

Covid Pneumonia in a Female with Metabolic Syndrome – A Case Report

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Abstract

Evidence across the globe indicates that among patients with confirmed SARS-CoV-2 infection, the outcomes were severe in those with diabetes, obesity, and hypertension with a high incidence of mortality regardless of age. We came across a 43-year-old obese female with type 2 diabetes and hypertension diagnosed with SARS-CoV2 infection. She presented with fever and cough for the previous 3-5 days and subsequently developed breathlessness. Laboratory investigations and radiological findings confirmed the diagnosis of SARS-CoV-2 infection. Our patient had dyspnea and higher CRP, NLR, and LDH than these threshold values with a CTSS of 17 and SpO₂ <71%. Moreover, the patient was previously diagnosed with metabolic syndrome. Considering the clinical status, she was hospitalized and managed as per COVID-19 protocol. Even though at high-risk, the patient recovered well due to the efficient team-work and the holistic approach at our hospital.

Keywords: Metabolic syndrome, SARS-CoV-2 infection, holistic approach

Introduction

Obese individuals with diabetes have a poor prognosis if infected with SARS-CoV2 infection. Accumulating evidence across the globe indicates that among patients with confirmed SARS-CoV-2 infection, the outcomes were severe in those with diabetes, obesity, and hypertension.^[1] The incidence of mortality is also higher regardless of age, particularly in individuals with poor glycemic control.^[2] For younger individuals with hypertension, there is an association of obesity with COVID-19 severity.^[3]

We report here a case of SARS-CoV-2 infection in a morbidly obese female with uncontrolled diabetes and hypertension who agreed to her non-identifiable data being published.

Case Report

A middle-aged (43-year-old) female presented with fever and cough for the previous 3-5 days and subsequently developed breathlessness.

The female was a known patient with type 2 diabetes and hypertension for the past 13 and 10 years, respectively. Due to her family responsibilities and her depressed feeling, she had been irregular in her follow-up visits to the clinic. She had a family history of diabetes.

On examination, her weight was 82 kg, height 152 cm, BMI 36.5 kg/m² and waist to hip ratio (WHR) 0.95. On admission, her pulse was 110/min, BP 150/90mmHg, respiratory rate 28/min, and SpO₂ was 71%. Respiratory examination revealed bilateral rales, more on the posterior aspect. A cardiac examination

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revealed a systolic murmur and a 4th heart sound. The liver was palpable. Given her long-standing diabetes, a fundoscopy was done which showed proliferative retinopathy.

The SARS-COV-2-RNA by real time PCR returned positive. Laboratory investigations performed showed Total Leucocyte count (TLC)-19, 200/cmm, neutrophil-to-lymphocyte (NLR) 5.1, platelets-adequate, urea- 32mg/dl, creatinine-1.0mg/dl. The HbA1C was 8.3%, C-reactive protein (CRP)- 89.8mg/l, serum ferritin- 290.16ng/ml (pre-menopausal) IL-6- 26.78pg/ml, Lactate dehydrogenase (LDH)- 565U/l, D-Dimer-0.54mg/l.

There were no abnormal findings on the electrocardiography (ECG).

Chest radiograph (Figure 1) displayed bilateral patches, band-like ground-glass and consolidative opacity. HRCT (Figure 2) of the thorax showed evidence of ground glass opacities, consolidation with intralobular and interlobar interstitial thickening, band-like opacities and atelectasis in all pulmonary lobes bilaterally suggesting viral pneumonia. The Computed Tomography severity score (CTSS) was 17/25.

The patient was put on oxygen through a high-flow nasal cannula (30 L/min). She was nebulized with Formoterol and Budesonide. She was started on systemic dexamethasone, hence was shifted to intravenous insulin. Low molecular weight heparin



Figure 1. Chest radiograph

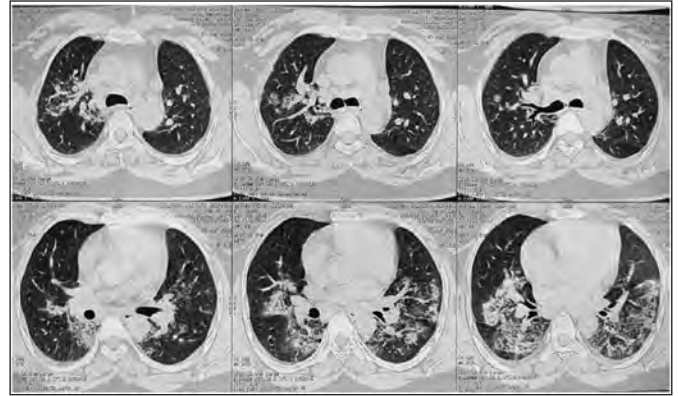


Figure 2. HRCT of Thorax

(Enoxaparin), Doxycycline, Meropenem, Favipiravir, and Ivermectin were also administered along with immunostimulants and immunomodulators such as vitamin C, Zinc, and vitamin D. She was given a calorie-restricted high protein diet.

Her oxygen saturation was maintained between 92% and 94%. She maintained an aware prone position as far as she could manage. At other times she was semi-prone. Chest physiotherapy was continued.

