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Cent. Eur. J. Med. • 8(5) • 2013 • 652-657
DOI: 10.2478/s11536-013-0208-z

Central European Journal of **Medicine**

Pulmonary actinomycosis as a rare cause of inflammatory myofibroblastic tumor: a case report

Case Report

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Received 11 January 2013; Accepted 13 April 2013

Abstract: Pulmonary inflammatory myofibroblastic tumor encompasses a heterogeneous spectrum of reactive, infectious, and neoplastic entities. It is composed of spindle-shaped myofibroblastic cells in a background of inflammatory cells and collagen fibres. Actinomycosis is a bacterial infection. It infects the lower respiratory tracts by inhalation or aspiration of oropharyngeal or upper gastrointestinal materials. Only eight cases of pulmonary IMT associated with actinomycosis have been reported in the literature so far. This is the ninth case reported.

Keywords: *Pulmonary inflammatory myofibroblastic tumor • Actinomycosis*

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1. Introduction

Inflammatory myofibroblastic tumor (IMT), also known as inflammatory pseudotumor or plasma cell granuloma encompasses a heterogeneous spectrum of reactive, infectious, and neoplastic entities, which may occur at virtually any site in the human body. It is characterized by a mass composed of spindle myofibroblastic cells in a background of inflammatory cells and collagen fibres [1].

Although these tumors are typically benign, IMTs have an uncertain malignant potential and may show local recurrence, infiltrative growth, vascular invasion, and malignant sarcomatous transformation [2].

Actinomycosis is a bacterial infection caused mainly by Actinomyces israelii and can involve sites of the body such as the cervicofacial, abdominopelvic and thoracic areas, as well as the skin, brain, pericardium, or extremities. Actinomyces infects the lower respiratory tracts by inhalation or aspiration of oropharyngeal or upper gastrointestinal materials [3].

More frequently, pulmonary actinomycosis occurs in immunocompetent persons during the fourth and fifth decades of life, with a prevalence in men. It is frequently

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misdiagnosed as primary or metastatic lung cancer or as other more conventional lung infections, usually tuberculosis [4].

In this study, we describe the clinicopathologic, imaging, and histologic features of a case of pulmonary IMT caused by Actinomycosis.

2. Case report

A 32 year old female patient was admitted to the hospital due to a persistent cough of 10 months duration, chest pain, transitory pain in the legs and spine, fever and an abnormal shadow on the chest X-ray (Figure 1). She had a history of psychosis and had taken medications for that disorder (Clozapine, Lorazepam, Sulpirid, Eftil). She was a 12 pack-year smoker, with no alcohol abuse.

A chest CT scan revealed a lobular expansive infiltration, 74x68x55 mm, located within the right middle lobe, in contact with costal and mediastinal pleura (Figure 1). Mediastinal lymph nodes were enlarged 20 mm. The patient underwent bronchoscopy, which was essentially normal, as well as transthoracic middle lobe aspiration biopsy. Echocardiography, abdominal ultrasonography and lung function tests were essentially normal. A right anterolateral thoracotomy was performed with biopsy of enlarged mediastinal lymph nodes and tumor from midle lobe. The diagnosis on frozen section was inflammatory pseudotumor, without carcinoma cells. A right middle lobectomy was performed. The postoperative course was uneventful. Subsequent workup excluded dental infections or poor oral health. The patient was discharged six days after surgery and one year later, there was no evidence of recurrence or other pulmonary infiltrations.

The right middle lobe with partially thickened, whitish pleura was received in the Pathology Department. On cross section, almost the entire lobe was occupied with a gray-yellowish, partially gray-whitish, lobulated, moderately solid tumor measuring 9.5x7 cm. In some parts, the tumor was not clearly distinguished from the surrounding structures (Figure 2).

