

Mediastinitis Due to *Actinomyces Naeslundii*

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Abstract

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A 48-year-old man with retrosternal chest pain and upper abdominal pain with propagation to the back, with clinical signs of nausea, dyspnea and dysphagia was referred to the Clinics of thoracic surgery. After esophagography, operative treatment was indicated. Left thoracotomy with mediastinotomy were performed. During the operation, a sample of pus was taken and sent for a microbiological examination at the Institute of Microbiology and Parasitology, Medical Faculty in Skopje. Standard microbiological procedures were used. The sample was cultured anaerobically on Schaedler agar and incubated for 48 hours at 37°C. Oval, smooth colonies were observed. Gram stained smear revealed short branching Gram-positive filaments suspected for genus *Actinomyces*. For a definitive diagnosis and differentiation of the *Actinomyces* species, an automated VITEK system was used. Two weeks after treatment by ceftriaxon, metronidazol and analgetics, all clinical signs improved and patient was released in good physical condition.

Introduction

Mediastinitis is inflammation of the tissues in the mid-chest, or mediastinum. Before the development of modern cardiovascular surgery, cases of acute mediastinitis usually arose from either perforation of the esophagus or from contiguous spread of odontogenic or retropharyngeal infections. However, in modern practice, most cases of acute mediastinitis result from complications of cardiovascular or endoscopic surgical procedures [1-3].

Actinomycosis is an uncommon, rare, chronic slowly progressive bacterial infection that induces both

suppurative and granulomatous inflammation. Actinomycosis is most often caused by *Actinomyces israelii* and less often by *Actinomyces naeslundii*, *A. odontolyticus*, *A. meyeri* and *A. gerencseriae* [1, 4-7].

Thoracic actinomycosis accounts for 15-20% of cases. Aspiration of oropharyngeal secretions containing actinomycetes is the usual mechanism of infection. Occasionally, thoracic actinomycosis results from the introduction of organisms via esophageal perforation (mediastinitis), by direct spread from an actinomycotic process of the neck or abdomen, or via hematogenous spread from a distant lesion. The disease is rare and may

Case Report

occur at any age, but most patients are 30 - 60 years old. Men get this infection more often than women do [5, 6].

The aim of this study was to present a patient with mediastinitis due to *Actinomyces Naeslundii*.

Case report

In our case, a 48 year-old man with retrosternal chest pain and upper abdominal pain with propagation to the back, with clinical signs of cough, nausea, dyspnea and dysphagia was referred to the Clinic of Thoracic surgery. After an esophagography (Fig. 3 and Fig. 5),

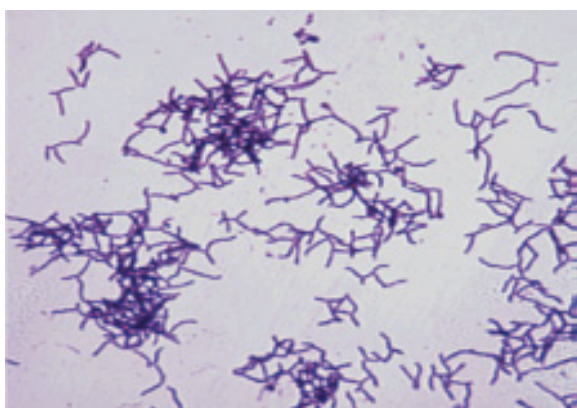


Figure 1: Gram stain of *Actinomyces Naeslundii*.

operative treatment was indicated. Thoracotomy (an incision into the pleural space of the chest on the left side) with mediastinotomy were performed. Posterolateral thoracotomy is a very common approach for operations on the lung or posterior mediastinum, including the esophagus.



Figure 2: *Actinomyces naeslundii* colonies on Schaedler agar after 48 hour incubation.



Figure 3: Native graph in PA projection to chest.

During the operation, a sample of pus was taken and sent for a microbiological examination at the Institute of Microbiology and Parasitology, Medical Faculty in Skopje. Standard microbiological procedures were used. The sample was cultured anaerobically on Schaedler agar and incubated for 48 hours at 37°C. Oval, smooth colonies were observed (Fig. 2). Gram stained smear revealed short branching Gram-positive filaments suspect for genus *Actinomyces* (Fig. 1).

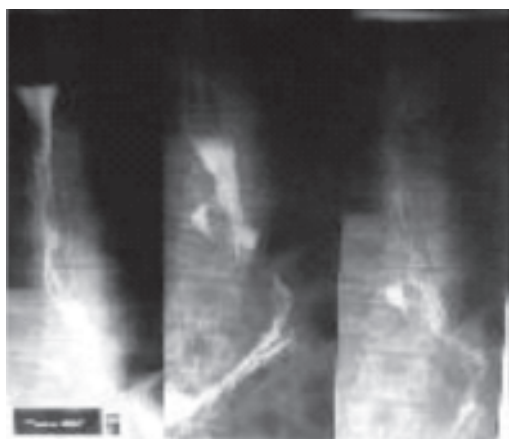


Figure 4: Esophagography to upper 2/3 of oesophagus (3 projections).

