



Abscess/infections/periareolar mastitis

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Contributions: (I) Conception and design: CE Pesce; (II) Administrative support: None; (III) Provision of study materials or patients: CE Pesce; (IV) Collection and assembly of data: CE Pesce; (V) Data analysis and interpretation: Both authors; (VI) Manuscript writing: Both authors; (VII) Final approval of manuscript: Both authors.

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Abstract: Breast infections can be considered lactational or nonlactational, and the guiding principle in treating breast infection is to give antibiotics as early as possible to stop abscess formation. Lactational abscesses are usually caused by *Staphylococcus aureus*, including MRSA, often due to trauma during breastfeeding. A combination of repeated aspirations and oral antibiotics is usually effective at resolving abscess formation and is the current treatment of choice. Women should be encouraged to continue breastfeeding. Rarely, surgical drainage of lactational abscesses is required, and the development of milk fistula is uncommon. Nonlactational abscess are considered central (periareolar) or peripheral. Periareolar abscesses are common in young women and smokers, and up to half of patients experience recurrent episodes of infection. The underlying cause of recurrent infections is obstructed lactiferous ducts by keratin plugs, and therefore a subareolar abscess will continue to recur unless these ducts are excised by total duct excision. Often, a mammary duct fistula can form due to recurrent infection treated by incision and drainage (I&D), and treatment is again surgical consisting of either opening up the fistula tract and leaving it to granulate or excising the fistula and affected ducts and closing the wound primarily. Peripheral breast abscesses are less common, and most recently treatment has shifted from open surgical drainage to less invasive repeated aspirations using ultrasound-guidance. Advantages to percutaneous aspiration include shorter healing time and improved cosmetic outcomes. For women older than 35 years old and/or at risk for breast cancer, management of breast infections should not forgo recommended screening, and upon resolution of symptoms mammography is recommended.

Keywords: Breast infection; lactational abscess; periareolar abscess; mammary duct fistula; peripheral abscess

Received: 23 November 2020; Accepted: 16 March 2021; Published: 30 September 2021.

doi: 10.21037/abs-21-49

View this article at: <http://dx.doi.org/10.21037/abs-21-49>

Breast infections most commonly affect middle aged women can be considered lactational or nonlactational infections. Infection of the breast starts as a skin infection primarily or due to a lesion such as an epidermoid cyst or hidradenitis suppurativa, and the guiding principle in treating breast infection is to give antibiotics as early as possible to stop abscess formation. If the infection or inflammation fails to resolve after one course of antibiotics, then abscess formation or an underlying cancer should be suspected (1).

Breast infections in lactating women

Lactational mastitis develops in up to 20% of all breastfeeding patients. The most common causative organisms are *Staphylococcus aureus*, including MRSA, as well as *Streptococci* and *Staphylococcus epidermidis*. The first stage is often due to trauma such as a cracked nipple or nipple abrasion from breastfeeding that results in both swelling, which compresses the subareolar breast ducts, and bacterial overgrowth on the skin. Bacteria then gain access

to the breast through the traumatized area and infect the poorly draining ducts. Infection is most common in a first pregnancy during the first 6–12 weeks after delivery but is also seen during weaning. Patients presents with a painful, red, swollen breast plus fever, chills, malaise, and myalgias (2).

If untreated, mastitis can quickly progress to abscess formation and thus antimicrobial treatment is indicated as soon as possible. Antimicrobial therapy which covers the most common organisms deemed safe in breastfeeding mothers include dicloxacillin, cefadroxil, cephalexin, or clindamycin (3). Tetracycline and ciprofloxacin should not be used as they enter the breast milk. Lack of improvement may suggest MRSA infection and/or clindamycin resistance and therefore a change in antimicrobial therapy may be indicated using trimethoprim/sulfamethoxazole or doxycycline. Symptomatic management should include analgesia with NSAIDs, warm or cold compresses, and regular and complete drainage of the breast, using a breast pump if necessary.

