

ORIGINAL ARTICLE

Comparison of Aspiration Versus Incision and Drainage in the Treatment of Breast Abscess, in terms of Recurrence: An Analytical Cross-Sectional Study

Maha Tariq,¹ Naveed Ahmed,¹ Iftikhar Ahmed,¹ Zainab Qutbuddin,² Rafia Wakil,³ Sidra Batool³

1. Department of General Surgery, Combined Military Hospital, Karachi, Pakistan.

2. Department of General Surgery, Burhani Hospital, Karachi, Pakistan.

3. Department of General Surgery, Jinnah Post Graduate Medical Center, Karachi, Pakistan.

Correspondence to: Dr. Maha Tariq, Email: tariqmaha600@gmail.com, ORCID: [0009-0007-6477-8363](https://orcid.org/0009-0007-6477-8363)

ABSTRACT

Objective: To assess and compare the treatment outcomes of breast abscess using two different methods aspiration versus incision and drainage.

Methods: This analytical cross-sectional study was conducted at Combined Military Hospital, Karachi, Pakistan, from October 2023 to March 2024. Females aged 18 to 50 years with ultrasound-diagnosed acute breast abscesses up to 5 cm, presenting with signs and symptoms such as breast pain, localized swelling, erythema, tenderness, and fever, were included. Patients were randomly assigned to receive needle aspiration or incision and drainage. Outcomes were assessed based on recurrence and scarring. Recurrence was defined as the reappearance of similar signs and symptoms after complete resolution. Patients were monitored for one-month post-treatment.

Results: Of total 124 patients, the mean age was 38.10 ± 5.21 years. The mean duration of procedure was 26.33 ± 10.58 minutes. A significantly longer mean duration of the procedure was observed in the aspiration group as compared to the incision and drainage group i.e., 36.61 ± 2.82 minutes vs. 16.04 ± 1.67 minutes (p -value < 0.001). A significant association found between the two groups in terms of parity (p -value < 0.001) and site of abscess (p -value 0.001). Treatment outcome showed higher rate of recurrence and scarring in the aspiration group compared to the incision and drainage group i.e., 8 (66.7%) vs. 4 (33.3%) and 5 (100.0%) vs. 0 (0.0%). However, a significant association of scar (p -value 0.022) was observed between groups.

Conclusion: Incision and drainage proved more effective than aspiration for treating breast abscesses, with lower rates of recurrence and scarring.

Keywords: Breast Abscess, Incision and Drainage, Needle Aspiration, Recurrence.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Breast abscess is a significant contributor to morbidity among women, posing a persistent health challenge despite advancements in maternal hygiene, nutrition, living standards, and the early use of antibiotics.¹ This condition remains particularly prevalent in developing countries, where socioeconomic disparities, limited access to healthcare, and delayed diagnosis further exacerbate the problem.²

Managing breast abscesses is a complex and multifaceted clinical problem that requires careful consideration of various factors.³ While, incision and drainage have traditionally been used as treatment methods, these approaches are not without drawbacks. The necessity for general anesthesia introduces potential risks,

particularly for patients with underlying health conditions.^{1,4,5} Recovery can be prolonged, often requiring consistent wound care and dressing changes, which may impact a patient's quality of life. For breastfeeding mothers, these procedures can disrupt lactation and the critical bonding period with their infants. Additionally, concerns regarding cosmetic outcomes, including scarring and altered breast appearance, may further complicate the overall treatment experience.^{1,4,5} Repeated needle aspirations, with or without the assistance of ultrasound guidance, represent an alternative approach to treating breast abscesses. This method involves the careful and repeated removal of purulent material from the abscess cavity using a fine needle, which may help reduce the size of abscess and alleviate symptoms.⁶⁻⁸

Ultrasound guidance can enhance the precision of the procedure by providing real time imaging, allowing clinicians to more accurately target the abscess and minimize the risk of damaging surrounding tissue.^{9,10}

Breast abscesses are a prevalent issue among lactating women in Pakistan, particularly affecting those over 30 years of age, with higher parity, and within the first two weeks postpartum. Addressing these risk factors through better postpartum care and hygiene practices could help reduce the incidence of this painful condition.¹⁰

There is a need to evaluate the treatment of breast abscess in our population to see the efficacy and patient's satisfaction. The primary goal of managing breast abscesses is to achieve prompt and efficient resolution. However, there is currently limited data available to compare the effectiveness of different treatment options. The study aims to evaluate the effectiveness of ultrasound-guided needle aspiration as a treatment option for breast abscesses. By comparing the outcomes of needle aspiration and incision and drainage, the study seeks to provide information that can improve patient care and establish a more effective and accessible treatment approach for breast abscesses.

