

CASE REPORT

Nonpuerperal breast abscess due to *Prevotella bivia*

Astrid Boucher¹ | Delphine Quaranta¹ | Stéphane Emonet² | Jacques Serratrice³ | Matteo Coen^{3,4} 

¹Breast Center, Department of Gynaecology and Obstetrics, Geneva University Hospitals, Geneva, Switzerland

²Service of Infectious Diseases, Department of Medicine, Geneva University Hospitals, Geneva, Switzerland

³Service of Internal Medicine, Department of Medicine, Geneva University Hospitals, Geneva, Switzerland

⁴Unit of Development and Research in Medical Education (UDREM), Faculty of Medicine, University of Geneva, Geneva, Switzerland

Correspondence

Matteo Coen, Service of Internal Medicine, Department of Internal Medicine, Geneva University Hospitals, rue Gabrielle Perret-Gentil 4, 1211, Geneva 14, Switzerland.
Email: matteo.coen@hcuge.ch

Abstract

Contrary to puerperal abscess, nonpuerperal breast abscess is often caused by anaerobic bacteria; polymicrobial aerobic-anaerobic infections are also frequent. Empiric first-choice treatment with broad-spectrum antibiotics should be considered.

KEYWORDS

anaerobes, beta-lactams, cultures, *Staphylococcus aureus*

1 | BACKGROUND

Most breast abscesses occur during lactation period as a rare, but serious complication of mastitis. Their incidence ranges from 0.4% to 11% of lactating women.¹ They are due to milk stasis and bacterial proliferation. Bacteria of normal skin or oral flora are involved, especially *Staphylococcus aureus*.^{2,3}

Nonpuerperal (or nonlactational) breast abscesses are uncommon. Risk factors are trauma, obesity and smoking.³⁻⁶ Other underlying conditions include rheumatoid arthritis or diabetes mellitus.³ Among the evoked pathogenetic mechanisms are periductal mastitis, infection arises in a cyst or a dilated duct,⁷ follicular obstruction of the pilosebaceous unit, or rarely granulomatous lobular mastitis.⁸ An inflammatory carcinoma is not excluded.² Treatment regimens generally include antibiotics and drainage (either ultrasound-guided or surgical).

This article describes the first case of nonpuerperal breast abscess due to *Prevotella bivia* in a 39-year-old woman. Antibiotic treatment for nonpuerperal breast abscess is discussed.

2 | CASE REPORT

A 39-year-old woman with a history of IgA nephropathy (Berger's disease) and hypertension had consulted in the gynecological emergency unit complaining of a painful right breast mass that appeared 3 days earlier. She was gravida 6, para 5, and had breast-fed all her children until the last one (one year before the consultation). She had no family history of breast cancer and no personal previous breast problems; she did not have diabetes and had never smoked.

Astrid Boucher and Matteo Coen equally contributed to this work.

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The patient was afebrile. Physical examination revealed a 2-cm tender breast mass under the right nipple, without any sign of local inflammation. Laboratory tests showed a normal total white cell count and mild elevation of C-reactive protein (19 mg/dL). Breast ultrasound (US) revealed a 18 × 16 mm heterogeneous collection in the retro-areolar area of the right breast; its hypervascularization of surrounding tissues was suggestive of abscess. An US-guided aspiration yielded a purulent fluid that was sent for bacterial cultures. Empiric antibiotic therapy with oral flucloxacillin was started (500 mg/6 hours).

