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CASE PRESENTATION

Coexistence of SARS-CoV-2 and Tuberculosis

Coexistencia de SARS-CoV-2 y Tuberculosis

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ABSTRACT

Introduction: the coexistence of tuberculosis (TB) and COVID-19 presents a significant medical challenge. Both diseases, which have different etiologies, Mycobacterium tuberculosis and SARS-CoV-2 respectively, affect the lungs and share severe respiratory manifestations.
Objective: to describe a case with coexistence of tuberculosis (TB) and SARS-CoV-2 disease (COVID-19).
Case presentation: a 21-year-old male patient is presented who presented an onset clinical picture compatible with pneumonia, etiology of COVID-19, due to the complications that the patient presented such as pleural effusion and bronchiectasis, the investigation was expanded with a subsequent diagnosis for pulmonary tuberculosis. The serological results and the cytochemistry of the pleural fluid support the complexity of the situation. This case reinforces the importance of understanding the interaction between both diseases for effective treatment and highlights the need for a comprehensive approach in health care.
Conclusions: this clinical case underlines the need to understand the interaction between tuberculosis and COVID-19 to provide effective treatment and improve clinical outcomes.

Keywords: Tuberculosis; Antibiotics; Sars-Cov-2.

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RESUMEN

Introducción: la coexistencia de la tuberculosis (TB) y COVID-19 presenta un desafío médico significativo. Ambas enfermedades que posee etiología diferente, *Mycobacterium tuberculosis* y SARS-CoV-2 respectivamente, afectan los pulmones y comparten manifestaciones respiratorias graves.
Objetivo: describir un caso con coexistencia de la tuberculosis (TB) y la enfermedad por SARS-CoV-2 (COVID-19).
Presentación de caso: se expone paciente masculino de 21 años que presentó un cuadro clinico de inicio compatible con Neumonía, etiología de COVID-19, debido a las complicaciones que presentó el paciente como derrame pleural y bronquiectasias, se amplió la investigación con diganostico posterior para tuberculosis pulmonar. Los resultados serológicos y el citoquímico del líquido pleural, respaldan la complejidad de la situación. Este caso refuerza la importancia de comprender la interacción entre ambas enfermedades para un tratamiento efectivo y destaca la necesidad de un enfoque integral en la atención médica.
Conclusiones: Este caso clínico subraya la necesidad de comprender la interacción entre la tuberculosis y la COVID-19 para proporcionar un tratamiento efectivo y mejorar los resultados clínicos.

Palabras clave: Tuberculosis; Antibióticos; Sars-Cov-2.

INTRODUCTION

The coexistence of tuberculosis (TB) and SARS-CoV-2 infection (COVID-19) presents a significant challenge in the contemporary medical field. The disparities and similarities between tuberculosis and COVID-19 are currently being analyzed, addressing their immunological particularities, diagnostic methods, epidemiological and clinical aspects, as well as the repercussions they have on public health. As health professionals, it is crucial to understand the interaction between these two infectious diseases.[1]

On the one hand, TB, an ancient disease caused by Mycobacterium tuberculosis, persists as a global threat,[2] positioning itself as one of the infectious diseases that kills the most people in the world.[3] Pulmonary presentation being the most common, in addition to the lungs, other commonly involved organ systems include the gastrointestinal (GI) system, lymphoreticular system, skin, central nervous system, musculoskeletal system, reproductive system, and liver.[2]

According to the Pan American Health Organization (PAHO) in conjunction with the World Health Organization (WHO) in its report: "Ecuador strengthens the fight against tuberculosis by promoting diagnosis and treatment", it states the following: worldwide, tuberculosis is the thirteenth cause of death and the deadliest infectious disease behind COVID-19 (ahead of HIV and AIDS)."[4]

In recent decades, there has been a global effort to eradicate tuberculosis.[2]Despite gains in tuberculosis control and a decline in both new cases and mortality, it still represents an enormous burden on health systems worldwide.[2]

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On the other hand, COVID-19, whose epicenter was in the Hubei province of the People's Republic of China.[5] It has become a global emergency, with more than 10 million cases and more than 500,000 deaths worldwide.[6] SARS-CoV-2, an RNA virus belonging to the coronaviridae family, exhibits high infectivity.[7] Its manifestations vary from asymptomatic or mild symptoms to severe pneumonia and acute respiratory distress syndrome (ARDS).[8]

