

Clinical Manifestations of SARS-CoV-2 Infections: A Case Study

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Received: July 02, 2020; **Published:** August 10, 2020

Abstract

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has caused an ongoing global pandemic in the world. Scientists and physicians have joined efforts to successfully manage the situation, however since consensus has not been reached yet about the proper management of SARS-CoV-2, it is imperative for physicians to exchange information about the clinical management of the patients affected by the virus. We present a case study of a male patient affected by the SARS-CoV-2 virus, who received successful treatment into the City Hospital, in Kutaisi, Georgia.

Keywords: *Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); Middle East Respiratory Syndrome (MERS); World Health Organization (WHO)*

Introduction

It is hard to dismiss the tremendous impact the Coronavirus Outbreak has had on the world, establishing a new status quo in the medical and economic sectors of a large number of countries. The approach adopted by scientists as well as governments varied across the countries, while some ratified fairly strict regulations in controlling the pandemic, others have embraced a more liberal approach. In hindsight, it is important to evaluate the strategies utilized by different countries, to prepare for the possible second wave of the infection, or a similar viral outbreak in the future.

Even though not much was known about the virus in 2019, it was last year when the first report appeared about a cluster of pneumonia cases with unknown cause in China [1]. Soon after, the health authorities established the connection to Huanan Seafood Wholesale Market, where animals were held in livestock, due to a high risk of infectious spread, the market was soon shut down (2020). Trying to understand the source of the spread of the virus is out of the scope of this article, however, it is important to understand the timeline of the outbreak. On January 12th, the World Health Organization (WHO), named the virus as the 2019 novel coronavirus or 2019-nCoV [2]. By the end of the month, the novel coronavirus was declared as a public health emergency of international concern (2020). The International Committee on Taxonomy of Viruses renamed the virus to acute respiratory syndrome coronavirus 2 (SARS-CoV-2). By the time the world's attention was turned to SARS-CoV-2, the number of confirmed cases in China reached 77,041, exceeding the numbers reported in the Severe Acute Respiratory Syndrome (SARS) outbreak in 2002 [2].

The reason why SARS-CoV-2 is often compared to SARS as well as the Middle East Respiratory Syndrome (MERS), is because all three viruses belong to the same B-coronavirus cluster [2] and all three have been responsible for human epidemics in 2012 [1]. It has been

established that the SARS-CoV-2 is a chimeric virus between a coronavirus infecting bats and a coronavirus of unknown origin (2020). However, even if the initial origin of the virus is from bats, not much is known about the intermediate hosts [2]. Since not a lot of evidence-based information is confirmed regarding Covid-19, it becomes imperative to compare the viral biology of the new coronavirus to SARS and MERS, in order to better comprehend its clinical management.

Georgia, which is a small Eastern European country, has had surprising success in managing the COVID-19 pandemic. In order to rationalize and justify what is meant under “success” it is important to evaluate the control of pandemic on a multitude of levels, whether it will be policies established by the government, the role of society’s adaptation to the new regulations, the effect of the virus on the economic sector, clinical management of the disease, etc. The first case reported in Georgia was on February 26th. The number of confirmed cases as of now reaches 843, including the recovered number of patients 696 and fatal outcomes in 13 cases. This paper aims to present the clinical characteristics of Covid-19 confirmed patient, in Kutaisi, Georgia to exchange information between healthcare workers in Georgia, and across the world about the successful management of the disease.

Case Presentation

A.A. was admitted to the City Hospital, on 26.03.2020. It was revealed that the patient arrived from Spain on the 20th of March, via traveling through France. The patient was kept in self-isolation, according to the protocol provided by the Georgian government. 4 days later, while in self-isolation he developed the first episode of low-grade fever: 37.5°C and generalized weakness. The patient began antipyretic therapy. Since his symptoms worsened over time, he was transferred to a hospital by an ambulance.

On arrival to the ER department, the patient’s chief complaints included hyperemia 38°C, SOB, generalized weakness, nausea, and dizziness. The vitals included: t-37.8°C, P-96’. T/A-170/90 mmHg, R-24, SPO₂-93%. Physical examination of the patient revealed the following abnormalities: swollen lower extremities, wheezing heard on pulmonary auscultation, crepitations in the left subclavian area, dryness of the tongue, hyperemia of the throat and abdominal distention. The patient also complained of increased bowel movement frequency, 3 - 4 times/day and changes in stool consistency. The patient also complained of decreased urinary frequency. Due to traveling history and high suspicion of clinical presentation, a nasopharyngeal swab was performed to test the patient for SARS-CoV-2, the result was confirmed to be positive. On admission, the patient’s health status was evaluated as moderately severe.

