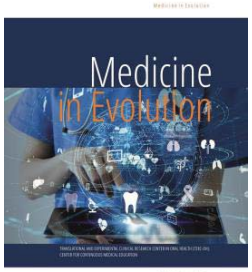
Case report of a patient with type 2 diabetes mellitus and severe Covid-19, successfully managed in Oradea Pelican Hospital



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Abstract

The coronavirus disease 2019 (COVID-19) pandemic began in China with a cluster of severe cases of pneumonia later identified as severe acute respiratory syndrome coronavirus 2 in December 2019. Diabetes is one of the most common comorbidities in people with COVID-19 with a prevalence ranging from 7 to 30%. Diabetics infected with SARS-CoV-2 have a higher rate of hospitalization, severe pneumonia, and mortality compared to non-diabetic subjects. Chronic hyperglycemia can compromise innate and humoral immunity. Moreover, diabetes is associated with a chronic low-grade inflammatory state that favors the development of an exaggerated inflammatory response and therefore the onset of acute respiratory distress syndrome. Control of blood glucose and comorbidities should be individualized to reduce the incidence of complications and decrease the burden on health systems. A special management of diabetic patients with COVID-19 infection is the association of a chronic respiratory pathology that becomes complicated after covid, requiring a multidisciplinary team to save the patient. Pulmonary fibrosis post-COVID-19 in the field of atopic bronchial asthma, in a patient with obesity, may require attention and coordination of the case depending on the complications that may develop after the SARS-CoV-2 infection.

Keywords: COVID-19, Diabetes, pulmonary fibrosis, bullous dystrophy

INTRODUCTION

During the COVID-19 pandemic, it was observed that patients with diabetes, obesity and chronic lung diseases in personal history had much more serious forms of COVID-19, compared to the general population. The risk of death existing in conjunction with the development of post covid life threatening complications. The need to closely monitor these patients is justified and without the existence of a multidisciplinary team it can endanger their lives.

Aim and objectives

The development of a pulmonary complication of the pulmonary fibrosis type and the appearance of a bullous dystrophy in a patient with atopic asthma may require both the patient, through serial presentations for close monitoring, and the team to choose the optimal operative moment in order to solve a post COVID-19 complication. The following case that we propose for presentation is a revealing one for the particular case management of patients with chronic lung disease and diabetes mellitus which develop a pulmonary complication after hospital release.

MATERIAL AND METHODS

The reported clinical case was selected from the cases admitted in the Medical Department, Covid Section of the Pelican Hospital Oradea.

CASE STUDY

RESULTS

We present the case of a type 2 diabetic patient, age 46, admitted to the Pelican Hospital Oradea, with fever (38^0C), inspiratory dyspnea, asthenia, myalgias, adynamic, productive cough, headache, loss of appetite, SaO2 90-92 %, positive PCR (polymerase chain reaction) test, condition that started 3 days before presenting to the hospital. We mention that the patient underwent prior to admission to outpatient treatment protocol with, anti-inflammatory treatmment, antitussive, vitamins (C, D3, Zn) at the recommendation of the family doctor.

Patient consent was obtained to report this case.

From the patient's pathological history, it is noted that he has several comorbidities: HTA (artreryal hypertension), atopic bronchial asthma, hyperuricemia, tipe 2 diabetes mellitus, obesity (BMI 30).

Immediately after admission to the covid department, blood samples were collected for evaluation and treatment was instituted in accordance with the protocol. A pulmonary CT scan was performed, which shows the appearance of frosted glass, characteristic of the average form of COVID-19 (figure 1).

