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Original Research Article

A Prospective Comparative Study of Needle Aspiration Versus Incision and Drainage of Lactational Breast Abscess in a Tertiary Care Hospital

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Conflict of interest: Nil

Abstract:

Background: Lactational breast abscess is a common complication of mastitis in breastfeeding women and contributes significantly to maternal morbidity. Traditional incision and drainage (I & D) remains a definitive treatment but is associated with pain, scarring, and prolonged recovery. Needle aspiration has emerged as a minimally invasive alternative.

Aims and Objectives: This study compares the clinical outcomes of needle aspiration versus I&D in the management of lactational breast abscesses.

Materials and Methods: This prospective comparative study included 120 lactating women with ultrasonographically confirmed breast abscesses at SMMH Medical College from January 2024 to January 2025. Participants were randomly assigned to two equal groups: Group A underwent needle aspiration, and Group B underwent incision and drainage. Outcomes assessed included healing time, residual abscess formation, number of procedures required, pain, cosmetic results, and microbiological profile. Statistical analysis was performed using SPSS version 20, with $p < 0.05$ considered significant.

Results: Most abscesses measured 4–5 cm, and 84% of patients presented within six weeks postpartum. Needle aspiration resulted in significantly faster healing (mean 19.4 days) compared with I&D (30.4 days). Residual abscess occurred in 20% of aspiration cases, whereas none were observed in the I&D group ($p = 0.041$). Pain was substantially lower in the aspiration group, with analgesic use mainly limited to the first day. In contrast, patients undergoing I&D required several days of analgesics. Cosmetic outcomes strongly favoured aspiration: all successfully treated patients healed without scars, whereas all I & D patients developed visible scars. MRSA was the predominant organism (61%), followed by Staphylococcus aureus.

Conclusion: Needle aspiration is an effective and cosmetically superior first-line treatment for uniloculated lactational breast abscesses up to 5 cm, offering faster healing and less pain. Incision and drainage should be reserved for large, multiloculated, or aspiration-resistant abscesses. The findings support wider adoption of minimally invasive management in suitable lactating women.

Keywords: Lactational Breast Abscess, Needle Aspiration, Incision And Drainage, MRSA, Breastfeeding Complications, Minimally Invasive Management.

Introduction

Lactational breast abscess remains one of the most troublesome complications encountered in breastfeeding women, contributing substantially to maternal discomfort, early cessation of breastfeeding, and avoidable hospital visits. The global incidence of breast abscess among lactating mothers varies widely, ranging from 0.4% to 11%, with higher rates reported from low- and middle-income countries due to delayed presentation and limited breastfeeding support services [1,2]. A lactational abscess typically evolves as a progression of acute mastitis when milk stasis, nipple trauma, and bacterial invasion—most commonly Staphylococcus aureus or community-acquired MRSA—trigger localized suppuration [3,4].

Ultrasound has become a cornerstone in the diagnosis and management of breast abscesses, helping differentiate mastitis from a true collection and assess abscess size, loculations, and suitability for minimally invasive drainage [5]. Traditionally, incision and drainage (I&D) was considered the

gold-standard treatment. However, this method is associated with postoperative pain, wound care burden, cosmetic scarring, interruption of breastfeeding, and a longer recovery period [6].

Over the last decade, evidence has increasingly supported the use of percutaneous needle aspiration, with or without ultrasound guidance, as a safe and effective alternative, particularly for small (<5 cm) uniloculated abscesses. Multiple studies have demonstrated faster healing, reduced pain, superior cosmetic outcomes, and better patient satisfaction with aspiration compared with I&D [7–8]. Additionally, repeated aspirations combined with culture-guided antibiotics allow outpatient management, significantly reducing healthcare resource utilization.

The rising prevalence of MRSA in lactational abscesses further underscores the importance of microbiological evaluation and targeted therapy, as MRSA-associated collections tend to be more aggressive and may influence treatment success [3, 6]. In many tertiary-care centres, including ours, breast abscesses represent a meaningful clinical burden among postpartum patients.

