

Diagnosis for pulmonary tuberculosis (WS 288-2017)

1. Scope of application

This criteria specifies the diagnostic basis, diagnostic principles, diagnosis and differential diagnosis of pulmonary tuberculosis.

This criteria is applicable to the diagnosis of pulmonary tuberculosis by medical and health facilities at all levels and medical staff.

2. Terms and definitions

2.1 Pulmonary tuberculosis refers to tuberculosis lesions that occur in lung tissue, trachea, bronchus and pleura

2.2 *Mycobacterium tuberculosis* (MTB) is the pathogenic bacterium causing tuberculosis in humans. Morphologically, *Mycobacterium tuberculosis* appears as slender, straight or slightly curved bacilli (rods) with rounded ends, measuring 1–4 μm in length and 0.3–0.6 μm in width.

3. Diagnostic basis

3.1 Epidemiology

With history of exposure to tuberculosis patients.

3.2 Clinical symptoms

Major symptoms of PTB include cough and expectoration ≥ 2 weeks, hemoptysis, and bloody sputum. People with suspected PTB symptom are those who have manifested one of the above symptoms. Additionally, the

followings are also common symptoms for PTB: chest distress, chest pain, mild fever, night sweat, weakness , poor appetite and weight loss.

3.3 Chest imaging examination

3.3.1 Primary PTB

The main manifestations of primary pulmonary tuberculosis are the enlargement of primary pulmonary lesions and intrathoracic lymph nodes, or simple intrathoracic lymph nodes. Primary pulmonary tuberculosis in children can also manifest as cavities, caseous pneumonia and bronchial tuberculosis caused by bronchial lymphatic fistula.

3.3.2 Hematogenous disseminated PTB

Acute hematogenous disseminated pulmonary tuberculosis showed miliary shadows with uniform size and density in both lungs; The diffuse lesions of subacute or chronic hematogenous disseminated pulmonary tuberculosis are mostly distributed in the upper and middle parts of both lungs, with different sizes and densities, and may be fused. Sometimes, acute hematogenous disseminated pulmonary tuberculosis in children only shows ground glass shadow. The exudation around the miliary lesions in infants is obvious, the edges are fuzzy, and it is easy to fuse.

3.3.3 Secondary PTB

The chest imaging manifestations of secondary pulmonary tuberculosis are diverse. Mild cases mainly showed patches, nodules and cord shadows, or showed tuberculoma or solitary cavity; The severe cases can be manifested

as lobar infiltration, caseous pneumonia, multiple cavity formation and bronchial dissemination; In the case of repeated progression, lung damage may occur, and the volume of damaged lung tissue shrinks, with multiple fibrous thick walled cavities, secondary bronchiectasis, or with multiple calcifications, traction and displacement of adjacent hilar and mediastinal structures, collapse of the thorax, pleural thickening and adhesion, modern compensatory emphysema in other lung tissues, and bronchial dissemination lesions of different ages.

3.3.4 Tuberculosis pleuritis

Tuberculous pleurisy is divided into dry pleurisy and exudative pleurisy. Dry pleurisy is an early inflammatory reaction of the pleura, which usually has no obvious imaging manifestations; Exudative pleurisy is mainly manifested as pleural effusion, and pleural effusion can be manifested as a small or medium amount of free effusion, or localized effusion in any part of the chest. Those with slow absorption are often complicated with pleural thickening and adhesion, and can also evolve into pleural tuberculoma and empyema.

3.3.5 Tuberculosis of trachea and bronchus

The main manifestations of tracheal and bronchial tuberculosis are irregular thickening of the tracheal or bronchial wall, luminal stenosis or obstruction, and secondary atelectasis or consolidation, bronchiectasis, and bronchial disseminated lesions in other parts of the lung tissue at the distal

end of the stenotic bronchus.

3.4 Laboratory examination

3.4.1 Bacteria examination

a) Smear positive PTB

b) Culture positive PTB

3.4.2 Molecular biology examination

Mycobacterium tuberculosis nucleic acid test was positive.

3.4.3 Immunology examination

3.4.3.1 Tuberculin skin test, moderately positive or strongly positive.

3.4.3.2 Gamma interferon release test (IGRA) was positive.

3.4.3.3 Tuberculosis antibody was positive.

3.5 Bronchoscopy

Bronchoscopy can directly observe trachea and bronchial lesions, and can also aspirate secretions, brush and biopsy.

4. Diagnostic principle

The diagnosis of pulmonary tuberculosis is based on etiology (including bacteriology and Molecular Biology) examination, combined with epidemic history, clinical manifestations, chest images, relevant auxiliary examinations and differential diagnosis, etc., to make a comprehensive analysis and diagnosis. The etiological and pathological results were used

as the basis for the diagnosis.

