



Case Report

Anaerobic breast abscess caused by *Prevotella bivia* in non-lactating woman: A case report with diagnostic and clinical implications

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ABSTRACT

Background and Clinical Significance: *Prevotella bivia* is an anaerobic Gram-negative bacillus commonly associated with pelvic and genital tract infections. Its isolation from breast abscesses, particularly in nonpuerperal women, is extremely uncommon.

Case presentation: We report a unique case of a 40-year-old non-lactating woman presenting with a recurrent right breast abscess. The patient experienced three episodes over three years (2022–2025); only the fourth episode was microbiologically confirmed as being caused by *P. bivia*, identified using MALDI-TOF MS. Antimicrobial susceptibility testing revealed resistance to ampicillin and susceptibility to amoxicillin/clavulanic acid and other agents.

Conclusion: The case underlines the critical role of anaerobic cultures and advanced identification techniques in recurrent breast infections. Although microbiological confirmation was achieved only in the latest episode, the recurrent clinical picture suggests a difficult-to-culture microbial aetiology.

1. Introduction and clinical significance

Breast abscesses are most frequently encountered in lactating women, where *Staphylococcus aureus* is the predominant pathogen [1,2]. Non-puerperal abscesses are less frequent but are increasingly reported and often involve mixed aerobic-anaerobic microbiota [3–6]. Anaerobic bacteria, including *Prevotella* species, are rarely implicated, especially in patients without traditional risk factors such as smoking, diabetes, or immunosuppression [1,5–6]. We present a rare case of recurrent right breast abscess in a healthy, non-lactating woman with a mild smoking habit, in whom *P. bivia* was isolated after the fourth episode. To our knowledge, this is the second documented case in Europe involving this pathogen in such a clinical context [1]. This report describes a rare case of recurrent breast abscess with microbiological isolation of *P. bivia*, emphasising the importance of including anaerobic cultures and advanced identification methods in the diagnostic evaluation of recurrent breast abscesses. A brief review of the existing literature on *Prevotella* species in breast abscesses is also presented.

2. Case presentation

The patient is a 40-year-old woman with no history of pregnancy or breastfeeding. She is healthy with no known comorbidities or previous surgeries other than past incision and drainage for breast abscess. Additionally, she has a mild smoking habit, consuming 4 to 5 cigarettes per day. In 2022, she experienced her first episode of right breast pain and heaviness, which lasted approximately 20 days. Surgical drainage was performed, and empirical antibiotic therapy with ceftriaxone started later switching to amoxicillin/clavulanic acid. No microbiological samples were collected at that time. In 2023, the patient experienced a second episode, again located in the right breast and presenting with discomfort and swelling, though without purulent discharge. Imaging or microbiological analyses were not performed. In early 2024, she developed a third episode characterized by the spontaneous formation of a cutaneous fistula with drainage of purulent material. She was treated empirically again with ceftriaxone for 15 days, leading to only partial resolution of symptoms. In 2025, the patient experienced a new