After initial intravenous insulin, she was switched to a basal-bolus regimen as her glycemic control improved. With further improvement of blood counts and tapering of injection Dexamethasone, she was started on oral Dapagliflozin. Only basal insulin was



Figure 3. Follow-up Chest X-ray

administered at night since despite counseling she insistently denied multiple shots of insulin.

As her clinical condition improved, (Figure 3) she was counseled repeatedly on the consumption of a balanced diet and lifestyle modification. She was indeed obese and felt depressed about her inability to control her body weight. Her diet counselor asked her to take frequent small meals at 2 to 3 hourly intervals.

She was also evaluated by a psychiatrist who prescribed an antidepressant. She revealed she was stressed and unable to cope with the sudden changes that occurred due to the pandemic-related restrictions.

She was discharged on the twelfth day of admission with advice on continuing the use of an incentive spirometer. She was also asked to come for a follow-up after a week followed by three weeks to keep a check on any post-COVID complications that she is susceptible to due to multiple comorbidities.

Discussion

The 43-year-old morbidly obese (BMI >35 kg/m²) female presented to our hospital with fever and severe hypoxemia on day 5 of symptom onset. A 3-month prospective cohort study in hospitalized COVID-19 patients showed that on day 5 presence of dyspnea ($p = 0.015$) and at least three abnormal laboratory findings among CRP > 80 U/L, ALT > 40 U/L, NLR > 4.5, LDH > 250 U/L, and CK > 80 U/L (OR 2.80; 95% CI 1.35–5.81; $p = 0.006$) were independently associated with COVID-19 progression.^[4] Our patient had dyspnea and higher CRP, NLR and LDH than these threshold values with a CTSS of 17 and SpO₂ < 71%. Moreover, the patient was previously diagnosed with metabolic syndrome. Considering the clinical status, she was hospitalized and managed as per COVID-19 protocol.

It has been well-established that obesity and diabetes per se are independent risk factors for morbidity and mortality associated with COVID-19. Simonnet *et al.* reported that among patients admitted to intensive care for SARS-COV-2, 75.8% were obese (BMI > 30 kg/m²), indicating a high incidence of obesity among severely ill.^[5] When compared to ICU admissions the preceding year for severe acute pulmonary condition, the distribution of BMI groups was distinctly dissimilar in patients admitted with COVID-19. Compared to those with, patients without SARS-COV-2 infection demonstrated a lower prevalence of obesity (25.8%).^[6] Abdominal obesity phenotype is associated with a higher radiograph score in hospitalized patients with COVID-19 compared to BMI-based grouping. Patients

in a large population-based cohort, with central obesity assessed by their WHR, were also reported to be more likely to develop severe COVID-19.^[7] Therefore, in suspected COVID-19 cases in a hospital setting, we measure waist circumference, and monitor the patient closely as in the current case.^[7] The presence of obesity, particularly visceral obesity in a large proportion of patients with type 2 diabetes and its association with inflammation, impaired immunity, oxidative stress, and a mechanical restriction of ventilation has been postulated to be an important determinant of the prognosis of COVID-19 patients.^[3,4] A meta-analysis of 12 studies of COVID-19 in patients with diabetes concluded that though diabetes does not increase the risk of SARS-COV-2 infection, it is associated with a worse outcome of the disease.^[5] Another meta-analysis of 33 studies found a pooled odds ratio of 2.16 in terms of severity and mortality in diabetics.^[6] An epidemiological study found a mortality rate of 9.3% in patients with COVID-19 with diabetes as compared to 0.9% in those patients without any comorbidities.^[7] One of the largest studies comparing patients with and without hypertension with COVID-19 found that patients reaching the composite endpoint of intensive care unit admission, mechanical ventilation, and death were twice as high in the former group (35.8% vs 13.7%).^[8] Patients with metabolic syndrome are in a state of systemic inflammation which predisposes them to an increased release of cytokines.^[8] Cytokine storm has been implicated in severe SARS-COV-2 infections. IL-6 was indeed elevated in our patient together with other inflammatory markers to the critical range.^[9]

As in our patient, insulin remains the mainstay of treatment of any moderate to severe infection and that is not any different with SARS-COV-2. A study has reported that patients with hyperglycemia who are treated with insulin have a lower risk of severe disease.^[9]

SGLT2 inhibitors may lead to modest weight loss and also reduce elevated blood pressure. Since our patient denied multiple shots of insulin, she was switched to dapagliflozin and basal insulin after she stabilized. A hypothesis has been proposed that by preventing the lowering of cytosolic pH and thereby reducing the viral load, Dapagliflozin can avoid the severe course of COVID-19 infection.^[10]

The patient was administered pneumococcal and influenza vaccines considering the increased risk (15–36%) of mortality associated with these infections in a comorbidity like diabetes.^[11,12,13,14]

A holistic approach was adopted for the patient

in the current case because not only was she suffering from metabolic diseases but also was demotivated and psychologically stressed due to her excessive body weight and family issues, respectively. She was advised of a healthy lifestyle by the dietician. Our psychiatrist also counseled her to practice meditation to relieve stress and prescribed sertraline.

Conclusion

Thus, our entire team including an intensivist, diabetologist, critical care specialist, psychiatrist, pathologist, counselors, paramedics, and health care workers efficiently managed the obese COVID-19 patient with diabetes and hypertension.

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