Microbes and Infectious Diseases 2023; 4(3): 724-728

Microbes and Infectious Diseases

Journal homepage: https://mid.journals.ekb.eg/

Short report

Quantiferon TB Gold conversion in the medical staff caring to COVID-19 patients

***Humberto Guanche Garcell* [*1], *Reynaldo Barban Arias* [2], *Eduardo Crespo Ramirez* [3]**

1- *Hospital Joaquin Albarran, Cuba*
2- *Hospital Giraldo Aponte Fonseca, Santiago de Cuba, Cuba*
3- *Hospital Comandante Pinares, Cuba*

ARTICLE INFO

Article history:
Received 29 March 2023
Received in revised form 13 April 2023
Accepted 15 April 2023

Keywords:
COVID-19
Latent tuberculosis
Healthcare worker
Prevention

ABSTRACT

Background: Tuberculosis constitutes a worldwide problem in relation to its morbidity and mortality. The exposure to tuberculosis patients constituted a significant occupational exposure for healthcare workers. During the pandemic of COVID-19, the incidence of tuberculosis was reduced probably related to the high priority to provide care during the pandemic. Cases of health workers who after several months of caring for COVID-19 patients have had seroconversion of QuantiFERON TB gold (QFT) were described. The initial QTF test was performed in April 2020 (before providing care to COVID-19 cases), and a positive test was reported in August and December 2020 for the reported cases. The exposure to patients from countries with high incidence tuberculosis during the pandemic constituted the most probable source of infection. Also, the limited tuberculosis screening in patients and the staff's adherence to infection prevention practices among other factors will explain these findings, which will require strategies to prevent occupational exposure during the influx of communicable diseases to healthcare services.

Introduction

Tuberculosis (TB) is present throughout the world, having a higher incidence in countries such as India, China, Indonesia, the Philippines, Pakistan, Bangladesh, Nigeria, and South Africa [1]. It is estimated at around 2 billion carriers of M*ycobacterium tuberculosis*. In the United States in 2019 it was estimated around 13 million people were affected according to the Centers for Disease Control and Prevention [2].

Treatment of active TB is the priority for TB control globally followed by the identification and treatment of people with latent TB infection (LTBI), especially those at high risk of developing the illness [3-5].

In most infected people, *Mycobacterium tuberculosis* infection is initially controlled by the host's defenses and the infection persists for a long time, called the suppressed “latency” state, however, the latent infection can potentially become an active TB [6]. The identification and treatment of latent TB greatly reduce the possibility of reactivation by protecting individual and general health and consequently reduces the number of potential sources of transmission [7,8].

DOI: 10.21608/MID.2023.202922.1495
* *Corresponding author:* Humberto Guanche Garcell
E-mail address: humbertoguanchegarcell@yahoo.es

During the COVID-19 pandemic, a substantial decrease in tuberculosis notifications was observed worldwide, related to the weakening of tuberculosis control programs [9-11]. Also, the coexistence of COVID-19 and tuberculosis generate additional occupational risks for health workers, which are increased due to the underestimation of the probable coinfection.

We aim to describe clinical cases of latent tuberculosis in healthcare workers who have worked in direct contact with COVID-19 patients from countries with a high incidence of tuberculosis.

Case report

The cases described worked in a COVID-19 dedicated facility with a 385-bed capacity. At hiring all staff required an initial medical assessment, including screening tests for latent tuberculosis (chest X-ray and QFT).

Clinical case 1

A 46-year-old female nurse, with a history of high blood pressure (HBP), was treated with enalapril and hydrochlorothiazide regularly, in April 2020, the initial TB screening report was negative for QFT and the chest radiograph showed no abnormalities. In July 2020 she acquired COVID-19, she presented mild symptoms such as general malaise, sore throat, and chills, without significant findings on clinical examination.

After 8 months of work, a new QFT plus performed become positive, with a negative chest X-ray and no other evidence of active TB **(Table 1, Figure 1).**

Clinical case 2

A 42-year-old male with a history of hypertension takes regular treatment with amlodipine and hydrochlorothiazide, a nurse, in April 2020 the initial QFT was negative, and the chest x-ray was without findings. In December 2020, QFT plus was repeated, and become positive, without other clinical or imaging evidence of active tuberculosis.