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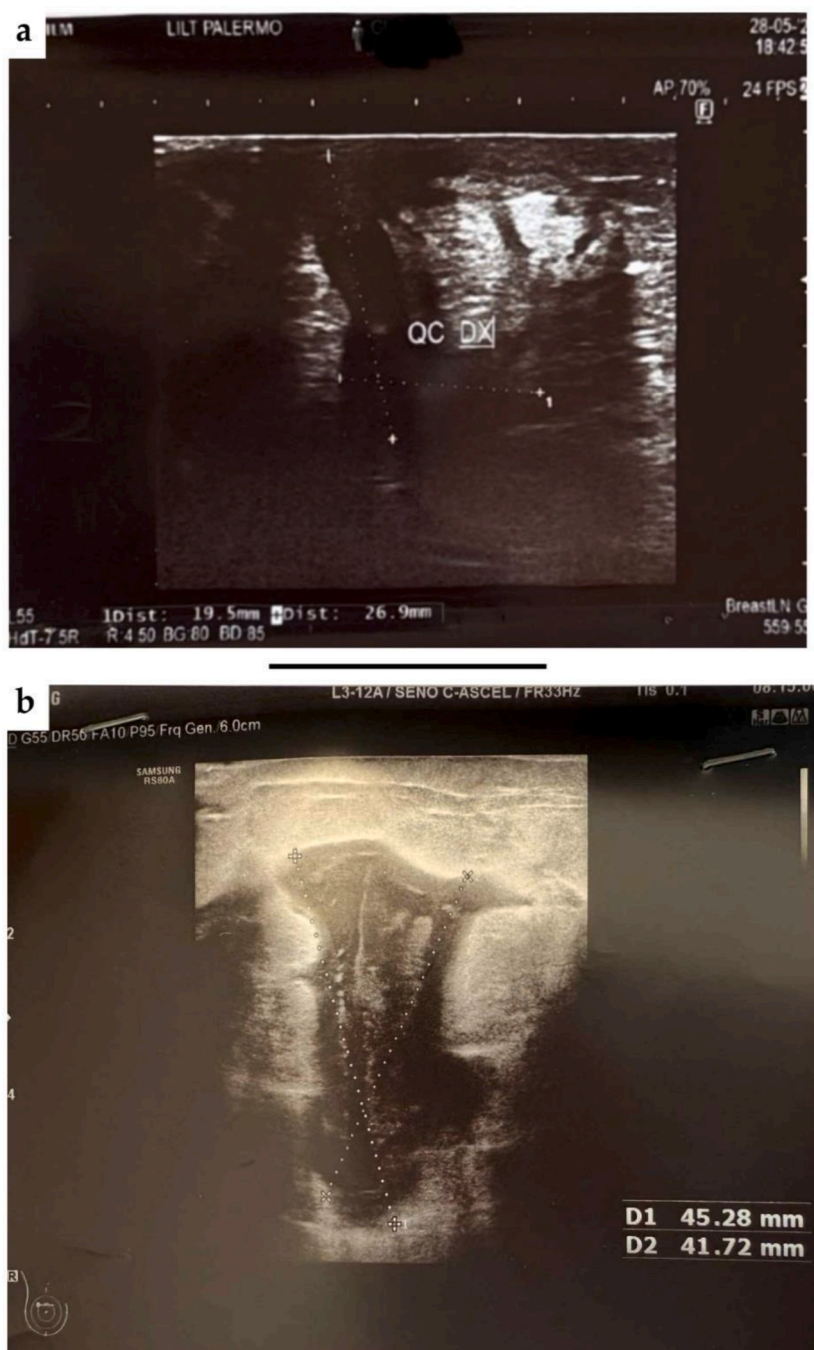


Fig. 1. Ultrasonographic evaluation of the right retro-areolar breast region.

(A) Initial scan showing a well-circumscribed, tubular hypoechoic lesion (20 × 27 mm) with both intra- and perilesional vascular signals, consistent with a mature abscess. (B) Follow-up scan after 8 days of ceftriaxone therapy revealed unexpected progression, with enlargement of the abscess cavity to 45.3 × 41.7 mm, highlighting treatment failure and the unusual pathogenic role of *Prevotella bivia*.

episode marked by increased swelling, pain, and spontaneous purulent discharge from the right breast. During this evaluation, an ultrasonographic examination using a high-frequency linear probe, along with colour Doppler vascular imaging, revealed a tubular hypoechoic lesion with well-defined margins in the retroareolar region of the right breast. The lesion measured approximately 19.5 × 26.9 mm and exhibited both intra- and perilesional vascular signals (Fig. 1a). These sonographic features were consistent with a mature breast abscess.

Empirical antibiotic therapy with intramuscular ceftriaxone was prescribed for 8 days; however, this treatment was ineffective, as the abscess enlarged to 41.72 × 45.28 mm (Fig. 1b). At this point, the breast

surgeon performed percutaneous drainage, and the aspirated purulent material was sent to the microbiology laboratory for culture and antimicrobial susceptibility testing.

