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CASE PRESENTATION

Reinfection, immunity and prevention of transmission of COVID-19

Reinfección, inmunidad y prevención de la transmisión en la COVID-19

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ABSTRACT

Introduction: The duration of natural immunity generated by COVID-19 is yet to be defined, which determines the probable reinfection.

Objective: To analyze issues related to natural infection and the need to maintain prevention practices regarding a case of reinfection in a health care worker.

Case presentation: Forty-eight-year-old female patient without comorbidities who was diagnosed with COVID-19 in June 2020 and March 2021, in both cases as a mild symptomatic disease. Twenty-four hours after the onset with headache, dizziness, and dry cough, the diagnosis of SARS CoV-2 infection was confirmed by positive PCR and cycle threshold (CT) at 24.84. Nine months and nine days after original infection, and two days after receiving the BNT162b2 vaccine (Pfizer-BioNTech), the patient began with general malaise, dry cough, runny nose, and sore throat, with a positive PCR and CT of 17.61.

Conclusions: The possibility of reinfection by COVID-19 points to the need to strengthen transmission prevention practices in healthcare facilities as long as scientific evidence provides us with more effective resources for its control.

Keywords:
COVID-19, SARS CoV-2, reinfection, natural immunity, scientific evidence.

RESUMEN

Introducción: La duración de la inmunidad natural generada por la COVID-19 está por definir, lo que determina la probable reinfección.

Objetivo: Destacar la necesidad de mantener las medidas de prevención a propósito de un caso de reinfección en un trabajador sanitario.

Presentación de caso: Paciente femenina de 48 años de edad con antecedentes de salud que, en junio, 2020 y marzo, 2021 se le diagnóstica la COVID-19, en ambos casos con el comportamiento de enfermedad sintomática leve. Después de 24 horas de comenzar con cefalea, mareos y tos seca se confirma el diagnóstico de infección por SARS CoV-2 con PCR positivo y umbral de ciclo (CT) en 24.84. Pasados 9 meses y 9 días de la infección original, y dos días posteriores a recibir la vacuna BNT162b2 (Pfizer-BioNTech), comienza con malestar general, tos seca, secreción nasal y dolor de garganta, con PCR positivo y CT de 17.61.

Conclusiones: La posibilidad de la reinfección por la COVID-19 orienta la necesidad de fortalecer las acciones de prevención de la transmisión en instituciones de salud en tanto las evidencias científicas nos provean de recursos más eficaces para su control.

Palabras claves:
COVID-19, SARS CoV-2, reinfección, inmunidad natural, evidencias científicas.

INTRODUCTION

COVID-19 has generated a greater challenge for health professionals and researchers in various areas of science as measures are required for its control supported by scientific evidence. The urgency of knowledge and evidence is determined by the magnitude of the epidemic and its impact on global society, which has far exceeded all previous pandemics that humanity has suffered.

Among the questions to be elucidated is the duration of natural or acquired immunity with vaccines in development. Knowledge about immunity related to influenza viruses, severe acute respiratory syndrome (SARS), and Middle East respiratory syndrome (MERS) related to beta coronavirus serve as a preliminary reference.[1,2,3] Previous studies have shown the existence of neutralizing antibodies 2 years after SARS-CoV-1 infection, while immunity related to MERS-CoV infection was shown to be dependent on several factors (eg, severity of infection) and antibody levels decline more rapidly. For SARS-CoV-2, the evidence is showing variability in the immune response as a function of various factors such as age, the severity of infection, or previous immune status.[4,5,6,7,8] However, due to the time that has elapsed since the onset of the pandemic, additional aspects of the duration of immunity must be clarified.

Regarding a clinical case of reinfection by COVID-19, we will analyze aspects related to immunity following natural infection with the **objective** of highlighting the need to maintain prevention measures after suffering from COVID-19 as long as the risks of transmission remain high.

CASE PRESENTATION

Forty-eight-year-old female patient without comorbidities who was diagnosed with COVID-19 in June 2020 and March 2021, in both cases as a mild symptomatic disease. She is a nurse dedicated to the care of COVID-19 cases in an Arab country with a high incidence of this disease.

