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Case Report
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Actinomycesodontolycus and *Bacteroides spp* as Etiological Agents Responsible of Pleural Empyema and Bacteriemia Case Report and Literature Review

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Abstract

We case report of a 83 years old male patients with personal history chronic bronchitis, immunosuppressed, leukopenia, operated of prostate cancer and right hemiplegia. He consults with der cay, fever and dyspnea. Respiratory auscultation: abolition of the right breath sounds. Develops a pleural empyema and bacteriemia by *Actinomycesodontolyticus* and *Bacteroides spp*. Confirmed by the studies of a laboratory tests, citobacteriologically and culture examination of pleural fluid, x-ray chest and computed tomographic scan of the chest. Are effective treatment for *A. odontolyticus* and Bacteroides infections with piperacillin/tazobactam and vancomycin, pleural drainage of secretions. Improvement and discharged from the hospital.

Keywords: Thoracic; Empyema; Actinomyces; odontolycus; Bacteroides

Introduction

Isolated pleural effusion due to actinomycosis is extremely rare and poses a diagnostic challenge to clinicians not only because it is uncommon and often forgotten. Pulmonary actinomycosis often presents with parenchymal disease, with less than 2% showing pleural involvement. Pulmonary involvement may be associated with poor oral hygiene, underlying lung disease, alcoholism, and possibly HIV infections [1-3].

Bacteroides species are significant clinical pathogens and are found in most anaerobic infections, with an associated mortality of more than 19% [4]. The bacteria maintain a complex and generally beneficial relationship with the host when retained in the gut, but when they escape this environment they can cause significant pathology, including bacteremia and abscess formation in multiple body sites. Clinically, Bacteroides species have exhibited increasing resistance to many antibiotics, including cefoxitin, clindamycin, metronidazole, carbapenems, and fluoroquinolones (e.g., gatifloxacin, levofloxacin, and moxifloxacin) [4].

Case Presentation

A 83 years old male patient with a history of Chronic Bronchitis, leukopenia, operated from prostate cancer and right hemiplegia. Often suffers from bronchial catarrh and respiratory processes frequently. Now he presents with cough, high grade fever, malaise, loss of appetite, mild dyspnea, high fever, dehydration, the respiratory auscultation shows a decreased breath sounds in much of the right chest, crackles in the right base, dullness to percussion of the thorax. Vitals signs: blood pressure: 145/90, heart rate 87/min, oxygen saturation 92%. The x-ray chest shows a opacity along with right pleural effusion that occupies almost the entire right lung (Figure 1a-c). He is diagnosed with right lung pleural empyema, he was admitted to the study and treated. Laboratory tests: Hematíes 3.69 10^6/uL, hemoglobin 9.7 g/dL, hematocrit 29.2%, 79.1 um^3, Erythrosedimentation 127 mm., White blood cell count was 13,800/µL, Procalcitonin: 0.467ng/mL (0-0.5), culture and sensitivity of pleural fluid: *Actinomycesodontolyticus and Bacteroides spp* is isolated, Gram stain: Gram-negative and gram-positive bacilli are observed. No smear acid-fast bacilli are observed. Bacteriological examination of pleural fluid: Cells 460340/uL, purulent aspect, pH 6. LPL-Adenosine deaminase: & gt; 100 U/L (0-45) (values below 45 U/L is compatible with non-tuberculous pleuritis. Computed tomographic scan (TC) of the chest (Figure 1d) revealed right lower lobe consolidation and large loculated pleural effusion, and right pleural empyema. The patient was treated with drainage of

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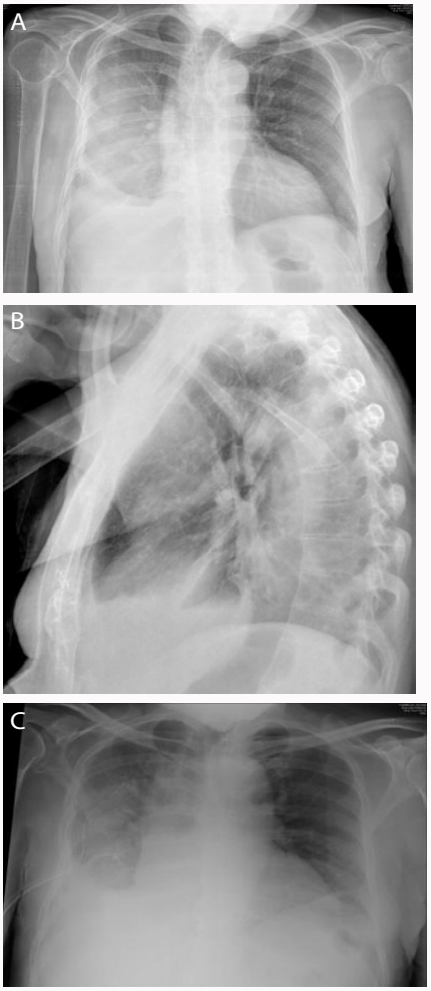

Figure 1a-c: Chest x-ray shows opacity in the right hemithorax, pleural effusion that occupies almost the entire right lung.

pleural fluid, intravenous antibiotics were started, he was placed in a pulmonary care unit. Was discharged by clinical and radiological improvement.

