

# Pulmonary actinomycosis presenting with hemoptysis and a peripheral lung mass; a case report

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- pulmonary actinomycosis
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**SUMMARY.** Pulmonary actinomycosis is a rare, chronic granulomatous disease, which is difficult to diagnose because it is commonly confused with other granulomatous infections or lung cancer. The case is reported of a 48 year-old man, a smoker, who presented with a 30 day history of productive cough with blood tinged sputum and a peripheral lung mass on the chest X-ray. He underwent full clinical and laboratory evaluation including bronchoscopy, which was unrevealing. Because of the haemoptysis the patient refused a computerized tomography (CT) guided fine needle aspiration biopsy, and proceeded directly to surgery. Following a right posterolateral thoracotomy and lysis of adhesions, a wedge resection of the right lower lobe mass in the lung was performed and sent for frozen section which was negative for malignancy. His postoperative course was unremarkable. The final pathology report established the diagnosis of pulmonary actinomycosis. Pulmonary actinomycosis should be included in the differential diagnosis of a lung mass in a patient presenting with haemoptysis, because an early and accurate diagnosis will preclude unwarranted surgery. *Pneumon* 2009, 22(3):258-261.

## INTRODUCTION

Actinomycosis is a granulomatous infection caused by prokaryotic bacteria, which were originally misclassified as fungi. The name *Actinomyces bovis* was first given to a ray-like organism found in purulent material obtained from cattle mandibles, and this term was derived from the Greek words *actino-* (which means radiating) and *mycos* (which means fungus). The thoracic form was discovered many years later when the species *Actinomyces*

*israelii* was isolated and considered to be responsible for the disease in humans<sup>1</sup>.

Actinomycosis can involve sites of the body such as the cervicofacial (55%), abdominopelvic (20%), and thoracic (15%) areas, as well as the skin, brain, pericardium, and extremities (10%). Actinomycosis in humans is caused most commonly by *A. israelii*, with *A. naeslundii*, *A. odontolyticus*, *A. viscosus*, *A. meyeri*, and *Arachnia proprionica*, being less commonly encountered. They are anaerobic, non acid-fast, and non-sporulating, Gram-positive, bacteria normally found in the flora of the oropharyngeal and gastrointestinal tracts, and the female genitalia<sup>1-4</sup>.

Aspiration of secretions due to poor oral hygiene and dental disease, particularly in debilitated patients or those with emphysema, chronic bronchitis or alcoholism, is the usual route of pulmonary infection. Haematogenous or lymphatic spread of the bacteria is responsible for the less common cases in healthy adolescents or children. Before the era of penicillin, the bacteria could invade the pleurae, soft tissues in the chest wall and ribs, forming purulent sinus tracts. Although actinomycosis is responsive to penicillin, even today, because it can mimic tuberculosis or lung cancer, surgery may be necessary to establish the diagnosis<sup>2-5</sup>.

The case is presented here of pulmonary actinomycosis in a 48 year-old man, which presented with haemoptysis and a peripheral lung shadow on chest X-ray, mimicking lung cancer.

## CASE REPORT

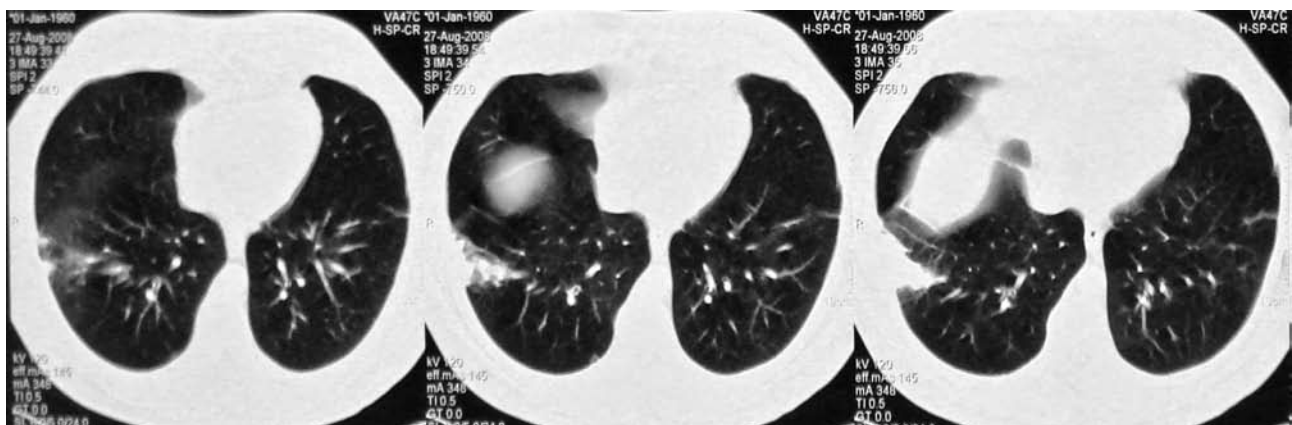
A 48 year-old man, a retired policeman working currently as a butcher, who was obese and a heavy smoker