METHODS

This analytical cross-sectional study was conducted at Combined Military Hospital (CMH), Malir, Karachi, Pakistan from October 2023 to March 2024. The study received ethical approval from Ethical Review Committee of CMH Malir, Karachi, Pakistan (Reference Number: 101/2023/ERC). All eligible study participants provided signed informed consent after receiving a detailed explanation of the study's benefits and potential drawbacks.

OpenEpi software was used for the estimation of sample size, taking confidence interval 95%, power of the test 80%, ratio (unexposed to exposed) as 1, success rate of needle aspiration 97.1% and incision and drainage 82.9%.⁷ The sample size was estimated to be 134, i.e., 67 in each group. However, only 124 participants (62 in each group) were enrolled due to unforeseen patient dropout, including individuals lost to follow-up, declining consent after initial enrollment, or due to incomplete data.

Female patients aged 18 to 50 years with acute breast abscesses, confirmed by ultrasound and measuring up to 5 cm in diameter, were included in the study. The study excluded patients who were immunocompromised, those with recurrent or chronic breast abscesses,

those with necrotic skin overlying the abscess, and those who declined to provide consent for participation. Patients were randomly assigned to receive either needle aspiration or incision and drainage treatment using computer-generated numbers. The allocation was done in a way that ensured that each patient had an equal chance of being assigned to either group. To do this, a random numbers list was created using Microsoft Excel, which is a commonly used spreadsheet software. The random numbers generated by Excel were then used to allocate patients to either the needle aspiration or incision and drainage group.

The patients who were allocated to the incision and drainage group underwent surgery under general anesthesia in the operating room. The incision and drainage group were treated by first making a skin depth incision at the location of the maximum fluctuation of the abscess. The incision was made following the natural skin lines to minimize scarring. A sinus forceps was then used to access the abscess cavity. A sterile pus swab was used to collect a sample of the pus which was then sent for culture and sensitivity testing. Once the sample was collected, the pus was carefully evacuated from the abscess cavity. If there were any loculations (pockets of pus), they were digitally broken down to ensure complete evacuation. Finally, the wound was packed with sterile gauze to keep the wound open and allow for further drainage of any remaining pus. This approach helps to ensure that the abscess is completely drained and minimizes the risk of recurrence.

After the procedure, patients were administered analgesics and antibiotics, including a one-time dose of Diclofenac 75 mg intramuscularly and 50 mg orally for 3 days, as well as 10 days of Augmentin 1 gm twice a day. The patient was discharged with instructions for daily wound dressing until the wound was fully healed.

Patients in the needle aspiration group were treated as outpatients in the Radiology Ultrasound room. The area surrounding the abscess was sterilized, and a small amount of skin next to the abscess was numbed with 1% Lignocaine through a 23 G needle. Under ultrasound guidance, aspiration was performed using a 16 G needle and a 20 mL syringe. After the first pus was sent for culture and sensitivity, the aspiration procedure continued until there was no significant residual pus. After the procedure, all patients were discharged with a standard prescription of antibiotics (Amoxicillin-Clavulanate, 1 g orally twice daily for 5 days) and analgesics (Diclofenac Sodium, 50 mg orally twice daily for 3 days), ensuring adequate coverage for infection and pain management.

The principal investigator conducted patient follow-ups

at the outpatient department on days 7, 14, and 30 post-procedure. During each visit, the patient's clinical status was evaluated by assessing symptoms and signs, including breast pain, localized swelling, erythema, tenderness, and fever, to monitor the resolution of the abscess. The treatment outcome was determined by the presence or absence of a recurrent abscess.

Patients from both groups were monitored for a duration of one month after complete resolution. If any patient exhibited similar symptoms and signs following their previous full recovery, it was categorized as a recurrence.