Discussion

Actinomyces species are prokaryotic bacteria that most commonly cause cervicofacial infection. Although a well-known cause of suppurative pneumonia, actinomycosis is an extremely rare diagnosis. Pulmonary actinomycosis often presents with parenchymal disease, with less than 2% showing pleural involvement. Although cases of empyema have been reported in Asia, Latin America, Scandinavia, and Europe, pleural actinomycosis is not very common in the United States. Pulmonary involvement may be associated with poor oral hygiene, underlying lung disease, alcoholism, and possibly HIV infections. It can mimic granulomatous disease, and oftentimes, distinction from tuberculosis, fungal infections, or malignancy is problematic.

It is important to include actinomycosis in the differential diagnosis of chronic suppurative pneumonia and to alert the microbiology laboratory early of the suspicion. Actinomycotic empyema is treated with prolonged antibiotic therapy of up to6 months with extensive surgical drainage and decortication [1-3].

Actynomicosis is a disease of antiquity, having most likely

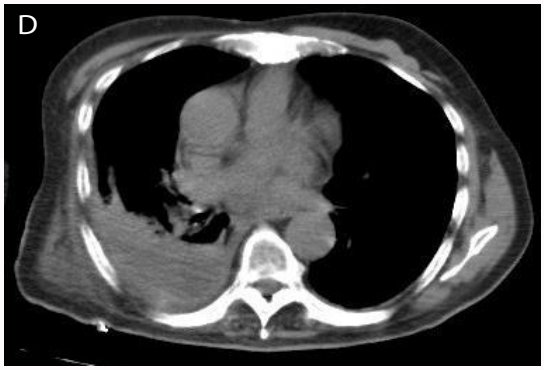

Figure 1d: Chest TC non-constrast: right lower lobe consolidation and large loculated pleural effusion.

infected the jaw of a fossil rhinoceros [5] and the ribs of a man discovered in southeastern Ontario, Canada, who by radiocarbon dating lived 230 A.D. + 55 [6]. In 1877, Bollinger and Harz [7] named the genus *Actinomyces* when they described the etiologic agent of bovine actinomycosis("lumpy jaw") and called it *Actinomycesbovis*. However, this organism has never been convincingly proven to cause actinomycosis in humans [8], nor has it ever been isolated from human mucosa or other human sources.

The major human pathogen for actinomycosis, *A. israelii,* was identified in two patients in 1878 and fully delineated by Israel [9]. In 1891, Wolff and Israel [10] described the cultural characteristics and its anaerobic growth. Since then, studies have identified *A. naeslundii, A. viscosus, A. pyogenes, Adenticolens, A. howellii, A. hordeovulneris,* and *A. meyeri* in humans as well as in dogs and cats. Actinomycosis is the most common infectious disease of kangaroos [11]. In 1958, Batty [12] isolated *A. odontolyticus* from persons with advanced dental caries.

Won Jung et al. [13], report a rare case of empyema caused by *A. meyeri*. A 49-year-old male presented with a history of 10 days of dyspnea and chest pain. A large amount of loculated pleural effusion was present on the right side and multiple lung nodules were documented on radiological studies. A chest tube was inserted and purulent pleural fluid was drained. *A. meyeri* was isolated in anaerobic cultures of the pleural fluid. The infection was alleviated in response to treatment with intravenous penicillin G (20 million IU daily) and oral amoxicillin (500 mg every 8 hours) for 4 months, demonstrating that short-term antibiotic treatment was effective.

Lawrence A Cone et al. [1], realiced the interesting rewiev of the casuistry with *Actinomycesodontolyticus* infection (n=25) were there are 4 cases (n=4) presented with empyema. In this important article the authors to conclude as with all other actinomycotic diseases, *A. odontolyticus* is an endogenous infection arising from the mucous membranes. After some experience, was able to isolate the organism from the dentine of 90% of subjects studied, while others authors isolated *A. odontolyticus* in female genital tract specimens from 4.8% of women fitted with intrauterine contraceptive devices, in 4% of women with pelvic inflammatory disease, and in 1.8%of women without pelvic inflammatory disease.

The capacity of actinomycetes to colonize mucosal surfaces and dentine appears to depend on two distinct fimbriae, type 1 and type 2, that bind preferentially to salivary acidic proline-rich proteins and to statherin, or to linked galactose or galactosamine structures on

epithelial or bacterial surfaces, respectively.