People with comorbidities are considered to have a higher rate of contracting superimposed infections.[1] In the ongoing global fight against the COVID-19 pandemic, it is essential to ensure the continuity of critical services and operations aimed at addressing the most pressing health issues. This approach not only saves the lives of those facing TB and other health conditions, but also highlights the crucial importance of understanding the interconnection between TB and COVID-19 in the global public health landscape.[4]

The relationship between tuberculosis and COVID-19 lies in their respiratory impact, since they affect the lungs and can present similar symptoms, such as severe pneumonia.[11]The interaction between COVID-19 and tuberculosis is not fully understood. Most researchers suggest that pulmonary tuberculosis increases the risk of developing a severe form of coronavirus infection. A reciprocal negative interaction between these diseases has also been pointed out, such as the increased risk of activation of a latent tuberculosis infection in the presence of COVID-19, attributed to the exhaustion of CD4+ T cells.

In various studies, they have observed a deterioration in the evolution of both diseases when they coexist, influenced by shared social, epidemiological and clinical factors.[7] A recent analysis in the Philippines found that COVID-19 patients who also had TB faced a 2,17-fold increased risk of death compared to those without the co-infection, with a 25 % lower risk of recovery for patients with both diseases compared to those with COVID-19 alone, and a significantly shorter time to death, while time to recovery was significantly longer for TB patients.[8]

These findings underscore the importance of prioritizing routine TB services and testing, even amid the disruption of health systems due to the burden of the SARS-CoV-2 pandemic.[9]A global cohort study found that tuberculosis and COVID-19 form a critical combination that requires immediate attention. Tuberculosis should be recognized as a risk factor for the development of severe forms of COVID-19, focusing COVID-19 preventive measures, such as vaccination, in particular on patients with tuberculosis.[9]

Although information on COVID-19 co-infection in patients with tuberculosis is limited, it is anticipated that those affected by both diseases may have poorer treatment outcomes.[1] It is therefore crucial that tuberculosis patients follow the precautions recommended by health authorities to protect themselves from COVID-19 and continue their treatment according to medical indications.[4] Given that people with TB and other comorbidities may be at higher risk of contracting COVID-19 infection, this underscores the importance of comprehensive care and public health strategies that address both diseases together.

CLINICAL CASE PRESENTATION

Male patient, 21 years and eight months old, with a personal history of chronic cough and umbilical hernia surgeries, two-dose vaccination schedule against COVID-19, no significant family history, no allergies to medications.

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He went to the emergency room due to a respiratory condition accompanied by tachypnea and was diagnosed with pneumonia complicated by pachypleuritis of secondary etiology due to SARS-CoV-2 confirmed with a swab. Due to the presence of pleural effusion, pericardial hypertension, and bronchiectasis with basal atelectasis, surgical resolution with a thoracotomy was required. During the procedure, he presented hypovolemic shock secondary to the loss of 900 ml of blood, which was reversed with epinephrine and red blood cell packs. Considering the torpid evolution, the investigation is expanded withXpert MTB/RIF.Awaiting the results of the histopathological study of a piece of pleuropulmonary tissue. Treatment included: Antibiotics: ceftriaxone and vancomycin; Analgesics: tramadol, ketorolac, morphine and paracetamol.

Table 1. Paraclinical studies.

Exam	Result	Reference value
Hematocrit	28,9	38 – 50
Hemoglobin	9,3	13 – 18
Red blood cell count	3,35	4,5 – 5.5
White blood cell count	10,98	4 – 10
Mean corpuscular volume	86,1	80 – 100
HCM	27,7	27 – 31
CHCM	32,2	32 – 36
Lymphocytes (#)	1,31	1,07 – 3,94
Neutrophils (#)	8,80	2,14 – 6,9
Monocytes (#)	0,82	0,085 – 0,79
Eosinophils (#)	0,05	0,08 – 0,39
Basophils (#)	0,00	0 – 0,1
Lymphocytes (%)	12,0	20 – 40
Neutrophils (%)	80,1	40 – 65
Monocytes (%)	7,5	1 – 10
Eosinophils (%)	0,4	1 – 5
Basophils (%)	0,0	0 – 1
Platelets	530	150 – 450
Mean platelet volume	6,7	7,4 – 11

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Table 2. Cytochemical and bacteriological fluid.