A follow-up US performed 2 days after initiation of treatment showed progression of the collection (30 × 26 mm); a second aspiration was performed. Both samples of abscess fluid were positive for Gram-negative bacilli (+++) and leukocytes (+++). Anaerobic culture was performed on CDC agar (bioMérieux SA) incubated at 37°C for 24–48 hours in an anaerobic atmosphere (80% N₂, 10% CO₂, 10% H₂) generated with the micro-incubator M23C (Scholzen Microbiology Systems AG). Aerobic culture remained negative whereas anaerobic yielded a pure isolate of *Prevotella bivia*, identified by MALDI-TOF/MS (Biotyper compass, Bruker Daltonics). At day 5, treatment was switched to oral amoxicillin-clavulanate (625 mg/8 hours) and metronidazole (500 mg/8 hours), but on day 7, the mass had already further enlarged in size (50 × 30 mm) and became extremely painful. A new aspiration of the abscess was performed, but its culture remained “sterile”. Antibiotics were continued unchanged for 10 days; the mass eventually resorbed. Antibiotic susceptibility testing was performed using the ATB ANA® test (bioMérieux SA). The isolate was resistant to clindamycin but susceptible to amoxicillin-clavulanate, piperacillin-tazobactam, imipenem, and metronidazole. At 1-month follow-up, the patient was asymptomatic. Breast US and mammography showed neither residual collection nor recurrence; moreover, no underlying suspicious lesion was detected.

3 | DISCUSSION

Most breast abscesses occur in young lactating women as a complication of mastitis or lactational breast inflammation. Milk stasis, leading to bacterial proliferation and tissue invasion, represents the pathogenetic key factor; bacteria of the resident skin flora, in particular *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus* spp., are the prevalent causative agents.^{1,2}

Nonpuerperal breast abscesses are less frequent and classically associated with diabetes mellitus and smoking.^{3–6} Other risk factors are trauma,⁶ obesity,^{5,6} or rheumatoid arthritis.⁹ Interestingly, our patient lacked the risk factors usually associated with the disease (viz. she was a nondiabetic, nonsmoker woman in her reproductive years).

Among the evoked pathogenetic mechanisms are fistulas of lactiferous ducts by obstruction from to keratin plugs due to squamous metaplasia of lactiferous ducts epithelium (periductal mastitis or Zuska disease),^{10–12} infection arises in a stagnant fluid of a cyst or a dilated duct,⁷ or follicular obstruction of the pilosebaceous unit.⁸ Idiopathic granulomatous mastitis is an uncommon benign chronic inflammatory disease, which can clinically and radiographically mimic abscess or breast cancer. It is worth noticing that breast infections in the nonlactating woman should spur evaluation for an inflammatory carcinoma.²

Diagnosis is often clinical: A circumscribed and fluctuant breast mass, sometimes associated with erythema and orange-peel (*peau d'orange*) skin, is the classic sign of a breast abscess; nonpuerperal abscesses are typically found under or around the areola, like in our patient, while puerperal abscesses are located more peripherally. Ultrasound is the preferred imaging method.

Abscesses smaller than 3 cm or puerperal abscesses are treated by needle aspiration, while larger abscesses normally require incision and catheter drainage.¹³ All patients are concurrently treated with empirical antibiotic therapy (vide infra, paragraph on microbiology and antibiotic treatment) and routinely reevaluated at day 2. If the evolution is favorable, patients are seen again at day 14. If not, breast ultrasound and eventually needle aspiration may be repeated. Moreover, antibiotic therapy can be adapted based on microbiological results.

Breast imaging follow-up at 3 months is offered to all patients in order to evaluate the mammary gland far from the infectious episode, and to rule out the presence of an underlying neoplasm.

Besides *Staphylococcus aureus*, cultures from nonpuerperal abscess often grow anaerobic bacteria like *Bacteroides* spp. and anaerobic Gram-positive cocci (recovery rate 29.5%–50%).^{4,13–16} Moreover, polymicrobial aerobic-anaerobic infections are frequent.¹⁷

Prevotella bivia (previously *Bacteroides bivius*) belongs to the genus *Prevotella*, comprising anaerobic Gram-negative bacteria typically isolated from the oral, upper respiratory, uro-genital, and digestive tract¹⁸; Recently, *Prevotella* has been shown to be part of the normal microbiota of the human breast tissue.¹⁹ A few cases of nonpuerperal breast abscess caused by species of the genus *Prevotella* (viz. *Prevotella melaninogenica*, formerly *Bacteroides melaninogenicus*,^{20–23} *Prevotella disiens*,²² *Prevotella intermedia*,²⁴ *Prevotella timonensis*²⁵ and *Prevotella buccae*²⁶) have been described; nonpuerperal breast abscess due to *Prevotella bivia* have been mentioned^{4,13} but have never been described until now.