Given these evolving trends, the present study was designed to prospectively compare outcomes of needle aspiration versus incision-and-drainage for lactational breast abscesses, with a specific focus on recurrence, healing time, pain, scar formation, and microbiological profile.

Materials and Methods

Study Design and Setting: This prospective comparative study was conducted in the Department of Surgery at SMMH Medical College, Saharanpur, over 1 year, from January 2024 to January 2025. The study included lactating women presenting with clinical features suggestive of puerperal breast abscess.

Sample Size and Participant Selection: A total of 120 breastfeeding women were enrolled after obtaining informed consent. All participants presented with symptoms such as painful breast swelling, localized erythema, tenderness, or fever. Diagnosis was confirmed using ultrasonography (USG), which assessed abscess liquefaction and the long-axis dimension of the cavity.

Participants were randomly divided into two equal groups:

- **Group A:** Needle Aspiration (n = 60)
- **Group B:** Incision and Drainage (I&D) (n = 60)

Inclusion Criteria

- Lactational breast abscess confirmed on ultrasonography
- Abscess size < 5 cm
- Willingness to participate and adhere to follow-up

Exclusion Criteria

- Tubercular breast abscess
- Chronic granulomatous mastitis
- Galactocele
- Fungal mastitis
- Non-lactational breast abscess
- Significant comorbidities affecting wound healing

Intervention Protocols

Group A: Needle Aspiration: Patients underwent ultrasound-assisted or clinically guided percutaneous aspiration using an 18-gauge needle attached to a 20-ml syringe as an outpatient procedure. Breastfeeding from both breasts was encouraged throughout treatment.

- Repeat aspirations were performed every 5–7 days if clinically indicated.
- Two criteria defined successful resolution:
    - No pus aspirated in subsequent attempts
    - USG confirmation of cavity collapse within 2–3 days
- Treatment failure was declared if symptoms persisted after five aspiration attempts.

All patients initially received amoxicillin–clavulanic acid, which was later modified based on culture results. Antibiotics were continued for 7 days.

Group B: Incision and Drainage (I&D): Patients in this group underwent open surgical drainage under general anesthesia.

- All patients received IV Amoxicillin–Clavulanic acid preoperatively, followed by oral antibiotics post-discharge.
- A short hospital stay (typically 24 hours) was required.
- Daily wound dressings were performed until complete healing was achieved.

Breastfeeding was resumed as soon as pain permitted.

Pain Assessment: Pain intensity was indirectly measured by counting the number of analgesic doses required during the treatment period in both groups.

Microbiological Evaluation: Pus obtained from aspiration or drainage was sent for:

- Gram staining
- Aerobic culture
- Antibiotic susceptibility testing

This included evaluation for MRSA, Staphylococcus aureus, and less common organisms.

Outcome Measures

The primary and secondary outcomes included:

- Healing time (in days)
- Residual abscess formation
- Pain (analgesic requirement)
- Scar formation
- Number of aspirations required
- Microbial profile and antibiotic sensitivity

Statistical Analysis: All data were entered and analyzed using SPSS version 27 (Chicago, IL, USA). Student's t-test was used to compare mean healing times. Z-test/Fisher's Exact Test was used to evaluate categorical variables, such as residual abscess and pain scores. A p-value < 0.05 was considered statistically significant.

Ethical Considerations: The study was conducted after obtaining approval from the Institutional Ethics Committee of SMMH Medical College. Written informed consent was obtained from every participant before enrolment, and confidentiality was maintained throughout the study.

Results

A total of 120 lactating women with clinically and ultrasonographically confirmed puerperal breast abscesses were enrolled and divided equally between the two treatment groups. The demographic distribution of participants is shown in Table 1. Half of the total population (50%) was more than 30 years of age, while 35% were between 26 and 30 years, and 15% were in the 21–26 years age group. The age distribution was comparable across Group A (needle aspiration) and Group B (incision and drainage), indicating no baseline demographic imbalance.