of 90 pack/years, was transferred to the chest hospital for further evaluation because he presented with a few episodes of minor haemoptysis (mostly blood-tinged sputum), and a productive cough of one month's duration. Chest X-ray and computed tomography (CT) scan revealed a peripheral mass in the right lower lobe of the lung, as depicted in Figure 1. He did not report fatigue, weight loss or fever, but he had had frequent upper respiratory tract infections over the previous year for which he had occasionally been given antibiotics. He had no signs of depression or immunocompromise. He did not reveal until after the pathology report, when he was asked persistently, that he had had dental extractions and surgery over the previous year. He was also on a diet for type II diabetes mellitus, and was taking a calcium channel blocker for hypertension. On physical examination there was bilateral wheezing, and a decrease of lung expansion at the base of the right side of his chest. His heart sounds were dual without audible murmurs, his blood pressure was 190/100 mmHg and his pulse rate 100/min, and he was afebrile. There were no abdominal or neurological signs and symptoms. He had no oedema or palpable lymph nodes.

Ear nose and throat examination was negative for bleeding.

Laboratory testing showed: Ht 49.1%, Hgb 16.4 g/dl, MCV 90.5, MCH 30.3 pg, MCHC 33.4 gr/dL, Platelets 430,000, WBC 8,300 with 65.1% neutrophils, 24.7% lymphocytes, 4.6% monocytes, and 2.7% eosinophils, blood glucose 252 mg/dL, blood urea 29 mg/dL, creatinine 0.9 mg/dL, SGOT 35 U/L, SGPT 49 U/L, LDH 247 U/L and  $\gamma$ -GT 133 U/L.

The Mantoux test was positive (16mm). Blood gases revealed pH 7.45, PO<sub>2</sub> 75 mmHg, PCO<sub>2</sub> 38 mmHg, with



**FIGURE 1.** Chest computerized tomography scan showing a peripheral mass in the lower lobe of the right lung.

SO<sub>2</sub> 96% on air.

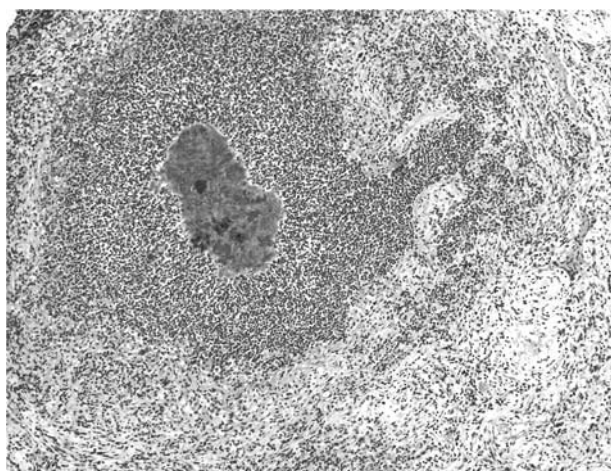
CT scan of the brain and upper abdomen, together with isotope scanning of the bones, showed no abnormal findings.

The patient, because of the haemoptysis wanted to proceed with surgery and refused a CT guided fine needle aspiration biopsy of his lung mass. He underwent a right posterolateral thoracotomy, and following lysis of adhesions a wedge resection was performed of the right lower lobe mass in the lung. Frozen section was negative for malignancy and following lymph node dissection one chest tube was inserted and his chest was closed. His postoperative course was uneventful and he was discharged on the 5<sup>th</sup> postoperative day. In the final pathology report the diagnosis of pulmonary actinomycosis was established. All lymph nodes were negative for malignancy, showing only reactive inflammatory changes. The lung specimen was a brown and yellowish mass, 6.5×5.5×2.5 cm in dimension, with three yellowish nodules inside it. Microscopic examination revealed changes of bronchiolitis obliterans obstructing pneumonia (BOOP) with acute fibrinoid organizing pneumonia (AFOP) adjacent to the mass. There was also diffuse infiltration of the interstitial tissue with lymphocytes, plasmacytes and eosinophils. The type II pneumocytes were hyperplastic and the alveoli were oedematous or replaced with myofibroblasts and multinuclear giant cells simulating inflammatory pseudotumour. Three small yellowish, nodular, cystic, necrotic, abscesses with sulphur granules surrounded with granulomatous inflammatory tissue were consistent with actinomyces colonies, as shown in Figure 2. The surrounding pleural wall was thickened, with mesothelial hyperplasia and fibrin deposition.

