



COMPARITIVE STUDY OF ULTRASOUND GUIDED NEEDLE ASPIRATION VS INCISION AND DRAINAGE IN THE MANAGEMENT OF BREAST ABSCESS

Surgery

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ABSTRACT

Background: Breast abscesses are localized infections that can occur in lactating women (puerperal) or in women who are not breastfeeding (non-puerperal). Treatment options include incision and drainage or minimally invasive procedures such as ultrasound-guided needle aspiration. Understanding the most effective approach is essential for optimal recovery, preservation of breast aesthetics, and resumption of breastfeeding. **Aim & Objectives:** This study aims to compare the outcomes of incision and drainage versus ultrasound-guided needle aspiration in managing breast abscesses. Specifically, it evaluates resolution rates, recurrence, cosmetic results, and the ability to resume lactation. **Material & Methods:** A hospital-based study was conducted over 18 months with 50 women aged 18 to 50 years diagnosed with breast abscesses. Patients were randomly assigned to treatment groups—incision and drainage or USG-guided aspiration. Follow-up assessments on Day 3 and 7 of the procedure involved ultrasonography to evaluate residual collections, healing, and recurrence in the patients of both groups. Data analysis was performed using SPSS, with significance considered at $p < 0.05$. **Results:** The ultrasound-guided aspiration group showed faster resolution, with only 12% having residual collections by Day 7, compared to 36% in the incision group. More women in the aspiration group resumed breastfeeding within two weeks (48% vs. 12%). Cosmetic results were superior, as only 4 patients had scars in the aspiration group, while all incision patients developed visible scars. Recurrence rates at two weeks were similar between groups. Overall, ultrasound-guided aspiration proved to be more effective, with quicker healing, better cosmetic outcomes, and higher patient satisfaction. **Conclusion:** Ultrasound-guided needle aspiration is a minimally invasive, effective, and cosmetically favourable approach for managing appropriate breast abscesses, facilitating quicker recovery and better breastfeeding outcomes. This method should be considered a first-line treatment for suitable cases.

KEYWORDS

Breast abscess, ultrasound-guided aspiration, incision and drainage, lactation, minimally invasive management, recurrence, cosmetic outcome.

INTRODUCTION

Breast abscesses, which are characterized as inflammation of the breast, can be either puerperal or non-puerperal. Puerperal breast abscess, an acute inflammation of the breast caused by pregnancy or breastfeeding, affects 0.4 to 11% of nursing women.^[1] A non-puerperal breast abscess is an inflammation of the breasts in a woman who is not breastfeeding. The two main causes of non-puerperal breast abscess are granulomatous lobular mastitis and periductal mastitis, both of which primarily affect young women. There are differences in the aetiology, clinical features, and prognosis of breast abscesses in women who are and are not puerperal. Puerperal abscesses can occur when mastitis, or inflammation of the breast, develops during lactation. Bacteria that are introduced through the terminal ducts of the nipple are given lactoserum culture medium by milk stagnation. *Staphylococcus aureus*, *Streptococci*, and *S. epidermidis* are the main offenders.^[2]

The main way to diagnose a breast abscess is by physical examination. If there is any frank drainage, cultures can be obtained to help guide antibiotic treatment. A breast ultrasound may be done to look for a build-up of drainable fluid if there is any uncertainty between cellulitis and an abscess. On ultrasonography, abscesses may appear as hazy masses with internal septations. To confirm the presence of a breast abscess, needle aspiration is sometimes used, and the fluid is analysed.^[3]

Incision and drainage were supposed to be the standard therapy for breast abscesses. Needle aspiration may be utilized for lactational abscesses or abscesses smaller than 3 cm. Non-lactational abscesses have a higher recurrence rate and can require multiple draining treatments. Incision and drainage might cause scarring and possibly poor cosmesis, but they are more invasive than needle aspiration and are less likely to recur. In order to promote greater drainage and prevent the skin incision from healing before draining is complete, large cavities may need to be packed after incision and drainage. Usually, these wounds heal very quickly. If the abscess originates from an ectatic or obstructed lactiferous duct, surgical excision may be necessary.^[4,5] Patients with severe breast abscesses or sepsis symptoms should be evaluated for hospitalization. Surgical incision and

