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Pulmonary actinomycosis mimicking lung cancer – a case report

Promienica płucna imitująca nowotwór płuca – opis przypadku

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Abstract

We present a case of a 55-year-old female patient admitted to the Thoracic Surgery Center for the treatment of a solid left lung mass of unknown aetiology. The patient was transported from another hospital, and the main reason for the patient's referral to the Thoracic Surgery Center was recurrent haemoptysis and pulmonary haemorrhages. A chest X-ray in the posteroanterior projection showed no changes that could indicate the cause of the patient's symptoms. In the course of diagnosis, a positron emission tomography combined with computed tomography scan was performed, in which an area of pathological radiotracer uptake was detected in the X segment of the left lung, with transverse dimensions of 6 × 6.5 cm, suggesting left lung cancer. Lower left lung lobectomy was performed, along with mediastinal lymphadenectomy. Final diagnosis was reached by histopathological examination of the resected tissues – the image corresponded to pulmonary actinomycosis.

Keywords: lobectomy, *Actinomyces*, pulmonary actinomycosis

Streszczenie

W pracy przedstawiono przypadek 55-letniej pacjentki przyjętej do Dolnośląskiego Centrum Torakochirurgii w celu leczenia zmiany litej płuca lewego o nieustalonej etiologii. Chora została przetransportowana z innego szpitala, a głównym powodem skierowania jej do Dolnośląskiego Centrum Torakochirurgii były nawracające krwiotłucia oraz krwotoki płucne. W wykonanym badaniu radiologicznym klatki piersiowej w projekcji tyłno-przedniej nie uwidoczniło zmian mogących wskazywać na przyczynę występujących u pacjentki objawów. W toku diagnostyki wykonano badanie pozytonowej tomografii emisyjnej połączonej z tomografią komputerową, w którym wykryto obszar patologicznego wychwytu radioznacznika w segmencie X płuca lewego o wymiarach poprzecznych 6 × 6,5 cm – obraz mogący sugerować nowotwór płuca lewego. Wykonano lobektomię dolną płuca lewego wraz z limfadenektomią śródpiersia. O ostatecznym rozpoznaniu rozstrzygnął wynik badania histopatologicznego usuniętych tkanek – obraz odpowiadał *actinomycosis* (promienicy płuca).

Słowa kluczowe: lobektomia, *Actinomyces*, promienica płucna

INTRODUCTION

Actinomyces is an opportunistic, strictly or facultatively anaerobic Gram-positive bacillus. Its characteristic feature is the production of delicate filamentary forms or fungus-like hyphae, both in an infected organism and under standard culture conditions^(1,2). *Actionomyces* colonise primarily the upper respiratory tract, the gastrointestinal tract and the female genitals. Infections most commonly occur in individual with poor oral hygiene, a history of invasive dental procedures or oral injuries. Cervicofacial actinomycosis is the most common type, accounting for up to 50% of cases, while pulmonary infections are relatively rare. Aspiration of secretions from the upper respiratory tract is the most common cause of thoracic infections. The classic clinical picture of infection is characterized by the development of granulomatous lesions that suppurate and transform into abscesses connected by fistulas. Areas of purulent tissue are surrounded by fibrotic granular tissue with a hard or wool-like structure. Diagnostic difficulties of lung actinomycosis result from its nonspecific symptoms, which can misleadingly suggest neoplastic changes or fungal infections^(1–5).

CASE REPORT

A 55-year-old woman was admitted to the Thoracic Surgery Center for surgical treatment of a solid lesion of unknown aetiology in her left lung. Recurrent haemoptysis was the main reason for referring the patient to the surgical department. Positron emission tomography with computed tomography (PET-CT) performed at

