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Actinomyces meyeri pleural empyema: A case report

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ABSTRACT

We report the case of a man with intense cough for several months and a few days of severe dyspnea. A massive pleural empyema due to *Actinomyces meyeri* was diagnosed by radiological, microbiological and thoracoscopic means. Pleural infections caused by this anaerobic bacterium are very rare and should be considered when risk factors like male gender, chronic alcohol abuse, and poor oral hygiene are present. Penicillin-based antibiotic treatment and surgical decortication led to recovery.

Introduction

Actinomycosis is a chronic infection caused by *Actinomyces* spp., gram-positive, anaerobic bacteriae, usually commensals of the human oropharynx, gastrointestinal, and urogenital tract [1]. Following a breach in the mucosal barrier and tissue infiltration, a variety of clinical presentations have been described, including pulmonary and pleural involvement [1,2]. In contrast to other *Actinomyces* spp., *Actinomyces (A.) meyeri* has a greater tendency for infiltrating the lung and progression of the infection to the pleural space [1,3]. We report the case of a man with unresolving cough and severe shortness of breath in whom a massive pleural empyema caused by *A. meyeri* was diagnosed.

Case presentation

A 52-year-old man with 40-pack year smoking history and daily alcohol consumption of 4 liters of beer was hospitalized with severe shortness of breath for one week, unproductive cough for “several months”, occasional night sweats but stable body weight. On physical examination he was orthopneic with absent breath sounds and a dull percussion note were present on the left side of his chest. Vital parameters were: blood pressure 143/88 mmHg, heart rate 105/min, respiratory rate 21/min, body temperature 37.6 °C, oxygen saturation 94%. Laboratory tests showed elevated inflammatory parameters and serum enzymes: C-reactive protein (CRP) 221.7 mg/l, white blood cells (WBC) 22.7 × 10^9/l, alkaline phosphatase (AP) 254 U/l, gamma-glutamyl transferase (yGT) 223 U/l, aspartate transaminase (ASAT) 55 U/l, alanine transaminase (ALAT) 82 U/l, lactate dehydrogenase (LDH) 285 U/l. Computed tomography (CT) of the thorax revealed a massive pleural effusion on the left with mediastinal lymphadenopathy and shift to the right side (Fig. 1 A, B). Bronchoscopy was unremarkable. Pleural tapping revealed turbid effusion fluid, a low pH of 7.15, low glucose of 1.5 mmol/l, elevated pleura/serum ratios of LDH 2.44 (normal < 0.6) and of protein 0.69 (normal < 0.5), all parameters suggestive of an empyema. Microscopy, however, did not show bacteriae. Especially to rule out pleural carcinomatosis, as cause of the mediastinal shift, medical thoracoscopy was performed, which besides turbid empyema fluid, revealed widespread adhesions, parietal and visceral pleural thickening, multiple septae formation, which in part were mechanically dissolved by forceps (Fig. 1 C, D, E). More than 2000 ml empyema fluid was removed, a chest tube was placed in dorsobasal position. To promote enzymatic lysis of septae and adhesions 10 mg alteplase and 5 mg dornase-alpha were instilled into the pleural cavity. The follow up chest X-ray (CXR) and CT thorax demonstrated an expanded lung and residual multiloculated pleural effusion on the left (Fig. 1 F, G). Matrix-assisted-laser-desorption-ionization-time-of-flight mass-spectrum (MALDI-TOF MS) analysis from pleural effusion fluid and septae biopsies, both retrieved during thoracoscopy, confirmed *A. meyeri,*