drainage, wound packing for secondary purpose healing, and even intravenous antibiotics may be necessary for large breast abscesses. Additionally, pain management with NSAIDs and/or prescription medications should be taken into account. The infant should not be breastfed on the breast where a breast abscess has been identified in order to prevent the infection from spreading.^[3] This study compares the outcomes of incision and drainage to USG guided needle aspiration/re-aspiration for the treatment of breast abscesses. This examination also determines whether a residual or reoccurring abscess is present and evaluates the result in light of the patient's basic functional and cosmetic criteria. This will help surgeons treat breast abscesses effectively and with the fewest negative effects.

Aim & Objectives

1. To compare the outcome of breast abscess management by incision and drainage v/s USG guided needle aspiration/re-aspiration.
2. To determine the presence of residual abscess/recurrent abscess in both the groups.
3. To evaluate the outcome in reference to patient's basic functional and cosmetic criteria.

Material and Methods

This study aimed to compare ultrasound-guided needle aspiration with incision and drainage in managing breast abscesses. It was a hospital-based, observational study over 18 months. A total of 50 patients aged 18 to 50 years with clinically and ultrasonographically confirmed breast abscesses were included. Patients were randomly divided into two groups: one undergoing incision and drainage, and the other receiving ultrasound-guided needle aspiration. All patients received appropriate antibiotics, with pus cultures guiding therapy adjustments. The procedure's outcomes were assessed through ultrasound scans on days 3 and 7 post-treatment, monitoring residual abscess, healing, recurrence, and functional recovery, particularly in lactating women. Data analysis employed SPSS, considering $p < 0.05$ as statistically significant. Ethical approval was obtained, and informed consent was secured from each participant. The study aimed to evaluate multiple factors such as cosmetic results, breastfeeding impact, healing time

and recurrence to determine the superior surgical approach for breast abscess management.

RESULTS

The age distribution of participants ranged from 15 to 50 years across both groups. In Group A, only one patient was in the 15–20-year age bracket, while seven patients were in the 25–30-year range, indicating a focus on young adults. Other age groups in Group A included three patients each in the 35–40 and 45–50-year ranges, and four patients in the 40–45-year bracket. In Group B, no patients were in the 15–20-year group, but four were aged 20–25 years, with nine in the 25–30 age group, similar to Group A. The subsequent age groups in Group B included three patients in the 30–35 years, four in the 35–40 years, three in the 40–45 years, and two in the 45–50-year range. Overall, both groups had a similar age distribution, predominantly consisting of young adults aged 25–30 years, with a smaller representation in the other age brackets. (Table 1)

The distribution of patients by diagnosis is shown in Figure 1. Eleven women in Group A had a left breast abscess, while fourteen women had a right breast abscess. Eight women in Group B had a left breast abscess, while seventeen women had a right breast abscess.

Figure 2 displays the distribution of patients according to size on USG. Maximum patients i.e. 22% had size 4X4–5X5 cm, 18% had size 5X5–6X6 cm, 16% had size 2X2–3X3 cm and 3X3–4X4 cm each, 10% has size 6X6–7X7 cm, 6% has size upto 2X2 cm, 4% had size 7X7–8X8 cm and 10X10–11X11 cm each. Only 1% had size 9X9–10X10 cm and 12X12–13X13 cm each.

The distribution of abscess sites among the 50 patients showed a variety of involved areas. In Group A, the most common sites were the right upper outer quadrant (RUOQ) with 5 patients (22%) and multi-loculated collections with 3 patients (12%). In Group B, RUOQ was also predominant, with 6 patients (24%), followed by multi-loculated collections with 3 patients (12%). Both groups had similar patterns, with the right upper outer quadrant being the most frequently affected site, followed by other quadrants like the right infra quadrant and left infra quadrant. Smaller numbers of abscesses involved the areas just below the nipple, below the nipple areolar complex, and diffuse multi-loculated or multi-loculated collections. Overall, the abscesses were distributed across various quadrants and sites, with the right upper outer quadrant being the most common site in both groups (Table 2).