We found the isolated strain to be catalase positive which is in variance with the recognized biochemical reactions of *A. naeslundii*.

The microorganisms were confirmed with automatic VITEK system.

On physical examination, the patient's blood pressure was 125/90 mmHg, pulse rate 78/min and body temperature about 38°C.

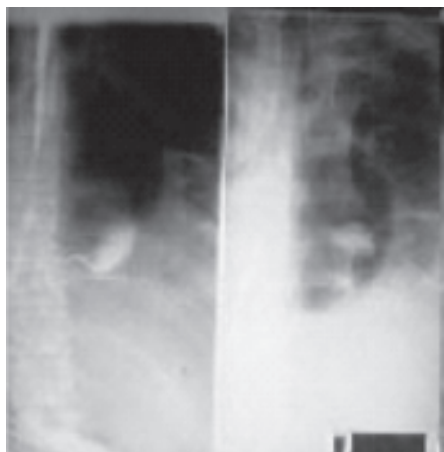


Figure 5: Native graph to chest (2 projections).

A specimen of the biopsy was taken and sent for a pathological examination at the Institute of Pathology in Medical Faculty in Skopje. The result for cancer cells, was negative.

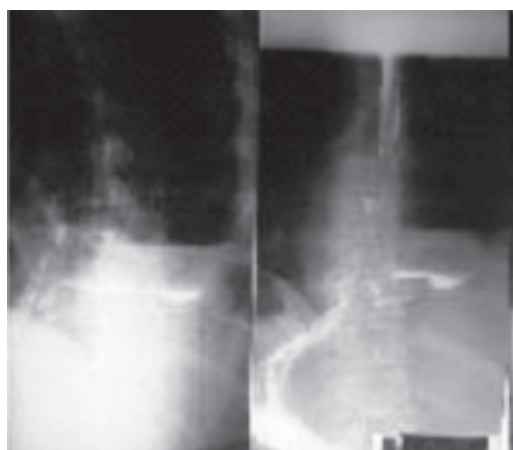


Figure 6: Esophagography to lower 2/3 of oesophagus (2 projections).

The patient was treated with Ceftriaxon (2 g daily) and Metronidazol (3x500mg) for a period of a few weeks. He responded well to the treatment and he was discharged from the hospital in good physical condition.

Discussion

Problems of correct recognition of many *Actinomyces spp.* are posed by their ability to grow aerobically to some extent and by the fact that aerobic growth is not taken into account in some of the traditional

identification schemes used in clinical laboratories nor in commercial identification kits [2, 8-10].

As early as 1977, in the VPI *Anaerobe Laboratory Manual* [11], some strains of *A. israelii*, *A. naeslundii*, and *Actinomyces viscosus* were described as being able to grow as well aerobically with CO₂ as anaerobically. This was also pointed out by Schaal in the 1986 *Bergey's Manual of Systematic Bacteriology* [12]. Therefore, these *Actinomyces spp.* should be included in tables and commercial systems used for the identification of aerobically isolated gram-positive rods. They are dealt with, for example, in the identification scheme of von Graevenitz and Funke [13]. In the 1999 edition of the *Manual of Clinical Microbiology* [14], there is an introductory algorithm that may be helpful in avoiding erroneous identifications.

Intrauterine device may predispose a patient to Actinomycosis of the genital tract. A case of infected total knee replacement secondary to *Actinomyces naeslundii* had been reported. Synovial actinomycosis of the knee had been reported also by Bose [16].

Actinomycosis, once fairly common and often fatal, has become a rare infection in the era of antibiotics [2-4]. In the thorax, actinomycosis commonly affects the lungs and chest wall. The cervicofacial and abdominal forms account for about 50% and 39%, respectively [2, 4,10].

A. naeslundii infection is known in classical settings of actinomycosis in the head and the abdomen [2]. The infection of a hip prosthesis presented here is unique. According to a Medline search, *A. naeslundii* has not been described as an infectious agent in infections of prostheses [6, 17, 18, 20, 21].

Actinomycotic pulmonary infection may follow a characteristic course demonstrating locally invasive disease or more often, may be manifested by an entirely nonspecific pneumonitis, cough, anorexia, chest pain and weight loss. Endobronchial disease due to the pathogen rarely is reported. Iliana Arid et al. reported five cases of actinomycosis of the main bronchi or trachea which were suggestive clinically of bronchogenic carcinoma [21]. Infection involving the mediastinum is extremely rare [10].