Data entry and analysis were performed using the Statistical Package for Social Sciences (SPSS) version 20.0. The mean and standard deviation were calculated for quantitative variables, including age, size of breast abscess, time of presentation from onset of symptoms, and duration of procedure. Frequencies and percentages were calculated for qualitative variables such as parity, lactation, side of breast affected, site of breast abscess, shape, location, recurrence, and scar. To examine inferential statistics, Chi-square/Fisher-Exact test and independent t-test were used to compare baseline, clinical characteristics and treatment outcome of the patients between groups. A p-value of ≤ 0.05 considered statistically significant.

RESULTS

Of total 124 patients, the mean age was 38.10 ± 5.21 years. There were 58 (46.8%) patients with ≤ 38 years and 66 (53.2%) with >38 years of age. The mean onset of symptoms was 7.17 ± 0.97 days. The majority of the patients had 79 (63.7%) days of onset of symptoms. The mean duration of procedure was 26.33 ± 10.58 minutes. There were 63 (50.8%) patients with ≤ 26 days of duration of procedure and 61 (49.2%) with >26 days of duration of procedure. Nulliparity was observed in 21 (16.9%), primiparity in 66 (53.3%), and multiparity in 37 (29.8%) patients. The average size of the breast abscess

was 3.16 ± 0.72 cm. Majority of the patients had a breast abscess ≤ 3 cm of size i.e., 64 (51.6%). Most of the patients were not lactating 67 (54.0%), had irregular shape of breast 59 (47.6%), and their abscess located periphery 80 (64.5%). The right side of the breast was affected in 50 (40.3%) patients, while 74 (59.7%) had the abscess on the left breast. The most common site of abscess was the upper outer quadrant observed in 52 (41.9%) patients.

Patients were equally divided into two groups. No significant differences were found in age (p-value 0.744), size of the breast abscess (p-value 0.214), and onset of symptoms (p-value 0.067) between the two groups. However, a significantly longer mean duration of the procedure was observed in the aspiration group as compared to the incision and drainage group i.e., 36.61 ± 2.82 minutes vs. 16.04 ± 1.67 minutes (p-value < 0.001) (Table 1). The study found a significant association between the two groups in terms of parity (p-value < 0.001) and site of abscess (p-value 0.001) (Table 2).

Treatment outcome showed higher rate of recurrence and scarring in the aspiration group compared to the incision and drainage group i.e., 8 (66.7%) vs. 4 (33.3%) and 5 (100.0%) vs. 0 (0.0%). However, a significant association of scar (p-value 0.022) was observed between groups (Table 3).

DISCUSSION

Breast abscess is a painful and distressing condition that requires prompt and effective treatment.¹¹ The two main treatment options for breast abscess were aspiration and incision and drainage. Aspiration involved using a needle to remove the pus from the abscess, while incision and drainage involved making an incision to drain the abscess.⁵ The selection of treatment depends on several factors, including the size, location, and severity of the abscess, as well as the

Table 1: Between group mean comparison of baseline and clinical characteristics of the patients (n=124)

Variables	Total Mean \pm SD	Aspiration (n= 62) Mean \pm SD	Incision and Drainage (n= 62) Mean \pm SD	p-value	95% CI of the Difference
Age (years)	38.10 \pm 5.21	37.95 \pm 5.92	38.25 \pm 4.41	0.744	-2.16 to 1.55
Onset of Symptoms (days)	7.17 \pm 0.97	7.02 \pm 1.15	7.34 \pm 0.75	0.067	-0.6 to 0.2
Duration of Procedure (minutes)	26.33 \pm 10.58	36.61 \pm 2.82	16.04 \pm 1.67	$< 0.001^*$	19.74 to 21.39
Size of Breast Abscess (cm)	3.16 \pm 0.72	3.08 \pm 0.69	3.25 \pm 0.74	0.214	-0.42 to 0.09

*p-value ≤ 0.05 (Independent t-test)

Table 2: Between group association of baseline and clinical characteristics of the patients (n=124)

