia accompanied by hypertension, urinary tract infection, SCI-induced immune suppression etc [4]. The higher the neurological level of injury in patients with spinal cord injury, the greater the risk of developing complications especially temperature dysregulation. Poikilothermia is a sign due to disruption of neurological signal related to hypothalamic temperature regulation center [5,6]. Lack of febrile response to non-physiologic situation causes impaired vasoconstriction and subnormal resting body temperature [5]. Therefore, in patients with SCI, febrile response may not occur in case of infection, and hence delay in diagnosis and treatment may occur [5]. SCI patients with Coronavirus disease may not present with fever which is one of the main symptoms of COVID-19.

In addition, respiratory dysfunction is one of the leading causes of morbidity and mortality in patients with SCI [7]. Impairment in clearing the secretions caused by involvement of the diaphragm and intercostal muscles creates a predisposition to pulmonary infection. Therefore, patients with SCI are more risky for acute respiratory distress syndrome [7]. Predisposition to acute respiratory distress syndrome in SCI due to lower respiratory tract involvement may complicate and worsen the prognosis of COVID-19 in disabled patients [8]. Dorsal pain, which can be seen in covid-19, may not be seen due to sensory defect in patients with spinal cord injury. Chest pain associated with cardiac involvement which are frequent symptoms and signs reported to be associated with covid-19 infection may not be the complaint of the SCI patient due to altered sensation of the cervical and upper thoracic region, depending on the level of involvement of the spinal injury [9].

Also, as it is well known, following spinal cord injury, changes in the innate immunity are observed and the immune response against viral infections is disrupted. The reason for systemic immune suppression is noradrenergic overactivity and excessive glucocorticoid release due to hypothalamic-pituitary-adrenergic axis over stimulation [10].

In this paper, we aim to present a severe case of COVID-19 infection confounded by other sources of infection with a delay in diagnosis in a SCI patient.

## 2. CASE PRESENTATION

A 43 year-old male patient is affected by ASIA A, T7 level paraplegia after an accident 20 years ago. He is a wheelchair-dependent patient but is leading a very active life as a CFO, driving his own car, diving and acting in theatre plays as his leisure time activities. The patient regularly applies clean intermittent catheterization.

After the COVID-19 outbreak, on March 11, 2020, he acquired severe dorsal pain with recurrent submaximal fever at night. During this period, the patient did not apply to a hospital because he had newly started a new business. Later on, when the general condition deteriorated and dorsal pain got worse, dorsal pain started 10 days before hospital application and which was constricting and together with breathlessness, than he applied to a urologist who follows regularly. Although the patient didn't experience dysuria, > 100000 Gram Negative Rod bacteria was observed in the urine analysis and culture. The patient was hospitalized and since resistance to many antibiotics was observed on the antibiogram, broad-spectrum antibiotic therapy was administered. In addition to signs of urinary system infection, lymphopenia and thrombocytopenia were detected in the patient's laboratory tests. Acute phase reactants such as C-reactive protein and ferritin were found to be elevated. In laboratory results, C-reactive protein is 217 mg/L, sedimentation is 80 mm and ferritin is 2130 µg/L. Despite antibiotic therapy, his dorsal pain didn't subside.

On the third day of the antibiotic treatment, the patient's symptoms did not regress; mild cough and dyspnoea began as a new symptoms and crepitation was observed in the lung sounds in the repeated examinations. First, a chest X-ray was taken, but no pathological image was detected. 15 days after the first signs, the patient was evaluated by chest computerized tomography, and the ground glass appearance was observed in the multiple lobes of both sides of the lungs. Since this condition was evaluated as compatible with covid-19 infection, combined throat and nasopharyngeal swab was taken from the patient and evaluated with reverse transcriptase polymerase chain reaction. Hydroxychloroquine was given as 400 mg loading dose and then 200 mg maintenance dose daily for 5 days. During this period, the patient developed dyspnoea and the patient was followed up by non-intubated in an intensive care unit. Acute phase reactant height of the patient continues and determination of d-dimer value >1000, favipiravir and anticoagulant were added to the treatment upon. Favipiravir was given as 2 x 1600 mg mg loading dose and then 2 x 600 mg mg maintenance dose daily. After mild hypoxia and respiratory alkalosis were detected in the arterial blood gas, the patient was intubated. Tocilizumab was also added to the treatment of the patient who was followed up intubated and the treatment response of the patient was

observed in the following days. IV immunoglobulin treatment was applied to the patient whose adequate treatment response could not be determined.

