



(CASE REPORT)



Acute uncontrolled hyperglycemia, a non-specific presentation and predictor of covid-19 severity- a report of three cases

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Abstract

Coronavirus disease 2019 (COVID-19) is a pandemic caused by the severe acute respiratory coronavirus 2 (SARS Cov-2) which currently has caused over 76 million cases with over 1.6 million people dead worldwide. COVID-19 can manifest with several non-specific clinical presentations, posing a diagnostic challenge. Several studies have shown an increased COVID-19 severity in patients with Diabetes mellitus. However, some patients with COVID-19 severity may present with new-onset Diabetes mellitus or worsening blood glucose control in a known diabetic. There are various mechanisms by which the SARS Cov-2 causes hyperglycemia in infected patients. This can lead to hyperglycemia as a presentation of COVID-19 in the absence of specific signs and symptoms. We present three cases: two of them initially presented with acute onset hyperglycemia and were diagnosed with Diabetes mellitus but shortly developed clinical manifestations that led to the suspicion of COVID-19 and a positive COVID-19 RT-PCR test. The third was a diabetic with previously good glycaemic control which suddenly worsened for no reason and shortly after, also developed clinical manifestations that led to the suspicion of COVID-19 which was later confirmed.

We recommend that patients with acute hyperglycemia state and/or worsening blood glucose control in patients with previously well controlled Diabetes mellitus should be evaluated for COVID-19 in order to reduce morbidity and mortality as hyperglycemia confers an increased disease severity

Keywords: Coronavirus disease 2019; COVID-19; Hyperglycemia; Diabetes mellitus; Case reports

1. Introduction

Coronavirus disease 2019 (COVID-19) is a pandemic caused by the severe acute respiratory coronavirus 2 (SARS Cov-2) which currently has caused over 76 million cases with over 1.6 million people dead worldwide as at 21st December, 2020 [1]. Several studies have shown an increased COVID-19 severity in patients with Diabetes mellitus with some patients presenting with new-onset Diabetes mellitus [2, 3]. Patients with COVID-19 may present with non-specific symptoms and this poses diagnostic challenges to the health care practitioner.

We present three cases: two of them initially presented with acute onset hyperglycemia and were diagnosed with Diabetes mellitus but shortly developed clinical manifestations that led to the suspicion of COVID-19 and a positive COVID-19 RT-PCR test. The third was a diabetic with previously good glycaemic control which suddenly worsened for

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no reason and shortly after also developed clinical manifestations that led to the suspicion of COVID-19 which was later confirmed.

2. Case reports

2.1. Case 1

A 42-year-old male with no known chronic illness presented with polyuria, polydipsia and polyphagia of 4 days duration associated with general malaise. There was no associated fever, chills, cough or breathlessness. Initially, he presumed these symptoms were due to malaria for which he self-medicated with antimalarials. However, there was no relief of these symptoms. He therefore presented to the emergency department. His vital signs revealed a body temperature of 36.2^oC, respiratory rate was 18 cycles per minute (cpm) and blood pressure of 138/92 mmHg. He had normal physical examination findings. Laboratory investigations were conducted. His laboratory results showed a high random blood glucose of 20.2 mmol/L, glycosuria of 3+ and hyperleukocytosis. Insulin therapy was commenced.

On the second day of admission, his condition suddenly worsened: patient was noticed to be hyperventilating with a respiratory rate of 47 cpm with an oxygen saturation of 70% on room air which improved to 83% on a non-rebreather mask at a flow rate of 15L/min. His blood pressure had increased to 206/111mmHg and the random blood sugar was 29.0mmol/L despite adequate insulin therapy. A COVID-19 RT-PCR test was requested which came back positive. On the fourth day of admission, patient developed left hemiplegia and dysarthria. A non-enhanced CT-scan of the head showed an acute right paramedian pontine infarct and minimal microvascular disease.

Patient was managed as a case of severe COVID-19 and was discharged after 14 days. He recovered with no neurological deficit on discharge. Blood pressure and blood glucose were well-controlled at the time of discharge. Patient is currently doing well on antihypertensives and lifestyle modifications for hyperglycemic control.

2.2. Case 2

A 61-year-old male was seen as an outpatient with complaints of polydipsia, nocturia, polyuria and polyphagia. He was diagnosed with Diabetes mellitus and started on Metformin and Gliclazide. He was compliant with these medications.

Two days after he was diagnosed with Diabetes mellitus, patient was rushed to the emergency department with a day's duration of dry cough, breathlessness, easy fatigability, worsening polyuria and polydipsia. There was no associated fever, chills, headache, dizziness or anosmia.