Variables	Total	Aspiration (n= 62)	Incision and Drainage (n= 62)	p-value
Age (years)				
≤38	58	27 (46.6)	31 (53.4)	0.472
>38	66	35 (53.0)	31 (47.0)	
Onset of Symptoms (days)				
≤7	79	40 (50.6)	39 (49.4)	0.852
>7	45	22 (48.9)	23 (51.1)	
Size of Breast Abscess (cm)				
≤3	64	33 (51.6)	31 (48.4)	0.719
>3	60	29 (48.3)	31 (51.7)	
Parity				
Nulliparous	21	3 (14.3)	18 (85.7)	<0.001*
Primiparous	66	32 (48.5)	34 (51.5)	
Multiparous	37	27 (73.0)	10 (27.0)	
Duration of Procedure (minutes)				
≤26	63	1 (1.6)	62 (98.4)	<0.001*
>26	61	61 (100.0)	0 (0.0)	
Lactation				
Yes	57	28 (49.1)	29 (50.9)	0.857
No	67	34 (50.7)	33 (49.3)	
Breast Affected				
Right	50	22 (44.0)	28 (56.0)	0.272
Left	74	40 (54.1)	34 (45.9)	
Site of Abscess				
UIQ	32	22 (68.8)	10 (31.2)	0.001*
UOQ	52	28 (53.8)	24 (46.2)	
LIQ	30	6 (20.0)	24 (80.0)	
LOQ	10	6 (60.0)	4 (40.0)	
Shape				
Oval	40	16 (40.0)	24 (60.0)	0.065
Irregular	59	36 (61.0)	23 (39.0)	
Multiloculated	25	10 (40.0)	15 (60.0)	
Location				
Subareolar	22	10 (45.5)	12 (54.5)	0.365
Periphery	80	38 (47.5)	42 (52.5)	
Indeterminate	22	14 (63.6)	8 (36.4)	

-UOQ: Upper outer quadrant, UIQ: Upper inner quadrant, LIQ: Lower inner quadrant, LOQ: Lower outer quadrant

*p-value ≤0.05 (Chi-square test)

Table 3: Comparison of outcome with respect to groups (n=124)

Treatment Outcome	Total	Aspiration (n= 62)	Incision and Drainage (n= 62)	p-value
Recurrence				
Yes	12	8 (66.7)	4 (33.3)	0.224 [^]
No	112	54 (48.2)	58 (51.8)	
Scar				
Yes	5	5 (100.0)	0 (0.0)	0.022 ^{~*}
No	119	57 (47.9)	62 (52.1)	

*p-value ≤ 0.05 ([^]Chi-square/~Fisher-Exact test)

patient's general health and personal preferences. Aspiration is the preferred treatment for small abscesses that are easily reachable, while incision and drainage is recommended for larger abscesses or those that are hard to access.¹²

According to the current study findings, treatment outcome showed that recurrence was observed in ten percent and scar in four percent women. An insignificant association of recurrence was observed between groups. Several studies have compared the treatment outcomes of aspiration versus incision and drainage for breast abscess.^{5,7,12} A review that analyzed multiple randomized controlled trials concluded that both aspiration and incision and drainage methods were equally effective in treating breast abscess, and there was no significant difference in the rates of treatment failure or recurrence between the two methods. However, aspiration was found to be associated with a higher risk of complications, including bleeding, scarring, and infection, compared to incision and drainage.¹³ Various studies have reported women who underwent aspiration reported less pain and better outcome than those who underwent incision and drainage.¹²⁻¹⁵ Several published studies from Pakistan also support aspiration method for treatment of breast abscess.¹⁶⁻¹⁸ Factors such as abscess located in the central area, pus volume exceeding fifty mL, aspiration performed more than three times, and treatment duration longer than fourteen days were identified as reasons for the failure of aspiration in lactating women.¹⁹

The present study reported no considerable difference in age, procedure duration, and size of the breast abscess between the two groups. Nevertheless, the aspiration group had a significantly longer mean duration of the procedure compared to the incision and drainage group. Moreover, a significant difference was observed in patients regarding their parity and the site of the abscess. Overall, the choice of treatment for breast abscess should be based on individual patient

factors and preferences. Aspiration may be preferred for small abscesses that are easily accessible, while incision and drainage may be necessary for larger or more complex abscesses.²⁰ The potential risks and benefits of each treatment should be discussed with the patient, and the treatment plan should be tailored to their specific needs and circumstances.²¹

