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OMICRON VARIANT BEHAVIOR IN A COUPLE: VACCINATED VERSUS NON-VACCINATED

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Abstract
Infection with severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) may present as the common cold, or in a series of cases can also result in severe or fatal pneumonia with severe respiratory distress. Since the virus's first appearance in December 2019, multiple studies have focused on clinical manifestations and biological features of different COVID variants in these five pandemic waves. Also, the variety of symptoms, the severity of the disease and the assessment of risk factors in each individual has continuously evolved among these two years, due to updated data published worldwide. The current paper presents the case of two patients, husband and wife, who develop a similar COVID-19 infection with only mild symptoms, although their disease history and COVID vaccination status is very different. They were among the first confirmed Omicron variant cases by genome sequencing in Romania and their favorable outcome despite the risk factors was encouraging for our every day practice.
Keywords: *COVID-19, pneumonia, Omicron variant.*

Rezumat
Infecția SARS-CoV-2 se poate prezenta sub forma unei "răceli comune" sau, în anumite cazuri selectate, poate conduce la pneumonie severă asociată cu sindrom de detresă respiratorie, condiție de multe ori fatală. Încă de la prima izolare a noului coronavirus în decembrie 2019, multiple studii din litarură s-au concentrat pe descrierea varietății tabloului clinic al acestei infecții, dar și pe decelarea modificărilor biologice induse de diferitele tulpini apărute în aceste cinci valuri pandemice. De asemenea, datele privind varietatea simptomelor, severitatea bolii, cât și factorii de risc individuali s-au modificat continuu. Lucrarea prezentă descrie cazurile a doi pacienți, soț și soție, care dezvoltă o formă ușoară de infecție COVID-19, deși atât istoricul de boală, cât și statutul de vaccinare anti-COVID a fost diferit în cazul acestora. Pacienții au fost printre primele cazuri de infecție cu varianta Omicron confirmată prin secvențiere genomică decelate în România, iar prognosticul acestora favorabil în ciuda factorilor de risc prezenți a fost motivant pentru practica noastră medicală de zi cu zi.
Cuvinte cheie: *COVID-19, pneumonie, varianta Omicron.*

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Introduction

The Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and its various emerging variants, is posing very high health threats with its continued pandemic waves with 6,05 million deaths out of 451 million confirmed cases reported worldwide as of March 10th, 2022[1]. After the Alpha, Beta, Gamma and Delta SARS-CoV-2 variants, the most recent B.1.1.529 variant (named as Omicron), is already creating alarming situations worldwide. It was first detected in specimens collected on November 11, 2021, in Botswana and on November 14 in South Africa[2-4]. The first two confirmed cases of Omicron in Romania were identified on December 4, 2021.

Omicron is the most mutated SARS-CoV-2 variant possessing 50 mutations in its genome including 30 mutations in its spike (S) protein alone, owing to which it gained higher transmissibility and partial resistance to immunity induced by currently available COVID-19 vaccines and antibody-based therapies[5-7]. The omicron variant is detected by RT PCR, however genomic sequencing is required for confirmation[8].

Therefore, we describe two cases of Omicron infection in a couple (husband and wife), diagnosed 2 days apart, both with mild symptoms but with a different vaccination status and disease history.

Case description

We present a case of a 53-year-old female patient with a history of asthma, GERD and severe SARS-CoV-2 related pneumonia in January 2021.

She presented then with a decreased oxygen saturation of 87%, fever, chills, dyspnea and intense fatigue. Lung CT scan showed bilateral peripheral ground glass opacities with a 60% involvement by visual assessment and a total CT severity score of 16 out of 25 (Figure 1). She was admitted to our hospital, initialized with Remdesivir, Tocilizumab and Dexamethasone, oxygen therapy, anticoagulants and symptomatic treatment. Her evolution was initially worse, needing high flow oxygen therapy (30 liters per minute), but she started to feel better after several days of hospitalization. The patient was discharged after 15 days of inpatient care, and after 4 months (May-June 2021) she received 2 doses of BioNTech, Pfizer COVID vaccine. She tested her COVID antibodies on November 2021 and laboratory results confirmed a very high level of antibodies (approximately 40,000 units with a negative value below 50 aU/mL).

