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【 CASE REPORT 】

A Tuberculosis-associated Endobronchial Polyp That Was Negative for Acid-fast Bacillus

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Abstract:
The author reports the case of a patient with a tuberculosis-associated endobronchial inflammatory polyp. Acid-fast bacillus (AFB) staining and culturing of sputum and bronchial washing fluid specimens were negative on three occasions. Biopsy results twice showed chronic inflammation. The patient was finally diagnosed with *Mycobacterium tuberculosis* based on a polymerase chain reaction (PCR) of a biopsy tissue specimen, along with the finding of chronic granulomatous inflammation. The author herein reports a rare case of a tuberculosis-associated endobronchial inflammatory polyp that was AFB smear- and culture-negative and the patient's clinical course after treatment.

Key words: endobronchial polyp, tuberculosis, negative acid-fast bacillus

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Introduction

The most common cause of an endobronchial polyp or mass is carcinoma of the bronchus; however, bronchial polyps are associated with benign tumors of the bronchi in approximately 5-10% of such cases (1, 2). In a series of 63 benign tracheobronchial tumors, only seven (11%) occurred due to inflammatory polyps (3).

Among these benign polyps, there are some reports about bronchial polyps and masses with endobronchial tuberculosis or inflammatory polyps caused by tuberculosis (4-7). In all of these reports, the sputum and biopsy specimens showed positive acid-fast bacillus (AFB) staining results, while biopsies showed non-specific findings (4, 6, 7).

In this case, AFB staining and culturing of sputum and bronchial washing fluid returned negative results three times, and chronic inflammation was observed in two separate biopsies. However, a polymerase chain reaction (PCR) of another biopsy specimen-which showed chronic granulomatous inflammation and negative AFB staining-was positive for *Mycobacterium tuberculosis*.

The author herein reports the case of a patient with an endobronchial polyp in which tuberculosis was difficult to diagnose and the clinical course after treatment.

Case Report

A 67-year-old man presented to the author's clinic with a complaint of hemoptysis of three days in duration. He reported cough and phlegm with blood, but denied fever, dyspnea, and body weight loss. He was an ex-smoker (one pack per day for 40 years), and had pneumoconiosis from his previous job, which involved blasting operations in the mountains. No aspect of his history included tuberculosis.

A physical examination of the patient's chest revealed normal bronchial breathing sounds during the inspiratory and expiratory phases; lymphadenopathy was not detected in the cervical or axillary regions.

His pulmonary function test showed obstructive ventilatory defects. The forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1) and FEV_1/FVC ratio were 82%, 78% and 67% of the predicted values, respectively.

A chest X-ray (Fig. 1) showed tiny lung nodules in both fields, with consolidation in the right upper lung field due to pneumoconiosis, which did not show any change in comparison to previous years.

A computerized tomography (CT) scan of the chest revealed that the consolidation in the right upper lobe was unchanged, with tiny lung nodules, and mild mediastinal lym-

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phadenopathy. In addition, suspicious endobronchial lesions in the left main bronchus were also observed.

Routine investigations of blood and urine samples were normal. An interferon-gamma release assay for tuberculosis (Quantiferon TB) returned a negative result, and a carcinoembryonic antigen (CEA) test also returned a normal result.

Three separate sputum examinations were performed; however, AFB staining was negative, culturing revealed no microorganisms, and no atypical cells were detected.

Flexible fiber optic bronchoscopy (Fig. 2A) showed a polypoid mass without caseous material in the left main bronchus that had filled approximately half of the left main bronchial lumen. A cytological examination of bronchial aspirate revealed inflammatory cells.

A histopathological examination of the endobronchial mass indicated chronic inflammation, which suggested an inflammatory polyp. AFB staining, culturing, and *M. tuberculosis* PCR were negative in the bronchial lavage fluid collected from the right and left bronchi, and routine bacterial cultures were negative.

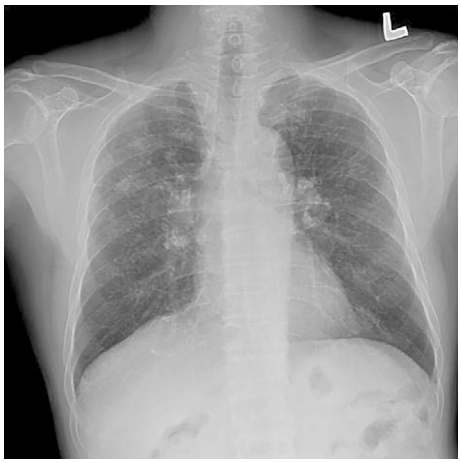

Figure 1. Initial chest X-ray showing tiny lung nodules in both fields and consolidation in the right upper lung field due to pneumoconiosis, which did not show any changes compared with previous years.

