

A case of influenza A and COVID-19 co-infection in a patient with severe asthma

Similarities and differences between the two viruses

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ABSTRACT

A novel coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulting in an acute respiratory illness has been recently emerged to a pandemic. COVID-19 pandemic developed in a season when influenza was prevalent. Influenza is well known to cause respiratory infection with other respiratory pathogens, however, limited data exists concerning COVID-19 and influenza co-infection. Both viruses seem to share transmission characteristics and clinical manifestations. Asthma, on the other hand, a chronic inflammatory condition involving the airways seems to be a risk factor for severe COVID-19 illness. It is important for pulmonologists to be aware of such potential co-infections in order to be able to early recognize them and prevent disease progression and death. We report the case of a patient with severe asthma, receiving biologic treatment, with a history of a recent travel abroad, who presented co-infection of influenza A and SARS-COV-2, reviewing as well the literature concerning the similarities and differences between the two viruses. *Pneumon 2020, 33(4):1-5.*

INTRODUCTION

At the end of 2019, a novel emergent coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first recognized in Wuhan, China resulting in an acute respiratory illness.¹ As of 1st August 2020, the COVID-19 has emerged to a pandemic and has affected over 17.354.751 confirmed cases, resulting in more than 674.291 deaths globally.² COVID-19 pandemic developed in a season when influenza was prevalent. Influenza is well known to cause respiratory infection with other respiratory pathogens, however, limited data exists concerning COVID-19 and influenza co-infection. Both viruses seem to share transmission characteristics and clinical manifestations.

Asthma is a life-long chronic inflammatory condition involving the airways

with varying pathophysiological mechanisms representing a risk factor for severe COVID-19 disease and death.³ Despite the fact that asthma is generally controlled by conventional therapies including inhaled corticosteroids and long-acting β 2 agonists, a small subgroup of patients suffers from severe disease either partially controlling or uncontrolling it.⁴ For such patients with atopic asthma, characterized by eosinophilia and excess of Th2-type lymphocytes and their secreted interleukins, new biologic treatment options are currently available, including mepolizumab, an anti-IL5 agent.⁵ We describe the case of a 71-year-old asthmatic female, who was receiving mepolizumab and presented a co-infection of influenza A and SARS-COV-2.

CASE PRESENTATION

A 71 year-old female, ex-smoker (60 pack-years) was admitted to our department complaining for progressive shortness of breath on exertion and fever with a maximum temperature of 38.9°C as well as a non-productive cough. She denied chest pain. She reported a recent travel abroad. Her medical history was remarkable for severe asthma receiving mepolizumab. Due to her recent trip, nasopharyngeal swab was sent for SARS-COV-2 testing, which was positive, while the influenza A test was reported positive as well. Her vital signs on presentation were tachypnea and tachycardia, with a resting respiratory rate of 20 breaths/min, heart rate of 120 beats/min, blood pressure of 140/100



FIGURE 1. Chest radiograph showed homogeneous opacities as well as a small pleural effusion on the right side of the chest.

mmHg and mild hypoxemia with oxygen saturation of 88% on room air. She was oriented. Lung examination was notable for tubular blowing on the right upper side of the chest. The patient's laboratory test results revealed leukocytosis 15,510 cells/mL, in which neutrophils were elevated 13,770 cells/mL, while the lymphocytes were 1,08 cells/mL. The patient's procalcitonin was elevated 6.99 μ g/L as well as C-Reactive protein, which was 351 mg/L. Chest X-ray showed homogeneous opacities as well as a small pleural effusion on the right side of the chest (Fig 1). Computerized Tomography Pulmonary Angiography (CTPA) was performed and excluded pulmonary embolism. It confirmed the upper lobar consolidation (Fig. 2, 3) Diagnostic thoracentesis revealed neutrophilic exudate with negative Gram stain and cultures. Urine

