

## CASE REPORT

# Positive PPD Test and TB-Ab Misdiagnosed as Tuberculosis Finally Proved as Sarcoidosis by Thoracoscopy: a Case Report

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### SUMMARY

**Background:** Tuberculosis (TB) is a common infectious disease in developing countries. Tuberculosis and sarcoidosis are difficult to differentiate. We report a case of a patient who was initially misdiagnosed as tuberculosis due to positive tuberculin test (PPD test) and tuberculosis antibody (TB-Ab), which was eventually proven as sarcoidosis by thoracoscopy.

**Methods:** Appropriate laboratory tests are carried out and a chest CT scan, bronchoscopy, thoracoscopic pathological biopsy were done.

**Results:** Serum sedimentation was increased and tuberculosis antibody was positive. The chest CT scan showed multiple pulmonary nodules in both lungs. The bronchoscopy demonstrated no abnormality. Thoracoscopic pathology showed noncaseating granulomas and acid-fast staining was negative.

**Conclusions:** When a patient has multiple pulmonary nodules and lymphadenopathy without obvious tuberculosis poisoning symptoms, physicians should pay attention to tuberculosis, sarcoidosis, and lung cancer. Pathology is crucial for the ultimate diagnosis.

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#### KEYWORDS

tuberculosis antibody, tuberculosis, sarcoidosis, thoracoscopy, pathology

#### CASE REPORT

Tuberculosis is a common infectious disease in developing countries. Tuberculosis and sarcoidosis are difficult to differentiate. In this article, we report the case of an adult patient who was first misdiagnosed as tuberculosis due to a history of exposure to TB patients, positive tuberculin test and TB antibodies, and a chest CT showed multiple nodules in both lungs, which was eventually proven as sarcoidosis by thoracoscopic biopsy.

The case was a 39-year-old young woman who is a nurse in the respiratory medicine department with a history of exposure to tuberculosis patients. In January 2021, the patient was found to have multiple nodules in both lungs with a maximum diameter of about 0.4 cm

on chest CT during a health check-up (Figures 1A, B). One year later, the patient's chest CT was repeated and showed that the nodules in both lungs were larger than before with a maximum diameter of about 0.5 cm (Figures 1C - E). Then she was admitted to our department. Physical examination was normal. Laboratory findings revealed that the blood routine test and tumor markers were normal. Serum sedimentation was 30 mm/hour (normal reference range of serum sedimentation was 0 to 20 mm/hours). The tuberculin test and tuberculosis antibody were positive. The bronchoscopy demonstrated no abnormality (Figure 1F, G). As a result, a diagnosis of tuberculosis was made and anti-tuberculosis treatment was initiated. Four months later, the patient's re-examination of the chest CT showed enlarged nodules in both lungs with a maximum diameter of approximately 0.7 cm and a ground glass density shadow in the lower lobe of the right lung (Figure 1H - J). Since the nodules were small and close to the pleura, it was considered difficult to obtain positive results by bronchoscopy and percutaneous lung puncture, so we arranged for the patient to undergo thoracoscopy and resection of 2 pieces of lung tissue. In the larger lung tissue section, 2 grayish-white nodules with diameters of 1 cm and 0.1 cm were seen, with distances of 0.3 cm and 0.1 cm from the lung membrane, respectively. In the smaller lung tissue section, 2 gray-black nodules with diameters of 0.2 cm were seen, adjacent to the lung membrane. Pathological findings were suggestive of chronic granulomatous inflammation and acid-fast staining was negative (Figures 1K, L). So, the ultimate diagnosis was sarcoidosis.

## DISCUSSION

Sarcoidosis is a common chronic granulomatous disease that can manifest with multi-systemic and multi-organ involvement, involving the lungs in about 90% of cases, and other sites such as the eyes, skin, liver, spleen, lymph nodes, skeletal muscle, and central nervous system [1]. The etiology of sarcoidosis is unknown and may be the result of a combination of genetic susceptibility, environmental/occupational exposure, and infectious factors [2]. Its morbidity and prevalence are strongly correlated with geographic region, population race, gender, and age [3]. The diagnosis of sarcoidosis is based on three main criteria: consistent and adequate clinical presentation; the presence of non-caseating granulomas in one or more tissue samples; and the exclusion of other causes of granulomatous disease [4]. Some people believe that sarcoidosis is an infectious disease similar to tuberculosis. The respiratory symptoms may overlap between the two entities. The constitutional symptoms such as fever, malaise, fatigue, weight loss, and night sweats are non-specific and common to both the diseases [5,6]. Both diseases can have the same extrapulmonary manifestations, such as peripheral lymphadenopathy, anterior uveitis, and erythe-