Exam	Result	V. Reference
Sample	Pleural fluid	
Aspect	*Before centrifuging:*Cloudy *After centrifugation: Serous*	
Glucose	35,28	60 to 70% of plasma value in CSF. 10 mg less than serum levels in synovial fluid
Proteins	6,07	CSF: 15 – 45 mg/dL Synovial: 1 – 3 g/dL
Albumin	2,83	
Cholesterol	96,55	
Leukocyte Count	672,5	
Mononuclear	100	
Gram stain	Gram Positive Cocci (+)	

Table 3. Saturation and vital signs.

Date	Hour	O2	FC	T	FR	TA
26/09/23	12:08	94	81	35,5	19	111/76
	18:00	96	106	37,1	20	103/61
	22:00	98	103	36,7	20	108/53
27/09/23	06:00	96	105	36,5	20	115/61
	12:00	93	111	37,6	20	111/65
	18:00	96	93	37	18	101/63
	22:00	96	100	37,5	19	100/80
28/09/23	06:00	94	108	37,5	20	103/76
	12:00	95	115	37,8	18	110/66
	18:00	95	100	38,1	20	125/75
	22:00	94	94	37,1	18	101/57
29/09/23	06:00	92	110	37,5	20	110/66

Radiological Report
Exam: AP THORAX X-RAY
Report
Opacity is evident at the level of the left lower lobe adjacent to the lateral pleural wall; findings probably related to pleural effusion.

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Echocardiogram Results

Echocardiogram Report

Mode

VD.17MM
A0,28 MM
EXAO. MM
AI.19MM
TIV.07MM
DDVI.43MM
DSVI.28MM
F.AC. 34 %
FEVI. 64 %
PP.07MM
FEVI X LONGITUD DE ÁREA. %

2D Mode

Left cavities of normal diameters.
Right cavities of normal diameters.
Preserved overall LV systolic function.
Preserved overall RV systolic function.
Atria of normal size and morphology.
No alterations in segmental motility at rest.
Normal anterior IV thickness and LV walls.
Normal mitral valve opening.
Normal valvular aortic opening.
Normal pulmonary and tricuspid valve opening.
Without intracardiac masses.
No pericardial effusion.

CONTINUOUS, COLOR, PULSED DOPPLER, PULMONARY VALVE

Flow in TAP type 1, TACP= MS PMTAP= MMHG
Pulmonary regurgitation velocity (PRV) = M/S Pulmonary diastolic pressure = MMHG

MITRAL VALVE

Normal mitral flow
E= 110 CM/SA= 75 CM/SE/A= 1.46 E'= CM/SE/E'=TRIV= MS
No mitral regurgitation

AORTIC VALVE

Aortic flow. PEAK G.= 6 MMHG V.MAX= 124 CM/S Without aortic regurgitation

TRICUSPID VALVE

Normal tricuspid flow.
Tricuspid regurgitation. TRG= MMHG DBP= MMHG (ESTIMATED BY VENA CAVA COLLAPSE) PSTAP= MMHG

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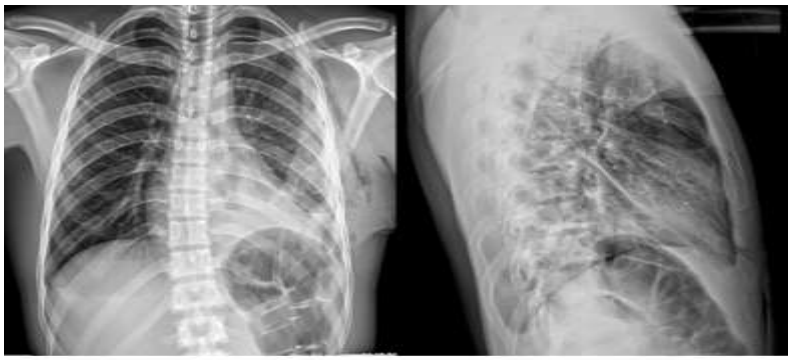

Fig. 1 Chest X-ray. (A. Anterolateral, B. Lateral)

