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Case Report

SARS-CoV-2 infection with pneumonia and stroke

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Abstract

Background: Covid-19 pandemic has been manifested mainly as respiratory and constitutional symptoms. Though, it may demonstrate the involvement of other systems i.e. cardiovascular system (CVS), central nervous system (CNS) or gastrointestinal system (GI).

Discussion: Systemic manifestation of Covid-19 requires further research. Recent surveys revealed a few alarming facts about Covid-19, that, when it hits the brain, can cause some serious complications like; psychosis, stroke and dementia.

Case Presentation: Here, the case is about two patients, having PCR confirmed Covid-19 and radiographic evidence of stroke, who eventually died during hospital stay. Data collection was done after informed consent and in retrospective manner.

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1. Introduction

Coronavirus disease, caused by SARS-CoV-2, has been a global pandemic, now. More than 31.3 million cases have been reported to date. This aerosol infection caused by SARS-CoV-2 possess a wide range of symptoms, varying from being asymptomatic to fatal, from simple cold, cough and flu to severe pneumonia, respiratory distress, kidney failure, multi-organ failure, even neurological and cardiovascular manifestations. Invasion through hematogenously and through cribriform plate explained the neuoinvasive potential of virus. Neurological manifestations described in 214 patients in Wuhan, China as 36.4% of all patients of Covid-19 had cerebral manifestations. This case reports of 2 SARS-CoV-2 patients confirmed by PCR, who developed ischemic stroke during their hospital stay.

1.1. 1st case report

A 67-year-old male, known case of type-2 Diabetes Mellitus (DM), hypertension (HTN), Ischemic heart disease (IHD), smoker, doctor by profession, and with no travel history in recent time presented to emergency room (ER) with the complain of shortness of breath (SOB) with mild cough and low-grade fever (undocumented). His receiving vitals were B.P: 110/80 mmHg, Pulse: 98 bpm, Respiratory rate: 18/min with 92% oxygen saturation on room air and was afebrile. Neurological examination was GCS: 15/15, pupils bilateral equal and reactive to light, moving all four limbs. Systemic enquiry revealed bilateral coarse crepitations on chest auscultation. After initial management in the ER, he was consulted by the On-call registrar of Covid-19 isolation ward for the ground glass appearance of his Chest X-Ray with pneumonic patches in the middle lobe of the right lung. He was taken over by the isolation ward after PCR confirmed the SARS CoV-2 infection. All baselines were within normal range except for the total leukocyte count (TLC) that showed marked lymphopenia (As shown in table 1). C-reactive protein (CRP) and D-dimers and serum ferritin, all were slightly elevated. Electrocardiogram (ECG) was unremarkable. He was started on Injectable antibiotics (ceftriaxone 1gm BD, azithromycin 500 mg OD) and his routine medications for diabetes (Inj. Insulin R + NPH), HTN and IHD (Aspirin 75 mg OD, Rosuvastatin 10 mg HS, Losartan 50 mg OD) were also continued. Though, he was received in a relatively promising condition and remained static till his 4th day of admission; when his GCS suddenly deteriorated to 10/15, left sided hemiparesis with ipsilateral plantar up-going, unable to maintain saturation on room air so was immediately put-on oxy-
2. Discussion

This case study narrates first ever Covid-19 positive patients presenting with stroke in Pakistan. A study conducted revealed that the percentage of people developing stroke, later in the disease course of Covid-19 is 5.7%. PCR confirmed SARS-CoV-2 has been detected from CSF of Covid-19 positive patients. Yet another study reported to have 5% incidence of stroke amidst Covid-19 patients, within 2 weeks from the day of onset of disease, but usually amongst those having severe form of disease and other known co-morbidities like HTN, IHD and DM. In the pathophysiology of stroke, the main contributory role seems to be played by the higher inflammatory state and the abnormal coagulation cascade, depicted clinically by raised CRP and D-dimers.

The exact course of events causing the stroke to take place, is still unknown. However, the increased risk of thromboembolism and cardiovascular events in an infective state, could be a cause, since the rate of thromboembolic complications among critically ill patients and those who are under ICU care is 31%. Angiotensin converting enzyme –2 (ACE-2) receptors provide the main doorway to all the coronaviruses including SARS-CoV-2. And thence, SARS-CoV-2 can get an entry into the CNS through these receptors and several other means as well, that might include hypoxic or immune-related injury or direct injury to blood brain barrier. Multiple cases of pulmonary emboli have also been reported.