The limitations of this study should be considered, as it was an observational study conducted with a small sample size. Additionally, due to time constraints, a long-term follow-up was not possible. Assessment of breast abscess treatment is important to determine the most effective and appropriate method of treatment for individual patients. This assessment can help to improve patient outcomes, reduce complications, and prevent recurrence of abscess. Understanding the benefits and risks of different treatment options can help healthcare providers to make informed decisions and provide the best possible care for their patients. Despite these limitations, this study provides valuable comparative data on the effectiveness of aspiration versus incision and drainage in managing breast abscesses, offering critical insights that can inform clinical decision-making and improve treatment strategies. Further studies on assessment of breast abscess treatment should consider factors such as the severity of symptoms, the presence of underlying medical conditions, and patient preferences. The suitability of various treatment options may vary for different patients based on individual factors such as the abscess size, location, and complexity. For instance, aspiration might be a more suitable option for small and easily accessible abscesses, whereas incision and drainage could be necessary for larger or more intricate abscesses. Assessment of treatment outcomes can also help to identify areas for improvement and guide future research. By evaluating the effectiveness of different treatment options, researchers can identify best practices and develop new treatments that can further improve patient outcomes. This can ultimately lead to

better care for patients with breast abscesses and other related conditions.

CONCLUSION

This study highlighted that incision and drainage are more effective than aspiration for treating breast abscesses, offering better outcomes with lower rates of recurrence and scarring. Additionally, the duration of the procedure was significantly longer in the aspiration group compared to the incision and drainage group. However, the treatment approach should be tailored to individual patient factors and preferences, with a shared decision-making process used to develop a personalized treatment plan that aligns with the patient's needs and goals.

ETHICAL APPROVAL: This study was approved by Institutional Review Board of the Combined Military Hospital, Karachi, Pakistan (Reference Number: 101/2023/ERC, dated: 10th May, 2023).

AUTHORS' CONTRIBUTIONS: MT & IA: Substantial contributions to the conception or design of the work. MT & ZQ: Data acquisition, analysis and interpretation. MT, SB & RW: Drafting the manuscript or revising it critically for important intellectual content. MT & NA: Provided supervision and/or project administration. Including oversight of the research activity planning and execution. All authors critically reviewed and gave final approval of the manuscript.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

FUNDING: This study did not receive any grant or funding.

Received: October 02, 2024

Accepted: December 10, 2024

REFERENCES

- Boakes E, Woods A, Johnson N, Kadoglou N. Breast Infection: A review of diagnosis and management practices. *Eur J Breast Health* 2018; 14:136-43. [doi:10.5152/ejbh.2018.3871](https://doi.org/10.5152/ejbh.2018.3871)
- Sharma K, Costas A, Shulman LN, Mera JG. A systematic review of barriers to breast cancer care in developing countries resulting in delayed patient presentation. *J Oncol* 2012; 2012:121873. [doi:10.1155/2012/121873](https://doi.org/10.1155/2012/121873).
- Pileri P, Sartani A, Mazzocco MI, Giani S, Rimoldi S, Pietropaolo G, et al. Management of breast abscess during breastfeeding. *Int J Environ Res Public Health* 2022; 19: 5762. [doi:10.3390/ijerph19095762](https://doi.org/10.3390/ijerph19095762)
- Amin A, Rang Ali AI, Hashmi JS, Khattak IA, Kamran H. Effectiveness of aspiration under ultrasound guidance in breast abscess in terms of early resumption of breast feeding: a randomized controlled trial. *Pak J Med Health Sci* 2022; 16:887-9. [doi:10.53350/pjmhs22168887](https://doi.org/10.53350/pjmhs22168887)
- Saeed S, Naumani AR, Kazmi A, Khalid R, Ali M, Naqi SA, et al. Comparison between needle aspiration versus incision and drainage in management of breast abscess. *Pak J Surg* 2006; 37:56-8.
- Colin C, Delov AG, Peyron-Faure N, Rabilloud M, Charlot M. Breast abscesses in lactating women: evidences for ultrasound-guided percutaneous drainage to avoid surgery. *Emerg Radiol* 2019; 26:507-14. [doi:10.1007/s10140-019-01694-z](https://doi.org/10.1007/s10140-019-01694-z)
- Fathy E, Nashed GA, Awadallah EG, Shokralla SY, Abd Elmonim AM. Comparative study between surgical drainage of acute lactational breast abscess and ultrasound-guided needle aspiration and/or drainage. *Egypt J Surg* 2022; 41:97-104. [doi:10.4103/ejs.ejs_281_21](https://doi.org/10.4103/ejs.ejs_281_21)
- Afzal S, Bashir A, Shahzad H, Masroor I, Sattar AK. Ultrasound-guided percutaneous aspiration for the treatment of breast abscess at a tertiary care center in the developing world. *Cureus* 2022; 14:e30865. [doi:10.7759/cureus.30865](https://doi.org/10.7759/cureus.30865)
- David M, Handa P, Castaldi M. Predictors of outcomes in managing breast abscesses-A large retrospective single-center analysis. *Breast J* 2018; 24:755-63. [doi:10.1111/tbj.13053](https://doi.org/10.1111/tbj.13053)
- Ahmad S, Amin S, Alam M, Tahir R, Noreen S, Khan AG, et al. Frequency of breast abscess among lactating women presenting to ambulatory care of tertiary care hospital. *Pak J Med Health Sci* 2023; 17:152-4. [doi:10.53350/pjmhs2023173152](https://doi.org/10.53350/pjmhs2023173152)
- Omrani pour R, Vasigh M. Mastitis, Breast Abscess, G Mastitis. *Adv Exp Med Biol* 2020; 1252:53-61. [doi:10.1007/978-3-030-41596-9_7](https://doi.org/10.1007/978-3-030-41596-9_7)
- Zhou F, Li Z, Liu L, Wang F, Yu L, Xiang Y, et al. The effectiveness of needle aspiration versus traditional incision and drainage in the treatment of breast abscess: A meta-analysis. *Ann Med* 2023; 55:2224045. [doi:10.1080/07853890.2023.2224045](https://doi.org/10.1080/07853890.2023.2224045).
- Irusen H, Rohwer AC, Steyn DW, Young T. Treatment for breast abscesses in breast feeding women. *Cochrane Database Syst Rev* 2015; Cd010490. [doi:10.1002/14651858.CD010490.pub2](https://doi.org/10.1002/14651858.CD010490.pub2)
- Karvande R, Ahire M, Bhole M, Rathod C. Comparison between aspiration and incision and drainage of breast abscess. *Int Surg J* 2016; 3:1773-80. [doi:10.18203/2349-2902.isj20163144](https://doi.org/10.18203/2349-2902.isj20163144)
- Chandika AB, Gakwaya AM, Kiguli-Malwadde E, Chalya PL. Ultrasound guided needle aspiration versus surgical drainage in the management of