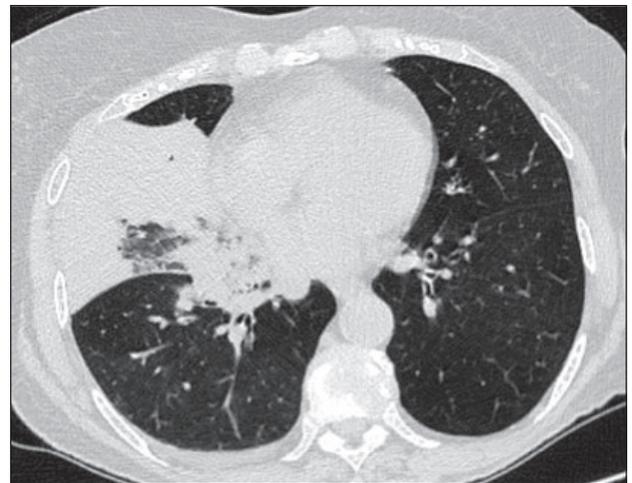
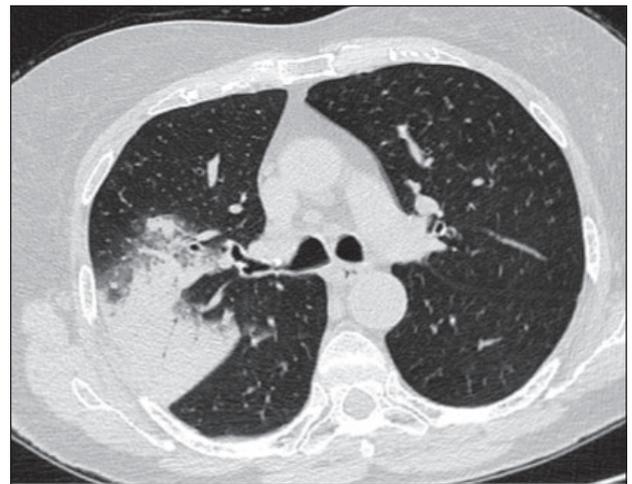


FIGURE 2, 3. Chest computed tomography confirmed an upper lobar consolidation and a small pleural effusion.

antigens testing for *Streptococcus pneumoniae* as well as *Legionella pneumophila* were negative. A Seldinger chest drain was inserted, while the patient received broad-spectrum antibiotics- ampicillin/sulbactam and azithromycin in combination with oseltamivir and she gradually improved. The patient was discharged from the hospital after remission of her symptoms. During her care at the hospital, she received the scheduled dose of mepolizumab as properly. She is closely followed-up and has complete clinical recovery.

DISCUSSION

The first COVID-19 case was diagnosed in Greece on February 26th. As of March 30th, Greece had 1.212 confirmed cases and 46 deaths. As COVID-19 pandemic emerged in a season when influenza was prevalent, comparisons have been made between the two viruses. Both can cause respiratory disease sharing clinical manifestations, however, there are important differences between the two viruses and how they spread.⁶ We report a case of an asthmatic patient, who was receiving mepolizumab and presented with fever due to co-infection of influenza A and SARS-COV-2.

SARS-COV-2 and influenza viruses have a similar disease presentation. Both cause respiratory disease, presenting with a wide range of illness from asymptomatic to severe disease and death.⁶⁻⁹ Concerning COVID-19, most patients (80%) present with mild illness, including uncomplicated upper respiratory tract viral infection symptoms such as fever, fatigue, cough, anosmia, anorexia, malaise, muscle pain, sore throat, nasal congestion, headache and gastrointestinal such as diarrhea.¹⁰ Approximately 15% of patients develop severe disease with respiratory failure and 5% have critical disease with complications requiring ventilation.¹¹ However, the aforementioned proportions of severe and critical infection are higher than those observed for influenza infection.

Secondly, both viruses are transmitted by contact, droplets and fomites.⁷ It has been proposed that transmission of SARS-COV-2 occurs mainly from symptomatic people by close contact through respiratory droplets, by direct contact with infected persons, or with contaminated objects and surfaces.¹²⁻¹⁵ However, the speed of transmission between the two viruses represents an important point of difference. Influenza has a shorter median incubation period that is the time from infection to appearance of symptoms and a shorter serial interval, the time between

successive cases than SARS-COV-2 virus. Particularly, the serial interval for SARS-COV-2 virus is estimated to 5-6 days, where as for influenza is 3 days suggesting that influenza can spread faster than SARS-COV-2.⁷

In addition, our patient presented with lobar pneumonia, however, both viruses can present similar imaging features on chest-computed tomography. The typical radiological features include ground glass opacities, peripheral consolidations and patchy lesions.¹⁶ According to our opinion, although the clinical spectrum of SARS-COV-2 infection is still being defined, bacterial superinfection could be a possible reason for the patient's pleural effusion despite the lack of bacterial isolation in successive cultures.

