



# A rare bacterium isolated from a breast abscess on sebaceous cyst: *Gleimia europaea*

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Hatice Erdal<sup>1</sup>, Hale Koc<sup>1</sup>, Adem Sentürk<sup>2</sup>, Madina Jamolzoda<sup>3</sup>, Tayfur Demiray<sup>1\*</sup>, Mehmet Koroglu<sup>1</sup>

\*Sorumlu Yazar

<sup>1</sup>Sakarya University, Faculty of Medicine, Department of Medical Microbiology, Sakarya, Türkiye

<sup>2</sup>Sakarya Training and Research Hospital, Department of Surgical Oncology, Sakarya, Türkiye

<sup>3</sup>Sakarya University, Institute of Health Science, Department of Medical Microbiology, Sakarya, Türkiye

## ABSTRACT

Breast abscesses developing on pre-existing sebaceous cysts are exceptionally rare. Actinomyces species are infrequently isolated as primary pathogens in breast abscesses. As part of the human commensal flora, these bacteria can cause opportunistic chronic infections, often presenting with a granulomatous and slowly progressive clinical course. *Gleimia europaea* (formerly *Actinomyces europaeus*), a rare causative agent of actinomycosis, has been infrequently reported in clinical infections. In this case report, we discuss an unusual instance of a breast abscess caused by *G. europaea*, arising in the background of a pre-existing sebaceous cyst.

**Keywords:** *Actinomyces spp.*, *Breast Abscesses*, *Gleimia europaea*, *Sebaceous Cyst*

## ÖZET

Önceden var olan bir sebace kist üzerinde gelişen meme apsesi son derece nadirdir. Actinomyces türleri, meme apselerinde primer patojen olarak nadiren izole edilir. İnsan kommensal florasının bir parçası olan bu bakteriler, genellikle granülomatöz ve yavaş ilerleyen bir klinik seyirle ortaya çıkan fırsatçı kronik enfeksiyonlara neden olabilir. *Gleimia europaea* (eski adıyla *Actinomyces europaeus*), aktinomikozun nadir görülen etkenlerinden biri olup klinik enfeksiyonlarda oldukça seyrek bildirilmiştir. Bu olgu sunumunda, önceden var olan bir sebace kist zemininde gelişen *G. europaea* kaynaklı nadir bir meme apsesi vakası irdelenmektedir.

**Anahtar Kelimeler:** *Actinomyces spp.*, *Gleimia europaea*, *Meme absesi*, *Sebase kist*.



## INTRODUCTION

Actinomyces species are rarely isolated as primary pathogens in breast abscesses, with most reported cases occurring in premenopausal women (Silva et al 2011). These bacteria are part of the normal flora of the oropharynx, gastrointestinal tract, and genitourinary tract. More than 30 species have been identified as potential human pathogens, many of which are opportunistic and cause granulomatous infections typically follow a protracted and indolent clinical course (Wong, Turmezei and Weston, 2011). Actinomyces israelii is the most commonly isolated species, followed by A. turicensis, A. radingae, A. viscosus, A. neuii, and A. europaeus (Nielsen, 2015). Gleimia europaea, a rare causative agent of actinomycosis, has been infrequently reported in clinical infections. When it was first isolated as a causative infectious agent in humans back in 1997, it was named as Actinomyces europaeus (Funke et al., 1997). It was later classified as Gleimia by advanced genomic-based studies (Nouioui et al., 2018).

Breast abscesses are commonly caused by polymicrobial flora, with Staphylococcus aureus being the most frequent primary pathogen (Saboo and Bennett, 2018; Russell et al., 2020; Gollapalli et al., 2010). However, the development of a breast abscess on a pre-existing sebaceous cyst is highly uncommon. Risk factors for breast abscesses include smoking, diabetes mellitus, obesity, and nipple piercing.

In this case report, we present a rare instance of a breast abscess caused by G. europaea, which developed in the background of a pre-existing sebaceous cyst.

