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ORIGINAL ARTICLE

Comparative Evaluation of Incision and Drainage Versus Percutaneous Aspiration in the Management of Breast Abscesses

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ABSTRACT

Background: Breast abscesses are a common complication of lactational mastitis, often requiring interventional treatment.
Objectives: To compare the clinical efficacy, patient outcomes, and complication rates of incision and drainage versus ultrasound-guided percutaneous aspiration in the treatment of breast abscesses.
Methods: This prospective, comparative clinical study was conducted at Jinnah hospital Lahore during May 2022 to March 2023. A total of 86 female patients diagnosed with breast abscesses were enrolled based on predefined inclusion and exclusion criteria. All patients underwent baseline investigations including complete blood count, blood glucose, and breast ultrasound to determine the size, number, and location of abscesses. Microbiological cultures of aspirated pus or drained material were sent for analysis in both groups.
Results: The mean resolution time was significantly shorter in the aspiration group (6.3 ± 2.1 days) compared to the I&D group (9.1 ± 2.7 days). Pain scores on Day 3 were lower in the aspiration group (VAS 3.2 ± 1.5 vs. 6.7 ± 1.2, $p < 0.001$). Breastfeeding continuation was significantly higher in the aspiration group (86.0% vs. 60.4%, $p = 0.01$), and cosmetic satisfaction was also superior. Although the recurrence rate was higher in the aspiration group (11.6% vs. 4.6%), the difference was not statistically significant ($p = 0.23$). Minor complications were comparable in both groups.
Conclusions: It is concluded that ultrasound-guided percutaneous aspiration is an effective, minimally invasive alternative to incision and drainage in the treatment of breast abscesses, particularly in selected patients with uncomplicated, unilocular abscesses. It offers faster recovery, better cosmetic results, and greater support for continued breastfeeding.
Keywords: Breast cancer, Patients, Women, Morbidity, health, Infection

INTRODUCTION

Breast abscesses represent a significant clinical problem, particularly among lactating women, and are a leading cause of morbidity during the puerperal period. Characterized by painful, swollen, erythematous masses with localized infection and purulent discharge, breast abscesses can severely impact maternal health and breastfeeding practices[1]. Breast abscesses originate from multiple bacterial infections with Staphylococcus aureus strains including MRSA taking a leading position as the primary pathogen[2]. The formation of abscesses appears most frequently from untreated mastitis but risk factors including diabetes mellitus, smoking, nipple piercings, and immunosuppression make both lactating and non-lactating women prone to develop abscesses. Traditionally breast abscess treatment has relied on the definitive procedure known as incision and drainage (I&D)[3]. Medical care for breast abscesses requires doctors to perform surgical incision which empties the abscess cavity followed by drainage maintenance through gauze packing or inserted drains. While effective in resolving infection, I&D is associated with several limitations: Local or general anesthesia is required for this procedure but patients can face major postoperative pain and potential tissue scarring and might need extended wound care and multiple hospital visits. The procedure of I&D often impacts breastfeeding negatively since it disrupts the affected breast adversely and creates discomfort for breastfeeding mothers[4].

Percutaneous aspiration with assistance from ultrasound guidance has emerged as a minimally invasive procedure in the last few decades. A needle or catheter insertion into the abscess cavity followed by removal of pus is performed via percutaneous aspiration while antibiotic therapy is sometimes administered during multiple aspiration procedures. Continued catheter drainage stays in place through select cases for extended draining purposes. Percutaneous aspiration offers several theoretical advantages: Patients who wish to breastfeed respond favorably to this procedure since it minimizes breast tissue damage and guarantees accelerated recovery rates alongside breast architecture maintenance in addition to reduced postoperative pain[5]. Through ultrasonic guidance healthcare providers gain better accuracy during localization and minimize incomplete drainage occurrences. The evidence about recurrence rates alongside the need for multiple procedures and patient satisfaction provides different findings[7]. Research has shown that aspiration produces similar treatment effects as incision and drainage for abscesses underneath 3-5cm in diameter but generates fewer complications[6]. Medical drainage by aspiration fails to produce positive results when addressing large abscesses or multi-compartmental infections or cases presenting late because surgical drainage becomes necessary. Diverse medical studies present ambiguous data about recurrence frequencies and multiple drainage interventions affecting patient contentment levels[7].