Twenty-four hours after starting with headache, dizziness, and dry cough, the diagnosis of SARS CoV-2 infection was confirmed with positive PCR and cycle threshold (TC) at 24.84. (**Figure 1**). Lab studies at the time of diagnosis show elevated alanine aminotransferase (ALT), lactate dehydrogenase (LDH), and glycemia, while no pleuropulmonary alterations are observed on the chest radiograph (**Table 1** and **Figure 2**). In compliance with the national protocol for mild infections, five days of treatment with azithromycin and hydroxychloroquine was ordered. She presents a satisfactory clinical evolution. After 8 days the PCR was repeated, which was negative.

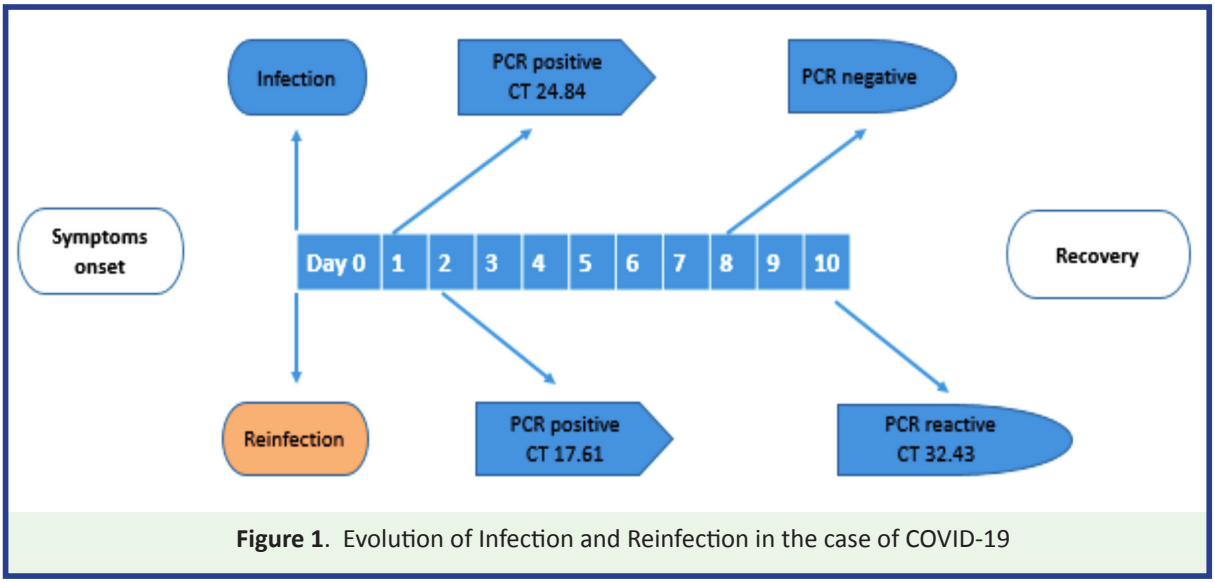
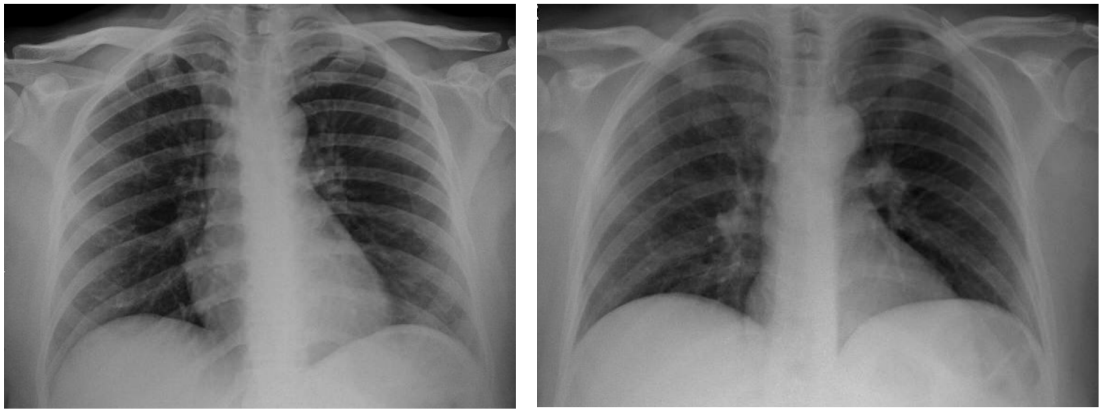