Fig. 2 Chest CT. (A. Coronal, B. Sagittal and C. Lateral planes)

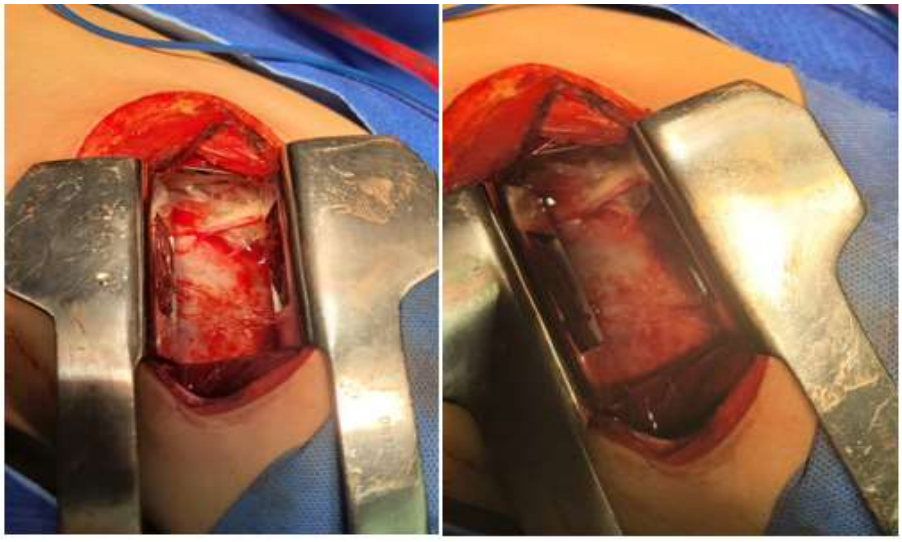

Fig. 3 Photographic record of thoracotomy.

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DISCUSSION

The coexistence of tuberculosis (TB) and SARS-CoV-2 disease (COVID-19) presents a significant challenge in the contemporary medical field. The disparities and similarities between tuberculosis and COVID-19 are currently being analyzed, addressing their immunological particularities, diagnostic methods, epidemiological and clinical aspects, as well as their impact on public health.[1]

Tuberculosis, caused by Mycobacterium tuberculosis, remains a global threat, being one of the infectious diseases that kills the most people in the world.[3] According to the Pan American Health Organization (PAHO) and the World Health Organization (WHO), tuberculosis is the thirteenth cause of death and the deadliest infectious disease, even ahead of HIV and AIDS.[4]

In recent decades, there has been a concerted global effort to eradicate tuberculosis, despite gains in tuberculosis control and declines in new cases and mortality, it still represents an enormous burden of morbidity and mortality worldwide.[2]

On the other hand, COVID-19, caused by SARS-CoV-2, has become a global emergency with more than 10 million cases and more than 500,000 deaths worldwide.[6] The manifestations of COVID-19 vary from asymptomatic or mild symptoms to severe pneumonia and acute respiratory distress syndrome.[8] The relationship between tuberculosis and COVID-19 lies in their respiratory impact, since both affect the lungs and can present similar manifestations, such as severe pneumonia.

In a recent analysis, it was revealed that COVID-19 patients who also had tuberculosis faced a 2,17-fold higher risk of death compared to those without co-infection. Furthermore, the risk of recovery decreased by 25 % for patients with both diseases compared to those with COVID-19 alone.[8]

In a global cohort study, tuberculosis and COVID-19 were found to form a critical combination that requires immediate attention. The importance of recognizing tuberculosis as a risk factor for the development of severe forms of COVID-19 is highlighted.[9]

In the clinical case presented, the coexistence of COVID-19 and tuberculosis is observed in a 21-year-old patient with significant complications, such as pleural effusion, pericardial hypertension and bronchiectasis with basal atelectasis. Test results, such as biometry and pleural fluid cytochemistry, support the complexity of the situation.

CONCLUSIONS

This clinical case highlights the need to understand the interaction between TB and COVID-19 to provide effective treatment and improve clinical outcomes. Maintaining essential services, even in the midst of the pandemic, highlights the need for a comprehensive approach to address public health challenges.

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Conflicts of interest
The authors declare that there are no conflicts of interest.

Author contribution
All authors declare involvement in conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review, and editing.

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