- breast abscesses: A Ugandan experience. BMC Res Notes 2012; 5:12. [doi:10.1186/1756-0500-5-12](https://doi.org/10.1186/1756-0500-5-12)
16. Naeem M, Rahimnajjad MK, Rahimnajjad NA, Ahmed QJ, Fazel PA, Owais M. Comparison of incision and drainage against needle aspiration for the treatment of breast abscess. Am Surg 2012; 78:1224-27.
 17. Qureshi UA, Arshad S, Tayyab MA, Khawar GR, Alvi AR. Efficacy of single time ultrasound guided needle aspiration in treating breast abscess. Pak J Med Health Sci 2022; 16:674-6. [doi:10.53350/pjmhs22164674](https://doi.org/10.53350/pjmhs22164674)
 18. Shah SI, Rasheed S, Rehman WU, Shaikh K, Hamid F, Azam Z. Comparison of outcome between percutaneous aspiration, incision and drainage in case of lactational and non-lactational breast abscess. Pak J Med Health Sci 2022; 16:876-7. [doi:10.53350/pjmhs20221611876](https://doi.org/10.53350/pjmhs20221611876)
 19. Li Y, Ma XJ. Risk factors for failure of ultrasound-guided fine-needle aspiration therapy for lactational breast abscess. Breastfeed Med 2021; 16:894-8. [doi:10.1089/bfm.2021.0060](https://doi.org/10.1089/bfm.2021.0060).
 20. Menegas S, Moayed S, Torres M. Abscess management: An evidence-based review for emergency medicine clinicians. J Emerg Med 2021; 60: 310-20. [doi:10.1016/j.jemermed.2020.10.043](https://doi.org/10.1016/j.jemermed.2020.10.043)
 21. Trop I, Dugas A, David J, El Khoury M, Boileau JF, Larouche N, et al. Breast abscesses: evidence-based algorithms for diagnosis, management, and follow-up. Radiographics 2011; 31:1683-99. [doi:10.1148/rg.316115521](https://doi.org/10.1148/rg.316115521)