A breast abscess develops as a complication of mastitis in 5–11% of cases (4). An abscess presents as a fluctuant mass with overlying skin erythema, and patients can have fever, tachycardia, and leukocytosis. Differentiating between mastitis and abscess can be challenging, and therefore when there is suspicion for abscess, ultrasound should be performed. Mastitis on ultrasound will appear as an ill-defined area of altered echotexture with increased echogenicity in the infiltrated and inflamed fat lobules. The diagnosis of abscess requires identification of a hypoechoic collection, often with a thick echogenic periphery (5). If the overlying skin is not thinned or necrotic, the abscess can be aspirated to dryness following injection of local anesthesia into the skin and the breast tissue and the cavity irrigated with local anesthetic to minimize pain and to dilute thick pus. The abscess should be irrigated until all the pus is evacuated and the fluid aspirated is clear. A combination of repeated aspiration and oral antibiotics is usually effective at resolving local abscess formation and is the current treatment of choice for most breast abscesses (1,6). Aspiration should be repeated every 2 to 3 days until no further pus is obtained, and antibiotics continued. Aspirates should be sent for culture and sensitivity testing with directed antibiotic therapy (5).

If the overlying skin is thinned and pus is visible then after application of the local anesthetic a small incision is made and the pus is drained. The cavity is then irrigated with local anesthetic solution, and irrigation is continued

every few days until the incision site closes. If the skin overlying the abscess is clearly necrotic, the necrotic skin can be excised to allow for further drainage (6). Women should be encouraged to continue breastfeeding in order to promote drainage of the breast and prevent ductal engorgement. Women should be reassured the infant is not harmed by ingesting the milk (2).

Few lactational abscesses require surgical drainage, and placing drains and wound packing are unnecessary. Women who have incision and drainage (I&D) of their breast abscesses performed under general anesthesia are more likely to stop breastfeeding compared with those treated by aspiration and antibiotic therapy. In one study comparing ultrasound-guided aspiration *vs.* surgical drainage of 105 consecutive breast abscesses, breastfeeding was continued for 91% of women treated with percutaneous drainage *vs.* 29% of surgical drainage patients due to the mother being separated from the baby and/or recommendations from their surgeon (7).

In general, open surgical drainage of lactational abscesses should be reserved as a last resort due to the possibility of milk fistula development. A milk fistula occurs when there is an abnormal connection between the skin surface and breast ducts resulting in spontaneous drainage of milk. Central abscesses seem to be at higher risk due to distribution of the ducts in the breast compared to more peripheral lesions. Most surgeons recommend cessation of breastfeeding to decrease milk formation and therefore flow through the tract, and most fistulae will close over time spontaneously. If any intervention is recommended for a lactating woman, the potential albeit low risk of milk fistula should be discussed prior to the planned procedure (8). While the risk of milk fistula formation is a feared complication, the overall incidence is not well reported, and given the small number of studies and case reports in the literature, it appears the overall rate of milk fistula formation is low.

Nonlactational infection

Nonlactational infections are categorized by their location in the breast: centrally (periareolar) or those that affect the peripheral breast tissue.

Central (periareolar) abscesses

Periareolar infections are most common among young women who smoke cigarettes. The mean age is 32 years old. The underlying pathologic process is periductal mastitis

(6,9). It can present as periareolar inflammation, with or without a mass, a periareolar abscess, or a mammary duct fistula. A patient presenting with periareolar inflammation without a mass should be treated with antibiotics that are active against both the aerobic and anaerobic bacteria seen in these lesions, such as amoxicillin/clavulanate. If the infection does not resolve after one course of antibiotics, ultrasound should be performed to determine whether a localized abscess is present. A patient who presents with or develops an abscess should be treated with oral antibiotics and recurrent aspiration or I&D.

Periareolar infections are the most difficult breast infections to treat, and up to half of patients experience recurrent episodes of infection. Due to the important role of smoking in this disease, it is important to encourage smoking cessation. The underlying cause of recurrent infections is obstructed lactiferous ducts by keratin plugs, and therefore a subareolar abscess will continue to recur unless these ducts are excised (10). The only effective long-term treatment for these women is removal of all the affected ducts by total duct excision. The operation is usually curative.