3. Microbiological investigation

Pus from the breast abscess was collected both by spontaneous drainage and by ultrasound-guided fine-needle aspiration (FNA) and immediately transported under anaerobe-protective conditions. After incision and drainage, the lesion released a greenish, foul-smelling purulent exudate. The samples were promptly collected under anaerobic

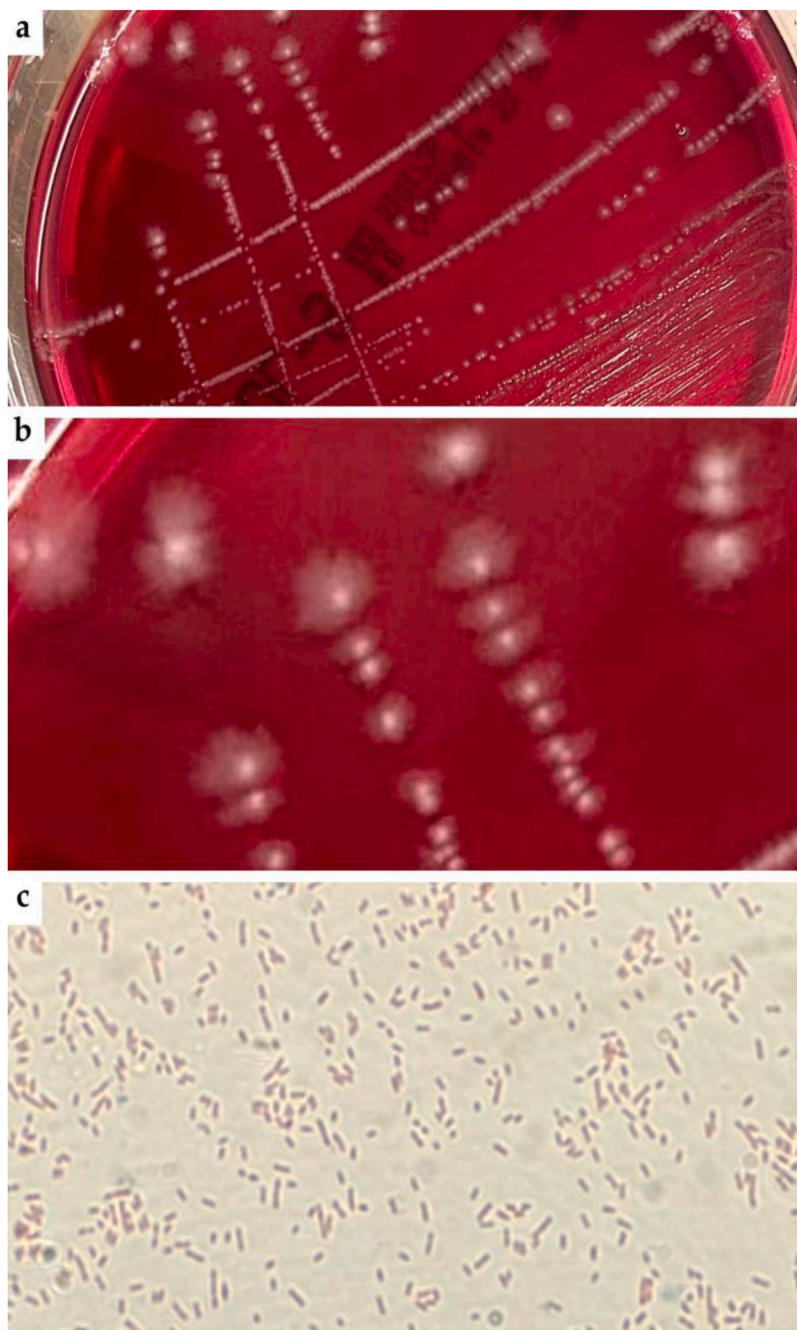


Fig. 2. Growth and microscopic features of *Prevotella bivia*. (A) Colonies on Columbia Agar after 48h anaerobic incubation. (B) Smooth, convex colonies. (C) Gram-negative coccobacilli.

conditions for microbiological analysis.