His vital signs showed a temperature of 37.2^oC, blood pressure of 150/90mmHg, respiratory rate was 28 cpm, pulse rate of 94 bpm. His random blood glucose was 20.4 mmol/L and oxygen saturation of 83 % on room air which improved to 95% on supplemental oxygen. The intensity of the breath sounds was reduced bilaterally on the lower lung zones and the quality was vesicular. A COVID-19 RT-PCR test requested was positive. A diagnosis of severe COVID-19 Pneumonia in a newly diagnosed Diabetes mellitus patient was made. Patient was referred to the COVID-19 treatment center. Patient unfortunately succumbed to COVID-19 on the second day at the treatment center.

2.3. Case 3

A 59-year-old male who is a known Diabetic, with good glycemic control ranging between 5.5-6.6 mmol/L on metformin, started experiencing general malaise, fever and body pains of a day's duration. Patient started a course of antimalarial treatment for his symptoms. Whilst taking the antimalarials, he noted worsening blood glucose levels despite his good adherence to his oral antidiabetic medications. He reported to the hospital on account of the high blood glucose.

During general assessment, he was afebrile, temperature of 37.1^oC, blood pressure was 132/84 mmHg, respiratory rate was 18 cpm, blood glucose was 23.2mmol/L and surprisingly his oxygen saturation was 88% on room air. He was not breathless or in respiratory distress. A chest X-ray requested showed bilateral lung infiltrate. A chest CT scan revealed ground glass appearance of the lungs. This clinical presentation and imaging findings prompted a COVID-19 RT-PCR test which came back positive.

He was subsequently referred to the COVID-19 treatment center where he unfortunately succumbed to the disease, a week after diagnosis.

3. Discussion

Hyperglycemia may be the initial presentation in patients with COVID-19 manifesting as a new onset Diabetes mellitus or high blood glucose in a previously well controlled Diabetic. Studies have shown that the Angiotensin Converting Enzyme 2 receptor used by SARS-Cov-2 for entry into target cells is also present on several tissues including lung, pancreatic beta cells, adipose tissues and small intestines [2, 3, 4]. The entry of the virus into pancreatic beta cells can lead to the destruction of the cells with resultant insulin deficiency and acute hyperglycemic states [3, 4, 5]. Other factors including cytokine production, which can lead to beta cells dysfunction and apoptosis with decreased insulin production and production of counterregulatory hormones such as glucagon and cortisol in the diseased state have been implicated in hyperglycemia in COVID-19 patients [6].

In the first case report, the patient had no previous chronic medical diagnosis and only presented to hospital with symptoms suggestive of Diabetes mellitus in addition to general malaise, nonspecific symptom. A presumptive diagnosis of malaria is assumed by most patients resulting in self-medication with antimalarials. This is a common practice which normally gives relief if the patient indeed has malaria. However, if the presumptive diagnosis is wrong, it results in delays in reporting to the hospital for a correct diagnosis and treatment to be made.

The patient's complaints of polyuria, nocturia and polydipsia is a common presentation of newly diagnosed Diabetes mellitus in the emergency room and this prompted the random blood glucose test which showed a high blood glucose of 20.2 mmol/L and glycosuria. The sudden onset of significant respiratory symptoms, hypoxia, hypertension and difficulty in blood glucose control despite adequate insulin therapy led to the suspicion and testing for COVID -19 which was not a clinical suspicion at the onset.

The second case developed significant respiratory symptoms within 48 hours after being newly diagnosed and started on treatment for Diabetes mellitus. This led to the clinical suspicion of COVID-19 which was later confirmed.

The patient with well controlled Diabetes mellitus in the third case had hyperglycemia associated with other non-specific symptoms. His blood glucose which was usually well controlled on metformin over several years was now ranging between 19-26mmol/L in the wake of COVID-19.

In all these cases, hyperglycemia preceded the clinical manifestations which led to the clinical suspicion and later diagnosis of COVID-19. Patients with acute onset Diabetes mellitus or worsening hyperglycemia in previously well controlled Diabetes mellitus should be evaluated for COVID-19 especially in scenarios where the control of the hyperglycemia becomes difficult. This will help in the early diagnosis of COVID-19 in these patients as they stand a risk of developing severe disease if infected, with the risk of increased mortality rates [7]. Appropriate interventions can then be instituted early to reduce mortality.

4. Conclusion

The various mechanisms by which the SARS Cov-2 causes hyperglycemia in patients infected can lead to hyperglycemia as a presentation of COVID-19 in the absence of specific signs and symptoms as presented by the patients in these case reports. Patients with acute hyperglycemia state and worsening blood glucose control in patients with previously well controlled Diabetes mellitus should be evaluated for COVID-19 in order to reduce morbidity and mortality as hyperglycemia confers an increased disease severity.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declare no competing interest.

Statement of ethical approval

Ethical approval for the study was obtained from the institutional ethics committee.

Statement of informed consent

Informed consent was obtained from the clients and relatives of participants included in the study.

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