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CASE REPORT

Breast abscess due to *Actinomyces europaeus*

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Abstract *Actinomyces europaeus* was first described in 1997 as a new species causing predominantly skin and soft-tissue infections. Mastitis due to *A. europaeus* is an unusual condition. This article reports a case of primary breast abscess caused by *A. europaeus* in a postmenopausal woman.

Keywords *Actinomyces europaeus* · Actinomycosis · Mastitis

Introduction

Actinomyces spp. normally colonizes mucous membranes particularly of the oral cavity, the colon, and the vagina. Disruption of the mucosa may lead to indolent infections characterized by a chronic course, progression across tissue boundaries, and formation of sinus tracts. Until recently, identification of *Actinomyces* spp. was based on phenotypic tests. With increasing use of genotypic analysis taxonomy has advanced and new species have been described in the past 15 years. The disease-causing potential of many of these newly described species and the associated range of clinical manifestations is, however, incompletely understood.

A. europaeus is a Gram-positive, nonmotile, non-spore-forming facultative anaerobic rod first described as new species in 1997 on the basis of 16S rRNA gene sequencing [1]. It was found to cause infections of the urinary tract and of skin and soft-tissue, notably abscesses, pilonidal sinus infection, and decubital ulcers [2]. In this article we report a case of primary breast abscess caused by *A. europaeus* in a postmenopausal woman.

Case report

A 67-year-old immunocompetent woman was admitted to the hospital because of a painful swelling and hyperemia of the left breast which had appeared 3 days earlier. There was no history of fever, nipple discharge, tooth problems, or lung or breast disease. She was not diabetic and was a non-smoker. Two months earlier, she had undergone uncomplicated open heart surgery to receive a prosthetic aortic valve for severe aortic stenosis.

On physical examination, the patient was afebrile and there were no signs of systemic disease. Her body mass index was 28.9 kg/m^2. There was a tender, fluctuating mass of 12 cm in the left breast. The overlying skin was infiltrated and erythematous. The margin of the inflamed skin

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reached within 2 cm of the sternotomy scar which was without signs of inflammation. Sternal compression was not painful.

Results of laboratory tests showed a hemoglobin level of 114 g/L, a WBC of 12.3 G/L without a left shift, a thrombocyte count of 117 G/L, and a level of C-reactive protein of 35 mg/L. A chest X-ray was normal and a computed tomography scan of the thorax showed no signs of infection of the sternum or of intrathoracic tissues. Blood cultures were negative. The clinically diagnosed breast abscess was incised and drained under general anesthesia. Pus and tissue samples were sent for microbiological examination and for histopathology. Postoperatively there was a tender mass of 12 × 6 cm in the inferior half of the breast. The wound was left open and a drainage tube was inserted. Two days later, the patient was free from pain and was discharged on oral amoxicillin-clavulanic acid 1 g tid.

Histopathology showed adipose-tissue necrosis, no sulfur granules, and no evidence of malignancy. Gram stains of pus revealed many Gram-negative bacilli and Gram-positive rods. Again, no sulfur granules were seen. Cultures grew *Actinomyces* spp. and a mixed anaerobic flora composed of Gram-negative rods and Gram-positive cocci that was not further characterized. *A. europaeus* was identified by full-length sequencing of the 16S rRNA gene by using MicroSeq Full Gene 16S rDNA PCR and sequencing kits (Applied Biosystems). BLAST analysis showed 99.7% identity with the 16S rRNA gene sequence of *A. europaeus* strain CCUG 32789A (GenBank accession no. NR_026363). The isolate was tested for susceptibility using the *E* test (AB Biodisk, Solna, Sweden) with the following results: penicillin G MIC: 0.008 μg/mL, amoxicillin MIC: 0.023 μg/mL, ceftriaxone MIC: 0.047 μg/mL, piperacillin-tazobactam MIC: 0.047 μg/mL, clindamycin MIC: 0.016 μg/mL, and tetracycline MIC: 0.380 μg/mL. According to the Clinical and Laboratory Standards Institute criteria the isolate was susceptible to all tested antimicrobial agents [3].

After three weeks, under the assumption that the mixed anaerobic flora had been eliminated, treatment was changed to amoxicillin 2 g tid for 4 weeks followed by amoxicillin 1 g tid for the remainder of the treatment period. The breast remained non-tender and painless. The tissue mass, infiltrated skin, and wound secretions improved only very slowly. After three months, three draining sinuses secreting minimal amounts of pus developed on the inferior aspect of the breast (Fig. 1). The opening left by the abscess drainage healed by granulation after 10 months. The draining sinuses that were débrided regularly resolved after 15 months. At that time the antibiotic treatment was discontinued. At follow-up, 6 months later, there were no signs of recurrent infection; the breast was free of masses and its shape was only minimally altered by scar formation.