The author suspected that this polypoid mass might have been associated with lung cancer, and thus performed bronchoscopy a second time. The second histopathological examination revealed chronic inflammation. Bronchial lavage fluid specimens were subjected to AFB staining, culturing, and a PCR to detect *M. tuberculosis*, but again, the results were all negative. One month later, the author performed bronchoscopy for a third time; the histopathological examination revealed chronic granulomatous inflammation and a PCR revealed that the tissue specimen was positive for *M. tuberculosis* (Fig. 3). However, AFB staining, culturing and a PCR of the bronchial lavage fluid failed to detect *M. tuberculosis*. Furthermore, AFB staining of the tissue was negative. Finally, the patient was diagnosed with tuberculosis.

Bronchoscopy, which was performed two months after the initiation of anti-tuberculosis treatment, showed that the polyp in the left main bronchus remained unchanged. An examination of a specimen of a polyp revealed that its stalk was detached from the bronchus; thus, the author was able to retrieve an entire 8 mm endobronchial polyp. The examination of the entire polyp revealed that it was composed of granulation tissue (Fig. 4).

Bronchoscopy performed at the end of the six-month treatment period revealed that a tiny polyp remained in the left main bronchus, with a fibrostenotic endobronchial lumen (Fig. 2B).

Chest X-ray and CT scans performed during and after treatment showed no changes in his pulmonary findings. It is possible that these findings were associated with pneumoconiosis.

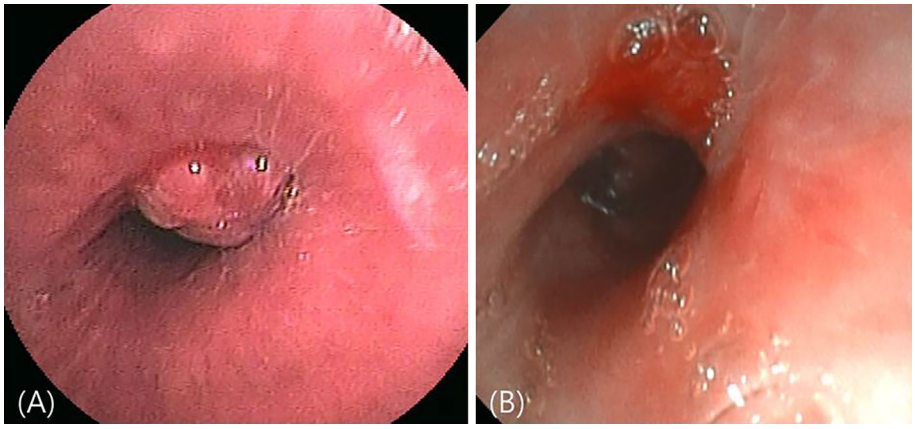

Figure 2. (A) Initial flexible fiber optic bronchoscopy shows an 1 cm-sized polypoid mass without caseous materials in the left main bronchus that had filled about half of the left main bronchial lumen. (B) Follow-up bronchoscopy at the end of anti-tuberculosis treatment shows a tiny polyp remained in the left main bronchus, with a fibrostenotic endobronchial lumen.

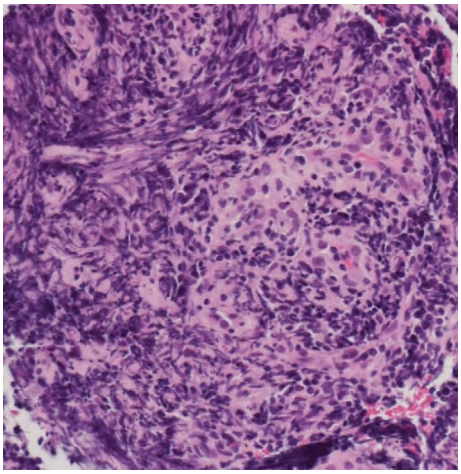

Figure 3. **Photomicrograph of the third bronchoscopic mass biopsy showing chronic granulomatous inflammation. Hematoxylin and Eosin staining ×200.**

