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Case Report

Empyema due to Actinomyces as a Diagnostic Challenge: A Case Report

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Abstract: Actinomycosis is a chronic, suppurative, and slowly progressive infection caused by anaerobic or microaerophilic, non-spore-forming Gram-positive bacilli belonging to the genus Actinomyces. This condition is challenging to diagnose as it requires anaerobic culture media. We present the case of an 80-year-old male patient diagnosed with loculated left empyema, treated surgically with decortication, along with prolonged antibiotic therapy, resulting in resolution of the case.

Keywords: Empyema, Actinomycosis, Penicillin.

INTRODUCTION

Pulmonary actinomycosis is a rare infection caused by the *Actinomyces* bacterial species. It occurs in approximately 1 in 3,000,000 people per year. Complications of the infection include empyema, endocarditis, pericarditis, pericardial effusion, and sepsis. The cornerstone of treatment is prolonged antibiotic therapy, with adjunctive surgery in severe cases [1].

CLINICAL CASE

An 80-year-old male, from the State of Mexico, occupation: teacher, with a history of long-standing hypertension, pacemaker use, 25 years of smoking (with a smoking index of 3.6), and 16 years of exposure to biomass (32 hours per year, mild exposure), presented with symptoms starting in April 2023. The patient reported a non-productive, sporadic cough with dyspnea, self-medicated with benzonatate with minimal improvement. In May 2023, he developed constant left-sided pleuritic pain, rated 9/10 on the pain scale, accompanied by dyspnea with moderate to minimal exertion, leading him to seek emergency care.

A chest X-ray (Figure 1) revealed a left pleural effusion, with involvement of approximately 40% of the lung parenchyma. An endopleural catheter was placed, yielding 1400 ml of purulent material. Samples were sent for cytological and cytochemical analysis as well as cultures. The pleural fluid was bloody, turbid, and coagulable. Cytochemistry showed microproteins at 354 mg/dL, LDH at 904 IU/L, and unmeasurable glucose, creatinine, and BUN.

Although the criteria for an exudate according to Light's criteria were met, cultures were negative, PCR for mycobacteria was negative, Ziehl-Neelsen staining was negative, KOH test was negative, and Gram staining revealed streptococci, Gram-negative cocci, and moderate yeasts.

A chest CT scan (Figure 2) showed a loculated left empyema with a solitary apical nodule in the left hemithorax. Surgical intervention was decided, and thoracic surgery with decortication was performed. Lung and pleural biopsies showed peripheral emphysema, atelectasis, vascular congestion, fibrinous pleuritis, but no malignancy.

With persistent purulent drainage despite negative cultures, a bronchoscopy with bronchoalveolar lavage was performed. Cytopathological results (Figure 3) revealed changes in bronchial epithelium due to *Actinomyces* infection.

The endopleural catheter was removed, and the patient was discharged with a 6-month course of antimicrobial treatment with amoxicillin-clavulanic acid. Follow-up four months later showed resolution of the condition on radiographic control (Figure 4).

