

Managing type 1 diabetes during the COVID-19 pandemic

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Abstract

Coronavirus disease 2019 (COVID-19) has constituted a public health problem with international concern. None suggested that children and adults with Type 1 Diabetes Mellitus (T1DM) are more severely affected. The isolation of these patients has highlighted the need for telemedicine monitoring of subjects with COVID 19 in developing countries.

We report 2 imported cases of COVID 19 in patients with type 1 diabetes. Symptoms were dominated by a dry cough and anosmia. The viral shedding duration was 18 and 22 days in the two cases. Both patients had maintained correct blood glucose levels without ketoacidosis decompensation with regular medical follow-up by telephone. The post lockdown check noted the maintenance of the correct sugar levels as well.

Keywords: COVID-19, SARS-CoV-2, outbreak, pandemic, type 1 diabetes mellitus.

Key clinical message: Our case report has shown that COVID-19 can occur without any disturbance in blood sugar levels or other complications in patients with type 1 diabetes and have underscored the importance of medical surveillance and patient self-monitoring.

Introduction

Coronavirus disease 2019 (COVID-19) has aroused public health concerns recently and has spread globally (1). Although there are reports suggesting high mortality in adults with diabetes (2,3), none of them had suggested that children and adults with Type 1 Diabetes Mellitus (T1DM) are more severely affected by SARS-CoV-2.

After three months of closure, and reopening of borders at June 27, 2020, Tunisian health decision-makers have classified countries into three categories; green, orange and red. Patients arriving from countries classified as green do not need to do an RT-PCR test neither before travel nor in Tunisia, and home confinement is recommended especially in the presence of symptoms. Travelers arriving from red zone were obligatory contained in a hotel for 7 days, with a systematic RT-PCR test on the 5th day. If the test was negative, they continue their containment for another 7 days at home, however patient with positive test, without signs of gravity, were confined in Monastir medical center of Corona (hotel for COVID patients) [Table 1].

Viral shedding duration was defined as the date of return from the COVID-19 pandemic countries for imported cases and from the first positive RT-PCR test for local cases, up to the second negative nasopharyngeal RT-PCR swab.

Indeed, in order to limit the possible spread of COVID-19, the Tunisian government has hospitalized infected patients in this medical center with confinement, which has led to a change in the physical activity, diet and psychological status of individuals. All of these factors can have an impact on blood sugar control in patients with diabetes, particularly patients with type 1 diabetes who are on insulin therapy.

Phone call consultation was adopted to monitor COVID-19 patients in Monastir medical center of Corona.

The aim of our cases report was to describe SARS-CoV-2 infection symptoms, glycemic control and viral shedding duration during and after lockdown among two patients with type 1 diabetes.

Patient and observation (Table 2)

Case 1

A 35-year-old Tunisian man. He returned from Kuwait, on June 09, 2020 and he was directly confined in a hotel. A systematic nasopharyngeal swab RT-PCR test was positive for COVID-19 on June 13, 2020, that is why he was transferred to Monastir medical center of Corona. The onset of symptoms (dry cough and anosmia) occurred on June 15th.

He had a T1DM since 17 years, treated with insulin analogues (glargine: 28 UI injected in the evening at 8 p.m) and well controlled.

The glycemic control, insulin injections and the modifications of the dose according to the blood sugar levels were assured by the patient himself. He was well educated about the signs of hypoglycemia and hyperglycemia. He benefited from medical daily phone call consultations to be ensured for general condition monitoring and glycemic control.

During the containment period, the mean of glycemic control was 132 mg/l (SD:22) and no complications such as hypo or hyperglycemia were noted, average blood pressure was 112/72 mmHg (100/70-140/80mmHg) and average oxygen saturation was 98% (97-99%).

The evolution was marked by the disappearance of symptoms on June 27, 2020 and the RT-PCR test was negative for SARS-CoV-2 on June 29 and 48 hours later on July 1. The case was discharged from the medical center 16 days after first positive RT-PCR (viral shedding duration 18 days).

A phone call was made after 1 month of recovery. The patient had maintained well-controlled blood sugar levels (mean of glycemic control was 145 mg/l (SD:31))

Case 2

A 35-year-old Tunisian woman, returned from Belgium (classified as green zone), on July 12, 2020 and she had self-containment at home. The patient had called for a RT-PCR test on July 13 because she was complaining from a dry cough, anosmia, aguesia, flu syndrom and chest tightness, 4 days before her arrival in Tunisia (July 8). A subsequent nasopharyngeal swab RT-PCR test was positive for SARS-CoV-2 on July 14, 2020, that is why she was transferred to Monastir medical center of Corona.

She had T1DM since 8 years treated with human insulin (Insuman basal: 20UI in the morning at 8 a.m and 14 UI in the evening at 8 p.m. and actrapid 5UI in the morning at 8 a.m 5UI in the midday and 5UI in the evening at 8 p.m), well controlled. She also had hypothyroidism since 19 years treated with l-thyroxine, asthma since 8 years treated with Seretide and she was obese (BMI: 33Kg/m²).

