

# First report of *Actinomyces europaeus* bacteraemia result from a breast abscess in a 53-year-old man

H. L. Nielsen<sup>1,2</sup>

1) Department of Clinical Microbiology, Viborg Hospital, Viborg and 2) Department of Clinical Microbiology, Aalborg University Hospital, Aalborg, Denmark

## Abstract

This is the first report of *Actinomyces europaeus* bacteraemia in a 53-year-old man. The bacteraemia was the result of a breast abscess. Identification was established by matrix-assisted desorption/ionization–time of flight mass spectrometry and confirmed by 16S rRNA gene sequencing. The patient was treated with surgical drainage and penicillin for 4 weeks; the patient did not experience any relapse during 6 months of follow-up.

**Keywords:** *Actinomyces europaeus*, actinomycosis, bacteraemia, breast abscess, penicillin

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**Corresponding author:** H. L. Nielsen, Department of Clinical Microbiology, Aalborg University Hospital, Hobrovej 18-22, DK-9000 Aalborg, Denmark  
**E-mail:** [halin@rn.dk](mailto:halin@rn.dk)

*Actinomyces* species are part of the commensal flora of the mucous membranes of the oropharynx, gastrointestinal tract and female genital tract. Many *Actinomyces* species are opportunistic pathogens of humans that may lead to actinomycosis, a slowly processing indolent granulomatous infection, often located in the cervicofacial, thoracic, abdominal and in women also the pelvic areas [1]. Breast infection with *Actinomyces* species is an unusual condition. Nevertheless, *A. israelii*, *A. turicensis*, *A. radingae*, *A. viscosus*, *A. meyerii*, *A. neuii* and *A. europaeus* have all been associated with breast infection in women [2–7]. Breast infection in men with *Actinomyces* species is rare. Only a single case of a 73-year-old man with a primary breast abscess from *A. neuii* mimicking an epidermoid cyst has been reported [8].

*Actinomyces europaeus* is a short, nonmotile, facultative anaerobic rod first described in 1997 [9]. Besides breast abscesses, *A. europaeus* has been described in urinary tract infections as well as skin and soft tissue infections [10]. To my knowledge, the present case is the first report of *A. europaeus* bacteraemia resulting from a breast abscess.

A 53-year-old Danish man was hospitalized in July 2014 with a painful swelling in the right breast which had appeared a few days earlier. The patient was diabetic and smoking 20 to 30 cigarettes a day. He had a history of obesity, chronic obstructive pulmonary disease and schizophrenia. Previously he had been experienced recurrent cutaneous abscesses, primarily localized to the axillae and the groin, which were treated with surgical drainage.

At examination, the patient was febrile (39.5°C) and had tachycardia and tachypnea. His right breast was diffusely swollen, and there was a hyperaemic area of 10 × 30 cm. He was also severely obese, with a body mass index of 45.9 kg/m<sup>2</sup>, and laboratory test showed a C-reactive protein level of 275 mg/L and white blood cell count of 14.3 × 10<sup>9</sup>/L. A chest X-ray revealed nothing abnormal. A blood culture was performed, and thereafter antimicrobial therapy was initiated with intravenous dicloxacillin 1 g three times a day. By ultrasound, a large abscess formation in the right breast was visualized, including a sinus tract located in the right inframammary region. Through the sinus, a pigtail catheter was inserted into the abscess, and there was a prompt discharge of thick pus. After drainage, the patient quickly improved; he was discharged on day 2 with oral flucloxacillin 1 g three times a day. Nevertheless, on day 5, the patient was rehospitalized as a result of increased purulent secretion from the sinus, and the antimicrobial therapy was changed to intravenous cefuroxime 1.5 g three times a day.

From the blood culture system (BacT/Alert 3D; BioMérieux, Marcy l’Etoile, France), the standard anaerobic bottle had a positive growth of short, nonmotile, Gram-positive coccoid rods after 5 days of incubation. The isolate were negative for catalase, urease and nitrate reduction but showed a positive fermentation of maltose. The coccoid rods was identified as *A. europaeus* by matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF MS; Vitek MS; BioMérieux) with 99.9% probability as well as partial sequencing of the 16S rRNA gene (ABI Prism Big Dye Sequencing kit) (GenBank accession KP752177). BLAST analysis showed 99% identity with the 16S rRNA gene sequence of *A. europaeus* strain CCUG 32789A (GenBank accession NR\_114971). The *A. europaeus* was susceptible to all antimicrobial agents tested according to the Clinical and Laboratory Standards Institute criteria by Etest (BioMérieux) with the following minimum inhibitory concentration results: penicillin G, 0.064 mg/L; piperacillin–tazobactam, 0.125 mg/L; ceftriaxone, 0.125 mg/L;

meropenem, 0.064 mg/L; clindamycin, 0.064 mg/L; erythromycin, 0.032 mg/L; and moxifloxacin, 0.250 mg/L.

Gram staining of the pus revealed a high number of short Gram-positive coccoid rods, but no sulphur granules were seen. Cultures grew *A. europaeus* and *Porphyromonas* species. The *Porphyromonas* species was susceptible to penicillin and metronidazole and was not further characterized. The *A. europaeus* from pus also was susceptible to all antimicrobial agents tested as above.

On day 8, the antimicrobial therapy was changed to oral penicillin 1.2 million units four times a day for 4 weeks. Finally, the patient was discharged on day 11 with a clean abscess cavity of 4 × 5 cm with no purulent secretion, and the breast remained painless. After 6 months, the patient had not been rehospitalized with recurrent infection in the breast.

To my knowledge, this is the first report of *A. europaeus* bacteraemia. The *A. europaeus* was isolated from both blood and the abscess cavity, and therefore it is fair to conclude that it was the main causal agent, whereas the *Porphyromonas* species was of minor importance. The patient had several comorbidities like diabetes, obesity, chronic obstructive pulmonary disease and schizophrenia. Previously he had experienced recurrent skin infections and cutaneous abscesses, and therefore it is plausible that *A. europaeus* reached the mammary tissue through skin lacerations with dissemination to the bloodstream. However, as a function of the increased usage of MALDI-TOF MS, the term “first report” may have a potential limitation because there may be an opportunity for previous cases of bacteraemia with *A. europaeus* encountered and reported with the simple identification as *Actinomyces* species.

The traditional treatment for actinomycosis is high-dose penicillin for prolonged period of 6 to 12 months. However, shorter treatment regimens have been successful [11]. To my knowledge, all cases of breast infection with *Actinomyces* species have been successfully treated with a combination of surgical drainage and antibiotic therapy. Minimum inhibitory concentrations for all antibiotics tested against were all very low, but other strains of *A. europaeus* have shown reduced susceptibility to piperacillin–tazobactam, ciprofloxacin, clindamycin and erythromycin [12]. The patient was treated with intravenous β-lactam antibiotics for 1 and 4 days, separated by 3 days of oral flucloxacillin. Finally, he was treated with 4 weeks of oral penicillin. Overall, this treatment seems short compared to the traditional recommendation for actinomycosis, but the patient did not have any relapse during the 6 months of follow-up.

This report confirms the pathogenic potential of *A. europaeus*, but future studies are needed to elucidate the clinical significance of this bacterium. Furthermore, future studies are needed to confirm that antibiotic treatment can be individualized and short-term regimens of only 4 weeks may be sufficient.

## Conflict of interest

None declared.

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