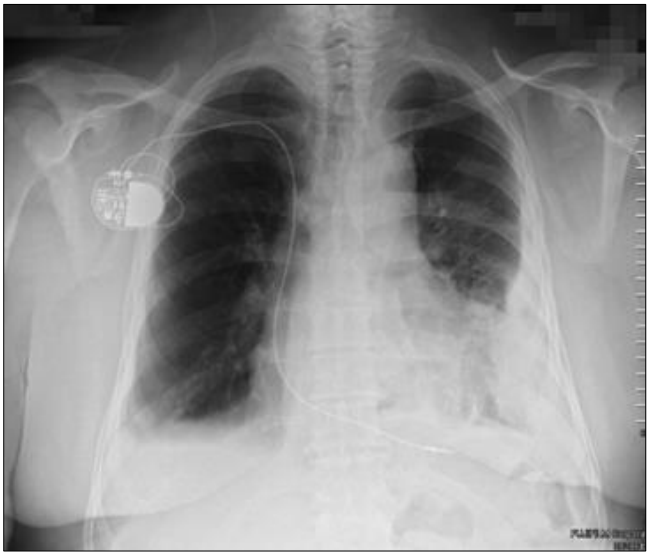

Figure 1: Initial left pleural effusion

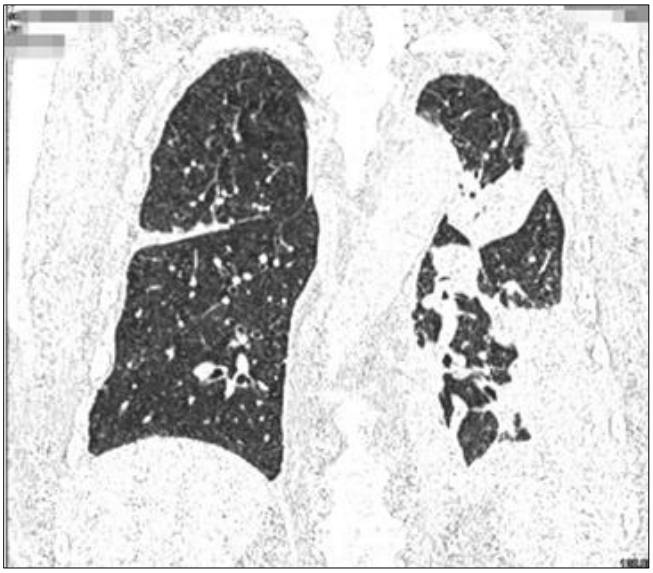

Figure 2: Chest CT with images suggestive of left empyema and a left pulmonary nodule, partially classified (LUNG RADS 1)

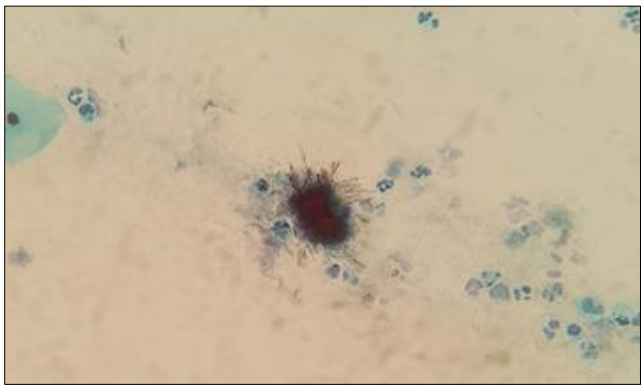

Figure 3: Papanicolaou staining showing bacterial aggregates with "sulfur granules" consistent with *Actinomyces* species

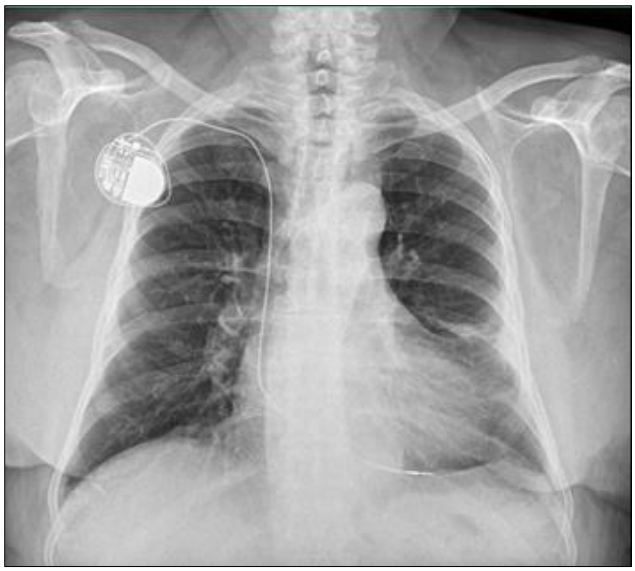

Figure 4: Chest X-ray 4 months after antibiotic treatment

DISCUSSION

Actinomycosis is a chronic, suppurative, and slowly progressive infection caused by anaerobic or microaerophilic Gram-positive bacilli, non-spore-forming, belonging to the genus *Actinomyces*. The most common clinical forms are cervicofacial (40-50%), abdominal-pelvic (20%), and thoracic (15%). It results from the aspiration of oropharyngeal material from the oral cavity, leading to subsequent invasion of lung tissue. The most frequent associated risk factors include alcoholism, diabetes, periodontal disease, immunosuppression, and esophageal disease, though up to 50% of cases occur in patients without comorbidities.