The patient had no severe symptoms of infection and blood sugar levels were controlled. The glycemic control, insulin injections and the modifications of the dose according to the blood sugar levels were assured by the patient herself. She was well educated about the signs of hypoglycemia and hyperglycemia. Indeed, human insulin was available and well-conserved. The patient had also benefited from medical daily phone call consultations for general condition monitoring and glycemic control.

During the containment period, mean of glycemic control was 100 mg/l (SD:8) and no complications such as hypo or hyperglycemia were noted, average blood pressure was 120/70 mmHg and average oxygen saturation was 99%.

The evolution was marked by the disappearance of symptoms on July 23, 2020 and the RT-PCR test was negative for SARS-CoV-2 virus on July 28 and 48 hours later on July 30 (viral shedding duration 22 days). We did not note any diabetes complication. The total daily dose of insulin did not change significantly, as well as the rate of bolus and basal insulin.

Then, the case was discharged from the medical center 16 days after first RT-PCR. A phone call was made after 15 days of recovery. The patient had maintained well-controlled blood sugar levels (mean of glycemic control was 90 mg/l (SD:5))and glycated hemoglobin (HbA1c) was 6.5%.

Discussion

We report 2 cases of patients with type 1 diabetes infected by SARS-CoV-2, the 1st case had only diabetes like comorbidities, whereas, the 2nd case had also hypothyroidism, asthma and obesity. The symptoms were dominated by dry cough and anosmia, the viral shedding duration was 18 and 22 days. Both patients had maintained correct blood glucose levels without any decompensation. The post lockdown check noted the maintenance of the correct sugar levels as well.

Reported symptoms were especially dry cough and anosmia. According to an American multicenter study, symptoms of COVID-19 in patients with T1DM were dominated by high blood glucose (48.5%), elevated temperature (45.5%), dry cough (39.4%), excess fatigue

(33.3%), vomiting (33.3%), shortness of breath (30.3), nausea (30.2%), and body/headaches (21.2%). A smaller proportion (15%) of patients experienced chills, chest pain, loose stools, abdominal pain, loss of taste, and loss of smell (4).

The median duration of viral shedding was equivalent to the general population (20.0 days (IQR 17.0–24.0)) (5).

Our two patients were not obese. In the literature, the most prevalent comorbidity among patients with type 1 diabetes and confirmed case of COVID-19 was obesity (39.4%), followed by hypertension or cardiovascular disease (12.1%) (4).

The most prevalent adverse outcome within COVID-19 patients was diabetic ketoacidosis (DKA) (4). Whereas, glycemic control of T1DM did not worsen among COVID-19 patients, due to the healthcare professional assistance through telemedicine and continue monitoring glycemic control (CGMS) (6,7,8).

Telehealth or telephone consultations for sick day management and routine diabetes care should be encouraged to prevent complications and partially alleviate the problem of uncontrolled diabetes during such pandemics in the future.

In Tunisia we adopted the method of follow-up of patients by regular phone calls in addition to the clinical examination, as long as possible. This was pending the development of telemedicine, which had a major interest in pandemic situations.

Besides, technological advancements such as uploading records from insulin pumps/CGMS and remote monitoring should be used whenever possible to optimize blood sugar control. A program in diabetes self-management education in this pandemic should be included (9).

Conclusions

Our case report has shown that COVID-19 can occur without any disturbance in blood sugar levels or other complications in patients with type 1 diabetes and have underscored the importance of medical surveillance and patient self-monitoring in preventing the disease decompensation.

References:

1. Lai C, Shih T, Ko W, Tang H, Hsueh P. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019(COVID-19): the epidemic and the challenges. *Int J Antimicrob Agents*. 2020;105924.
2. Huang C, Wang Y, Li X. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497e506.
3. Zhou J, Tan J. Diabetes patients with COVID-19 need better blood glucose management in Wuhan, China. *Metabolism*. 2020;107:154216.
4. Osagie AE, Nudrat N, Mary PG, G Todd A. Type 1 Diabetes and COVID-19: Preliminary Findings From a Multicenter Surveillance Study in the U.S. *Diabetes Care*. 2020 Aug; 43(8):e83-e85.
5. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. 2020 Mar 28;395(10229):1054–62.
6. Tornese G, Ceconi V, Monasta L, Carletti C, Faleschini E, Barbi E. Glycemic control in type 1 diabetes mellitus during COVID-19 quarantine and the role of in-home physical activity. *Diabetes Technol Therapeut*. 2020;22:6.
7. Maddaloni E, Coraggio L, Pieralice S, Carlone A, Pozzilli P, Buzzetti R. Effects of COVID-19 lockdown on glucose control: continuous glucose monitoring data from people with diabetes on intensive insulin therapy. *Diabetes Care*. 2020;6:dc200954. <https://doi.org/10.2337/dc20-0954>.
8. Bonora BM, Boscari F, Avogaro A, Bruttomesso D, Fadini GP. Glycaemic control among people with type 1 diabetes during lockdown for the SARS-CoV-2 outbreak in Italy. *Diabetes Ther*. 2020;11:1369e79. <https://doi.org/10.1007/s13300-020-00829-7>.
9. Verma A, Rajput R, Verma S, Balania VKB, Jangra B. Impact of lockdown in COVID 19 on glycemic control in patients with type 1 Diabetes Mellitus. *Diabetes Metab Syndr*. 2020 September-October; 14(5): 1213–1216.

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