On 15th December 2021, she presented to our emergency department with a two-day history of sore throat and occasionally dry cough. She denied fever or chills and declared a recent close contact with a work colleague



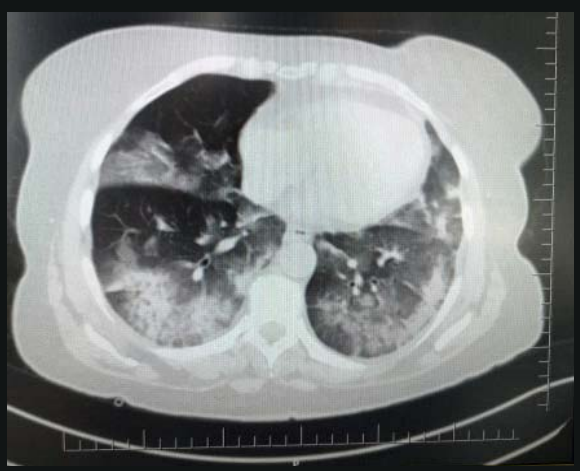
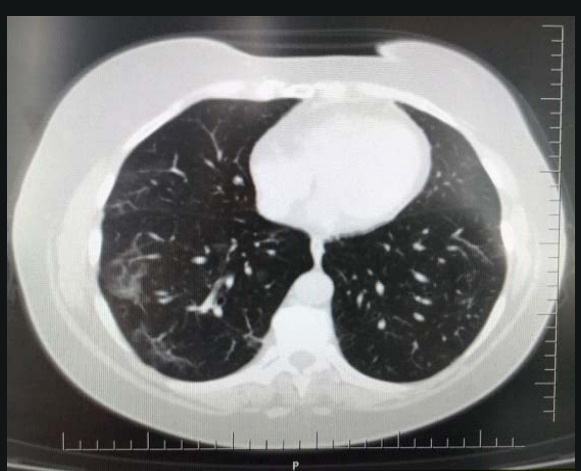




Figure 1. *Lung CT showing bilateral ground glass difusse opacities*



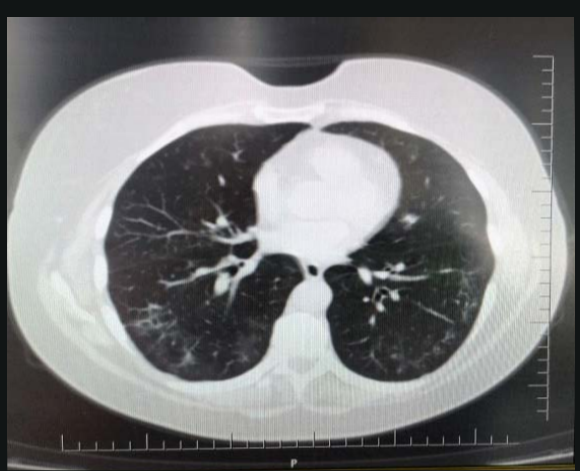


Figure 2. *Lung CT showing fibrotic peripheral lesions due to SARS-CoV2 severe pneumonia one year ago*



who had just returned from Dubai. Oxygen saturation was 98%, without dyspnea, she was normotensive and had a stable heart rate. Rapid COVID antigen test was completed that turned out negative. She tested afterwards positive on PCR method. Lung CT scan was performed which showed no new COVID related lesions (Figure 2). Given the patient's history and vaccination status, we sent the SARS-CoV-2 sample to a genetics laboratory for genome sequencing which demonstrated that it was an infection of Omicron variant BA.1 – N501Y, delHV69/70, K417N mutations present.

The patient was admitted for observation, given the history of severe SARS-CoV-2 pneumonia in January 2021, and was treated with symptomatic treatment - decongestants, antihistamines, antitussives, zinc therapy, vitamin C and D and hydration. She remained stable and was discharged after 7 days in good health.

The second case is the patient's husband, a 54 years old male. He presented to our ED a day after his wife's admission, accusing chills, nasal congestion and scratchy throat. He was a heavy smoker with an unremarkable medical history. He was not vaccinated against COVID-19 by his choice and did not have a history of COVID-19 disease. He also tested for COVID antibodies together with his wife one month prior to presentation and got a negative result.