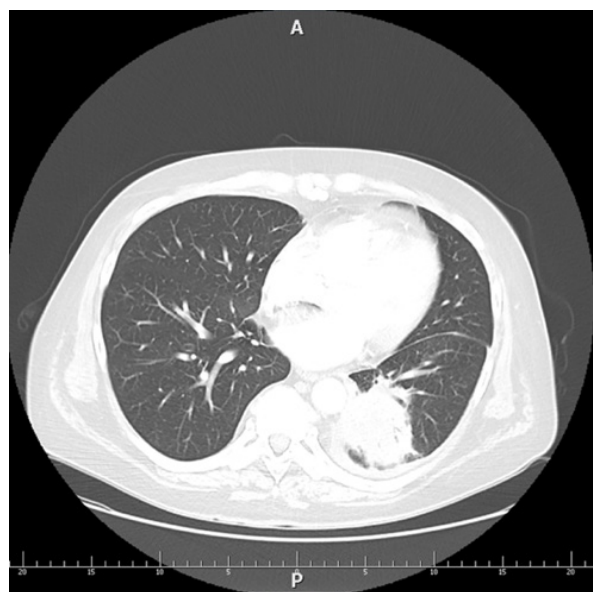


Fig. 1. Computed tomography with contrast. In segments IX and X of the left lung, an irregular infiltrative lesion measuring $8 \times 7 \times 6.3$ cm is visible

the referring department showed a region of pathological radiotracer uptake in segment X of the left lung – irregular density with a maximum standardised uptake value (SUV_{max}) of 12, and transverse dimensions of 6.0×6.5 cm. The image raised a suspicion of left lung cancer. She had medical history of systemic lupus erythematosus, which was at that time in remission, and a pneumonia episode that occurred four months earlier. Upon admission, the patient presented with coughing and expectoration of blood-tinged sputum. Physical examination revealed a decrease in vesicular breath sounds in the lower lobes of the left lung. Laboratory workup showed mild normocytic anemia, with no other abnormalities detected. Contrast-enhanced computed tomography (CT) of the chest showed an irregular infiltrative $8.0 \times 7.0 \times 6.3$ cm lesion in segments IX and X of the left lung and enlarged left hilar, subcarinal and peritracheal lymph nodes (Fig. 1).

Due to the image suggesting a neoplastic lesion, an anatomical resection of the left lower lobe was performed, preceded by the separation of the lobe from multiple, solid planar pleural adhesions. Mediastinal lymphadenectomy and pleural drainage were performed. Intraoperative specimens were sent for histopathological examination. Macroscopically, yellow-cream lung parenchyma with increased cohesiveness, single cavities filled with beige content. Microscopically, in addition to collagen fibrosis and active, massive inflammatory infiltration with the formation of abscesses, multiple small cavities and dilated bronchi, in which colonies of periodic acid–Schiff positive microorganisms arranged radially were visible, surrounded by purulent exudate. On the edges of the colonies, eosinophilic amorphous masses – the Splendore–Hoeppli phenomenon – were observed. The image corresponded to actinomycosis. No malignancy was found in the sampled lymph nodes. Antibiotic therapy was initiated based on the histopathological examination: piperacillin with tazobactam. Surgical procedure was complicated by wound abscess requiring vacuum-assisted closure therapy. Further course of treatment was uneventful, and bleeding from the bronchial tree ceased. The patient was in good overall condition and transferred to the referring hospital for further treatment.

DISCUSSION

Actinomycosis is a rare, endogenous and slowly progressing bacterial infection. Although cervicofacial actinomycosis is the most common form, the abdominal cavity, chest, pelvis and central nervous system may also be involved^(1–6).

Intrathoracic actinomycosis, which presents with non-specific manifestations, is diagnosed in about 15–20% of cases^(4,6). It most often occurs as a result of aspiration of upper respiratory and gastric secretions. Malnourished, diabetic, post-radiotherapy and immunocompromised patients, like in our case, are predisposed.

Pulmonary actinomycosis most often takes the form of an inflammatory infiltration of the lung, with fibrosis and scarring, as well as the formation of abscesses and fistulas. The most common symptoms include a productive cough with expectoration of purulent secretions, exertional dyspnoea and fever. Patients may also experience haemoptysis and pleural chest pain. Due to the non-specific course of actinomycosis, the diagnosis may be challenging, and the symptoms may suggest malignancy^(1,3,4,7).

Diagnostic imaging can visualise infiltrative changes with an air bronchogram. The pleura and chest walls may also be involved, often with signs of disintegration, fibro-cirrhotic changes and the formation of fistulas and abscesses. Mediastinal lymphadenopathy is common. Such clinical picture requires differentiation with neoplastic lesions and other infectious diseases, such as pulmonary tuberculosis^(4–8).