Microscopic examination revealed a mixture of spindle cells showing fibroblastic and myofibroblastic differentiation arrayed in fascicles, or with storiform architecture. The spindle cells had oval nuclei, fine chromatin, inconspicuous nucleoli, and pale eosinophilic cytoplasm. Admixed with the spindle cells was an inflammatory infiltrate containing lymphocytes, plasma cells, and a few neutrophils. Immunohistochemical analysis showed positive staining for vimentin and SMA

Figure 2. Gray-yellowish, partially gray-whitish, lobulated, tumor measuring 9.5x7 cm.

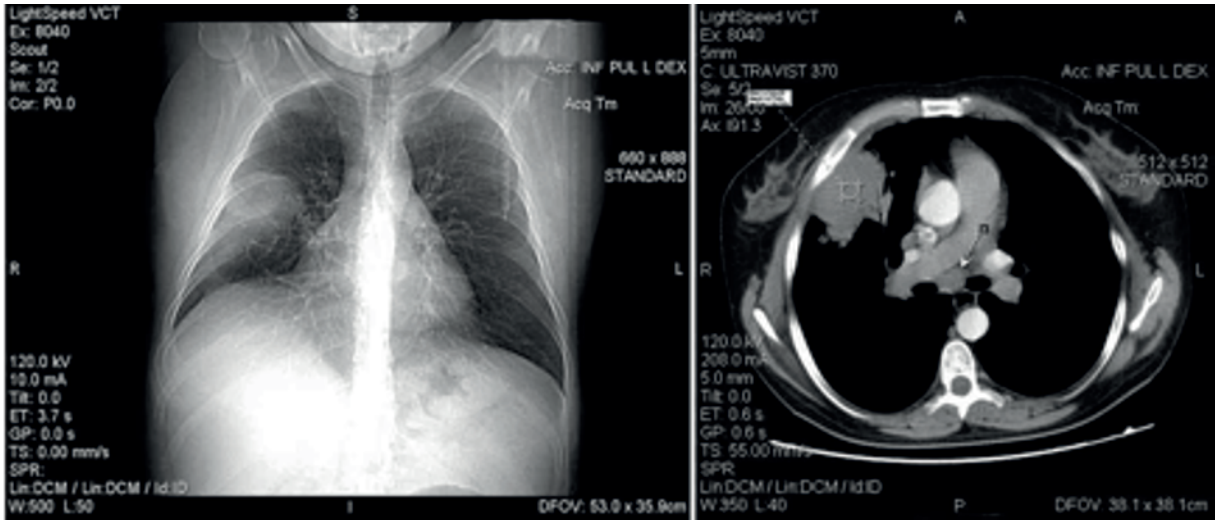

Figure 1. Chest X-ray: Homogenous shadow in the right middle lobe; CT: lobular expansive infiltration located within the right middle lobe.

(Figure 3), and negative staining for desmin, S 100 protein and pan-cytokeratin.

Within this pseudotumor are multiple 'microabscesses' which contained centrally located colonies of bacteria. These colonies have an eosinophilic hyaline "clubbing" material. Brightly eosinophilic clubs at the periphery of the granules are identified as the Splendore-Hoeppli phenomenon. The bacterial colonies are composed of individual, thin bacterial filaments with frequent 90-degree branching and a beaded appearance. The bacterial filaments are Gram-positive, Grocott silver positive, PAS positive (Figure 4) and acid fast negative.

3. Disscussion

IMT has an equal sex distribution and occurs in all ages, with a peak incidence in the second and third decades [5]. The lung is the most common site of such lesions, which are frequently detected incidentally on chest radiograph as a solitary lung mass or nodule in asymptomatic patients. Symptomatic patients may complain of cough, chest pain, fever, hemoptysis, and dyspnea [6].

IMT can be solitary or multiple with a wide range in size, from less than 1 cm to occupying almost the entire hemithorax [7].

The differential diagnosis for spindle cell tumors includes IMT, leiomyoma, leiomyosarcoma, rhabdomyosarcoma, malignant fibrous histiocytoma, inflammatory

fibrosarcoma, intra-abdominal fibromatosis, and gastrointestinal stromal tumor [2].