The patient was extubated in the following days and removed from the intensive care unit. Control laboratory results, C-Reactive protein is 97 mg/L, sedimentation is 39 mm and ferritin is 1220 µg/L. Pulmonary rehabilitation exercises were taught to the patient, who regressed both symptomatically and in laboratory tests, and were included in the telerehabilitation program. The patient, who continued to exercise-induced dyspnoea, was discharged after completing his medical treatment.

### 3. DISCUSSION

SCI patients are vulnerable individuals of our society in having urinary tract infections and respiratory infections. Comorbidities caused by the spinal cord injury lay the ground for this. The importance of this sensitive condition should be emphasized in the COVID-19 pandemic. SCI patients may not come with symptoms such as fever, cough, and dyspnoea, which are typical symptoms of covid-19 in initial hospital admissions [8]. For this reason, this should be taken into consideration in hospital applications of SCI patients.

SCI patients are especially sensitive to all kinds of infections due to the change in innate immunity that occurs in all their bodies after the accident. As a result of excessive stimulation of the hypothalamic-pituitary-adrenergic axis and an increase in noradrenergic release, impairment in innate immunity may occur and patients may become immunosuppressant. This condition is called SCI-induced immune suppression. This makes SCI patients hypersensitive to COVID-19 infection [10].

Asymptomatic bacteriuria is frequently seen in SCI patients, and this is a condition that does not require treatment. Urinary tract infection is the most common cause of fever in SCI patients. Generally, in case of suspected infection, this is considered as a urinary tract infection and treatment is initiated but treatment response cannot be obtained. In this case, different infection foci and factors should be considered in the differential diagnosis [4].

Even in cases with such as weakness and fatigue, SCI patients should be evaluated for

infection even if they do not have fever. The typical febrile response described by WHO may not be seen in SCI Patients. Because in SCI patients, disruptions can be observed in the signals between the hypothalamic temperature regulation center and the receptors in the body. This results in deterioration in vasoconstriction and tremor reflexes, even in case of infection, subnormal body temperature can be observed. The diagnosis may be delayed in SCI patients due to the absence of fever or an impairment in the fever prodrome during infection [11]. In SCI patients, there may be no fever or fever in different patterns during COVID-19 infection. This may cause delay in diagnosis and treatment as in our patient.

Respiratory dysfunction is one of the leading causes of morbidity and mortality in patients with SCI. SCI patients may have impaired respiratory functions and cough reflex due to intercostal and diaphragm muscle involvement. As a result of the reduced lung capacity, absence of cough reflexes, clearance of secretions is disturbed and susceptibility to pulmonary infection is observed [7]. Hypoxia can be seen as the first symptom of covid-19, since cough and fever cannot be fully observed in SCI patients. The use of accessory muscles can also be a sign of respiratory muscle fatigue and associated respiratory failure. Therefore, close monitoring of the oxygen value is recommended. In SCI patients, in the presence of covid-19 infection, more aggressive pulmonary toilet and monitoring in the intensive care unit are recommended [6].

Social isolation recommended to the whole society gains more importance in SCI patients. Especially in patients who need constant care, not only the patient but also the caregiver should pay attention to social isolation. In addition, pulmonary rehabilitation programs are of extra importance for these patients. It is better to choose telerehabilitation programs instead of face-to-face rehabilitation on days when we reduce contact due to Covid-19.

#### 4. CONCLUSION

Complications of SCI can cover fever and cough associated to COVID-19 infections. This may cause delay in diagnosis and treatment. When evaluating SCI patients with any infection, this should be known and cautious. In this way, there is no delay in the treatment of SCI patients and less mortality can be observed.

#### CONSENT

Patient provided his informed consent.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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