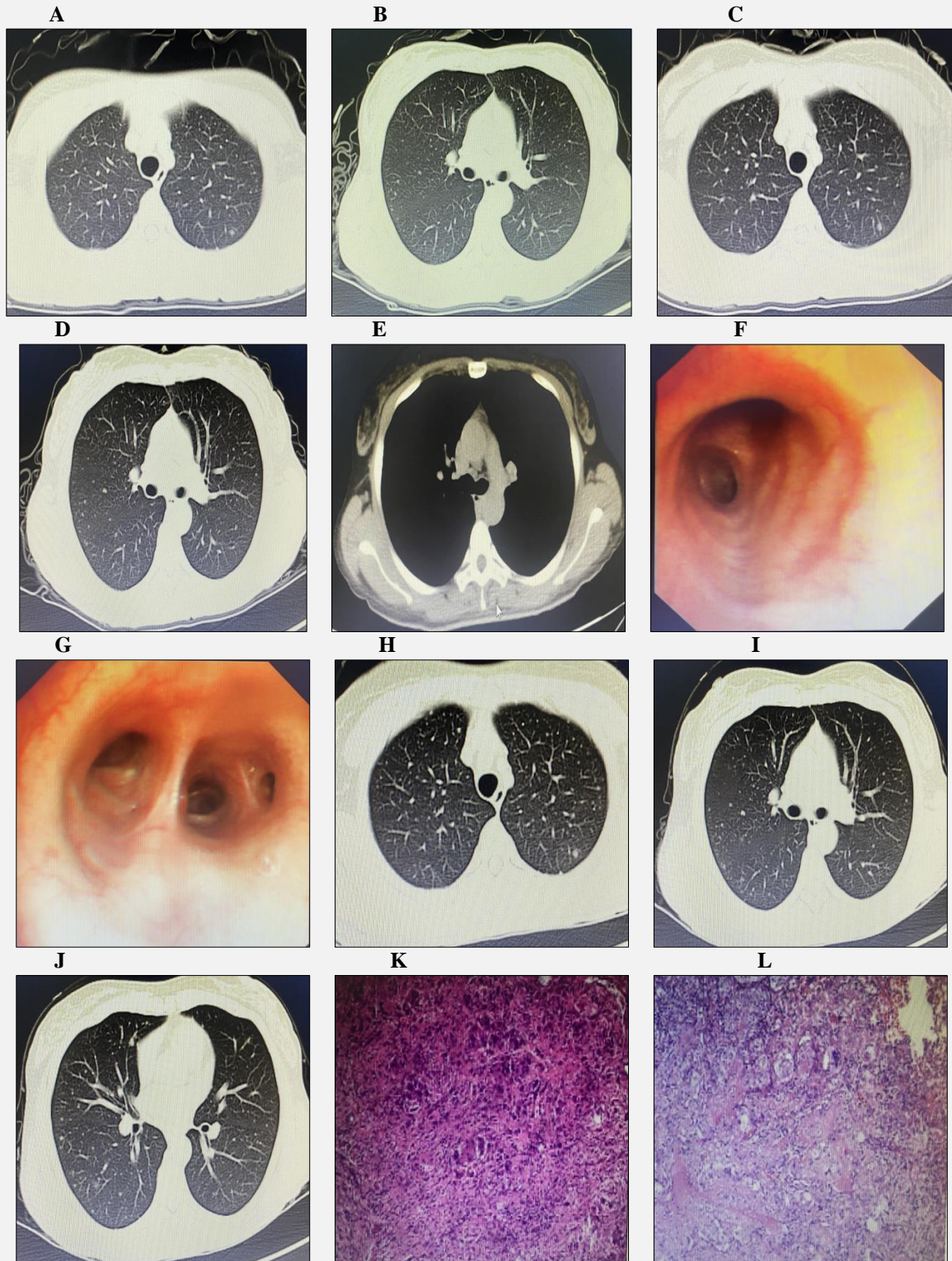
ma nodosum [7]. So, we often confuse these two diseases. However, weight loss in sarcoidosis patients occurred only in the first 1 - 12 weeks of onset. Lofgren syndrome has been classically described in sarcoidosis including nodular erythema, bilateral hilar lymphadenopathy, and arthralgia, especially ankle pain. These symptoms occur in 20% to 50% of patients [8].