Table 1

| Laboratory Findings | Normal Range | Patient 1 | Patient 2 |
|---------------------|--------------|-----------|-----------|
| WBCs (4.8–10.8 K/µL) | 14.45        | 18.5      |
| Neutrophils (1.4–6.5 K/µL) | 9.2         | 8.8       |
| Lymphocytes (1.2–3.4 K/µL) | 0.9         | 0.8       |
| Platelet Count (130–400/mm³) | 175         | 188       |
| Hemoglobin (12–16 g/dL) | 13.8        | 14.5      |
| Albumin (3.5–5.2 g/dL) | 4.2         | 3.6       |
| ALT (0–41 U/L) | 55          | 75        |
| AST (0–41 U/L) | 30           | 28        |
| LDH (50–242 U/L) | 280          | 320       |
| Creatinine (0.7–1.5 mg/dL) | 1.2         | 1.1       |
| PT (9.95–12.87 s) | 10.80        | 12.0      |
| APTT (27–39.2 s) | 34.5         | 35.0      |
| D-Dimers (0–230 ng/mL) | 703         | 892       |
| Ferritin (15–150 ng/L) | 1947        | 1548      |
| CRP (0.00–0.40 mg/dL) | 26.3        | 53.9      |

2.2nd case report

62 years old female with a previous history of IHD, T2DM and osteoarthritis (OA), presented in ER with shortness of breath and drowsiness. The attending vital signs were BP:130/80 mmHg, HR:88 bpm, Temp: 98° F, RR: 20/min with saturation of 94% on room air. The systemic examination was insignificant except for the respiratory system upon auscultation, there were bilateral coarse crepitations all over the chest and chest X-ray showed bilateral consolidations (Radiographic Assessment of Lung Edema (RALE) Score :17/33). PCR for SARS CoV-2 was positive. She was admitted in Covid-19 isolation. All the baseline investigations were sent, including CRP, serum ferritin and D-dimers, out of which TLC and raised Ferritin and D-dimers took the most of attention (As shown in Table 1). Her condition was progressively deteriorating when she developed right sided hemiplegia and worsening of breathing with saturation dropped to 82% with dual oxygen, on 6th day of her admission. Acute MCA infarct, affection thus made on the radiologic findings shown by the CT-Scan Brain and HRCT chest showed extensive ground glass opacification with interlobular reticulations/septal thickening in bilateral lungs. Patient was then put on ACMV mode of mechanical ventilator with a PEEP of 12, there she was saturating 88–90% with FiO2 1.0. She was being managed on the lines of Acute Respiratory Distress Syndrome (ARDS) and was on injectable broad-spectrum antibiotics (Inj. Piperacillin and Tazobactam). However, the routine medications for her type-2 Diabetes (Insulin Regular), and IHD (Aspirin 75 mg OD, Rosuvastatin 10 mg HS), were being continued since day 1 along-with other supportive measures. Laboratory findings after onset of stroke were listed in Table 2. Due to poor functional status, the patient deemed not to be a good candidate for any neurologic intervention or thrombolysis. Despite all the striving and efforts, the patient couldn’t survive and died on 11th day of hospitalization.
autopsies carried out, revealed the presence of macroangiopathic thrombi in lungs and kidneys of SARS-CoV-2 infected patients, but there is no evidence of such findings in brain, yet in the literature\(^1\).

With such limited literature available, thrombi formation due to hypercoagulable state may be rendered as the most probable pathophysiological mechanism, hypoxia and infection may also play their contributory role.

### 3. Conclusion

Fight against the Covid-19 in terms of control, protection and management remains the mainstay. However, the probability of stroke amongst Covid-19 infected patients must be considered and the management plans must be made accordingly. Further more research is needed to explore the disease course of Covid-19, associated complications and other neurological manifestations.

**Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Informed consent**

Informed consent was obtained from all individual participants included in the study.

**Consent for publication**

Patients sconsented for the study and publication.

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