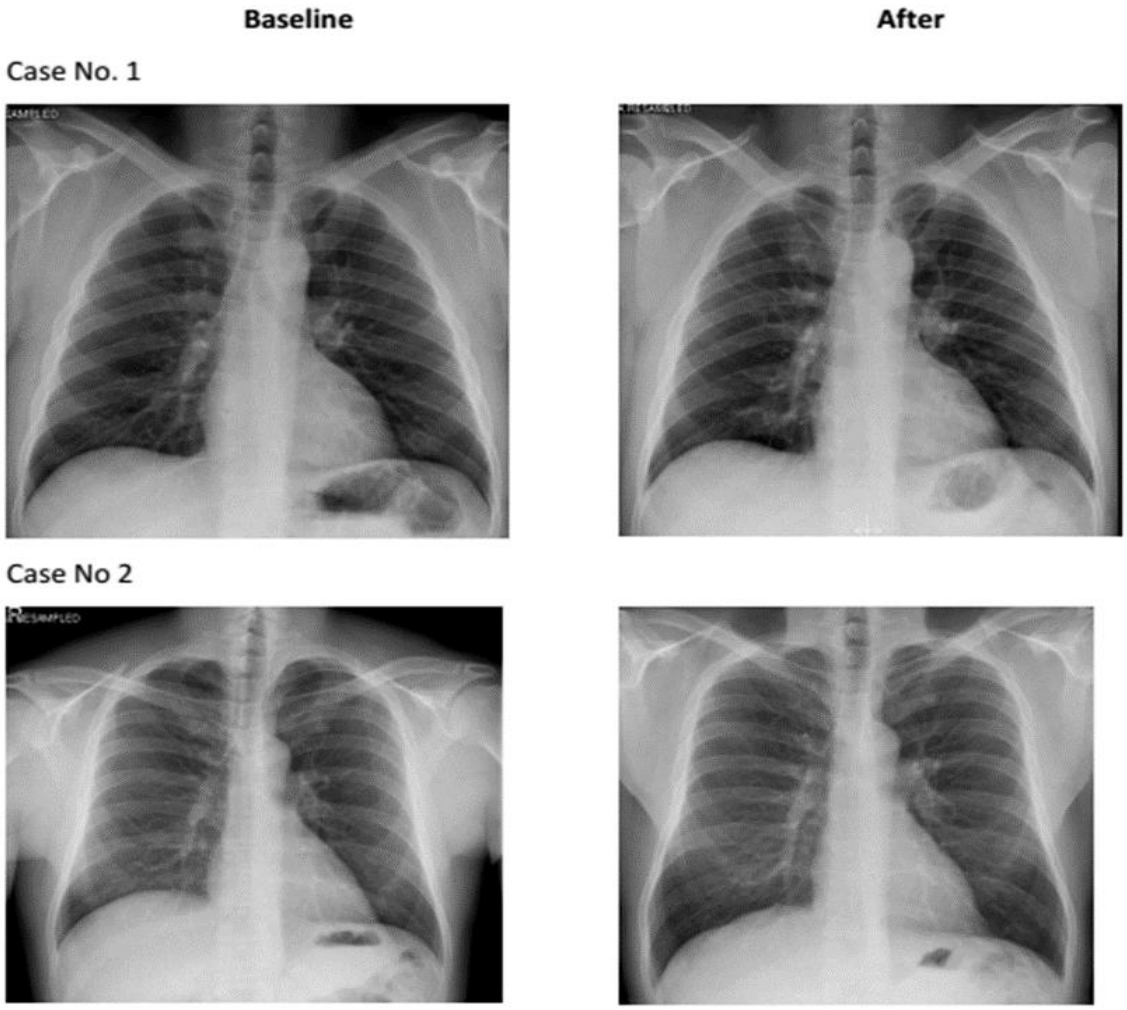
Other lab and image tests did not show abnormal findings **(Table 1, Figure 1)**, except for slight lymphocytosis and an increase in basophils in both cases, more marked in case 1, which was also a COVID-19 case.

Table 1. Lab test result at baseline and after exposure to COVID-19 patients.

Lab test	**Case 1**		**Case 2**		**Reference figures**
	Baseline 20/04/2020	**After * 13/12/2020**	**Baseline 21/04/2020**	**After* 31/01/2021**	
White blood count	11.37	9.44	8.82	7.11	4-10 $x10^3$ /l
Hemoglobin	16.3	15.1	16.0	15.0	13-17 g/dl
Neutrophils	6.4	4.2	4.6	3.3	2-7 $x10^3$ /l
Lymphocytes	4.0	4.3	3.2	3.1	1-3 $x10^3$ /l
Basophile	0.16	0.04	0.13	0.05	0-0.02 $x10^3$ /l
Creatinine	84	84	84	104	70-115 umol/l
Glucose	5.1	-	-	-	3.3-5.5 mmol/l
HbA1C%	6.0	5.8	6.0	5.6	4.8-6%
Quantiferon TB Gold	Negativo	Positivo	Negativo	Positivo	Negativo

***** After a potential exposure to infectious Tb patient coinfected with SARS CoV2.

Figure 1. Baseline and after potential exposure chest radiographs of cases without evidence of current or previous tuberculosis infection.



Discussion

The cases we have presented show the risk of occupational exposure to tuberculosis during the COVID-19 pandemic, which is related to multiple factors. An outstanding element is the incidence of tuberculosis in the country of origin of patients, as we mentioned before, which is among the highest in the world. In addition, the high prioritization in the diagnosis and management of COVID-19 disease is likely to reduce the attention to tuberculosis screening. The combination of SARS-CoV-2 infection and tuberculosis possess an important challenge for clinicians and infection prevention.[11-13] In healthcare setting the gaps in compliance with prevention practices are keys, among which the use of personal protective equipment and infection control engineering systems (e.g. air filtration and ventilation of facilities) should be highlighted [12].