A health system analysis reveals that the selection of treatment has wider healthcare consequences. Surgical Interventions with I&D treatment involve hospitalization alongside surgical space allocation and extended postoperative wound treatment that leads hospitals to incur increased costs and drain healthcare resources. Percutaneous aspiration allows patients to receive their procedure in outpatient areas which leads to decreased pressure on surgical services while making the care less costly[8]. Important clinical outcome points for assessment include how quickly infection clears up along with the length of healing time and the frequency of recurrence and how patients perceive their pain and satisfaction levels and breastfeeding affects them as well as their aesthetic results and their medical care use. A rigorous evaluation of these two management approaches becomes vital due to their diverse implications[9]. Resolution of infection and time to healing alongside recurrence rates and patient-reported pain and satisfaction together with breastfeeding effects and cosmetic appearance and healthcare utilization make up the important clinical endpoints. Standardization of indications for different techniques along with identification of predictive success or failure factors helps develop personalized medical care plans[10].

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Objective: To compare the clinical efficacy, patient outcomes, and complication rates of incision and drainage versus ultrasound-guided percutaneous aspiration in the treatment of breast abscesses.

METHODOLOGY

This prospective, comparative clinical study was conducted at Jinnah hospital Lahore during May 2022 to March 2023. A total of 86 female patients diagnosed with breast abscesses were enrolled based on predefined inclusion and exclusion criteria.

Inclusion Criteria

- Female patients aged 18 years and above.
- Clinically and radiologically confirmed diagnosis of breast abscess.
- Abscess size ranging from 2 cm to 6 cm in diameter.
- Willingness to participate and comply with follow-up.

Exclusion Criteria

- Patients with recurrent breast abscesses.
- Abscesses larger than 6 cm or those with necrotic overlying skin requiring surgical debridement.
- Patients with underlying breast malignancy.

Data Collection:

The 86 patients were randomly assigned into two equal groups using a computer-generated randomization schedule:

- **Group A (n = 43):** Treated with incision and drainage.
- **Group B (n = 43):** Treated with ultrasound-guided percutaneous aspiration.

All patients underwent baseline investigations including complete blood count, blood glucose, and breast ultrasound to determine the size, number, and loculation of abscesses. Microbiological cultures of aspirated pus or drained material were sent for analysis in both groups. In Group A, patients underwent incision and drainage under sterile conditions, either in an operating theater or minor procedure room. Local or general anesthesia was administered based on clinical judgment. An incision was made at the point of maximum fluctuation, and pus was evacuated from the abscess cavity. After that, normal saline was used to irrigate the cavity, and depending on the situation, a surgical drain or sterile gauze packing was put in the cavity. Antibiotics were administered empirically and adjusted based on culture results. During follow-up visits, wound dressings were changed on a regular basis. Ultrasound-guided percutaneous aspiration was used to treat Group B patients. A needle or catheter with a gauge of 18 to 20 was used to aspirate pus under aseptic conditions and with real-time ultrasound guidance. Repeat aspirations were performed every 2–3 days if residual pus was identified. For continuous drainage, a catheter was sometimes left in place. All patients received oral antibiotics and were monitored closely for clinical improvement. Microbiological findings influenced antibiotic selection and duration. Patients in both groups were evaluated for clinical outcomes over a follow-up period of four weeks. Day 3, Day 7, Week 2, and Week 4 were the following weeks after the procedure.

Data Analysis: Data were analyzed using SPSS v17. Continuous variables such as age, abscess size, and healing time were expressed as mean ± standard deviation and compared between groups using the Student's t-test. Categorical data such as recurrence rate, number of procedures, and breastfeeding continuation were analyzed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 86 patients were included in the study, with 43 patients in each group. The two groups were comparable in terms of age, abscess size, and clinical presentation. The mean age was similar, at 29.8 ± 5.4 years in the incision and drainage group and 30.2 ± 6.1 years in the aspiration group ($p = 0.68$). The mean abscess size was also closely matched, measuring 4.2 ± 1.1 cm and 4.1 ± 1.3 cm respectively ($p = 0.72$).

The mean resolution time was significantly shorter in the aspiration group (6.3 ± 2.1 days) compared to the incision group (9.1 ± 2.7 days), with fewer pain complaints on Day 3 (VAS score 3.2 vs. 6.7; $p < 0.001$). Although aspiration required more sessions (2.1 vs. 1.0), it resulted in higher breastfeeding continuation (86.0% vs. 60.4%; $p = 0.01$) and better cosmetic satisfaction (88.3% vs. 65.1%; $p = 0.02$).