The Past Medical History of the Patient is significant for chronic illnesses, which include arterial hypertension, arrhythmia and chronic heart failure. The patient was diagnosed with a testicular tumor 3 years ago, for which he received radiation therapy. Currently, he is under the supervision of an oncologist. His last PSA control, which was done three months ago, was normal. The patient is taking the following medications: Doxazosin, Enalapril, and Amlodipine.

Upon confirmation of the SARS-CoV-19 infection, Chest X-Ray was performed to assess the degree of damage to the lungs. The image showed left-side pneumonia. The following treatment was started: Ceftriaxone 1g IV twice daily, Captopril 25 mg once or twice daily per os, Sol Ringer 500 mL IV twice daily, Furosemide 2 mL IV on demand. Laboratory analysis also revealed high Creatinine levels, proteinuria, and leukocyturia.

The next day, despite the antibiotic treatment, the patient’s fever spiked in the range of 38.5°C - 39.5°C. The patient complained of: generalized weakness, SOB, productive cough tinged with a rusty color, and nasal discharge. The patient underwent additional radiological studies such as an ultrasound of the pleural cavity and heart Echo, as well as the thoracic CT. The CT revealed multifocal, bilateral pneumonia. Based on the worsening clinical presentation and radiological data, the treatment of the patient was modified to Meropenem 1g IV thrice daily, Vancomycin 500g IV twice daily, Hydroxychloroquine 200 mg twice daily per os, Clexane 0.4 mL sub-cu.

On the 29th, the general condition of the patient was evaluated as stable, even though the patient was still pyretic with a fever of 38.5°C. The patient complained of SOB, generalized weakness, productive cough, and nasal discharge. The patient also described a heavy sensation across the projection of the heart borders. No significant changes were revealed during the physical examination. Laboratory analysis showed a decrease in creatinine levels which were elevated on admission: CREA 13.56 mmol/L. Other changes include increased CRP and D-dimer. The treatment plan was updated and the following changes were made: Meropenem 1g IV thrice daily, Captopril 25 mg as needed, per os, Vancomycin 500g IV twice daily, Enterol 250 mg twice daily, per os, Pantoprazole 40 mg once daily per os, Paracetamol 500 mg as needed, Metamizole Sodium 2.0 ml and Diphenhydramine 1.0 ml IM as needed, Clexane 0.4 mL sub-cu, Amlodipine 10 mg per os, Calcium Gluconate 10 mL IV. The patient was also given an infusion of 0.9% NaCl 500 mL, Vit "C" 4.0 mL, Dexamethasone 1.0 mL, Citoflavin 10.0 mL for three hours, 40 - 45 drops/minute.

From the 29th to 16th the patient's condition was stable, without drastic clinical changes. The treatment was continued according to the scheme presented above, the patient was managed under close monitoring. On the 16th, the patient's hemodynamic parameters have improved: t-37.3°C, P-79, T/A 130/85 mmHg, R-22, SPO₂-94%. Lung auscultation revealed wheezing in the lower lobe, more prominent on the left side. For the next three days, the patient was given an IV infusion of 0.9% NaCl 500 mL and 1000 mg Vancomycin. On the 17th the vitals signs of the patient continued to be stable: Vitals: t-36.5°C, P-79, T/A 130/85 mmHg, R-22, SPO₂-96%.

The nasopharyngeal test was performed twice, according to the guidelines provided by WHO. The swab was negative on the 17th and on the 18th. For the last two days, prior to admission, the patient was given the following medications: Captopril 25 mg per os as required, Pantoprazole 40 mg once daily per os, Enterol 250 mg twice daily, Hydroxychloroquine 200 mg twice daily per os, Paracetamol 500 mg as needed, Metamizole Sodium 2.0 ml and Diphenhydramine 1.0 ml IM as needed, Clexane 0.4 mL sub-cu, Amlodipine 10 mg per os, 250 ml Moxifloxacin IV once daily, 100 mg Cardioaspirin per os.