The specific appearance on radiographs or CT scans of mediastinitis caused by actinomycosis has been described very rare. Demonstrable signs on CT of infective mediastinitis due to other organisms include abscess formation, mediastinal masses, soft-tissue collections contiguous to other infected compartments, and areas of

diffuse mediastinal infiltration with fat plane loss without prominent lymphadenopathy [9, 10].

In summary, mediastinal actinomycosis, a very rare condition, has no pathognomonic findings on chest radiographs or CT scans [8, 19, 22, 23].

Mediastinitis usually results from either perforation of the oesophagus (spontaneous or after instrumentation), penetrating chest trauma, complications of thoracic surgery, tracheobronchial perforation, or contiguous spread of pulmonary infection [5, 8, 10, 23, 24].

In our case, mediastinitis with *Actinomyces naeslundii* is due to aspiration of oropharyngeal secretion after perforation of esophagus. This may be caused by any damage in the wall of the esophagus that may have occurred during the patient's life: genetically damage or consequence of the patient's living habits (Fig. 3-6). This infection did not show a tendency for haematogenous dissemination.

Although involvement of the mediastinal structures is most commonly caused by contiguous spread of infection from adjacent lung, radiologic features of the pulmonary involvement may be less apparent, and patients may exhibit signs limited to mediastinal disease like in our case. However, in patients who have a mediastinal mass and signs and symptoms including fever, malaise, anorexia, and chest pain, actinomycosis should remain on the list of differential diagnoses, especially if chest wall involvement or other manifestations of thoracic actinomycosis are present [10, 22-24]. On the figures we can see the perforation of oesophagus and the sign for inflammation and infiltration in the thoracic spacemen.

Extended antimicrobial therapy (6-12 months) has typically been recommended for patients with all clinical forms of actinomycosis to prevent disease recrudescence. Penicillin G is the drug of choice for treating an infection caused by any of the Actinomyces. It is given in a high dosage over a prolonged period, because the infection has a tendency to recur. Most deep-seated infections can be expected to respond to intravenous penicillin G, 10 to 20 million units/day given for 2 to 6 weeks, followed by an oral phenoxypenicillin in a dosage of 2 to 4 g/day [1, 3, 24, 25].

Although pulmonary actinomycosis is an unusual infection in lung transplant recipients, it should be part of the differential diagnosis of subacute and chronic pulmonary infiltrates and mediastinitis. A high index of suspicion and collection of appropriate anaerobic samples may increase the number of reported cases of *A. naeslundii* [25].

References

1. Kim YS, Suh JH, Kwak SM, Ryu JS, Cho CH, Park CS, Min SK. Foreign body-induced actinomycosis mimicking bronchogenic carcinoma. Korean J Intern Med. 2002;17(3):207-10. [PMID:12298433](#).
2. Bartlett J G. Agents of actinomycosis. In: Gorbach S L, Bartlett J G, Blacklow N R, editors. Infectious diseases. 2nd ed. Philadelphia, Pa: W. B. Saunders Co.; 1998. pp. 1973–1980.
3. Sah SP, Mishra A, Rani S, Ramachandran VG. Cervicofacial actinomycosis: diagnosis by fine needle aspiration cytology. Acta Cytol. 2001;45(4):665-7. [PMID:11480741](#).
4. Zitsch 3rd RP, Bothwell M. Actinomycosis: a potential complication of head and neck surgery. Am J Otolaryngol. 1999;20(4):260-2. [doi:10.1016/S0196-0709\(99\)90012-1](#) [PMID:10442782](#).
5. Kwartler JA, Limaye A. Pathologic quiz case 1. Cervicofacial actinomycosis. Arch Otolaryngol Head Neck Surg. 1989;115(4):524-7. [PMID:2923698](#).
6. Vandevelde AG, Jenkins SG, Hardy PR. Sclerosing osteomyelitis and Actinomyces naeslundii infection of surrounding tissues. Clin Infect Dis. 1995;20(4):1037-9. [PMID:7795046](#).
7. Funke G, Renaud F N, Freney J, Riegel P. Multicenter evaluation of the updated and extended API (RAPID) Coryne database 2.0. J Clin Microbiol. 1997;35(12):3122–3126. [PMID:9399506](#).
8. Schaal K P. Genus Actinomyces. In: Sneath P H A, Mair N S, Sharpe M E, Holt J G, editors. Bergey's manual of systematic bacteriology. Vol. 2. Baltimore, Md: The Williams & Wilkins Co.; 1986. pp. 1383–1418.
9. Hooi LN, Na BS, Sin KS. A case of empyema thoracis caused by actinomycosis. Med J Malaysia. 1992;47(4):311-15. [PMID:1303486](#).
10. Verrot D, Disdier P, Harle JR, et al. Actinomycose pulmonaire: responsabilite d'actinomyces odontolyticus? Rev Med Intern. 1993;14:179-81. [doi:10.1016/S0248-8663\(05\)81167-1](#)
11. Bruce Micales Anaerobe Laboratory Manual Fri 1995. 21 22:07:01 EST.
12. Bergey's Manual of Systematic Bacteriology Gram-positive Bacteria other than Actinomycetes 2nd Edition Vol 2. 1986.
13. Funke G, von Graevenitz A. Infections due to Actinomyces neuii (former "CDC coryneform group 1" bacteria). Infection. 1995;23(2):73-5. [doi:10.1007/BF01833868](#) [PMID:7622266](#).
14. Manual of Clinical Microbiology (Hardcover, 1999), book.