It was promptly delivered to the microbiology laboratory, where Gram staining revealed numerous polymorphonuclear leukocytes, Gram-negative rods, and no fungal elements. For aerobic culture, the specimen was inoculated onto BD Columbia Agar with 5% sheep blood, BD BBL™ Chocolate II Agar, and BD BBL™ MacConkey II Agar. For anaerobic culture, BD Columbia Agar with 5% sheep blood was used exclusively and incubated in anaerobic conditions generated with BD GasPak™ EZ sachets. BD BBL™ Sabouraud Dextrose Agar was employed for fungal isolation. All plates were incubated at 37°C: chocolate agar in a CO₂-enriched atmosphere, and the remaining plates under appropriate aerobic or anaerobic conditions and monitored for up to seven days.

A pus aspirate and an abscess aspirate yielded identical microbiological results. Monomicrobial, translucent colonies were observed

exclusively on blood agar under anaerobic conditions after 48 hours of incubation. No bacterial or fungal growth was detected under aerobic conditions. In both specimens, the isolate was identified as *Prevotella bivia* using MALDI-TOF MS (Bruker Biotyper, Bruker Daltonics, Germany), with a score of 2.35, indicating reliable species-level identification (MBT Compass Library v5.2, DB-5982).

Antimicrobial susceptibility testing was performed using the Kirby-Bauer disk diffusion method (BD BBL™ Sensi-Disc™) and interpreted according to the EUCAST 2025 clinical breakpoints. The isolate was resistant to ampicillin (2 µg), while remaining susceptible to amoxicillin/clavulanic acid (2 µg), clindamycin (2 µg), ertapenem (10 µg), imipenem (10 µg), and meropenem (10 µg).

Given the chronic and recurrent nature of the breast abscess, a differential diagnosis of granulomatous mastitis was also considered.

However, specific investigations for *Mycobacterium* spp. or *Corynebacterium kroppenstedtii* were not performed, as the clinical and radiological presentation was not suggestive of these conditions. In particular, the patient showed no evidence of chronic fistula formation, multilobular granulomatous involvement, or multiple recurrent abscesses with atypical features on imaging.

Fig. 2 illustrates the anaerobic growth of *P. bivia* on blood agar after 48 hours of incubation, the colony morphology at higher magnification, and the Gram-stained colony appearance at 40 × magnification, highlighting Gram-negative coccobacilli arranged singly or in short chains.

4. Treatment and follow-up

Based on microbiological findings and susceptibility profile, the infectious disease specialist prescribed a 14-day course of amoxicillin/clavulanic acid. A follow-up ultrasound performed at the end of antimicrobial treatment (day 14) demonstrated complete resolution of the abscess cavity, with restoration of normal breast parenchymal architecture and absence of residual fluid collections. No recurrent lesions were observed during subsequent clinical and radiological monitoring.

5. Discussion

Prevotella bivia is an obligate anaerobic Gram-negative rod primarily recognised as a commensal of the female genital tract and, to a lesser extent, of the gastrointestinal mucosa [1–6,8]. It has been implicated in gynaecological infections, pelvic inflammatory disease, bacterial vaginosis, and polymicrobial intra-abdominal infections [8–9]. However, its isolation from skin and soft tissue infections, particularly outside of the anogenital region, is considered very rare [1–6]. To our knowledge, this represents the third documented case worldwide of *P. bivia* isolated from a chronic breast abscess in a non-lactating, immunocompetent woman without significant comorbidities [1,5]. The occurrence of *P. bivia* in this anatomical site raises important questions regarding the pathogenesis of infection. Unlike other anaerobes occasionally encountered in breast abscesses—such as *Cutibacterium acnes*, *Finegoldia magna*, or *Peptoniphilus* spp.—*P. bivia* is not part of the normal skin microbiota [7,8]. Its detection therefore suggests opportunistic behaviour under specific predisposing conditions. Several mechanisms could explain its presence [9]: (i) translocation from mucosal surfaces [10], (ii) disruption of the skin barrier [11], (iii) transient colonisation following local microtrauma [12], or (iv) haematogenous dissemination from distant sites [13].

Although the predominant causative agent in breast abscesses is *Staphylococcus aureus*, followed by other pathogens such as *Streptococcus* spp, *Enterococcus* spp, and *Enterobacterales* [4,14], a variety of bacterial species have been observed in mixed co-infections in non-lactating patients [14,15].