A mammary duct fistula is a communication between the periareolar skin and a subareolar breast duct (2). Fistulae occur most commonly after I&D of nonlactational breast abscesses, and patients usually have preceding episodes of recurrent abscess formation and report purulent discharge through the fistula opening. Occasionally, more than one external opening is present usually at the areolar margin, either from a single affected duct or from multiple diseased ducts. Treatment is surgical, and consists either of opening up the fistula tract and leaving it to granulate (11) or excising the fistula and affected ducts, a total duct excision, and closing the wound primarily. The incision to excise the fistula can be radial directly over the fistula tract or circumareolar incorporating the fistula opening. The latter incision produces a superior cosmetic outcome.

Peripheral abscesses

Peripheral abscesses are less common than periareolar abscesses. Risk factors include medical co-morbidities including diabetes, obesity, and rheumatoid arthritis as well as black race and tobacco use (12). The most causative agent is *Staphylococcus aureus* however mixed flora can also be seen. A retrospective case series of 44 women with breast abscesses from 2013–2015 showed that the most common organism in breast abscesses included *Staphylococcus aureus*,

of which 58% were MRSA. The remaining organisms included coagulase-negative *Staphylococcus*, Diphtheroids, *Pseudomonas aeruginosa*, and *Proteus* (13).

Treatment requires aspiration of the abscess, sending fluid to microbiology for aerobic and anaerobic culture, and tailoring antimicrobial therapy based on culture and susceptibility results. Surgical drainage most definitively leads to resolution of symptoms but is not without its disadvantages, and since the 1990s treatment has shifted to less invasive options. In a randomized trial of 45 patients comparing I&D to percutaneous aspiration, surgical drainage was associated with poor cosmesis in 70% of patients and prolonged healing time (45 *vs.* 20 days) (14,15). Other studies (7,14,16–20) have also shown that aspiration allows for complete resolution (54–100%) without operative intervention (Table 1). For these reasons, in 2018 the American Society of Breast Surgeons (ASBrS) Patient Safety and Quality Committee (PSQC) as part of the American Board of Internal Medicine (ABIM) Choosing Wisely® campaign endorsed the guideline, “Don’t routinely operate for a breast abscess without an initial attempt to percutaneously aspirate” (21). Patients most likely to fail attempts at aspiration and ultimately require surgical intervention include those with large abscesses (5 cm), multiple loculations, late presentation of symptoms (>6 days), and large volumes of pus aspirated (4,22).

Patients most likely to have recurrent breast abscesses include smokers as well as older patients. A study looking at patients with recurrent peripheral breast abscesses showed that patients had a higher incidence of infections with mixed bacteria, anaerobes, and *Proteus* and a lower incidence of *Staphylococcus*, indicating a need for broader antibiotic coverage to be considered in this high risk population. Antimicrobial therapy in this situation would include amoxicillin/clavulanate ± ciprofloxacin in order to cover possible gram negatives and anaerobes (23).

For women older than 35 years old and/or at risk for breast cancer, management of breast infections should not forgo recommended screening, and patients require appropriate breast imaging to evaluate for abnormalities after resolution of their abscess. When patients’ symptoms have improved to allow for compression of the breast, mammography is recommended. Any suspicious finding should be followed with a tissue sample from the abscess cavity and be sent for cytology. Failure to perform this biopsy may lead to a missed oncologic diagnosis and a delay in treatment.