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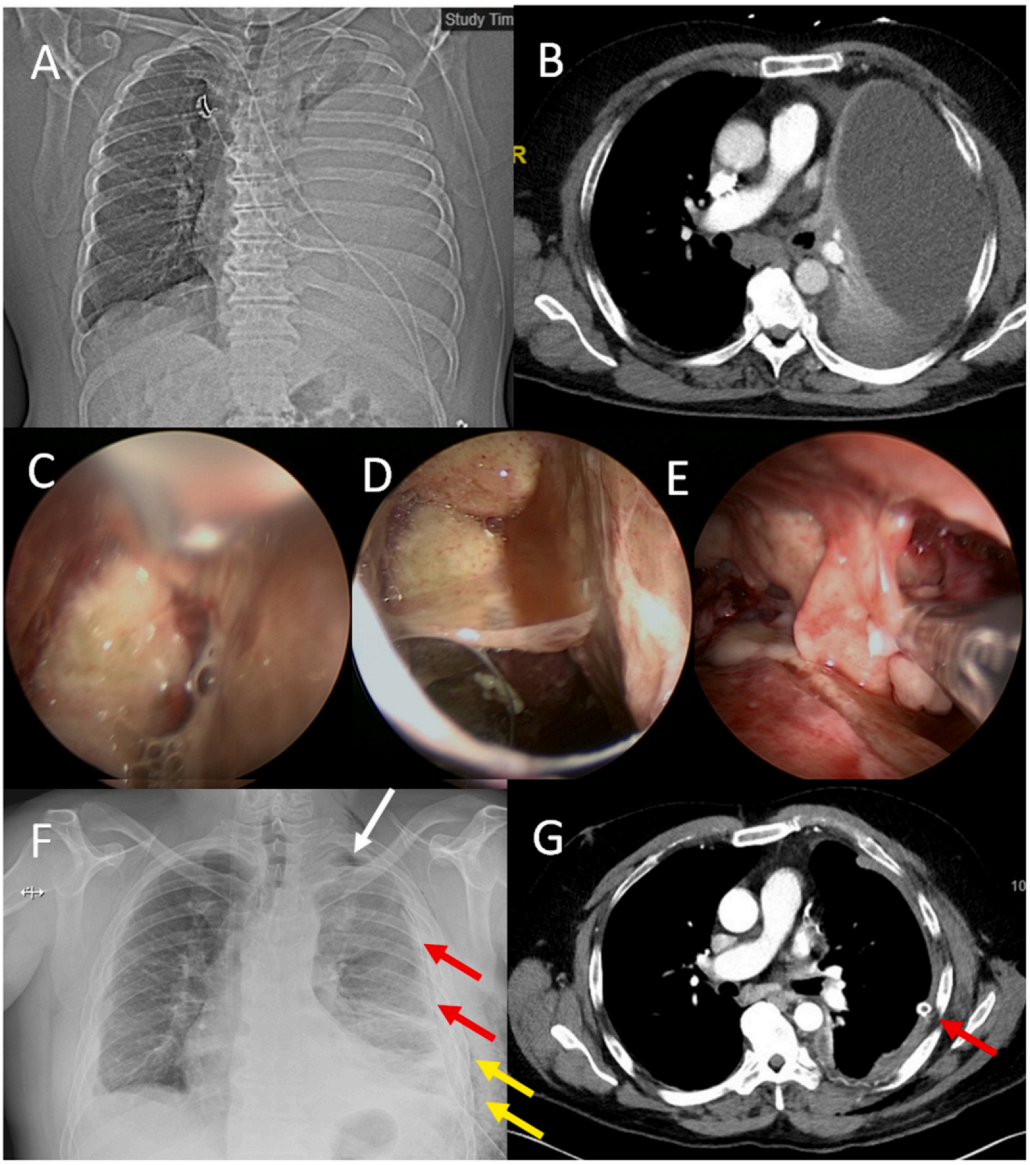

Fig. 1. A, B: *Computed tomography (CT) Thorax with contrast media, day 1:* Unilateral, pronounced left sided pleural effusion, mediastinal lymphadenopathy and shift to the right, space-occupying effect on the diaphragm, no signs of pulmonary embolism. C, D, E: *Exploratory thoracoscopy, day 2:* C: turbid empyema fluid, D: fibrotic visceral and parietal pleural thickening and adhesions, E: detachment of fibrotic septae by forceps. F: *Chest X-ray, day 2:* Following thoracoscopy residual left sided pleural effusion, dystelectasis lower zone, apical pneumothorax of 1.6 cm width (white arrow), chest drainage tube in place (red arrows), soft tissue emphysema (yellow arrows). G: *CT Thorax, day 2:* Following thoracoscopy, partial reexpansion left lung with residual, residual multiloculated effusion, partial atelectasis lower lobe, mild diaphragmatic protrusion, no signs of tumor growth. Chest drainage tube in place (red arrow). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