Discussion

A global pandemic can be analyzed from various angles, among which understanding the epidemiological characteristics of the virus is of prime importance. It has been reported that the fatality rate in males is higher compared to females and the disease presentation was also more complicated in male patients [3]. The variation in clinical outcomes between genders can be dependent on the differences in terms of sex biology or various social factors. The numbers provided by researchers are calculated in a small portion of time, therefore it would be important to recalculate the findings when more data is available. It is also interesting to conduct studies analyzing the differences in epidemiological data between countries. Such analysis will shed light on possible geographical variations, in terms of the manifestation and the management of the disease.

It can be argued that understanding the common presentation of the SARS-CoV-2 virus, is the most important step in diagnosing the disease. The quick clinical recognition will become even more important during the possible second outbreak of the virus, especially if it will correspond with higher rates of other respiratory tract infections such as the seasonal flu. Huang, *et al.* [4] analyzed the clinical manifestations of 41 confirmed SARS-CoV-2 patients in Wuhan, China (2020). The team showed that 98% of patients presented with fever, among which 78% developed fever higher than 38°C, followed by cough in 76%, fatigue and myalgia in 55%, dyspnea in 8% (2020). Symptoms such as hemoptysis and diarrhea were much less common, 5% and 3% respectively (2020). Other studies have had similar results, Guen, *et al.* also showed that fever and cough are predominant symptoms in patients with confirmed SARS-CoV-2 infection (2020). The group has analyzed 1099 cases, out of which 87.9% developed fever and 67.7% presented with cough. The case study presented in this paper also follows this pattern of clinical manifestation. As described above, the chief complaint of the patient presented in this paper was fever, accompanied by cough, SOB, fatigue, and diarrhea, which corresponds to the descriptions given by the international studies. The initial chief complaint of diarrhea is relatively rare as compared to other symptoms and is only present in approximately 10% of patients

[5]. Unfortunately, these symptoms are not specific to SARS-CoV-2 and can accompany almost any viral respiratory infection, making the preliminary diagnosis almost impossible.

One of the most common complications following the Covid-19 infection is Acute Respiratory Distress Syndrome (ARDS). Importantly, as it was demonstrated by Huang [4] the diagnosis of the infection to the development of ARDS could be as short as 2 days (2020). It becomes important to not only understand what are the possible complications of the virus but to also measure the approximate time, these complications might manifest. Such an approach is important not only in the hospital setting, but also in the quarantine zones, where susceptible individuals are under monitoring.

The hardest part about SARS-CoV-2 pandemic is the lack of successful treatment options. Even though large pharmaceutical agents are involved in producing novel medications, including vaccines no particular medications keeps the upheaval for a prolonged period of time. With this phase of trial and error, it is important to share the clinical experiences among doctors to guarantee better results and more cohesive treatment options. Current management has two primary goals: 1) symptomatic relief and 2) prevention of complications. The treatment plan is not universally accepted by all countries, therefore comparison of the successful management outcomes could give clinicians information about what substitutes the best treatment option.

Designing a vaccine targeting the virus would be an easy solution to the SARS-CoV-2 pandemic, however, this is a lengthy process, complicated by scientific challenges as well as bureaucratic complications. Lurie, *et al.* [6] even argue that by the time the vaccine is developed the pandemic might be even over, as this has already happened in the past regarding Zika and SARS vaccines (2020). The article also summarizes different approaches, adopted by scientists to develop optimal vaccines, which in the best case starting from viral sequencing to clinical trials would happen in 16 weeks (2020). Regarding SARS-CoV-2, a lot of hope has been established around the virus's spike protein, however, targeting the full-length protein vs only the receptor-binding protein still remains an issue (2020). As was mentioned above, scientists draw much of the information about the novel coronavirus, from their past experiences with dealing with SARS and MERS. Unfortunately, while working on vaccines for these two coronaviruses it has been shown that the vaccine could cause lung damage via antibody-dependent enhancement, thus again underlining the importance of right animal models and prolonged clinical trials (2020). Scientific dilemmas aside, when it comes to dealing with a global problem, it is also important to consider societal values, for example, if multiple vaccines will be available in the second half of 2020, handling regulations of multiple trials and vaccines, can be tricky, both on an organizational and ethical level (2020). Additionally, private-sector partners should be protected from financial costs and fair allocation must be ensured (2020).

Conclusion

Early investment in characterizing the clinical progression of SARS-CoV-2 virus, is important for proper management of the pandemic, especially if we take into account the high chance of an upcoming second wave of peak.

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Volume 9 Issue 9 September 2020

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