Figure 1. Evolution of Infection and Reinfection in the case of COVID-19

Table 1- Results of laboratory tests

Lab test	Reference	Results	
		Infection	Reinfection
White blood count	5-10 X 10^3/uL	7.08	3.83
Hemoglobin	12-15 gm/dL	13.8	12.4
Platelets	150-400 X 10^3/uL	319	224
Neutophils	2-7 X 10^3/uL	4.1	2.2
Lymphocites	1-3 X 10^3/uL	1.8	1.0
D dimer	0.00-0.44 mg/L	0.32	0.28
Creatinine	53-97 umol/L	55	56
ALT	0.0-30.0 u/L	31	41
AST	0.0-31.0 u/L	23	30
LDH	135-214 u/L	224	248
Glycemia	3.3-5.5 mmol/L	5.8	5.8
HbA1c	4.8-6.2%		6.2
Ferritin	8-252 mcg/L	29	54



Infection Reinfection

Figure 2. Chest X-Ray at diagnosis of COVID-19 infection and reinfection

Nine months and nine days after the original infection, and two days after receiving the first shot of BNT162b2 vaccine (Pfizer-BioNTech), she begins with general malaise, dry cough, runny nose, and sore throat. She was seen on the fourth day of symptoms and reinfection was confirmed with a positive PCR and CT of 17.61. Similar findings were observed in the previous Lab tests except that leukopenia was observed in the reinfection. She was treated with amoxicillin with clavulanic acid, azithromycin, hydroxychloroquine, and lopinavir/ritonavir. The clinical evolution was satisfactory, presenting mild and temporary nausea, vomiting, and diarrhea. After 10 days of the initial test, the PCR performed shows CT at 32.43.

DISCUSSION

The duration of natural immunity after COVID-19 is not clearly defined and should differ from immunity related to the vaccine.[8] In the case presented, reinfection occurred nine months after the original infection, which demonstrated a weakening of the immunological memory secondary to the mild natural infection in an immunocompetent patient.

In a study of 188 patients with COVID-19, Dan et al observed that immunity lasts in 95 % of individuals for at least 6 months, including the four major types of immunological memory (memory B cells, antibodies, CD4 + T cells of memory, and/or memory CD8 + T cells).[5] The severity of infection seems to be related to the magnitude of antibody formation and patients with mild disease have a lower response and the decrease in antibodies level is faster.[8] A large population study carried out in Ireland measured the level of antibodies in samples of 30,576 people, observing that antibodies levels did not decline in the 4 months after the diagnosis of COVID-19.[6]

In health workers, Glück V et al showed that 90 % of individuals maintained antibody levels for SARS-CoV-2 after 30 weeks (7 months) from symptoms onset, with higher levels for those with severe disease or older age.[4]

The possibility of COVID-19 reinfection determines the prevention and control practices at the community level or in health institutions, which will have to be maintained as long as the epidemiological situation does not change. At the community level, the following should be considered: 1) transmission prevention practices (universal use of masks, social distancing, hand hygiene) and 2) vaccination against SARS-CoV-2. Vaccination is vital as a primary resource for prevention in the population and as a complement to protective immunity in individuals who have suffered from the disease. For health workers, prevention generates additional complexities given the high risk of transmission of COVID-19, also observed in the SARS and MERS epidemics, in which up to 57 % and 27 % of health workers became ill.[9,10] In addition to the aforementioned measures for the prevention of community transmission, it is important to add the recommendations of the World Health Organization to protect patients, workers, and visitors to health facilities.[11] These include actions for the early identification of cases in health services and their timely isolation, the use of standard and transmission-based precautions, among other infection control actions.

CONCLUSION

In summary, the case of a health worker who has suffered COVID-19 reinfection points to the need to strengthen transmission prevention actions in health institutions as long as scientific evidence provides us with more effective resources for its control.

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Conflicts of interests

The authors have no conflicts of interests to declare.

Authorship contribution

Humberto Guanche Garcell: Research design, writing, review and approval of the final text.

Reynaldo Barbán Arias: Writing, review and approval of the final text.

Both authors participated in the discussion of results and have read, reviewed and approved the final text of the article.