Diagnostic routines in breast centers are usually designed to detect aerobic pathogens, most often collected with an eSwab [6,16]. However, when abscesses are involved, where anaerobic bacteria like *Prevotella* may play a role, sampling by puncture or aspiration provides more reliable results [6]. Conventional culture protocols rarely consider the longer incubation times and special growth conditions required for anaerobes, and the precise identification of individual species in cases of mixed anaerobic communities is generally not part of standard practice. Yet, these steps are essential for correctly recognizing pathogens such as *Prevotella* [6,15].

Currently, there is only one review that has specifically examined breast abscesses caused by bacteria of the *Prevotella* genus [6]. This review identified several species, including *P. buccae*, *P. timonensis*, *P. bivia*, *P. melaninogenica*, *P. bergensis*, *P. disiens*, and *P. intermedia* [6]. Most of these cases were found in mixed cultures alongside Gram-positive bacteria such as *S. epidermidis* and *S. lugdunensis*, as well as other bacteria from the genera *Actinomyces*, *Finegoldia*, *Peptoniphilus* [15] and *Actinotignum* [16]. This suggests that, in non-puerperal infections,

anaerobic bacteria are often isolated in coculture with other pathogens rather than in pure culture.

The isolation of *P. bivia* in our patient therefore represents a particularly notable finding, contributing to the limited literature on this entity.

Several host-related risk factors have been associated with anaerobic breast abscesses, including tobacco smoking, nipple piercing, diabetes mellitus, obesity, prior breast surgery, and chronic mastitis [1–6,15].

Notably, smoking has been strongly correlated with both non-puerperal and recurrent breast abscesses among women of reproductive age. This correlation may arise from mechanisms such as ductal epithelial injury, keratin plugging, and a compromised local immune response [17–18].

In the case under consideration, the patient reported a mild smoking habit, averaging 4 to 5 cigarettes per day. While she did not present with other significant comorbidities, this particular risk factor may have contributed to the recurrence of her infection. This observation aligns with existing evidence that indicates a relationship between tobacco exposure and increased susceptibility to anaerobic pathogens in non-lactating breast infections.

The therapeutic management of breast abscesses typically involves drainage combined with empiric antibiotic therapy [6]. In most guidelines, particularly for lactational abscesses, treatment is primarily directed against *Staphylococcus aureus*, the most frequent causative agent [14,15]. For this reason, ceftriaxone was initially prescribed to our patient. However, this empiric approach proved unsuccessful, as the abscess increased in size during therapy, suggesting the involvement of additional pathogens beyond the common Gram-positive bacteria.

The turning point in our case was the decision to perform percutaneous drainage with strict anaerobic sampling and culture, followed by susceptibility testing. This process enabled the identification of *Prevotella* spp., which was resistant to ampicillin but susceptible to amoxicillin-clavulanate. The tailored treatment with amoxicillin-clavulanate for 14 days, combined with drainage, led to complete clinical resolution. This outcome clearly demonstrates how integrating anaerobic culture into the diagnostic workflow can change the clinical trajectory, especially when standard empiric regimens fail.

It is also important to note that anaerobic bacteria are often associated with recurrent or chronic breast abscesses [6]. Given our patient's clinical course, which was characterised by a persistent and recurrent infection, our findings strongly suggest that an underlying, difficult-to-culture anaerobic aetiology may have played a central role. Recognising this possibility is crucial, as it reinforces the need for a targeted microbiological workup with an antibiogram, allowing for the selection of the most appropriate therapy and the prevention of future recurrences.

Furthermore, recent literature documents a growing resistance of several *Prevotella* species to penicillins, a phenomenon often linked to the production of β -lactamases [1,6,15]. For this reason, current recommendations support the use of regimens that combine a β -lactam antibiotic with a β -lactamase inhibitor, thereby restoring antimicrobial efficacy [6,15]. This therapeutic strategy, which was successfully applied in our case, led to complete clinical resolution.

Finally, the choice to prolong the course of treatment is consistent with evidence suggesting that extended therapy reduces the risk of recurrence compared to shorter regimens (6–7 days) [6,15]. The favourable outcome in our patient aligns with these observations, underscoring the importance of both appropriate antibiotic selection and an adequate treatment duration in the management of anaerobic breast abscesses.

