Unexpected positron emission tomography-positive Actinomyces-related mass of the bronchial stump

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Pulmonary actinomycosis is a rare disease frequently misdiagnosed, even by experienced clinicians, as primary or metastatic lung cancer or as other more conventional lung infections. It is often an unexpected disease that is basically detected only on cytological/histological examination. A case involving a patient who presented with a mass in the bronchial stump (of a previous pulmonary lobectomy) is described. Despite a strong suspicion of recurrent lung cancer, positron emission tomography confirmed a diagnosis of a suture-related bronchial actinomycosis.

Key Words: Bronchoscopy; CT; PET; Respiratory infection; Transbronchial needle aspiration

Learning objectives
• To recognize that pulmonary actinomycosis is an infectious disease with protean clinical and radiological presentations. Prolonged therapy with penicillin is the standard treatment. Positron emission tomography scan could be useful, especially when computed tomography scan features are nonspecific in supporting the pathological diagnosis and therapeutic response.
• To understand that pulmonary actinomycosis should be included in the differential diagnosis with primary or metastatic lung malignancies, and other granulomatous and nongranulomatous pulmonary infections.

Pre-test
• What are the predisposing factors for pulmonary actinomycosis?
• How is pulmonary actinomycosis diagnosed?

CASE PRESENTATION
A 62-year-old male exsmoker with a history of throat cancer (in 2007) treated with radiotherapy and a left lower lobe resection for primary squamous cell carcinoma (April 2009) came to our attention for the presence of a mass in the surgical bronchial stump. The mass was discovered incidentally on computed tomography (CT) scan (Figure 1A) during follow-up for lung cancer. The lesion had a mean standard uptake value (SUV) of 6.8 (highly suspicious for malignancy) on fluorodeoxyglucose position emission tomography (PET) (Figures 1B and 1C).

The patient had no symptoms other than a dry cough due to gastroesophageal reflux secondary to previous radiotherapy, for which treatment with proton pump inhibitors was instituted. Pulmonary function tests were unremarkable.

Bronchoscopy was negative, but a transbronchial needle aspiration performed on the surgical stump indicated the presence of methanemine silver-positive filamentous microorganisms consistent with Actinomyces species (Figure 2).

Refusing intravenous treatment, the patient underwent oral antibiotic therapy (amoxicillin 3 g/day) and, despite advice to continue therapy for one year, he stopped the treatment after six months.

Nevertheless, imaging studies performed after discontinuation of antibiotic therapy were unchanged (Figure 3A), and a subsequent PET scan (one month later) showed a marked reduction of fluorodeoxyglucose uptake (Figures 3B and 3C), with an SUV of 2.7. Although initially suspicious of cancer recurrence, this finding supported the cytological diagnosis of suture-related bronchial actinomycosis.

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Carcinoma at a bronchial stump may also occur, separation of these entities is challenging.

However, in experienced hands, some imaging features may suggest actinomycosis, but radiology alone is not diagnostic. Nonspecific symptoms and radiographic findings commonly lead to diagnostic delay. Cytological examination is the definitive test because the diagnosis of actinomycosis relies on pathologist recognition. In fact, Actinomyces are fastidious bacteria that are difficult to grow in culture (3). Cytology or histology show a necrotic, supplicative background with a predominance of neutrophils, plasma cells and histiocytes; in some cases, granulomatous inflammation with giant cells are present. In most cases, ‘sulfur granules’ with club-like, long, thin filamentous branching rods radiating from their periphery (so-called Splendore-Hoeppli phenomenon) are detected in inflammatory/necrotic tissue.

Penicillin remains the mainstay of treatment. Generally, intravenous penicillin is administered for two to six weeks, followed by oral therapy with amoxicillin (or penicillin V) for three to six months. In severe cases, oral therapy should be continued for at least 12 months. Acceptable alternatives to penicillin include tetracyclines, erythromycin and clindamycin (4). The availability of antibiotics has greatly improved the prognosis of all forms of actinomycosis. Presently, cure rates are high, and neither deformity nor death is common.

Similar to the few other reports in the literature (5,6), our study shows that PET scanning can support the pathological diagnosis of actinomycosis when the differential diagnosis includes lung cancer. Actinomycosis-related elevation of the SUV was probably due to acute inflammation involving all of the bronchial mucosal layers. The reduction of metabolic activity after specific antibiotic therapy significantly supports the diagnosis of actinomycosis. The search for predisposing factors, such as gastroesophageal reflux and/or foreign bodies (e.g., wire sutures), as in the present case, is important if this particular pathological condition is suspected.
Post-test

- Widely-accepted predisposing factors for bronchopulmonary actinomycosis are poor dental hygiene, alcoholism, dental problems and interventions, oral trauma and infections, and various chronic debilitating diseases as well as diabetes mellitus, neurological and psychiatric diseases, gastrointestinal reflux and/or hiatus hernia, virus-related or virus-free hepatitis, malnutrition, radiation, drug abuse, congenital and acquired immunosuppression, endobronchial foreign bodies and medications.

- The diagnosis of actinomycosis relies on pathological findings (cytology and/or histology), and frequently the pathologist is the first to recognize this microorganism. Actinomyces, due to their anaerobic nature, are difficult to grow in culture and microbiological analyses are often pointless.

REFERENCES