His rapid antigen test was positive for COVID-19, laboratory results showed no significant changes (Table 1) and the lung scan revealed pulmonary emphysema, but with no COVID specific lesions (Figure 3).

He was normotensive, with an oxygen saturation of 97-98%. He was also admitted in the hospital alongside his wife for observation. Genome sequencing was also conducted for him, which was positive for Omicron variant with N501Y, delHV69/70, K417N mutations present. He was treated with hydration, acetaminophen, zinc therapy, vitamin C and D and decongestants. His condition remained stable, with no dyspnea or cough. He was discharged 6 days later in good health alongside his wife.

Discussion

Preliminary evidence suggest an increased risk of reinfection in COVID-19 recovered patients as well as vaccine breakthrough in vaccinated individuals with this variant. Both of our patients got infected with Omicron variant, even though the female had a history of severe SARS-CoV-2 pneumonia a year before, was vaccinated with 2 doses and had a very high COVID antibodies level one month prior to the infection. Until now, Omicron has been reported to cause asymptomatic infection or a milder disease with earliest common symptoms such as sore throat,

Test name	Patient 1 - January 2021	Patient 1 - January 2022	Patient 2 - January 2022
Hemoglobin	13.6 g/dL	14.4 g/dL	14.7 g/dL
Total leucocyte count	2,100/µL ↘	4,700/µL	7,500/µL
Total lymphocyte count	600/µL ↘	1,400/µL	1,500/µL
Fibrinogen	532 mg/dL ↗	318 mg/dL	260 mg/dL
CRP	89.43 mg/L ↗	4.69 mg/L	1.27 mg/L
D-dimer	697.4 ng/ml ↗	436.74 ng/ml	389.4 ng/ml

Table 1. *Comparison of laboratory findings between the 2 patients (omicron versus non-omicron)*



Figure 3. *CT scan showing apical pulmonary emphysema with no COVID specific lesions*

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headache, running nose, body ache, fever and fatigue/weakness[9], without respiratory failure and inflammatory syndrome (Table 1), as seen in the previous COVID variants.

The COVID-19 vaccines are based on the SARS-CoV-2 spike receptor-binding domain (RBD). The Beta variant has three mutations and Delta variant has five mutations, while Omicron has 32 mutations in this region, the main antigenic target of antibodies generated by either infections or vaccination[10].

The COVID-19 vaccines were found less effective against Beta and Delta variants as the mutations facilitated the virus variants to partially evade immune responses[11]. In case of this newer variant (Omicron), many such functions and impacts of higher mutations on efficacy of vaccines are yet to be analyzed. Chen et al. showed that Omicron is about 10 times more infectious than the original virus and about 2.8 times as infectious as the Delta variant whilst Omicron's vaccine-escape capability is near 14 times as high as that of the Delta variant[10].

Here, the cases described both presented mild symptoms of COVID infection, without signs of pneumonia and without clinical and biological markers of inflammation. They underwent genome sequencing which was positive for Omicron variant. The first patient had a history of severe SARS-CoV2 pneumonia one year ago and was also vaccinated against COVID, whilst the second one had no history of COVID nor was vaccinated, and was also a heavy smoker. We expected a more severe infection given the patient's status, however his condition remained stable and in good health.

In conclusion, as these two Omicron cases were diagnosed in late December 2021, when Delta variant was still dominant, and even though our patients had different COVID history and vaccination status, we could only hope that severe COVID related pneumonia patients will remain in the past. Moreover, it is expected that this pandemic disease will subside in the coming couple of months like SARS and MERS[12], and focus should now be on the assessment of long-term effect of SARS-CoV2.

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Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Authors' contributions

AR is the corresponding author and participated in the design of the case report. CV, CL, AMC and AR were involved in acquisition of data and described the

patient evolution and management. LFT and ALC were involved in the analysis and interpretation of data, and revising the final manuscript. All authors confirm the authenticity of all the raw data. All authors have read and approved the final manuscript.

Patient consent for publication

Written informed consent was obtained from the patient prior to publication at the time of admission.

Competing interests

The authors declare that they have no competing interests.

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