The diagnosis of sarcoidosis is commonly established based on clinical and radiologic findings that are supported by histologic findings. On imaging, both sarcoidosis and tuberculosis can present as multiple nodules in both lungs. The typical radiologic findings associated with sarcoidosis include symmetric, bilateral hilar, and paratracheal lymphadenopathy, with or without concomitant parenchymal abnormalities [9]. However, in 25 - 30% of cases, the radiologic findings are atypical, which causes difficulty in making a correct diagnosis. Although there are many similarities between sarcoidosis and tuberculosis in terms of clinical presentation, there are significant differences in histopathology. Tuberculosis is histologically characterized by caseous granulomas, whereas sarcoidosis is non-caseous granulomas [10,11].

The typical histological features of sarcoidosis granulomas are the formation of well-developed, concentrically arranged layers of immune cells, including a core layer formed by macrophage aggregates and multinucleated giant cells, with loosely arranged lymphocytes (mainly T lymphocytes) and a few inserted dendritic cells located in the outer layer of the granuloma; in some cases, scattered B lymphocytes may also be present [12]. In the lung, nodular granulomas are usually distributed along the pleura, lobular septa and lymphatic tracts of the bronchial vascular bundles [13].

In our report, in a country with a high prevalence of tuberculosis, the patient had a history of contact with tuberculosis patients, a positive tuberculin test and tuberculosis antibodies, and no abnormalities on bronchoscopy. We initially mistook the patient for TB and therefore initiated anti-tuberculosis treatment. A repeat chest CT after 4 months of anti-tuberculosis treatment showed an increase in the size and number of pulmonary nodules compared to the previous one. Due to the small size of the lesion, bronchoscopy and percutaneous lung puncture were difficult to obtain meaningful results, so we scheduled the patient for thoracoscopy with lobectomy, and the histopathological findings suggested chronic granulomatous inflammation and acid-fast staining was negative.

Positive tuberculin test and tuberculosis antibodies are one of the main points of diagnosis in patients with tuberculosis, but they are influenced by several factors, according to the literature, tuberculosis antibodies and tuberculin test are influenced by the immune system and other factors [14]. Neither is the gold standard for the diagnosis of tuberculosis and we must exclude false positive results. Pathological examination is the key to further clarify the diagnosis. Bronchoscopy and CT-guided percutaneous lung aspiration biopsy are the two



**Figure 1. Patient imaging and histological results.**

In 2021 the patient's chest CT showed multiple nodules in both lungs (Figures 1A, B). In 2022, the patient's repeat chest CT showed multiple nodules in both lungs that were larger than before (Figures 1C - E). The bronchoscopy demonstrated no abnormality (Figure 1F, G). After 4 months of anti-tuberculosis treatment, a repeat chest CT showed enlarged nodules in both lungs and a ground glass density shadow in the lower lobe of the right lung (Figure 1H - J). Pathological findings by thoracoscopy suggest chronic granulomatous inflammation and acid-fast staining was negative (Figure 1K, L).

most common pathological diagnostic methods in respiratory medicine. However, in bronchoscopy it is often difficult to examine the periphery and extralumen of the lung. In contrast, CT-guided percutaneous lung aspiration biopsy is difficult to obtain positive results in the case of small lesions. Thoracoscopy could be used as a valid minimally invasive method for the diagnosis of sarcoidosis, as it allows larger samples of tissue and greater diagnostic yield. Furthermore, in comparison with the traditional open techniques, Thoracoscopy offers less postoperative pain, a more rapid recovery, and much less complications [15].

The lesson learned from this case is that we initially considered a positive tuberculin test and tuberculosis antibody with multiple nodules in both lungs as pulmonary tuberculosis in a country where tuberculosis is prevalent. Tuberculosis and sarcoidosis may overlap in terms of symptoms and ancillary tests, making them difficult to distinguish from each other. A proper diagnostic plan must be developed, and histopathological examination is the key to their differential diagnosis.

## CONCLUSION

Although positive tuberculin tests and tuberculosis antibodies are characteristic of tuberculosis, they are influenced by a variety of factors and need to be excluded from other diseases that present with false-positive results, such as sarcoidosis.

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### Ethical Approval:

This study was approved by the ethics committee of North China University of Science and Technology Affiliated Hospital. All procedures performed in studies were in accordance with the ethical standards. Informed consent was obtained.

### Declaration of Interest:

No conflicts of interest.

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