Some believe IMT is a reactive inflammatory condition, others that it represents a low grade mesenchymal malignancy [5]. Noguchi reports IMT may be due to trauma- or coagulopathy-induced intraparenchymal bleeding, or it is autoimmune in nature , the latter supported by the presence of abundant plasma cells [8]. A specific IMT-inducing infectious agent has not been identified yet, but numerous infectious agents have been reported as potential causes of IMT including: Coxiella burnetti, Bacteroides corrodeus, Klebsiella pneumoniae, Pseudomonas veronii [9], Cryptococcus

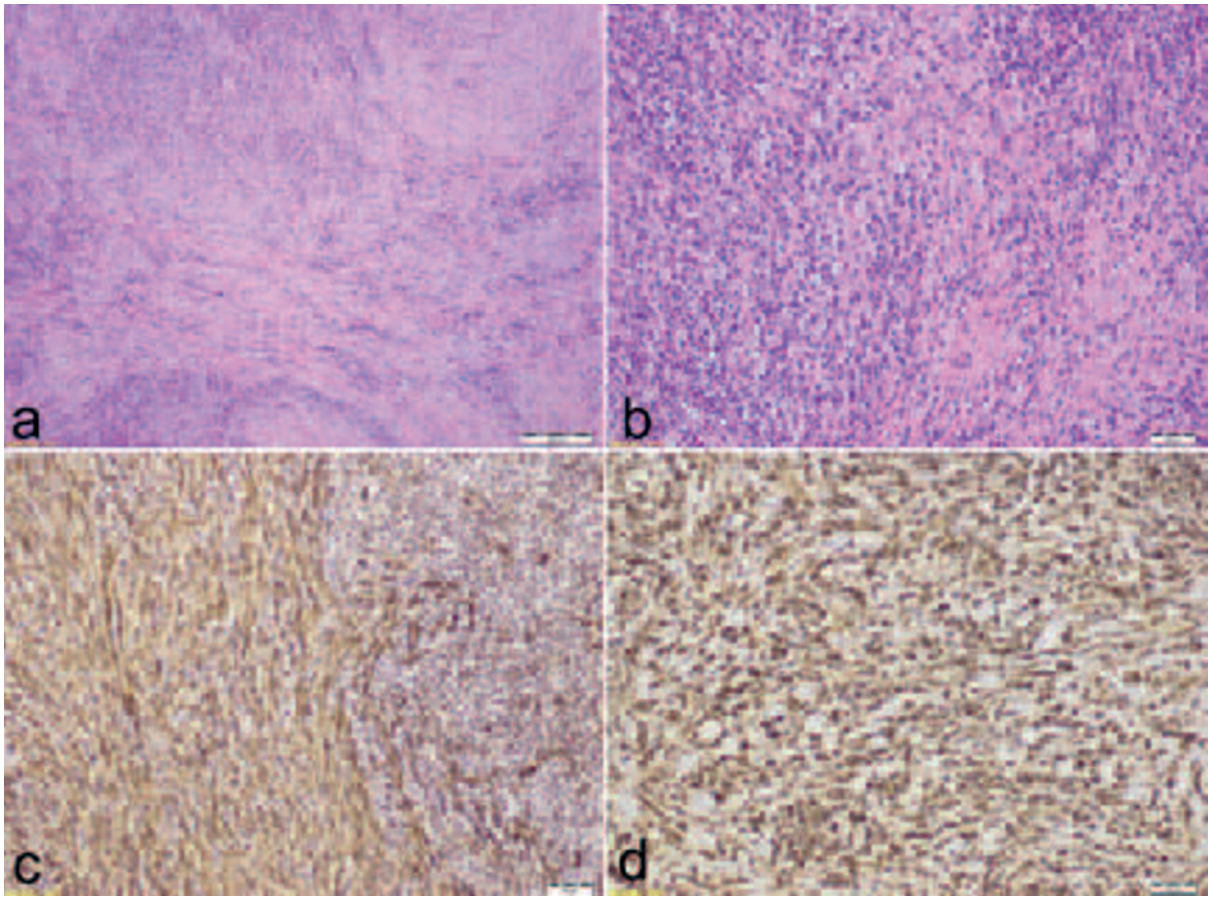

Figure 3. A. Mixture of spindle cells showing fibroblastic and myofibroblastic differentiation arrayed in fascicles, or with storiform architecture. B. The spindle cells have oval nuclei, fine chromatin, inconspicuous nucleoli, and pale eosinophilic cytoplasm; inflammatory infiltrate containing lymphocytes and plasma cells. C. Positive staining for vimentin, and D. Positive staining for SMA.