Microbiological diagnosis is challenging due to the need for anaerobic culture media, as these bacteria are demanding and require CO2-enriched media (6-10%). Bacteriological samples obtained via conventional bronchoscopy or even from infected tissues can be sterile in up to 50% of cases. It is more common to find Gram-positive organisms and the characteristic “azurophilic granules” (aggregates of actinomycetes) in pathological specimens. Differential diagnosis should include conditions such as tuberculosis, lung neoplasms, pulmonary metastases, pulmonary aspergillosis, and other granulomatous diseases.

Prolonged antimicrobial therapy, lasting 6 to 12 months, is recommended for patients with any clinical form of actinomycosis. Conventional antibiotic treatment consists of high-dose intravenous penicillin (20 million IU of Penicillin G per day for 4 to 6 weeks). For patients allergic to penicillin, erythromycin, clindamycin, or tetracycline are good therapeutic options.

CONCLUSION

In conclusion, Actinomyces infection, dubbed the "great mimicker" due to its varied and nonspecific clinical presentation, requires a high degree of clinical suspicion for accurate diagnosis. Confirmation of the infection relies on identifying the microorganism in anaerobic cultures, and it is crucial to consider and rule out other differential diagnoses to ensure effective treatment. Fortunately, when correctly identified and treated with targeted therapy, the resolution of the infection is generally successful.

REFERENCE

- Actinomicosis. Revistamedicasinergia.com. [Internet]. Available from: https://revistamedicasinergia.com/index.php/rms/article/download/560/946?inline=129/05/23. Accessed July 25, 2024.
- Boot, M., Archer, J., & Ali, I. (2023). The diagnosis and management of pulmonary actinomycosis. *Journal of Infection and Public Health*, *16*(4), 490-500.
- Choappa, R. C., & Vieille Oyarzo, P. (2018). Diagnóstico histológico de actinomicosis. *Revista argentina de microbiología*, *50*(1), 108-110.
- Dharmaprakash, A., Thandavarayan, R., Joseph, I., & Thomas, S. (2015). Development of broad-spectrum antibiofilm drugs: strategies and challenges. *Future microbiology*, *10*(6), 1035-1048.
- Flores, A., Parrilla, I., Urdes, E., Quintana, V., & Gutiérrez, V. (2010). Prevención, diagnóstico y tratamiento de la Actinomicosis en adulto. México D. F.: IMSS, CENETEC; http://www.cenetec.salud.gob.mx/descargas/gpc/CatalogoMaestro/480_GPC_.

- Llombart, M., Chiner, E., Signes-Costa, J., Arriero, J. M., Gómez-Merino, E., Andreu, A., & Pastor, E. (2005, March). Thoracic actinomycosis: an old disorder with new clinical manifestations. In *Anales de Medicina Interna (Madrid, Spain: 1984)* (Vol. 22, No. 3, pp. 124-129).
- López, B. B., Palau, M. M., Luizaga, L., & Sanz-Santos, J. (2022). Pulmonary Actinomyces Infection Diagnosed by Linear Endobronchial Ultrasonography. Correlation with Histopathological Examination. *Open respiratory archives*, *4*(2), 100159.
- Valour, F., Sénéchal, A., Dupieux, C., Karsenty, J., Lustig, S., Breton, P., ... & Ferry, T. (2014). Actinomycosis: etiology, clinical features, diagnosis, treatment, and management. *Infection and drug resistance*, 183-197.