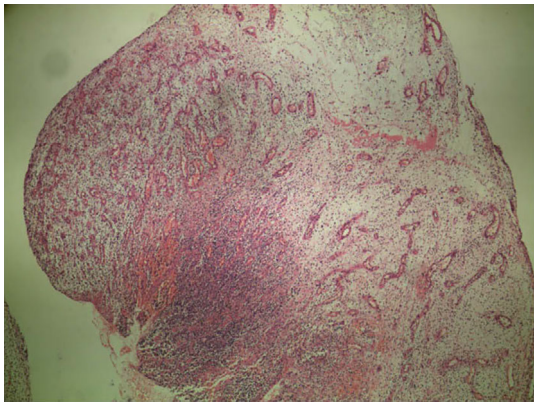

Figure 4. **Photomicrograph of endobronchial mass showing granulation tissue, two months after getting started on anti-tuberculosis agents. Hematoxylin and Eosin staining ×40.**

Discussion

There are likely pathogenetic mechanisms that lead to the development of bronchial polyps that show an exaggerated but localized inflammatory reaction to chronic airway irritation (8). It has been proposed that injuries such as infection and sensitization to bacteria can lead to increased capillary permeability and the infiltration of inflammatory cells, causing vascular congestion and tissue edema. Pressure resulting from the accumulation of intracellular- and extracellular-bound edema fluid may push forward the mucous membrane, first giving rise to folds and projections and then to massive mucosal herniation in the respiratory tract: the so-called polyp (2, 9).

Five potential mechanisms are believed to be responsible for the development of endobronchial infections caused by *M. tuberculosis*: (i) direct invasion from an adjacent parenchymal focus, (ii) implantation of organisms from infected sputum, (iii) hematogenous spread, (iv) erosion of a lymph node inside a bronchus and (v) lymphatic drainage from the parenchyma towards the peribronchial region (10, 11).

In the present case, there was no focus of parenchymal infection or adjacent enlarged lymph node, and AFB staining of the sputum was negative. The present case had coexisting pneumoconiosis, which is a major risk factor for tuberculosis. In pneumoconiosis, the acid-fast bacilli can remain encapsulated within the silicotic nodules, which may be responsible for the reactivation of tuberculosis (12). This case might have been caused by an inflammatory reaction to chronic airway irritation by organisms from the infected sputum that contained a minimal bacterial burden. This would explain why the polyp was AFB- negative and why the patient did not exhibit pulmonary parenchymal lesions or lymph node enlargement. There is no evidence that pneumoconiosis causes bronchial polyps; thus, pneumoconiosis was not considered to be related to the polyp itself.

Chung et al. (13) classified the forms of endobronchial tuberculosis (EBTB) into seven subtypes according to their bronchoscopic findings: (1) actively caseating, (2) edematous-hyperemic, (3) fibrostenotic, (4) tumorous, (5) granular, (6) ulcerative, and (7) nonspecific bronchitic EBTB. With these forms, sputum cultures, bronchial washing fluid, and biopsy specimens typically show positive AFB staining or culturing results. The present case seemed similar to tumorous-type EBTB; however, Chung et al. noted that tumorous EBTB was characterized by an endobronchial mass whose surface was often covered with a caseous material (14). The endobronchial polyp in the present case did not have any caseous material; thus, it was slightly different from the typical tumorous-type EBTB. Şahin et al. (10) analyzed EBTB cases with negative sputum AFB results. In all of the cases, the histopathological examination of biopsy specimens revealed granulomatous inflammation with caseation. In contrast, caseation was not observed in the present case.

Chung et al. (14) provided a schematic illustration of the presumptive natural course of EBTB lesions, which was based on their observation of the healing process. It showed that tumorous-type EBTB can transform into granulation tissue and the fibrostenotic type. The examination of the entire polyp that was obtained at two months after the initiation of anti-tuberculosis treatment revealed granulation tissue. At the end of treatment, a tiny endobronchial polyp with a fibrostenotic endobronchial lumen was observed.

Although possible, contamination of the PCR is considered unlikely, as all of the negative controls worked properly, and all the PCRs were performed at separate physical sites with a one-way workflow, according to the recommended guidelines.

It should be noted that in this particular case, the patient was living in a highly tuberculosis-endemic area and his incident risk was considered to be high. A PCR revealed *M. tuberculosis* positivity and chronic granulomatous inflammation was detected in a histopathological examination. In cases involving a high risk of tuberculosis, and in which

granulomatous inflammation is observed in tissues without AFB staining, a PCR to detect *M. tuberculosis* in a tissue specimen can be helpful for making a final diagnosis of tuberculosis (15).

This case suggests that when a patient with a high incident risk of tuberculosis presents with endobronchial polyps, tuberculosis should be considered, even when AFB staining and culturing of sputum, bronchial body fluid and biopsy specimens are negative.

The author states that he has no Conflict of Interest (COI).

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