## CASE

A 61-year-old woman applied to the General Surgery Clinic with complaints of pain and swelling in her right breast that had been increasing for approximately 5 days. On physical examination, fluctuation, tenderness, and swelling were observed. Blood tests and radiological examinations were requested for the patient with a preliminary diagnosis of

non-lactating mastitis. When risk factors such as smoking, obesity, and diabetes were questioned, no risk or comorbidity was detected except for a body mass index of 32.6 kg/cm<sup>2</sup>. Blood count and biochemical parameters were within normal limits except for slightly elevated white blood cells (11.673/  $\mu$ L). But ultrasonographic evaluation of the right breast revealed a loculated cystic lesion, diagnosed as an abscess, possibly arising from an underlying sebaceous cyst. The patient was initially prescribed ciprofloxacin (2x500 mg oral); however, the treatment did not result in optimal clinical improvement. Subsequently, the abscess was surgically drained. Purulent fluid from the abscess and biopsy material from the suspected cyst were collected for microbiological and pathological evaluation.

For microbiological analysis, slides were prepared from the purulent sample for Gram-stained microscopic examination. The sample was inoculated onto 5% sheep blood agar, chocolate agar, and eosin methylene blue (EMB) agar under both aerobic and anaerobic conditions. Gram staining revealed numerous polymorphonuclear leukocytes and gram-positive filamentous coccobacilli. After 48 hours of incubation at 35–36°C under both aerobic and anaerobic conditions, smooth, transparent, gray-colored pure colonies were observed on the bacteriological plates.



**Fig 1.** Tiny, smooth, transparent gray colored colonies of *G. europaea*

Identification via mass spectrometry (bioMérieux, France) confirmed the bacterial species as *Gleimia europaea*. The European Committee on Antimicrobial Susceptibility Testing (EUCAST), which is widely followed in microbiology laboratories in our country, has not yet established specific antimicrobial breakpoints for *Gleimia* spp. Therefore, a gradient strip test (E-test, bioMérieux, France) was performed on Brucella agar containing 5% sheep blood under anaerobic incubation to determine susceptibility to various antibiotics, including penicillin, amoxicillin/clavulanate, piperacillin/tazobactam, clindamycin, erythromycin, and ciprofloxacin.

The isolate was found to be susceptible to amoxicillin/clavulanate and piperacillin/tazobactam but resistant to penicillin, clindamycin, erythromycin, and ciprofloxacin, based on comparative EUCAST criteria for other *Actinomyces* spp. and anaerobes (Wolff et al., 2022). Consequently, the patient's antibiotic regimen was adjusted to amoxicillin/clavulanate, leading to full recovery after 14 days of treatment. Histopathological analysis confirmed the diagnosis of a sebaceous cyst.

## DISCUSSION

Breast abscesses are a serious condition associated with significant morbidity, particularly in lactating women, often leading to breastfeeding interruption and its associated consequences. A breast abscess is defined as a localized infection characterized by a walled-off collection of pus, often occurring as a severe complication of mastitis (Pileri et al., 2022). Besides lactating women, non-lactating mastitis and abscesses are relatively uncommon. Squamous metaplasia of the lactiferous duct epithelium, ductal ectasia, obstruction or dilation of lactiferous ducts can be responsible for the pathogenesis of the breast abscesses (Saboo and Bennett, 2018).

Several risk factors have been identified, including advanced maternal age at delivery, primiparity, post-term gestation (>41 weeks), previous mastitis, cracked nipples,

breastfeeding difficulties during hospitalization, and being a working mother (Pileri et al. 2022; Cobo, Guillot and Navarro-Marí, 2020). Treatment options for breast abscesses include antibiotic therapy, ultrasound-guided needle aspiration, and incision and drainage, though there remains no definitive consensus on the optimal treatment approach. However, prolonged hospital stay, poor wound healing, scarring, and poor cosmetic results are the drawbacks of surgical drainage. Recently, with the development of radiological imaging methods and cosmetic concerns, less invasive alternative methods such as ultrasound-guided needle aspiration have been used instead of surgical incision (Kang and Kim, 2016).