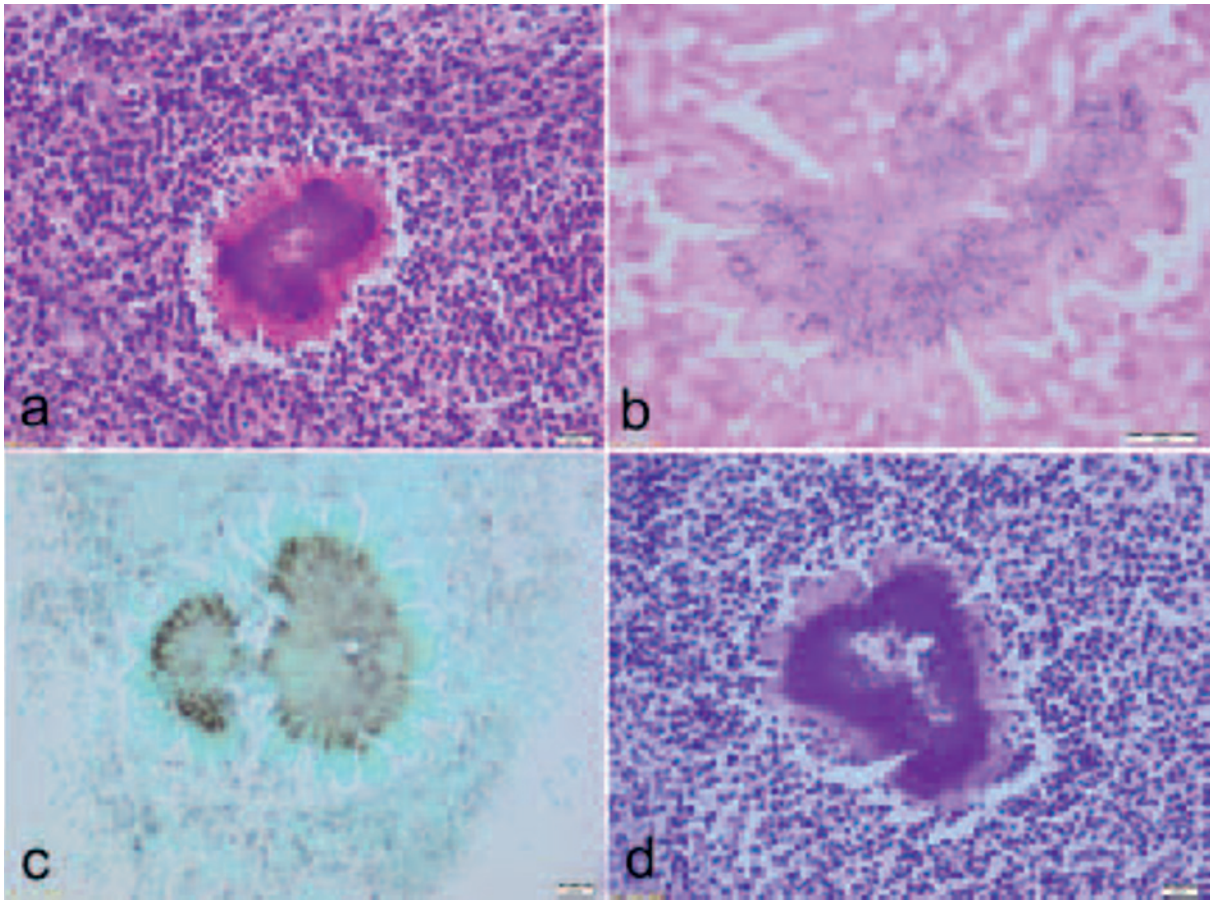

Figure 4. A. Microabscess with centrally located bacterial granules exhibiting the Splendore-Hoeppli phenomenon. B. The bacterial granules are composed of individual, thin bacterial filaments which are Gram positive C. Grocott silver positive, and D. PAS positive.