Table 1 Literature review of abscesses treated with percutaneous intervention

Study [year]	Study design	No. of abscesses	Number of procedures, drainage technique	Mean size of abscess (cm or mL)	N1 = no. of punctures; N2 = days/time drainage with indwelling catheter	Cure rate with percutaneous treatment (%)
Ulitzasch [2004]	Retrospective case series	56	23 NA; 33 PC	NA: 2.2 cm; PC: 5.2 cm	–; N2=1.8	98
Christensen [2005]	Retrospective case series	89	23 NA; 66 PC	3.5 cm	N1=1; N2=4	98
Eryilmaz [2005]	Prospective RCT, NA vs. surgery	45	22 NA; 23 surgery	44 mL	N1=3.5; –	59
Suthar [2012]	Prospective RCT, NA vs. surgery	70	35 NA; 35 surgery	4.97 cm	N1=2; –	83
Kang [2016]	Retrospective case series	44	44 NA	4.2 cm	N1=1.4; –	88
Falco [2016]	Retrospective case series	34	34 PC	5.4 cm	N1=11.5; –	100
Colin [2019]	Retrospective case series	105	97 NA; 14 PC	4.5 cm	N1=2.6; –	96

Adapted from: reference (7). RCT, randomized controlled trial; NA, needle aspiration; PC, pigtail catheter.

Clinical pearls

- ❖ Breast infections are considered lactational *vs.* nonlactational. Of nonlactational infections, infections are grouped into periareolar/central or peripheral.
- ❖ The guiding principle in treating breast infections is to give antibiotics as early as possible to prevent abscess formation.
- ❖ An attempt at percutaneous aspiration of a breast abscess should proceed surgical intervention.
- ❖ The likelihood for development of a milk fistula due to intervention in a breastfeeding patient is likely uncommon but overall largely unknown.
- ❖ Recurrent periareolar infections are the most difficult breast infections to treat, and the only effective long-term treatment is surgery with duct excision.
- ❖ For women older than 35 years old and/or at risk for breast cancer, mammography is recommended upon resolution of infection.

Clinical scenarios

(I) A 35yo G4P3 female delivered 6 weeks ago. She is currently breastfeeding and states she developed fevers/chills and then more recently breast redness ×1 week. She

has been taking clindamycin ×4 days. Now she states she has developed an area of more significant swelling consistent with an abscess. Percutaneous aspiration of the abscess is performed under ultrasound guidance with removal of approximately 100 cc of purulent, foul smelling drainage. Cultures grow out MRSA. What is the best course of action?

Discussion: Due to cultures growing MRSA, it is likely resistant to clindamycin. At this point aspirates should be sent for sensitivity testing and antimicrobial therapy should be changed empirically to trimethoprim/sulfamethoxazole or doxycycline, in addition to the need for possible repeated aspirations. Additional antimicrobial options include vancomycin IV and linezolid IV or po. Approximately 30% of all MRSA infections are known to be resistant to clindamycin (24).

(II) A 35yo female presents with her third episode of periareolar mastitis. Previous episodes have responded well with amoxicillin/clavulanate, and her second bout required I&D in the clinic of a subareolar abscess. Currently she states she has more pain with this episode, and ultrasound again confirms a periareolar abscess. She has been referred to your smoking cessation clinic in the past however is still currently smoking. How would you manage this patient?

Discussion: Recurrent subareolar abscess is often mismanaged with temporary measures including repeated courses of antibiotics and I&Ds however not correcting the primary inciting process. This leads to nipple and breast distortion with multiple scars and without resolution. Successful definitive treatment requires excision of the central cleft of the nipple including the obstructed ducts. In a retrospective review of patients treated surgically with this condition from 1993–2005, a cure rate of 91% was achieved as well as an overall 95% satisfaction rate in the cosmetic outcome of the nipple (10).

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Annals of Breast Surgery* for the series “A Practical Guide to Management of Benign Breast Disease”. The article has undergone external peer review.

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/abs-21-49>). The series “A Practical Guide to Management of Benign Breast Disease” was commissioned by the editorial office without any funding or sponsorship. KY served as the unpaid Guest Editor of this series and serves as an unpaid editorial board member of *Annals of Breast Surgery* from Oct 2019 to Sept 2021. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/abs-21-49

Cite this article as: Pesce CE, Yao K. Abscess/infections/ periareolar mastitis. *Ann Breast Surg* 2021;5:25.