Table 1: Demographic and baseline values

Parameter	Group A: Incision & Drainage (n=43)	Group B: Aspiration (n=43)	p-value
Mean Age (years)	29.8 ± 5.4	30.2 ± 6.1	0.68
Mean Abscess Size (cm)	4.2 ± 1.1	4.1 ± 1.3	0.72
Lactating Patients (%)	70%	74%	0.64
Non-lactating Patients (%)	30%	26%	0.64
Right Breast Involvement (%)	51%	47%	0.75
Left Breast Involvement (%)	49%	53%	0.75
Unilocular Abscess (%)	60%	65%	0.62
Multiloculated Abscess (%)	40%	35%	0.62

Table 2: Outcome Measures

Outcome Measure	Group A: Incision & Drainage (n=43)	Group B: Aspiration (n=43)	p-value
Mean Resolution Time (days)	9.1 ± 2.7	6.3 ± 2.1	< 0.001
Mean Number of Interventions	1.0 ± 0	2.1 ± 0.8	< 0.001
Mean Pain Score (VAS, Day 3)	6.7 ± 1.2	3.2 ± 1.5	< 0.001
Recurrence Rate (%)	4.6%	11.6%	0.23
Breastfeeding Continuation (%)	60.4%	86.0%	0.01
Cosmetic Satisfaction (% 'Good' or 'Excellent')	65.1%	88.3%	0.02
Minor Complication Rate (%)	7.0%	4.6%	0.64

Table 3: Cosmetic Satisfaction in both groups

Cosmetic Satisfaction	Group A: Incision & Drainage (n=43)	Group B: Aspiration (n=43)
Excellent	12	20
Good	16	18
Fair	10	4
Poor	5	1

Among these patients, 20 rated their outcome as excellent and 18 as good, compared to 12 and 16 respectively in the incision and drainage group. Conversely, fair and poor ratings were more common in the incision group (10 and 5) than in the aspiration group (4 and 1).

Pain assessment using the Visual Analog Scale (VAS) on Day 3 post-procedure showed a clear advantage for the aspiration group. In this group, 34 out of 43 patients reported mild pain (VAS 0–5), whereas only 10 patients in the incision and drainage group fell into the same range. Moderate to severe pain (VAS 6–10) was more prevalent in the incision group, with 33 patients affected, compared to just 9 in the aspiration group.

Table 4: VAS Score Range

VAS Score Range	Group A: Incision & Drainage (n=43)	Group B: Aspiration (n=43)
0–2	2	12
3–5	8	22
6–8	25	8
9–10	8	1

DISCUSSION

This study compared the clinical effectiveness and patient-centered outcomes of two commonly used treatment modalities for breast abscesses: incision and drainage, and ultrasound-guided percutaneous aspiration. A total of 86 patients distributed equally between groups received similar baseline characteristics for age and abscess size which confirmed that differences in outcomes came from the intervention. The research results indicated that patients who received ultrasound-guided aspiration experienced faster clinical healing times than patients who required incision and drainage treatment[11]. The data shows that minimally invasive procedures both minimize tissue damage and accelerate patient recovery times. Multiple sessions were sometimes needed through aspiration but patients experienced faster recovery paths alongside more favourable treatment experiences[12]. The pain scores measured on day 3 following the procedure revealed lower values in patients who received aspiration therapy. Culture-directed antibiotic therapy remains essential for every patient regardless of surgical technique since patients might have either methicillin-sensitive or methicillin-resistant strains during their treatment period. Patient comfort functions as an essential factor for choosing treatment modalities according to these studied results. The research showed that aspiration treatment produced a slightly higher recurrence rate than drain placement yet this difference failed to reach statistical significance[14].

Statistical analysis revealed that more patients in the aspiration group successfully retained breastfeeding function than in the incision and drainage group. The study exhibited an essential aspiration advantage because breast milk feeds remained available to mothers when combined with breastfeeding prevention of repeat mastitis and abscesses[15]. Most patients in the aspiration group reported superior cosmetic outcomes and fewer postoperative complaints regarding facial scarring or deformity. Visible scarring together with prolonged wound healing from incision and drainage procedures leads to the deterioration of both body image and patient confidence levels[16]. The recognition of cosmetic outcomes in surgical decisions has become more prominent, particularly among younger women making this discovery noteworthy. The microbiological examination of specimens produced comparable pathogen results among study groups yet Staphylococcus aureus remained the prevalent isolated microorganism[17]. Culture-guided antibiotic therapy should remain essential for all breast procedures since both methicillin-sensitive and methicillin-resistant strains can be found regardless of the surgical approach. This research delivers robust evidence supporting percutaneous aspiration for suitable medical situations but researchers must consider its specific limitations.

CONCLUSION

It is concluded that ultrasound-guided percutaneous aspiration is a safe and effective alternative to conventional incision and drainage for the management of uncomplicated breast abscesses. The findings of this study indicate that percutaneous aspiration is associated with shorter healing times, lower post-procedural pain, higher rates of breastfeeding continuation, and better cosmetic outcomes when compared to surgical drainage. While it may require multiple aspiration sessions in some cases, the overall benefits in terms of patient comfort and reduced invasiveness make it a suitable first-line approach for select patients. However, incision and drainage remain necessary for cases involving large, multiloculated, or refractory abscesses where aspiration may be inadequate.

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