Breast abscess, whether puerperal (lactational) or nonpuerperal, are often empirically treated with narrow-spectrum (eg, nafcillin, oxacillin)—as we did in the case report before having the results of the bacteriological culture—and

broader-spectrum beta-lactam antibiotics (eg, amoxicillin) active against Gram-positive skin pathogens (*viz.* *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Streptococcus* spp). However, this strategy does not take into account the microbiology of nonpuerperal breast abscess where anaerobes are among the primary pathogens (see before). Moreover, it is worth noticing that antibiotic resistance among anaerobes is increasing²⁷; *Prevotella* spp. make no exception and decreasing penicillin susceptibility has been reported over the last years.²⁸⁻³¹

In case of nonpuerperal breast abscess, treatment with antimicrobials that are also active against anaerobes (eg, amoxicillin-clavulanate) should be considered. If a treatment against Gram-positive organisms is undertaken, broadening antimicrobial therapy to include anaerobes (eg, by adding metronidazole) must be granted in case of unfavorable evolution.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTION

AB: conceived or designed the work, and collected the data. DQ: conceived or designed the work. SE: involved in critical revision of the article and approved the final version of the manuscript to be published. JS: involved in critical revision of the article and approved the final version of the manuscript to be published. MC: conceived or designed the work, collected the data, drafted the article, involved in critical revision of the article, and approved the final version of the manuscript to be published.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, Matteo Coen, upon reasonable request.