Table 1: Age Distribution

Age (years)	Group A	Group B	Total (%)
21–26	10	8	18 (15%)
26–30	24	18	42 (35%)
>30	26	34	60 (50%)

Abscess size varied from 2 cm to 5 cm, with more than half (51.6%) measuring 5 cm in diameter. The distribution of abscess size in both groups is presented in Table 2. Group A included a larger number of 3–4 cm abscesses, while Group B had a higher proportion of large (5 cm) abscesses.

Table 2: Size of Abscess

Size	Group A	Group B	Total (%)
2 cm	3	0	3 (2.5%)
3 cm	18	3	21 (17.5%)
4 cm	22	12	34 (28.3%)
5 cm	17	45	62 (51.6%)

A significant difference in healing time was observed between the two treatment modalities. The detailed comparison is provided in Table 3, which shows that healing after needle aspiration occurred more rapidly across all abscess sizes. For example, 3-cm abscesses healed in an average of 17.1 days with aspiration compared to 26 days with incision and drainage. Similarly, 5-cm abscesses resolved in 24.2 days in Group A but required 31.2 days in Group B. The overall mean healing time was 19.4 days for the aspiration group versus 30.4 days for the I&D group.

Table 3: Time Required for Healing

Size of Abscess	Aspiration (days)	Incision & Drainage (days)
2 cm	12	—
3 cm	17.1	26
4 cm	19	29.5
5 cm	24.2	31.2

Residual abscess formation was noted in 12 patients (20%) in Group A, while no residual abscess was detected in Group B. This difference was statistically significant (p = 0.041), as shown in Table 4, although most failures in the aspiration group eventually resolved after incision and drainage.

Table 4: Residual Abscess

Residual Abscess	Group A	Group B	p-value
Yes	12	0	0.041
No	48	60	

In Group A, the number of aspiration attempts varied depending on abscess characteristics. Twelve patients required only one aspiration session, 25 required two, eight required three, three required four, and two required five. Thus, the overall success rate of needle aspiration was 80% (48/60), whereas incision and drainage achieved a 100% success rate.

Microbiological evaluation revealed Methicillin-resistant Staphylococcus aureus (MRSA) as the predominant organism (61%), followed by Staphylococcus aureus (27%), and a remaining 12% comprising organisms such as Corynebacterium, Streptococcus agalactiae, and Staphylococcus epidermidis. These findings highlight the increasing prevalence of MRSA in lactational abscesses.

Additional clinical characteristics demonstrated that 58 abscesses were located on the right breast and 62 on the left. The lower quadrants were involved in 70 of the cases—most women (84%) presented within the first six weeks postpartum. Regarding obstetric history, 52% were primiparous, and 48% were multiparous. Notably, 74 patients had been delivered by LSCS, whereas 46 had undergone expected vaginal delivery.

Pain relief patterns differed considerably between the two groups. Women in the aspiration group reported rapid pain reduction, requiring analgesics primarily on the first day. In contrast, patients in the incision and drainage group experienced significant discomfort during daily dressings and required NSAIDs for approximately five days. Cosmetic outcomes also varied substantially. Among the 48 women successfully treated with aspiration, none developed visible scars, whereas all patients undergoing incision and drainage—along with those who failed aspiration—developed noticeable scars.

Discussion

The present study compared the clinical effectiveness of needle aspiration and incision and drainage (I&D) in the management of lactational breast abscesses. The findings indicate that needle aspiration offers substantially faster healing, reduced pain, and superior cosmetic outcomes compared with conventional surgical drainage, particularly for uniloculated abscesses measuring up to 5 cm. These results are consistent with current global evidence increasingly favoring minimally invasive approaches for the management of lactational abscesses.