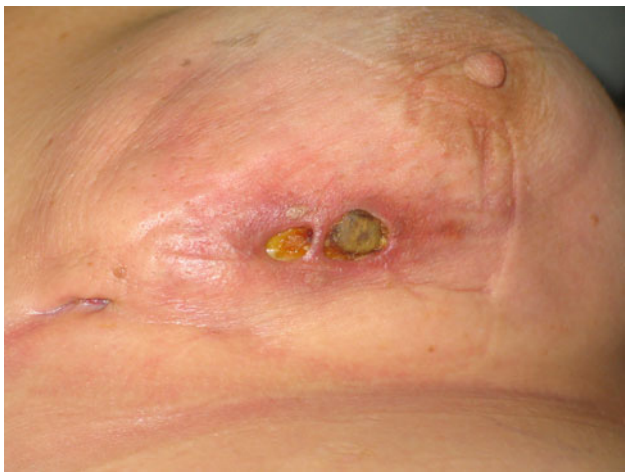

Fig. 1 Photograph of the patient's left breast 6 months after abscess drainage and start of antibiotic therapy. The incision wound on the medial aspect is healing, the mass in the inferior medial quadrant and erythematous skin have improved. On the inferior aspect draining sinuses that formed after 3 months of antibiotic therapy are covered by necrotic membranes that are regularly débrided. Eventual healing was observed after 15 months of treatment

Discussion

The main clinical manifestations of actinomycosis are slowly progressing, granulomatous and sinus-forming infections in the cervicofacial, thoracic, abdominal, and, in women, pelvic areas. Adjacent organs may be infiltrated but hematogenous dissemination has not been observed. The disease is four times more common in men; usually patients are in good health, free from underlying diseases [4].

Breast infections are relatively common, particularly in lactating women. They are often caused by bacteria of normal skin or oral flora, especially *Staphylococcus aureus.* Breast infections with *Actinomyces* spp. are rare and have mainly been described in premenopausal women [5]. They are classified as primary or secondary, depending on how the microorganisms reach the site of infection. Secondary actinomycosis of the breast results from pulmonary infection penetrating through the thoracic wall [5, 6]. The more common primary form occurs when skin flora reach mammary tissue directly, possibly through cracks in the skin on or around the nipple. Risk factors for development of primary breast abscess include smoking, diabetes, and obesity [7]. Primary actinomycosis of the breast has most commonly been ascribed to *A. israelii* [4]. More recently, breast infections due to *A. viscosus*, *A. turicensis*, and *A. radingae* have been described [8, 9]. Seven of the ten

clinical strains in the first description of *A. europaeus* were isolated from human abscesses, one of which was a breast abscess in a 54-year-old woman [1]. Interestingly, sulfur granules have not been described in abscesses due to *A. europaeus* and were not found in this case [1, 2, 9]. Absence of sulfur granules has also been observed in infections caused by *A. neuii*, another *Actinomyces* species not commonly associated with classical actinomycosis [10].

The patient described here did not have pulmonary disease or evidence of osteomyelitis of the sternum or the ribs. It is plausible that actinomycetes reached mammary tissues through skin lacerations caused by post-sternotomy dressings.

Interestingly, the association of *A. europaeus* with other bacteria is more common than its isolation in pure culture. Clarridge et al. [11] found them associated with coagulase-negative staphylococci and corynebacteria and suggested that the normal niche of *A. europaeus* was the skin of the upper body. Sabbe et al. [2] found *A. europaeus* accompanied by a mixed anaerobic flora, as in the case described here. Attar et al. [8] also described two cases of actinomycosis of the breast (caused by strains other than *A. europaeus*) in association with anaerobic bacteria.

The most common clinical presentation of actinomycosis of the breast is recurrent retropapillary abscesses. Fistulas and purulent or bloody discharge from sinuses may occur. In the most advanced cases, fibrosis with local cicatrisation and distortion of the breast were reported [4]. In one series, two-thirds of the cases presented as persistent or recurrent breast abscesses and the other third presented with a breast lump suggestive of carcinoma [12]. Further differential diagnoses include tuberculosis, syphilis, rib osteomyelitis, and inflammatory carcinoma [5].

Recommended treatment for actinomycosis is intravenous penicillin at a daily dose of 18–24 million U for 2–6 weeks, followed by oral penicillin or amoxicillin for a period of 6–12 months. Shorter treatment regimens may also be successful [13]. In the case presented here, however, treatment was given for 15 months, until full closure of all skin lesions. All reported cases of *Actinomyces* spp. of the breast have been successfully treated with a combination of surgical drainage and short-course antibiotic therapy [8, 9]. Surgical curettage is an important adjunctive treatment because of limited penetration of the antibiotics into the chronically indurated tissue of actinomycotic lesions and the dense aggregates of *Actinomyces* spp. known as sulfur granules.

A. europaeus seems to be susceptible in vitro to a wide range of β-lactam antibiotics which should be regarded as agents of first choice. Some *A. europaeus* have reduced susceptibility to tetracycline, ciprofloxacin, clindamycin, linezolid, and piperacillin/tazobactam [14]. The isolate reported here was fully susceptible to all β-lactam agents tested, and to clindamycin and tetracycline. In mixed infections with anaerobes amoxicillin–clavulanic acid may be preferred for initial treatment because of the notable β-lactamase activity of certain anaerobes.

Physicians and microbiologists should be aware that the clinical range of disease manifestations due to *Actinomyces* spp. may be widening and that new species may be causing particular disease manifestations. Treatment should be individualized and may need to be prolonged.

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Conflict of interest None.

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