With the establishment of the diagnosis the patient was given oral penicillin V (6 million units/day, divided into 4 doses), for 3 months, during which period he completed his dental surgery. At follow-up 6 months after surgery he was doing well.

## DISCUSSION

Pulmonary actinomycosis is a rare, chronic, non-contagious, granulomatous disease, which is challenging to diagnose because it mimics lung abscess, tuberculosis-like granulomatous infections and lung cancer. It occurs most commonly in young males of age 30 to 50 years, although younger males, and females, can be affected. It has a worldwide distribution, without age or race preference and with no occupational predilection. A.



**FIGURE 2.** Microscopic examination of the lung mass showing small yellowish, nodular, cystic, necrotic, abscesses with sulfur granules, surrounded with granulomatous inflammatory tissue, consistent with actinomyces colonies.

*israelii* is normally found in the oropharyngeal flora and it invades the lungs after aspiration of oropharyngeal or gastric secretions, or inhalation of material contaminated with Actinomyces. Poor dental hygiene, oral trauma, dental procedures, diabetes mellitus, diaphragmatic hernia, tracheo-oesophageal fistula, status epilepticus, immunosuppression, alcoholism, chronic bronchitis and malnutrition, are the usual predisposing factors<sup>1-5</sup>.

Nowadays, and not only in the western world, the thoracic form of actinomycosis is not only rare, but is also less aggressive than formerly. The presentation of sinus tracts to the chest wall is no longer seen, in contrast with the pre-antibiotic era, although chest wall invasion by 'masses' (solid type of pulmonary actinomycosis mimicking tumour), have been recently reported<sup>1,4,6-7</sup>. Surgical intervention for pulmonary actinomycosis is usually limited to diagnostic procedures, especially to rule out lung cancer, and is rarely performed for resection of irreversible parenchymal destruction, since it has been observed that no other diagnosis is so often missed by experienced clinicians<sup>2,4-5</sup>.

The clinical presentation of pulmonary actinomycosis is variable, with cough, sputum production, chest pain, low grade fever and haemoptysis being the most common symptoms. Plain chest X-rays usually show non-specific findings, such as mass-like shadows, consolidation, pleural effusion or an air fluid level. CT of the chest may be more indicative if it shows a peripheral lung mass with central low attenuation or the open bronchus sign

(non-obstructed bronchus, in contrast with bronchogenic cancer), but is still not specific<sup>[2-5]</sup>. Positive culture of *A. israelii* from sputum or bronchial lavage is obtained in about 50% of cases, due to synergic bacterial overgrowth (normal inhabitant of the oropharyngeal cavity), prior antibiotic treatment, or imperfect anaerobic conditions, and without the sulphur granules it may represent colonization<sup>1-3</sup>. Therefore, pulmonary actinomycosis can be diagnosed only by histologic and microscopic examination of tissue biopsy obtained by either surgical resection, or bronchoscopy or percutaneous fine needle aspiration.

Sulphur granules are the pathological hallmark of the disease. They are detected in the lesion and consist of intertwined filaments of the Actinomyces. They are gritty and yellowish, ovoid or round in shape, around 2 mm in size, with a radiating arrangement of eosinophilic clubs on the surface. Without surgical resection diagnosis of the coexistence of actinomycosis with, or its differentiation from lung cancer or tuberculosis like granulomatous infections or lung abscess may sometimes be very difficult<sup>1-5</sup>. In chronic or complicated cases of actinomycosis, with lung parenchyma destruction, sinus tract discharge, thoracic empyema, or when a male patient presents with haemoptysis and a lung mass, surgery is indicated not only to expedite diagnosis but to optimize treatment<sup>2,4-5</sup>.

Regarding the medical treatment of pulmonary actinomycosis, long term use of penicillin, in high doses (20 million units per day of penicillin G, divided into 4 doses, for one month, followed by 6 million units per day of penicillin V per os, divided into 4 doses, for a total of six months), is considered the treatment of choice. Alternative regimens, particularly for patients allergic to penicillin, include clindamycin, tetracycline, roxithromycin, etc<sup>1,3</sup>. Following surgical resection, oral penicillin for 2 months is considered adequate adjuvant treatment<sup>4</sup>.

This is a report of a middle-aged man, a smoker,

who presented with cough, minor haemoptysis and a peripheral lung mass, and who wanted to proceed with surgery skipping the option of fine needle aspiration biopsy because of his fear of lung cancer. He had not mentioned the history of his relevant poor dental hygiene and the dental surgery provided by his dentist because he had not considered it important, and only revealed it on questioning after final histology report had provided the diagnosis. Although actinomycosis is not transmitted to humans by processed animals, his recent change of job (butcher) had not been taken into account, either.

In conclusion, physicians should be aware of this rare disease, since with the appropriate diagnostic approach and penicillin treatment, unwarranted surgery, with its possible associated morbidity and mortality, can be avoided.

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