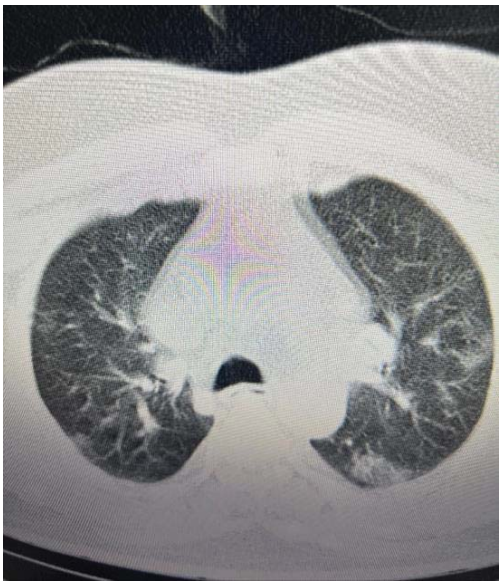

Figure 1. Pulmonary CT scan with frosted glass image

Oral antivirals and antibiotics were administered due to the fact that he had a fever with a productive cough in order to prevent the onset of bacterial pneumonia. The oxygen saturations, with all the medication administered, did not improve, the doses of oxygen on the facial mask were progressively increased, the blood sugars began to rise from 140 mg/dl at admission, to 300-400 mg/dl in the fourth day after admittance, when it was decided to institute the treatment with insulin. After 6 days of hospitalization in the Covid ward, the patient's condition worsen, SaO2 (oxygen saturation) drops to 40%, at which time he is transferred to the Intensive Care Unit, and requires emergency orotracheal intubation and mechanical ventilation on SIMV (synchronized intermittent mandatory ventilation) with FiO2 (fraction of inspired oxygen) of 0.8%

In these critical moments, the team decide to administer intravenous antibotics, antiviral therapy, interleukin 6 inhibitors, convalescent plasma according to COVID-19 treatment protocol, the patient has been in the ICU (Intensive Care Unit) for 5 days, thus ensuring the necessary hydric and caloric supplies.

After 5 days of IOT (orotracheal intubation) and VM (mechanical ventilation), the patient is extubated and put on a CPAP-NIN mask after 5 days. The patient's nutritional status is precarious, reaching muscle hypotonia and the inability to get out of bed and walk. Food consisting of pureed preparations and protein solutions were administrated.

Daily physiotherapy sessions and breathing exercises begin.

The patient is kept on the CPAP mask for 15 days, physical therapy is intensified within the limits of the patient's possibilities, during this period a slight improvement of movements was observed within the limit of the physical effort allowed.

After 15 days of the CPAP mask, the patient is put on an oxygen mask, thus having saturations of up to 98%, the insulin treatment continues, blood sugar levels begin to regulate, physical therapy and breathing exercises are continued.

The patient is later discharged after 45 days of hospitalization (from 29.11.2020-15.01.2021) in an improved general condition with an oxygen mask at home, using it very rarely.

In the outpatient clinic, physiotherapy exercises follow, the general condition improving from one day to the next.

From March 2021, he presents himself monthly for evaluation to a pneumology, where a lung CT is repeated in March 2021, on which the appearance of pulmonary fibrosis is observed accompanied by bronchial dilatations of emphysema bubbles (figure 2).

Figure 2. Emphysematous image on pulmonary CT scan

Biological samples collected at hospital admittance, in the day of intubation and in the day of patient release from the hospital are presented in the following table (Table 1).

Table 1. Biological samples collected in the first day, in the 7 th day and at the release day from hospital; abbreviation used CRP- C reactive protein, ALT-alanine transaminase, AST-aspartate aminotransferase, FBG-fasting blood glucose

	DAY 1 (admitance)	DAY 7 (intubation)	DAY 48 (release)
CRP	21.17mg/mL	68.23mg/dl	16.2 mg/dl
FERITINE	458.9 ng/ml	966.6ng/ml	452ng/ml
ALT	32U/L	43.4 U/L	31U/L
AST	28U/L	33.7 U/L	35 U/L
LYPHOCYTES	1.47 $\cdot 10^3/\mu L$	0.57 $\cdot 10^3/\mu L$	1.07 $\cdot 10^3/\mu L$
LEUKOCYTES	5.27 $\cdot 10^3/\mu L$	6.19 $\cdot 10^3/\mu L$	5.45 $\cdot 10^3/\mu L$
FBG	312 mg/dl	450 mg/dl	312 mg/dl
SERUM CREATININE	0.91 mg/dl	0.81 mg/dl	0.9 mg/dl
SERUM GLUCOSE	140mg/dl	440 mg/dl	180 mg/dl

In the period 18.01.2022-25.01.2022, the patient is admitted to undergo surgery for bullous emphysema.

