

CASE REPORT

Polyserositis caused by tuberculosis in a young female patient with hypothyroidism: A diagnostic challenge

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Key Clinical Messages

The diagnosis of polyserositis due to tuberculosis (TB) is complex and challenging, which may cause delays in treatment. TB should be ruled out first before attributing polyserositis to any other cause like hypothyroidism, particularly in high TB burden countries.

Abstract

Polyserositis has numerous causes and frequently occurs in neoplasia, autoimmune disorders, endocrine conditions like hypothyroidism, and infectious diseases like tuberculosis (TB). The diagnosis of TB polyserositis is complex and challenging, which may cause the start of definitive therapy to be delayed. Here, we report the case of a 32-year-old female patient who presented with abdominal distension for 3 weeks associated with shortness of breath, cough, excessive fatigue, and loss of appetite. Thyroid function tests were suggestive of primary hypothyroidism, and later on, sputum GeneXpert MTB/RIF test turned out to be positive. She was initially started on oral levothyroxine and then anti-TB medications. The polyserositis resolved a month after the initiation of anti-TB drugs. TB should be ruled out first before attributing polyserositis to any other cause like hypothyroidism, particularly in high TB burden countries. Microbiologic tests, such as GeneXpert, remain the most important tools to make a diagnosis of TB and start anti-TB medications early.

KEYWORDS

hypothyroidism, polyserositis, tuberculosis, young female

1 | INTRODUCTION

Polyserositis is an accumulation of fluid in more than one serous membrane, including the pleura, pericardium, and peritoneum.¹ It has numerous causes and frequently occurs in neoplasia, autoimmune disorders, endocrine conditions like hypothyroidism, and infectious diseases like

tuberculosis (TB).^{2,3} According to a systemic review of 114 cases, the most common causes of polyserositis were neoplasia (30; 26.3%), autoimmune illnesses (19; 16.7%), and infections (16; 12.2%).⁴ Serosal TB is a common extrapulmonary TB presentation, particularly in areas where the disease is highly endemic.⁵ However, polyserositis did not frequently result in *Mycobacterium tuberculosis*

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isolation.^{6,7} As a result, the diagnosis of TB polyserositis is complex and challenging, which may cause the start of definitive therapy to be delayed.¹

Hypothyroidism and TB are correlated in both directions. Patients with hypothyroidism have a roughly threefold increased risk of developing TB compared to those without hypothyroidism, and those already suffering from TB have a twofold increased risk of developing hypothyroidism.⁸ Chemotaxis, phagocytosis, the generation of reactive oxygen species, and the release of cytokines are just a few of the immune system processes that thyroid hormones regulate.⁹ Hypothyroidism may have a negative impact on the immune system, and recent research has demonstrated that thyroid hormone signaling is crucial for an effective immunological response to TB infection.¹⁰

We report a case of polyserositis involving the pleura, pericardium, and peritoneum due to TB in a young female patient with hypothyroidism.

2 | CASE PRESENTATION

A 32-year-old female patient presented with abdominal distension for 3 weeks associated with shortness of breath, cough, excessive fatigue, and loss of appetite. She did not have a fever, weight loss, or night sweats. Upon further inquiry, she reported a medical termination of pregnancy 3 days prior to the onset of the aforementioned symptoms. She had no previously known chronic medical illnesses. She had a blood pressure of 100/70 mmHg, a pulse rate of 72 beats per minute, a temperature of 36.6°C, a respiratory rate of 28 breaths per minute, and an oxygen saturation of 85% in atmospheric air. Chest examination showed dullness and decreased air entry over the lower one third of the bilateral posterior chest, and abdominal examination showed a grossly distended abdomen with positive shifting dullness and fluid thrill. She had coarse and dry skin over her trunk and extremities (Figure 1). She had no palpable thyroid mass.

Upon laboratory investigations (Table 1), a complete blood count revealed moderate anemia. Liver enzymes and serum creatinine were within normal ranges. Thyroid function tests showed high thyroid stimulating hormone (TSH) level with low free T3 and T4. The Sputum GeneXpert MTB/RIF test was positive for rifampicin sensitive *M. tuberculosis* (TB). Anti-nuclear antibody and rheumatoid factor were negative. She tested negative for HIV. Pleural fluid analysis revealed a high cell count (with lymphocyte predominance), high protein, high LDH, and low glucose levels, which were suggestive of exudative pleural effusion. There was mild pericardial effusion on echocardiography and ascites on abdominal ultrasound. A chest x-ray revealed bilateral pleural effusion (Figure 2).



FIGURE 1 Dry and coarse skin on bilateral lower extremities.

Thyroid ultrasound showed heterogeneous echogenicity of bilateral thyroid lobes measuring 0.4 mL, which suggested thyroid atrophy.

The initial impression was polyserositis secondary to primary hypothyroidism, and the patient was started on oral levothyroxine 100 microgram once daily. She was put on intranasal oxygen, and a therapeutic pleural tap was also done. But the patient continued to have tachypnea and desaturation, and she was investigated for TB and the sputum for the GeneXpert MTB/RIF test turned out to be positive. The final diagnosis was primary hypothyroidism and disseminated TB (involving the lung, pleura, pericardium, and peritoneum). She was started on anti-TB medications with four tablets of RHZE (rifampicin 150 mg/isoniazid 75 mg/pyrazinamide 400 mg/ethambutol 275 mg) once daily, and the levothyroxine was continued. After a month of initiation of anti-TB therapy, follow-up imaging confirmed resolution of the serous membrane fluid collections.