Caring for COVID-19 patients can increase the risk of acquiring TB by health workers as well as facilitate nosocomial transmission to other patients during healthcare. The COVID-19 pandemic has determined the need to admit patients in suboptimal conditions for the prevention of airborne infections (particles smaller than 5 microns) such as tuberculosis. Patients are admitted to temporary facilities (including field hospitals, tents, and others), with a high density of patients, low staff coverage, and limited availability of isolation rooms. This risk is higher when the patient population is at high risk for tuberculosis.

One case presented acquired COVID-19 during patient care, which is strongly related to compliance with infection control practices. In the second case, there was no clinical evidence or

laboratory evidence of coronavirus infection. Tuberculosis and COVID-19 are transmitted by the respiratory route. Nevertheless, tuberculosis is transmitted exclusively through airborne particles, while SARS-CoV-2 is transmitted by droplets (infectious particles greater than 5 microns) or airborne in aerosol-generating procedures. These facts also suggest the existence of gaps in the proactive screening of tuberculosis in patients with COVID-19, in which the spectacular radiological picture of severe pneumonia may mask the coexistence of *Mycobacterium tuberculosis* infections.

Conclusion

The cases we have presented support the additional risks of exposure to tuberculosis during the care of patients with COVID-19, which can be controlled through infection control programs focused on the efficient use of personal protective equipment and the proactive screening of tuberculosis.

Conflicts of interest : The authors declare that they have no conflict of interest..

Financial disclosure: None.

Authors' contribution: RBA, HGG, ECG: research design, writing, revision and approval of the final text of the article. HGG: writing, revision and approval of the final text of the article. The authors participated in the discussion of the results and we have read, reviewed and approved the final text of the article.

References

1-**Glaziou P, Floyd K, Raviglione MC.** Global Epidemiology of Tuberculosis. Semin Respir Crit Care Med 2018 Jun;39(3):271-285.

2-**Miramontes R, Hill AN, Yelk Woodruff RS, Lambert LA, Navin TR, Castro** KG, et al. Tuberculosis infection in the United States: prevalence estimates from the National Health and Nutrition Examination Survey, 2011-2012. PloS one 2015 Nov 4;10(11):e0140881.

3-**Sterling TR, Njie G, Zenner D, Cohn DL, Reves R, Ahmed A, et al.** Guidelines for the Treatment of Latent Tuberculosis Infection: Recommendations from the National Tuberculosis Controllers Association and CDC, 2020. MMWR Recomm Rep 2020 Feb 14;69(1):1-11.

4-World Health Organization. Latent TB Infection: Updated and consolidated guidelines for programmatic management, 2018. Available at: http://www.who.int/tb/publications/2018/latent-tuberculosis-infection/en/ (Accessed on March 06, 2021).

5-**Getahun H, Matteelli A, Abubakar I, Aziz MA, Baddeley A, Barreira D, , et al.** Management of latent Mycobacterium tuberculosis infection: WHO guidelines for low tuberculosis burden countries. Eur Respir J;46(6):1563-76.

6- **Gideon HP, Flynn JL**. Latent tuberculosis: what the host "sees"? Immunol Res. 2011 Aug;50(2-3):202-12.

7- Targeted tuberculin testing and treatment of latent tuberculosis infection. Am J Respir Crit Care Med. 2000;161(4 Pt 2):S221-47. doi: 10.1164/ajrccm.161.supplement_3.ats600.

8-**Horsburgh CR Jr, Rubin EJ.** Clinical practice. Latent tuberculosis infection in the United States. N Engl J Med 2011 Apr 14;364(15):1441-8.

9-**Can Sarınoğlu R, Sili U, Eryuksel E, Olgun Yildizeli S, Cimsit C, Karahasan Yagci A.** Tuberculosis and COVID-19: An overlapping situation during pandemic. J Infect Dev Ctries 2020 Jul 31;14(7):721-725.

10- **Winglee K, Hill AN, Langer AJ, Self JL**. Decrease in Tuberculosis Cases during COVID-19 Pandemic as Reflected by Outpatient Pharmacy Data, United States, 2020. Emerg Infect Dis. 2022;28(4):820-827. doi: 10.3201/eid2804.212014.

11-**Patra K, Batabyal S, Mandal K, Ghose D, Sarkar J.** Tuberculosis and COVID-19: A

combined global threat to human civilization. Clin Epidemiol Glob Healt 2022 May-Jun;15:101031.

12-**Bostanghadiri N, Jazi FM, Razavi S, Fattorini L, Darban-Sarokhalil D.** *Mycobacterium tuberculosis* and SARS-CoV-2 Coinfections: A Review. Front Microbiol 2022 Feb 3;12:747827.

13-**World Health Organization.** WHO Policy on TB Infection Control in Health-care Facilities, Congregate Settings and Households. Geneva, WHO, 2009.

Guanche Garcell H, Barban Arias R, Crespo Ramirez E. Quantiferon TB Gold conversion in the medical staff caring to COVID-19 patients. Microbes Infect Dis 2023; 4(3): 724-728.