Lactational breast abscess most commonly affects women in the early postpartum period, typically developing as a complication of acute mastitis triggered by milk stasis, nipple trauma, or improper latch technique. In our study, 84% of participants presented within the first six weeks postpartum, which aligns with previously reported epidemiological trends [9,10]. The higher proportion of primiparous women and those undergoing LSCS reflects recognized risk factors for delayed breastfeeding initiation, impaired milk drainage, and subsequent abscess formation [11].

Abscess size remains an important determinant of treatment success. Although needle aspiration was attempted up to 5 cm in our study, its success rate (80%) was lower for larger lesions, with 20% requiring conversion to I&D. Similar observations have been reported in earlier studies, which demonstrated reduced aspiration success for abscesses exceeding 3–5 cm or those with multiloculated cavities [6, 12]. Nevertheless, aspiration still provided meaningful benefits, including significantly shorter healing time (mean 19.4 days) compared with I&D (30.4 days). These results echo the findings of Zhou et al. and Christensen et al., who reported faster resolution and lower morbidity with ultrasound-guided aspiration [8,10].

One of the most significant advantages of needle aspiration observed in this study was the absence of scar formation in all successfully treated patients. In contrast, every patient undergoing incision and drainage developed a visible scar. This difference has substantial implications for body image and breastfeeding confidence, particularly among young mothers. Previous research has similarly emphasized the favourable cosmetic outcomes of aspiration, highlighting it as a preferred option whenever feasible [13].

Pain relief patterns further strengthen the case for minimally invasive management. Women in the aspiration group required analgesics only on the first day after the procedure. In contrast, those undergoing I&D experienced discomfort for several days due to daily dressings and open wound healing. These findings align with contemporary studies that document significantly improved patient comfort with aspiration techniques [14].

The microbiological profile in the present study revealed a predominance of Methicillin-resistant Staphylococcus aureus (MRSA), accounting for 61% of isolates. This pattern reflects the rising prevalence of community-acquired MRSA in postpartum infections reported in several recent studies [15]. MRSA-associated abscesses are known to be more aggressive and more likely to require repeated aspirations, which may partly explain the 20% aspiration failure rate observed. Culture-guided antibiotic adjustments, therefore, remain essential for achieving optimal outcomes.

Despite its advantages, needle aspiration is not universally effective. Persistent purulent collections, inadequate liquefaction, large abscess size, and multiloculation are common reasons for treatment failure. In such cases, timely conversion to I&D

remains appropriate, as surgical drainage continues to offer a definitive cure. This was reflected in our study, where all patients undergoing I&D achieved complete resolution, consistent with global data supporting its reliability when aspiration is insufficient or contraindicated [16].

Overall, the findings of this study reinforce the role of needle aspiration as the preferred first-line treatment for uniloculated lactational breast abscesses up to 5 cm in size. Its advantages, faster healing, superior cosmetic results, minimal pain, and avoidance of inpatient care, make it a highly suitable option for breastfeeding mothers. Incision and drainage should be reserved for aspiration failures, large or multiloculated abscesses, or when atypical infections such as tuberculosis or fungal disease are suspected.

Conclusion

In this prospective comparative study, needle aspiration proved to be an effective, minimally invasive, and cosmetically superior option for the management of uniloculated lactational breast abscesses up to 5 cm in size. Patients treated with aspiration experienced significantly faster healing, reduced pain, and scar-free recovery compared to those undergoing incision and drainage. Although a 20% failure rate was observed—primarily in larger or persistent abscesses—these cases were successfully managed with surgical drainage. Incision and drainage remain a reliable definitive treatment, particularly for large, multiloculated, or aspiration-refractory abscesses; however, its longer healing time, greater postoperative discomfort, and inevitable scarring limit its desirability as a first-line therapy. Overall, the findings support needle aspiration as the preferred initial management strategy in appropriately selected lactating women, reserving incision and drainage for specific clinical indications or treatment failures.

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