5. Differential diagnosis of pulmonary tuberculosis

5.1 Differential diagnosis of pulmonary tuberculosis with infiltrative imaging findings

Pulmonary tuberculosis with infiltrative manifestations on imaging should be differentiated from infectious lung diseases such as bacterial pneumonia, pulmonary mycosis and pulmonary parasitosis. Bacterial pneumonia often has a history of cold, most of which are accompanied by elevated blood leukocytes, and the focus of anti-infection treatment is absorbed rapidly. Pulmonary mycosis often has a long-term history of antibiotics, immunosuppressants or immune diseases, positive sputum fungal culture, positive blood G-test and GM-test, ineffective anti-inflammatory and anti-tuberculosis treatment, and effective antifungal treatment. Patients with pulmonary parasitosis often have a history of living in endemic areas, eating contaminated food and drinking raw water, and insect eggs are found in sputum or pleural fluid. Serum specific antibody examination is helpful for diagnosis.

5.2 Identification of pulmonary tuberculoma

Tuberculoma is differentiated from peripheral lung cancer, inflammatory pseudotumor, pulmonary hamartoma and pulmonary sequestration. Patients with peripheral lung cancer often find lesions with cough, chest pain or physical examination. Most of the lesions have lobulation and burr,

and most of them have no satellite lesions. Tumor cells can be found in patients' sputum. Percutaneous lung biopsy or bronchoscopic lung biopsy can often confirm the diagnosis; Inflammatory pseudotumor is an inflammatory granulomatous lesion with unknown etiology. The patient had a history of chronic lung infection before, and the lesion gradually narrowed after anti-inflammatory treatment; Pulmonary hamartomas are often solitary lesions with popcorn-like shadows. Pulmonary sequestration is more common in 20-year-old young people. Without pulmonary infection, it can be asymptomatic for a long time. The lesions mainly occur in the posterior basal segment of the lower lobe of the lung and are more common in the left lower lung. The density is uniform, the edge is clear, and there are few calcifications. Angiography and lung radionuclide scan can see a separate blood supply, which can be confirmed.

5.3 Differential diagnosis of hematogenous disseminated pulmonary tuberculosis

Hematogenous disseminated pulmonary tuberculosis is differentiated from bronchoalveolar cell carcinoma, pulmonary hemosiderosis and diffuse interstitial lung disease. Most patients with alveolar cell carcinoma have no symptoms of tuberculosis poisoning, chest tightness and shortness of breath are obvious, and there can be more foamy sputum. The lesions are mostly located in the middle and lower lung fields of both lungs, with uneven distribution. Cancer cells can be found in sputum examination, and

percutaneous lung biopsy and bronchoscopic lung biopsy can often confirm the diagnosis. Patients with pulmonary hemosiderosis often have symptoms of recurrent cough, hemoptysis and iron deficiency anemia, and have a history of allergy, mitral stenosis, pulmonary hemorrhage nephritis syndrome, etc. there are many lower lung fields in the shadow. Hemosiderin particles found in sputum macrophages of patients can help diagnose. The diagnosis usually depends on percutaneous lung biopsy or transbronchial lung biopsy pathological examination. Patients with diffuse pulmonary interstitial disease have a long history and progressive dyspnea. Some patients have a history of dust exposure. The shadows are more in the middle and lower lung fields and the inner and middle zones. When patients are not complicated with infection, they are mostly afebrile and have obvious hypoxemia. Lung biopsy is usually required for diagnosis.

5.4 Differentiation of bronchial lymph node tuberculosis

Bronchial lymph node tuberculosis is differentiated from central lung cancer, lymphoma and sarcoidosis. Most patients with lung cancer are older than 40 years old. Patients may have irritating dry cough and blood sputum in the early stage, and most of them have no symptoms of tuberculosis poisoning; Lymphoma is a malignant tumor of the lymphatic system, which can show unilateral or bilateral hilar lymphadenopathy. Patients are often accompanied by decreased hemoglobin and superficial lymphadenopathy. Sarcoidosis is a systemic granulomatous disease of

unknown cause. Imaging findings include bilateral hilar or mediastinal lymphadenopathy. Tuberculin test is mostly negative, Kveim test is positive, angiotensin-converting enzyme is elevated, and adrenocortical hormone treatment is effective. The diagnosis of the above diseases usually requires bronchoscopy or endoscopic ultrasonography and pathological examination.

5.5 Identification of Pulmonary Tuberculosis Cavity

Pulmonary tuberculosis cavity is differentiated from cancerous cavity, lung cyst and cystic bronchiectasis. The walls of lung cancer cavity are often irregular, and nodular protrusions can be seen in the cavity. There is no satellite focus around the cavity, and the cavity increases rapidly; Lung cysts are congenital abnormalities of lung tissue, which mostly occur in the upper field of the lung. When complicated with infection, fluid levels can be seen in the cavity, and there are no satellite foci around. When not complicated with infection, they can be asymptomatic for many years, and the lesions have not changed for many years. Cystic bronchiectasis usually occurs in the middle and lower lung fields of both lungs. Patients often have a history of cough, massive sputum and hemoptysis. Thin slice CT scan or lipiodol bronchography can help in the diagnosis.