Routine bacteriological cultures remain the gold standard for identifying the causative microorganism (Cobo, Guillot and Navarro-Marí, 2020). However, breast abscesses caused by *Actinomyces* species are rare (Bing et al., 2015). Even more uncommon is an abscess developing on the background of a sebaceous cyst, as in this case.

As part of the human commensal flora, *Actinomyces* species can cause opportunistic chronic infections, often presenting with a granulomatous and slowly progressive clinical course (Valour et al. 2014; Wong, Turmezeian and Weston, 2011). The most commonly observed actinomycoses occur in the cervicofacial, thoracic, abdominopelvic, and central nervous system regions (Smith et al. 2005). However, the pathological role of *Actinomyces* species is often overlooked, and their accurate identification remains a challenge. Correctly identifying these rare species is crucial for initiating appropriate antimicrobial therapy. Routine bacteriological culture and phenotypic identification methods frequently fail to distinguish *Actinomyces* species, particularly less common ones like *Gleimia europaea*. The bacterium's complex nutritional requirements, slow growth, and strict anaerobic conditions further complicate its identification (Lynch, Gregson, Church, 2016). When bacterial colonies that grow as small, indistinct colonies are detected in 5% sheep blood agar medium under aerobic and especially

anaerobic conditions, and when gram-positive rod-shaped bacteria are observed in Gram-stained smears, *Actinomyces* species should be considered (Figure). The introduction of MALDI-TOF mass spectrometry in many clinical microbiology laboratories has improved identification rates compared to conventional techniques, though molecular methods remain superior (Lynch, Gregson, Church, 2016).

Infections arising from sebaceous cysts are highly uncommon, making the isolation of a rare bacterium like *G. europaea* in such an infection particularly remarkable. The clinical manifestations of *Actinomyces* infections often resemble fungal infections, which can lead to misdiagnosis and inappropriate antimicrobial therapy (Allen, James and Jain, 2021). Previously considered a low-virulence anaerobe, *G. europaea* has now been recognized as an emerging pathogen capable of causing severe infections such as necrotizing fasciitis (Anthony, Douthit, Foster, 2023). Additionally, this species has developed resistance to multiple antibiotics, increasing the likelihood of treatment failure. Standardized antimicrobial susceptibility breakpoints for *G. europaea* have yet to be established. However, as the number of reported infections increases, the determination of susceptibility standards will become essential for guiding empirical treatment strategies.

For anaerobic bacteria, EUCAST recommends agar dilution as the gold standard for antimicrobial susceptibility testing. However, this method is time-consuming and impractical for routine clinical use. The gradient test strip method provides a faster, relatively reliable alternative, though discrepancies have been reported due to the slow and inconsistent growth of *Actinomyces* species, which can make inhibition zones difficult to interpret (Wolff et al., 2022).

Beta-lactam antibiotics combined with beta-lactamase inhibitors are generally considered first-line therapy for *Actinomyces* infections. In vitro susceptibility testing of *G. europaea* isolates against 12 antimicrobial agents demonstrated resistance to tetracycline, ciprofloxacin, clindamycin, erythromycin, and piperacillin/tazobactam.

Additionally, high minimum inhibitory concentrations (MICs) of linezolid and ciprofloxacin suggest a risk of treatment failure with these agents (Smith et al., 2005). Chronic, densely inflamed abscess tissue often impedes antibiotic penetration, necessitating surgical drainage as an adjunct to antimicrobial therapy.

As a conclusion, in cases of abscesses developing on the basis of sebaceous cysts, rare pathogens should be kept in mind and advanced diagnostic methods should be used. Accurate identification and antimicrobial susceptibility testing are essential for achieving successful treatment outcomes. Amoxicillin/clavulanate appeared to be the most appropriate antimicrobial choice due to its beta-lactamase inhibitory activity and broad-spectrum efficacy against infectious agent in this case. When necessary, surgical drainage alternatively, ultrasound guided needle drainage should be performed to enhance treatment success.

### Conflict of Interest

There are no any conflict of interest.

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