One patient with acute leukemia and a dental abscess, probably secondary to *A. odontolyticus,* that served as a portal for the bacteremia. Of the 23previously reported case-patients of *A. odontolyticus* infection in this reviewer, only one another wise healthy 20-year-old man had bacteremia. The two reported case-patients were women: one had received chemotherapy for acute granulocytic leukemia and the other had received high dose corticosteroids for vasculitis. Immunosuppression probably playeda major role in the etiology of bacteremic *A. odontolyticus* infection. Further studies to evaluate possible mechanisms would be appropriate.

Actinomyces pleuropulmonary infection can also be seen in children, in a new Case Record of the Massachusetts General Hospital it is reported an 8-year-old girl with placement of a long-term tracheostomy tube presented with a chest-wall mass. Imaging studies revealed a soft-tissue mass, a pleural effusion, and pulmonary consolidation. Adiagnostic procedure was performed [3].

Empyema necessitatis is a process characterized by extension of pleural empyema into the chest wall. Empyema necessitatis typically develops over a period of 4 to 8 weeks and is associated with pain, swelling, and lymphadenopathy of the anterolateral chest, often without fever. It can also result in a pleurocutaneous or bronchopleurocutaneous fistula.

Empyema necessitatis was more common in the era before antibiotics. At that time, it was associated with an overall mortality of approximately 66%; the most common pathogens were *Mycobacterium tuberculosis* (mortality, 87%) and *Streptococcus pneumoniae* (mortality, 28%). Since antibiotics have been in use, cases of empyema necessitatis are rarely fatal, and actinomyces species are a more common cause than is *Streptococcus pneumoniae*. Less common pathogens include *Staphylococcus aureus, Streptococcus milleri, Fusobacteriumnucleatum, Mycobacterium avium, Mycobacterium intracellulare, Burkholderia cepacia, blastomyces species, and Nocardia asteroides.*

Suri Arvind et al. [2], published a similar case to ours, but this time by *Actinomyces israelii* on a 84-year-old woman from the community with lobar pneumonia and massive empyema caused by *Actinomyces israelii* was admitted for respiratory distress and altered mental status.

Other authors too report clinics cases with infection by actynomices. Stating that of thoracic actinomycosis represents 25% of all cases of the disease, whose presentation varíes greatly. Pleural involvement is inusual and only rarely is it found as an isolated sign. They describe 2 cases of empyema due to actinomycosis; both cases responded well to surgical drainage and antibiotics, as our patient [14].

Pleural effusion represents an unusual but significant manifestation of actinomycosis, as illustrated in this case presentation. The diagnosis was made after bronchoscopy and examination of bronchoalveolar fluid and culture. No parenchymal abnormality was noted on the chest film [15].

Isolated pleural effusion due to actinomycosis is rare and poses adiagnostic challenge to clinicians not only because it is uncommon and often forgotten, but also because culture of the causative microorganism is technically difficult [16].

Bacteroides spp represent an important anaerobic bacteria genus associated with human infection. In combination with other facultative/strict anaerobes, they are responsible for the majority of localized abscesses within the cranium, thorax, peritoneum, liver, and female genital tract. They can cause pulmonary abscesses when naturally-occurring oropharangeal *Bacteroides* and closely related genera are aspirated into the lung. These taxa can lead to many types of diseases, some of which can be fatal, including noma (cancrum oris), human apical periodontitis, endocarditis, pelvic inflammatory disease, suppurative thrombophelebitis, and wound infections. Organisms from oral flora also have a role in dental abscesses and infectivity of human bites. Susceptible to chloramphenicol, clindamycin, and metronidazole. Piperacillin- tazobactam combinations as well as tigecycline are active against most strains of Gram negative rods. Ertapenem, imipenem, and meropenem are consistently active against most anaerobes. Moxifloxacin is moderately active against many strains [17].

Conclusions

A. odontolyticus is an endogenous infection arising from the mucous membranes. Immunosuppression probably played a major role in the etiology of bacteremic *A. odontolyticus* infection. Empyema necessitatis is a process characterized by extension of pleural empyema into the chest wall. Empyema necessitatis typically develops over a period of 4 to 8 weeks and is associated with pain, swelling, and lymphadenopathy of the anterolateral chest, often without fever. It can also result in a pleurocutaneous or bronchopleurocutaneous fistula. Actinomyces should also be kept as a differential diagnosis in patient with chronic suppurative pneumonia.

Bacteroides spp. represent an important anaerobic bacteria genus associated with human infection. In combination with other facultative/strict anaerobes, they are responsible for the majority of localized abscesses within the cranium, thorax, peritoneum, liver, and female genital tract.

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