susceptible to amoxicillin/clavulanic acid (AMC). Tuberculosis and malignancy were ruled out. Antibiotic treatment with intravenous AMC 2.2 g q8h were started on day 2. Because of persistent infection signs surgical minithoracotomy with empyema evacuation, complete parietal pleurectomy, decortications of the left upper and lower lobes were performed (day 6). Postsurgical respiratory insufficiency, could be successfully treated with a few days of non-invasive ventilation (NIV). Because of transient renal function impairment AMC was adjusted to 1.2 g q8h and switched to Amoxicillin (AMX) 1000 mg q8h from days 14–43. The patient gradually improved and was transferred for rehabilitation on day 19. Laboratory parameters during the following two month were unremarkable.

Discussion

Pleural infections with *A. meyeri* are very rare. Only 13 cases were published in the literature up to 2017 with men predominating (84.6% of cases) and the vast majority of cases being over 40 years of age (92.3%) [3]. In addition to the pleura, other organs, mainly the lungs, may be involved [2–5]. Alcoholism, as present in our patient, is a predisposing factor, favoring aspiration of the bacterium from the oral cavity into the pulmonary parenchyma. Progress to local necrosis, cavitation, invasion of the pleura, chest wall, soft tissues and bony structures and fistulization, characteristic of actinomycosis, may occur [1]. The pleura becomes involved either from contiguity or hematogenous dissemination [1,3,6].

The presentation of only a few days of severe shortness of breath before hospital admission, resembling subacute pulmonary embolism, was quite unusual in our patient, whereas typical symptoms, like sputum, chest pain, weight loss, malaise, and ongoing fever [1] were not predominant. The thoracoscopic findings of septae formation, considerable pleural thickening, and multiloculated effusion in the pleural cavity, however, demonstrated that the disease was advanced already. No pulmonary tissue involvement, penetration to

the chest wall, diaphragm, pericardium, mediastinum, skeletal or connective tissue, adjacent abdominal organs or fistula formation, as described in other cases [3,5,7,8], were found in our patient.

The antibiotic treatment of choice is penicillin-based with intention of long course treatment until full recovery can be achieved. Other antibiotics with good in vitro susceptibility include ceftriaxone, erythromycin, tetracycline, doxycycline, and clindamycin [2,3,7,9]. Our patient responded favorably to AMC in the acute and AMX in the consolidation phase. Medical thoracoscopy is a treatment option for patients with monoloculated empyema [10]. This approach was regarded necessary in our patient, not only to rule out malignancy, often associated with a massive pleural effusion and mediastinal shift to the contralateral side, but in addition, by direct inspection of the pleural cavity it was possible to retrieve representative empyema fluid and biopsy samples which finally led to the microbiological identification of *A. meyeri*. Intracavitary fibrinolytic therapy was administered, as studies have shown that in patients with complicated infective pleural effusion or empyema, this approach was associated with a reduction in the requirement for surgical intervention and overall treatment failure [11]. Persistent elevated inflammation parameters, despite removal of pleural fluid, chest tube drainage, and ongoing antibiotic therapy, however, prompted us to perform a secondary surgical intervention with parietal pleurectomy and decortication. Two other cases of pleural empyema caused be *A. meyeri* treated by decortication in addition to antibiotic treatment have been reported before [12,13].

We conclude that pleural empyema caused by *A. meyeri* should be considered especially in male patients with a history of alcoholism and symptoms of longstanding severe cough, night sweats, increasing shortness of breath, and signs of a massive pleural effusion. Medical thoracoscopy in combination with modern microbiological techniques like MALDI-TOF MS may facilitate diagnosis in such cases. Surgical intervention and decortication should be considered when despite drainage of the empyema and antibiotic therapy the infection cannot be controlled.

Ethics approval and consent to participate

The patient signed a written informed consent for the publication of the case and the use of the X-ray, CT scans and thoracoscopy images.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that will influence the work reported in this paper.

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