Table 1. Inflammatory pseudotumor associated with actinomycosis – review of literature [6, 17-35]

Localization of IMT	Number of cases	%
Abdominal [18,19,20]	9	32.1
Lung [6,17,21,22,23,24]	8	28.5
Liver [25,26,27,28]	4	14.2
Lymph node [29]	1	3.6
Brain [30]	1	3.6
Pelvis [31]	1	3.6
Kidney [32]	1	3.6
Colon [33]	1	3.6
Urachal remnants [34]	1	3.6
Retroperitoneal [35]	1	3.6
TOTAL	28	100.0

gattii [1], Epstein-Barr virus [10], Mycobacterium avium intracellulare, Corynebacterium equi, Campylobacter jejuni, Bacillus sphaericus, Escherichia coli [2], Nocardia [11], Mycobacterium malmoense, Mycoplasma pneumoniae [6], John Cunningham virus [12], Mycobacterium tuberculosis, Human Herpes Virus-8 [13], Eikenella corrodens [14] and Actinomyces [15].

To our knowledge, 28 cases of IMT associated with actinomycosis have been reported so far, only eight of which were pulmonary IMTs (Table 1).

The gram-positive bacterium, Actinomyces israelii is a commensal organism in humans and can be found in the mouth, bronchi, gastrointestinal and genitourinary tracts.

Actinomycosis is a disease of insidious onset with nonspecific symptoms and therefore poses a diagnostic challenge. Due to a similar histological presentation, it is essential for a pathologist to differentiate actinomycosis from nocardiosis and botryomycosis,

Histological examination of a biopsy from the actinomycotic lesion demonstrates bacteria colonies that are associated with variable amounts of eosinophilic,

amorphous, Splendore-Hoeppli material. The bacterial colonies are composed of individual, thin bacterial filaments which are Grocott silver positive, PAS positive, acid fast negative and Gram-positive with frequent 90-degree branching and a beaded appearance [16].

Nocardiosis is a bronchopulmonary infectious disease caused by Nocardia sp. Histologic examination shows multiple confluent abscesses and long filamentous, thin, and beaded microorganisms arranged in a "Chinese character" pattern. The microorganisms stain positively with Gram, methenamine silver stains and acid fast stains [4].

Botryomycosis is an uncommon infection caused by nonfilamentous bacteria (usually Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli). Histologic examination reveals aggregates of nonfilamentous, gram-positive cocci or gram-negative bacilli that form colonies and may exhibit the Splendore-Hoeppli phenomenon; methenamine silver stains are negative. [4].

Our case is IMT with numerous microabscesses which contain colonies of Actinomyces.

The mainstay of treatment for IMT is surgical resection with wide margins. Radiotherapy, immunosuppression, and chemotherapy have not been proven to have any definitive benefit [2].

The genus Actinomyces is susceptible to a wide variety of antibiotics in vitro, and penicillin is the drug of choice for the treatment of actinomycosis. Ferreira reports the "surgical treatment of actinomycosis is controversial and should be restricted to abscess drainage, debridement of necrotic tissue, curettage of bone, and drainage of empyema". [17]. When actinomycosis is associated with IMT, we consider that the surgical removal of the "tumorous" mass is a necessary and reasonable treatment modality.

4. Conclusion

Although the etiology and pathophysiology of IMT require further investigation, our case demonstrates that a reactive inflammatory process secondary to chronic infection, including actinomycosis is a cause of IMT.

Acknowledgments

This study was supported by the Serbian Ministry of Education and Science, Grant Number 175006/2011.

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