The recommendations at discharge are to avoid physical efforts and exposure to noxes and the cold weather, to continue physiotherapy and respiratory gymnastics.

DISCUSSIONS

The patient presented above is with long history of diabetes mellitus tested before admission by RT-PCR test for SARS-CoV-2; his severe case rapidly progressed to respiratory distress syndrome. Our patient belongs to the category with risk factors with a demonstrated higher risk of developing a severe form of disease, as well as a higher risk of mortality (1).

We will summarize a special situation of SARS-CoV-2 infection in diabetic patient and the impact of pandemic on the life of a patient with chronic pulmonary disease as comorbidity, knowing that the second most common comorbidity in the disease of COVID-19 is diabetes (2).

Potential mechanisms that may increase the susceptibility of diabetic patients to COVID-19 include: 1) higher affinity cellular binding and efficient entry of virus, 2) decreased viral clearance, 3) decreased T cell function, 4) increased sensitivity to hyperinflammation and"cytokine storm" syndrome and 5) the presence of CVD(cardiovascular disease), mechanisms, which our patient presented during hospitalization, the cytokine storm occurring on day 10 after hospitalization, when he required IOT [3].

According to the length of hospitalization and the treatment administered, the patient's condition improves, so that upon discharge from the hospital, oral antidiabetic treatment with SLGT2 (Sodium-glucose Cotransporter-2) inhibitors is resumed, having beneficial effects on cardiovascular and renal risk.

After discharge from the hospital, the patient became aware of the risk of the disease he went through, as well as the risks of comorbidities, and therefore started a new lifestyle in terms of nutrition, physical and respiratory exercises. After approximately 1 year (2022) the BMI (body mass index) has gradually decreased from 30 to 27, the blood sugars levels are on target, and he regularly presents himself for cardiological, metabolic and respiratory evaluation.

Context-specific strategies show the capacity of health systems to sustain essential health services during the pandemic. The link between pandemic responses and health care utilization can inform purposeful strategies to ensure communities have access to care and provide lessons for promoting high health service utilization [5]

The patient continued to receive prescribed medication and received high-quality medical care from staff specially trained to treat patients with COVID-19. These included chest physiotherapy maneuvers including deep breathing exercises (wearing a mask to reduce aerosols) and encouraging self-reclining according to the UK Intensive Care Society Guidelines [6].

CONCLUSIONS

We present this case report as an example of successful management using standardized, evidence-based treatment guidelines according to WHO guidelines [4]. Successful management of severe hypoxic disease COVID-19 includes oxygen titrated to SaO2, prone position to improve pulmonary perfusion, dexamethasone (if not contraindicated), and effective multidisciplinary teamwork.

At the current moment 2024, the patient in question, as a result of the efforts made by an interdisciplinary team makes physical effort limited to a sports basis.

After discharge from the hospital, the patient became aware of the risk of the disease he went through, as well as the risks of comorbidities, as a result he started a new lifestyle in terms of nutrition, physical and respiratory exercises. After approximately 1 year (2022), it can be said that the BMI (body mass index) has gradually decreased from 30 to 27, the blood sugars are on target, as well as FBG and he regularly presents himself for cardiological, metabolic and respiratory evaluation.

In the year 2024, the patient is in good health, maintains his weight, has gained muscle mass as a result of physical exercises, respects the food strategy and blood glucose monitoring.

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