In summary, our clinical case demonstrates that including specific sampling and culture methods for anaerobic bacteria is fundamental for a complete diagnosis and effective therapy, especially when conventional treatments fail.

Table 1
Summary of reported cases of breast abscesses caused by *Prevotella* spp.

Reference	Patient Profile	Gynecological History	Infection Characteristics	Identification Method	Treatment and Outcome
Boucher et al. [1]	39 y/o woman, non-lactating; no risk factors	Gravida 6, para 5; breastfeeding ended 1 year before abscess	Acute breast abscess	Anaerobic culture + MALDI-TOF	Amoxicillin-clavulanate + metronidazole for 10 days; resolution
Aboud et al. [5]	Woman with Zuska disease; obese and smoker	No data	Recurrent subareolar abscesses and fistulae	Anaerobic culture	Amoxicillin-clavulanate + metronidazole for 10 days; resolution
de Koning et al. [6]	21 patients; mean age 45.8 ± 12.6 years; varied profiles	History of abscesses (28.6%), breast surgery (14.3%)	Puerperal and non-puerperal mastitis	Anaerobic culture	Amoxicillin-clavulanate effective; recurrence prevention
Our case	40 y/o; healthy, no risk factors	Never pregnant, never breastfed; recurrent abscesses	Non-lactating abscess	Anaerobic culture + MALDI-TOF	Amoxicillin/clavulanic acid for 14 days

6. Literature review

Although *P. bivia* is a rare finding in breast infections, several reports in the literature support its pathogenic potential in similar contexts. Boucher et al. (2020) [1] described a breast abscess in a non-lactating woman due to *P. bivia*, successfully treated with amoxicillin-clavulanate and metronidazole. Unlike previously reported cases, our patient had never been pregnant or breastfed, thus excluding indirect predisposing factors for breast abscesses such as anatomical changes of the mammary gland, post-lactational ductal involution, and possible alterations of the mammary microbiota. This makes the occurrence of a chronic breast abscess caused by *P. bivia* even more unexpected and noteworthy. Aboud et al. (2022) [5] reported recurrent subareolar abscesses with fistula formation linked to *Prevotella* spp. in the setting of Zuska disease. In contrast, our patient had no clinical or radiological signs of Zuska's disease, which is typically characterised by chronic periductal mastitis and ductal ectasia, strongly associated with anaerobic infections and recurrent abscess formation. The absence of this predisposing condition, along with the lack of a history of pregnancy or breastfeeding, underscores the exceptional nature of our case. Additionally, a retrospective study of 21 patients with breast abscesses, with different clinical histories [6], found *Prevotella* species among the anaerobic isolates (in pure or in co-infection), with amoxicillin-clavulanate proving effective in resolving the infections and preventing recurrence. These findings, despite being limited in number, underscore the relevance of anaerobic organisms in breast infections, which have traditionally been considered the domain of aerobic bacteria. Our case adds to this growing body of evidence and reinforces the need for comprehensive microbiological evaluation in atypical or persistent breast abscesses, regardless of the patient's risk profile. Although clinical outcome data are still pending, the identification of *P. bivia* as the causative agent of a breast abscess in a healthy, nulligravid, non-lactating woman remains of scientific relevance. The case underscores the importance of anaerobic culture in breast abscesses and expands the spectrum of documented presentations of *Prevotella* infections.

7. Conclusion

This case report illustrates a rare presentation of a recurrent breast abscess in a healthy, non-lactating woman, with *P. bivia* identified only during the latest episode. It reinforces the necessity for comprehensive microbiological evaluation, including anaerobic cultures and advanced identification techniques, in persistent or recurrent infections to ensure accurate diagnosis and appropriate management Table 1.

CRedit authorship contribution statement

Chiara Massaro: Writing – original draft, Investigation, Conceptualization. **Cinzia Cala:** Resources. **Antonio Anastasia:** Investigation. **Simona Lupio:** Investigation. **Rosa Alduina:** Writing – review & editing. **Teresa Fasciana:** Writing – review & editing. **Roberta Virruso:** Supervision, Project administration. **Giovanni M. Giammanco:** Writing – review & editing.

Declaration of competing interest

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

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