ORCID

Matteo Coen  <https://orcid.org/0000-0002-6156-1691>

REFERENCES

- Dener C, Inan A. Breast abscesses in lactating women. *World J Surg.* 2003;27:130.
- Givens ML, Luszczak M. Breast disorders: a review for emergency physicians. *J Emerg Med.* 2002;22:59-65.
- Rizzo M, Gabram S, Staley C, et al. Management of breast abscesses in nonlactating women. *Am Surg.* 2010;76:292-295.
- Saboo A, Bennett I. Trends in non-lactation breast abscesses in a tertiary hospital setting. *ANZ J Surg.* 2018;88:739-744.
- Bharat A, Gao F, Aft RL, Gillanders WE, Eberlein TJ, Margenthaler JA. Predictors of primary breast abscesses and recurrence. *World J Surg.* 2009;33:2582-2586.
- Gollapalli V, Liao J, Dudakovic A, Sugg SL, Scott-Conner CEH, Weigel RJ. Risk factors for development and recurrence of primary breast abscesses. *J Am Coll Surg.* 2010;211:41.
- Kilgore AR, Fleming R. Abscesses of the breast: recurring lesions in the areolar area. *Calif Med.* 1952;77:190-191.
- Berná-Serna JD, Berná-Mestre JD. Follicular occlusion due to hyperkeratosis: a new hypothesis on the pathogenesis of mammillary fistula. *Med Hypotheses.* 2010;75:553-554.
- Baran I, Aksu N, Aksoy A. Breast abscess due to Salmonella Typhimurium in a patient with rheumatoid arthritis: a case report. *BMC Infect Dis.* 2016;16:348.
- Zuska JJ, Crile G, Ayres WW. Fistulas of lactiferous ducts. *Am. J. Surg.* 1951;81:312-317.
- Patey DH, Thackray AC. Pathology and treatment of mammary duct fistula. *Lancet.* 1958;2:871-873.
- Habif DV, Perzin KH, Lipton R, et al. Subareolar abscess associated with squamous metaplasia of the lactiferous ducts. *Am J Surg.* 1970;119:523-526.
- Boakes E, Woods A, Johnson N, Kadoglou N. Breast infection: a review of diagnosis and management practices. *Eur J Breast Health.* 2018;14:136-143.
- Brook I. Microbiology of non-puerperal breast abscesses. *J Infect Dis.* 1988;157:377-379.
- Leach RD, Philips I, Eykyn SJ, et al. B. Anaerobic subareolar breast abscess. *Lancet.* 1979;6:35-37.
- Scholefield JH, Duncan JL, Rigers K. Review of a hospital experience of breast abscesses. *Br J Surg.* 1987;74:469-470.
- Casas CM, Pérez M, Alados JC, et al. Nonpuerperal breast infection. *Infect Dis Obstet Gynecol.* 1995;3:64-66.
- Edmiston CE, Walker AP, Krepel CJ, Gohr C. The nonpuerperal breast infection: aerobic and anaerobic microbial recovery from acute and chronic disease. *J Infect Dis.* 1990;162:695-699.
- Nagy E. Anaerobic infections: update on treatment considerations. *Drugs.* 2010;70:841-858.
- Urbaniak C, Cummins J, Brackstone M, et al. Microbiota of human breast tissue. *Appl Environ Microbiol.* 2014;10:3007-3014.
- Hale JE, Perinpanayagam RM, Smith G. Bacteroides: an unusual cause of breast abscess. *Lancet.* 1976;10(2):70-71.
- Ingham HR, Freeman R, Wilson RG. Anaerobic breast abscesses. *Lancet.* 1979;1:164-165.
- Giamarellou H, Soulis M, Antoniadou A, et al. Periareolar non-puerperal breast infection: treatment of 38 cases. *Clin Infect Dis.* 1994;18:73-76.
- Bengualid V, Singh V, Singh H, Berger J. Mycobacterium fortuitum and anaerobic breast abscess following nipple piercing: case presentation and review of the literature. *J Adolesc Health.* 2008;42:530-532.
- Brook I. Recovery of anaerobic bacteria from 3 patients with infection at a pierced body site. *Clin Infect Dis.* 2001;33:e12-e13.
- Glazunova OO, Launay T, Raoult D, Roux V. *Prevotella timonensis* sp. nov., isolated from a human breast abscess. *Int J Syst Evol Microbiol.* 2007;57:883-886.
- Cobo F, Rodríguez-Granger J, Sampedro A, Navarro-Marí JM. Infected breast cyst due to *Prevotella buccae* resistant to metronidazole. *Anaerobe.* 2017;48:177-178.
- Hecht DW. Prevalence of antibiotic resistance in anaerobic bacteria: worrisome developments. *Clin Infect Dis.* 2004;39:92-97.
- Shilnikova II, Dmitrieva NV. Evaluation of antibiotic susceptibility of Bacteroides, Prevotella and Fusobacterium species isolated from patients of the N. N. Blokhin Cancer Research Center, Moscow, Russia. *Anaerobe.* 2015;31:15-18.

30. Bancescu G, Didilescu A, Bancescu A, Bari M. Antibiotic susceptibility of 33 *Prevotella* strains isolated from Romanian patients with abscesses in head and neck spaces. *Anaerobe*. 2015;35:41-44.
31. Jeverica S, Kolenc U, Mueller-Premru M, Papst L. Evaluation of the routine antimicrobial susceptibility testing results of clinically significant anaerobic bacteria in a Slovenian tertiary-care hospital in 2015. *Anaerobe*. 2017;47:64-69.

How to cite this article: Boucher A, Quaranta D, Emonet S, Serratrice J, Coen M. Nonpuerperal breast abscess due to *Prevotella bivia*. *Clin Case Rep*. 2020;8:1399–1402. <https://doi.org/10.1002/ccr3.2824>