Another difference between the two viruses is that children seem to be important drivers of influenza virus transmission in the community.⁷ For COVID-19 virus, data indicates that children are less affected.⁷ One the other hand, those most at risk for severe influenza infection are children, pregnant women, elderly, and patients with underlying chronic medical conditions or immunosuppressed. Concerning COVID-19, older age, smoking and underlying diseases such as diabetes, hypertension, cardiac disease, chronic lung disease and cancer, have been reported as risk factors for severe disease and death.^{17,18}

Patients with asthma, especially severe have been identified as being at increased risk of serious illness from COVID-19.¹⁹ Furthermore, a recent large English cohort study confirmed that asthma was associated with an increased risk of in-hospital death from COVID-19, with higher risk presenting those with oral corticosteroid use.¹⁹ Atopic asthma is characterized by high immunoglobulin IgE or eosinophilia and it represents approximately 50% of asthmatic patients.^{4,5} As interleukin IL-5 constitutes the fundamental cytokine promoting the differentiation and survival of eosinophils, specific biologic therapeutic agents, such as mepolizumab have been approved as add-on therapy for severe eosinophilic asthma.^{4,5} This humanised monoclonal antibody is capable of binding to human IL-5 with high affinity and specificity resulting in significant improvement of health-related quality of life, lung function and exacerbations in patients with severe eosinophilic asthma.^{4,5} During COVID-19 pandemic, it is broadly recommended that asthma medications should be continued as usual. Among others, people is suggested to manage their asthma as well as possible to reduce risk from COVID-19 that is continue prescribed medications, avoid known triggers, review inhaler techniques and use asthma action plans. Our

patients did not present an asthma exacerbation. She did not suffer from symptoms of bronchospasm and wheezing. This observation is compatible with previous data from hospitalized patients in China whom also did not report similar symptoms.²¹

Concerning co-infection, it seems that few patients with COVID-19 experience a secondary bacterial infection.²⁰ A recent systematic review of hospitalized patients with COVID-19 reported only 8% as experiencing bacterial/fungal co-infection.²² Concerning influenza virus, it represents a common pathogen during the winter that can cause pneumonia. However, very few patients are diagnosed with both COVID-19 and influenza. In a recent study that examined the clinical characteristics of patients co-infected with both COVID-19 and influenza, only 5 out of the 115 confirmed cases with COVID-19 were diagnosed with influenza virus infection, with three patients having influenza A and other two influenza B.¹⁶

CONCLUSION

Influenza and COVID-19 co-infection can occur in patients and both present with similar symptoms. It is essential for the clinicians to recognize potential co-infections with other respiratory viruses for the COVID-19 patients in order to prevent disease progression and death. Patients should be encouraged to be vaccinated against pathogens causing respiratory infections to reduce the risk of co-infection. As a result, the same public health measures, such as hand hygiene, physical distancing, use of masks and respiratory etiquette are important actions that can contribute to prevention of both infections.

CONFLICTS OF INTEREST

None

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ΠΕΡΙΛΗΨΗ

Συλλοίμωξη γρίπης τύπου Α και COVID-19 σε ασθενή με σοβαρό άσθμα. Ομοιότητες και διαφορές μεταξύ των δύο ιών

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Στα τέλη του 2019, εμφανίστηκε ένα νέο στέλεχος κορονοϊού, ο SARS-CoV-2, ο οποίος προκαλεί σοβαρή λοίμωξη του αναπνευστικού, τη νόσο COVID-19 και πρόσφατα αναβαθμίστηκε σε πανδημία. Η νόσος COVID-19 αναπτύχθηκε την εποχή, στην οποία η γρίπη επικρατεί. Είναι σήμερα γνωστό ότι η γρίπη μπορεί να προκαλέσει λοίμωξη του αναπνευστικού μαζί με άλλα παθογόνα, παρόλ' αυτά περιορισμένα δεδομένα υπάρχουν σχετικά με τη συλλοίμωξη με COVID-19. Και οι δύο ιοί φαίνεται ότι μοιράζονται κοινά χαρακτηριστικά και κλινικές εκδηλώσεις. Το βρογχικό άσθμα, από την άλλη μεριά, αποτελεί μια χρόνια φλεγμονώδη νόσο των αεραγωγών και παράγοντα κινδύνου για εμφάνιση σοβαρής νόσου COVID-19. Είναι σημαντικό για τους πνευμονολόγους να είναι ευαίσθητοποιημένοι στο ενδεχόμενο συλλοίμωξης προκειμένου να την αναγνωρίζουν και να την αντιμετωπίζουν έγκαιρα. Αναφέρουμε μια ενδιαφέρουσα περίπτωση ασθενούς με σοβαρό άσθμα, υπό βιολογικό παράγοντα και ιστορικό πρόσφατου ταξιδιού στο εξωτερικό, η οποία παρουσίασε συλλοίμωξη από γρίπη τύπου Α και SARS-CoV-2, ανασκοπώντας παράλληλα τη βιβλιογραφία όσον αφορά τις ομοιότητες και τις διαφορές μεταξύ των δύο ιών.

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Λέξεις - Κλειδιά: COVID-19, Πανδημία, Γρίπη, Συλλοίμωξη

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