3 | DISCUSSION

Infectious diseases like TB have been known to cause polyserositis. Serosal TB is a common extrapulmonary manifestation, particularly in places with a high TB burden, whereas polyserositis is a less common form of the disease.^{5,11} In an old case series, 50% of the cases of polyserositis had *M. tuberculosis*.⁶ Certain case reports

TABLE 1 Laboratory findings.

Laboratory test	Units	Results	Reference ranges
White blood cell count	cells/ μ L	6×10^3	$4\text{--}10 \times 10^3$
Hemoglobin	g/dL	9.8	12–16
Mean corpuscular volume	fl	88	80–100
Platelet count	cells/ μ L	199×10^3	$150\text{--}450 \times 10^3$
Creatinine	mg/dL	0.5	0.7–1.3
Aspartate transaminase	U/L	9	<40
Alanine transaminase	U/L	13	<40
Alkaline phosphatase	U/L	123	<130
Sputum GeneXpert MTB/RIF test ^a	–	Positive	–
HIV	–	Negative	–
Thyroid stimulating hormone	μ IU/mL	49	0.3–4.5
Free T3	pg/mL	1.1	2.0–4.2
Free T4	ng/mL	0.3	0.9–1.75
Anti-nuclear antibody		Negative	
Rheumatoid factor		Negative	
Pleural fluid analysis			
Cell count	cells/ μ L	1200	<300
Lymphocyte	%	93.3	–
Neutrophil	%	6.7	–
Protein	g/dL	5.6	<4.1
LDH	U/L	704	<480
Glucose (mg/dL)	mg/dL	47	50–96

Abbreviations: fl, femtoliter; HIV, human immunodeficiency virus; LDH, lactate dehydrogenase; MTB, *Mycobacterium tuberculosis*; RIF, rifampicin.

^aManufacturer of the GeneXpert machine was Cepheid.

have shown that endocrine disorders, including hypothyroidism, can also cause polyserositis.² A diagnostic challenge is faced when there are two or more possible causes of polyserositis, like in our case, where there were evidences of both TB and hypothyroidism. In such cases, microbiologic tests, such as GeneXpert, remain the most important tools to confirm TB as the cause of the polyserositis.

The most typical clinical features of hypothyroidism include cold intolerance, fatigue, weight gain, constipation, and dry skin.^{12,13} Ascites, pericardial effusion, or pleural effusion can all occur alone in patients with primary hypothyroidism; however, the occurrence of all three together is highly uncommon and not well recognized.¹⁴ Hypothyroidism-related pericardial and pleural effusions have features that lie in between exudate and transudate and exhibit little sign of inflammation.¹⁵ Different pleural fluid characteristics, including transudative, exudative, and bloody pleural effusions, have been reported from patients with multiple body cavity fluid collections due to hypothyroidism.^{16–19} Our patient had clinical features and thyroid function tests suggestive of hypothyroidism;

however, the polyserositis was most likely due to disseminated TB, as evidenced by a positive GeneXpert MTB/RIF test from sputum and the exudative nature of the pleural fluid.

In a small study of 50 patients with sputum-positive pulmonary TB who were hospitalized in South Africa, the most prevalent endocrine dysfunction was a low free T3 state, which was present in almost 90% of patients as part of sick euthyroid syndrome.²⁰ Temporary spikes in blood TSH values (up to 20 mU/L) may occur in some hospitalized individuals recovering from nonthyroidal illnesses.²¹ It is typical for patients to have permanent hypothyroidism when their serum TSH levels are over 20 mU/L.²² Sick euthyroid syndrome might have been considered as one differential diagnosis for the hypothyroidism in our patient, but the very high TSH level (47 mU/L) was suggestive of permanent hypothyroidism.

Hypothyroidism has been rarely reported to be caused by thyroid TB, an uncommon disease with an incidence of 0.1%–0.4%, even in areas with high rates of pulmonary TB. The most common clinical presentation of thyroid TB is a solitary thyroid nodule, whereas our patient had thyroid



FIGURE 2 Chest x-ray revealed bilateral pleural effusion.

atrophy, which makes thyroid TB unlikely.²³ There are also case reports of hypothyroidism following the initiation of second-line anti-TB agents, particularly p-amino salicylic acid and ethionamide, and first-line anti-TB agents such as rifampicin, which have more significant effects on thyroid physiology.^{24,25} Contrary to these findings, our patient did not take any anti-TB medication before the diagnosis of hypothyroidism.

4 | CONCLUSION

TB should be ruled out first before attributing polyserositis to any other cause like hypothyroidism, particularly in high TB burden countries. Microbiologic tests, such as GeneXpert, remain the most important tools to make a diagnosis of TB and start anti-TB medications early.

AUTHOR CONTRIBUTIONS

Gashaw Solela: Conceptualization; data curation; resources; validation; writing – review and editing. **Ferhan Kedir:** Resources; writing – original draft. **Merga Daba:** Conceptualization; data curation; writing – original draft.

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CONFLICT OF INTEREST STATEMENT

The authors declared no potential conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this case report are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethical clearance, including publication of this patient's case details, was obtained from the Institutional Review Board of Yekatit 12 Hospital Medical College.

CONSENT STATEMENT

The patient gave an informed written consent for publication of her case details, including the history, physical findings, laboratory reports, and images.

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