Microbiological diagnosis may isolate the pathogen from the affected organs. For most reliable results, the material for the examination should be taken before antibiotic therapy and under strictly anaerobic conditions. Due to the required conditions and frequently occurring mixed infections, a positive culture is obtained in a small number of cases⁽⁶⁾. Sputum cannot be used for microbiological tests due to the natural occurrence of this microorganism in the oral cavity. Microbiological blood tests are mostly useless in the diagnosis due to the rare, transient, and clinically insignificant bacteraemia^(1,2). Mucous membranes of the nasopharynx or gastrointestinal tract are the source of most isolates. Histopathological examination is of great importance. However, biopsy samples are often insufficient due to the easy fragmentation of bacterial colonies during sample collection and their uneven Gram staining pattern, often similar to that of streptococcal colonies. Therefore, final diagnosis is most often reached only by thoracotomy. Histopathological examination can visualise a massive inflammatory infiltrate with the formation of abscesses and fistulas. Often, colonies of microorganisms arranged radially and surrounded by purulent exudate can also be seen. The phenomenon of Splendore–Hoeppli, i.e. the formation of eosinophilic amorphous masses on the edges of colonies, is another typical finding.

Another characteristic finding in actinomycetes is the occurrence of “sulfur granules” – yellowish radiating granules containing branched, partially calcified masses of microorganisms⁽⁶⁾. For this reason, the diagnosis can usually be made on the basis of the clinical picture and histopathological examination of the collected material.

Conservative treatment involves prolonged antibiotic therapy for 4–12 months. Penicillin is the first-line antimicrobial. In the case of resistance or the patient's allergy, carbapenems, macrolides and clindamycin are used. Treatment also includes surgical debridement of tissues and drainage of abscesses. In the case of conservative treatment failure, surgical intervention may be necessary with lobectomy of the affected lobe, as in the case of our patient^(4,6,7).

CONCLUSION

Due to the entire clinical picture of actinomycosis and the diagnostic challenges it poses, the diagnostic process should be improved, and non-invasive treatment methods should be considered first. This could spare some patients from the need for surgical treatment.

Conflict of interest

The authors report no financial or personal relationships with other individuals or organizations that could have influenced the content of this publication, nor do they have any rights to this publication.

Author contributions

Analysis and interpretation of data: AK, BP. Writing of manuscript: AK, BP, IM. Final approval of manuscript: AK, BP.

References

1. Murray PR, Rosenthal KS, Pfaller MA et al.: Mikrobiologia. Elsevier Urban & Partner, Wrocław 2017; 40: 380–382.
2. Kayser FH, Bienz KA, Eckert J et al.: Mikrobiologia lekarska. Wydawnictwo Lekarskie PZWL, Warszawa 2007; 4: 238–239.
3. Bociaga-Jasik M: Promienica. In: Gajewski P (ed.): Interna Szczeklika 2019. Medycyna Praktyczna, Kraków 2019: E13.
4. Qiu L, Lan L, Feng Y et al.: Pulmonary actinomycosis imitating lung cancer on ¹⁸F-FDG PET/CT: a case report and literature review. Korean J Radiol 2015; 16: 1262–1265.
5. Martínez-Girón R, Pantanowitz L: Pulmonary actinomycosis: cytomorphological features. Monaldi Arch Chest Dis 2021; 92. DOI: 10.4081/monaldi.2021.1641.
6. Drozd-Werel M, Porzezińska M, Cynowska B et al.: Pulmonary actinomycosis – a case report. Pneumonol Alergol Pol 2012; 80: 349–359.
7. Jassem J, Krzakowski M (eds.): Nowotwory klatki piersiowej. Praktyczny przewodnik dla lekarzy. 3rd ed., Via Medica, Gdańsk 2018; 3: 27–29, 15; 172–174.
8. Hofer M, Abanador N, Kamper L et al.: Podstawy radiologii klatki piersiowej. MediPage, Warszawa 2008; 5: 66–67, 7; 134–136, 8; 146–147.