15. Fejerskov O, Nyvad B, Kidd EAM: Pathology of dental caries; in Fejerskov O, Kidd EAM (eds): Dental Caries. The Disease and Its Clinical Management, ed 2. Oxford, Blackwell Munksgaard, 2008, pp 19-48.
16. Bose R, Karjoo R, Makarem EH. Synovial actinomycosis of the knee: a case report. *Br J Surg.* 1979;66(6):437. [doi:10.1002/bjs.1800660621](https://doi.org/10.1002/bjs.1800660621) [PMID:466031](https://pubmed.ncbi.nlm.nih.gov/466031/).
17. Dom K, Pittevels T. Synovial actinomycosis of the hip: case report and review. *Acta Orthop Belg.* 1999;65(2):242-4. [PMID:10427810](https://pubmed.ncbi.nlm.nih.gov/10427810/).
18. Ruhe J, Holding K, Mushatt D. Infected total knee arthroplasty due to *Actinomyces naeslundii*. *Scand J Infect Dis.* 2001;33(3):230-231. [doi:10.1080/00365540151060987](https://doi.org/10.1080/00365540151060987) [PMID:11303817](https://pubmed.ncbi.nlm.nih.gov/11303817/).
19. Nicholson P, Kiely P, Street J, Mahalingum K. Septic arthritis due to *Actinomyces pyogenes*. *Injury.* 1998;29(8):640-642. [doi:10.1016/S0020-1383\(98\)00142-9](https://doi.org/10.1016/S0020-1383(98)00142-9) [PMID:10209601](https://pubmed.ncbi.nlm.nih.gov/10209601/).
20. Rieber H, Schwarz R, Krämer O, Cordier W, Frommelt L. *Actinomyces neuii* subsp. *neuii* Associated with periprosthetic infection in total hip arthroplasty as causative agent. *J Clin Microbiol.* 2009;47(12):4183-4. [doi:10.1128/JCM.01249-09](https://doi.org/10.1128/JCM.01249-09) [PMID:19794032](https://pubmed.ncbi.nlm.nih.gov/19794032/).
21. Ariel I, Breuer R, Kamal NS, Ben-Dov I, Mogel P, Rosenmann E. Endobronchial actinomycosis simulating bronchogenic carcinoma. Diagnosis by bronchial biopsy. *Chest.* 1991;99(2):493-5. [doi:10.1378/chest.99.2.493](https://doi.org/10.1378/chest.99.2.493) [PMID:1989815](https://pubmed.ncbi.nlm.nih.gov/1989815/).
22. Mohos E, Valkó A, Nagy A, Tóth E, Ligeti E. [Mediastinal actinomycosis]. *Magy Seb.* 2000;53(6):276-8. [PMID:11305287](https://pubmed.ncbi.nlm.nih.gov/11305287/).
23. Kumar A, Detrisac DA, Krecke CF, Jimenez MC. Actinomycosis of the thigh presenting as a soft-tissue neoplasm. *J Infect.* 1991;23(2):187-190. [doi:10.1016/0163-4453\(91\)92248-4](https://doi.org/10.1016/0163-4453(91)92248-4) [PMID:1753119](https://pubmed.ncbi.nlm.nih.gov/1753119/).
24. Aas JA, Griffen AL, Dardis SR, Lee AM, Olsen I, Dewhirst FE, Leys EJ, Paster BJ. Bacteria of dental caries in primary and permanent teeth in children and young adults. *J Clin Microbiol.* 2008;46(4):1407-17. [doi:10.1128/JCM.01410-07](https://doi.org/10.1128/JCM.01410-07) [PMID:18216213](https://pubmed.ncbi.nlm.nih.gov/18216213/).
25. Hindler J A, Swenson J M. Susceptibility testing of fastidious bacteria. In: Murray P R, Baron E J, Pfaller M A, Tenover F C, Tenover R Y, editors. *Manual of clinical microbiology*. 7th ed. Washington, D.C.: American Society for Microbiology, 1999;pp. 1544–1554.