On Day 3, there was a significant difference between the groups ($P = 0.03$). Group A had more patients with residual collections (6) and combined collection with edema (5), whereas Group B had fewer residual collections (9) and no cases of combined collection + edema. By Day 7, the difference remained significant ($P = 0.04$). Group A continued to have some residual collections (3) and edema (6), while Group B showed a marked improvement, with only 1 residual collection and 2 edema cases. Notably, by Day 7, a larger number of patients in Group B had no abscess (20) compared to Group A (9), indicating better resolution in Group B. Overall, these findings suggest faster or more complete healing in Group B (Table 3).

After two weeks, both groups showed similar recurrence rates, with no significant difference ($P = 0.69$). However, resumption of lactation was significantly better in Group B, where 12 patients resumed breastfeeding compared to only 3 in Group A ($P = 0.01$). Additionally, the presence of scars was markedly higher in Group A, with all 25 patients developing scars, whereas only 4 patients in Group B had scars, a difference that was highly significant ($P < 0.0001$). Overall, these findings suggest that patients in Group B experienced better healing outcomes, with more effective lactation resumption and fewer scars, indicating possible superiority of the treatment or intervention used in that group, as shown in Table 4.

Table 1: Distribution of Participants According to Age

Age group (Years)	Group A (n=25)	Group B (n=25)
15-20	01	00
20-25	00	04
25-30	07	09
30-35	07	03
35-40	03	04
40-45	04	03
45-50	03	02

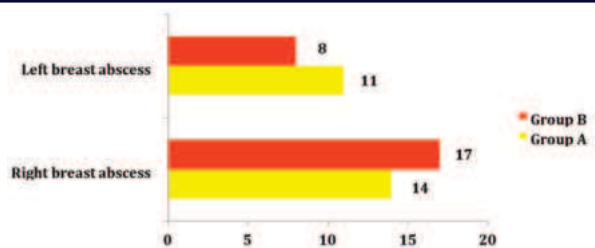


Figure 1: Distribution of Participants According to Diagnosis: (n=50)

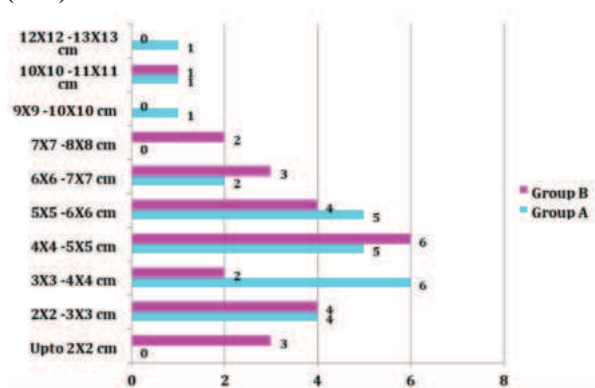


Figure 2: Distribution of Participants According to Size on USG: (n=50)

Table 2: Distribution of Patients According to Site Involved: (n=50)

Site involved	Group A	Group B	Percentage (%)
RUOQ	05	06	22
RUIQ	03	02	10
LUOQ	02	03	10
LUIQ	01	01	04
RLOQ	02	03	10
RLIQ	01	03	08
LLOQ	03	01	08
LLIQ	03	02	10
Just below nipple	00	01	02
Just below NAC	00	01	02
Diffuse multiloculated collection	01	00	02
Multiloculated	03	00	06
Retroareolar	01	00	02
Diffuse Abscess	00	02	04
Total	25	25	100

Table 3: Comparison of Patients in Both Groups According to Residual Abscess on Day 3 & Day 7:

Residual abscess	Group A	Group B	P value
On day 3			
Only Collection	06	09	0.03
Only Edema	07	03	
Collection + Edema	05	00	
Loculi	01	02	
Loculi + Edema	02	01	
Residual abscess	01	01	
Normal	03	09	
On day 7			
Only Collection	03	01	0.04
Only Edema	06	02	
Collection + Edema	01	00	
No abscess	09	20	
Yes	06	02	

Table 4: Comparison of Patients in Both Groups According to Outcome After 2 Weeks: (n=50)

	Group A	Group B	P value
Recurrence after 2 weeks			
Yes	05	03	0.69
No	20	22	

Resumption of lactation			
Yes	03	12	0.01
No	08	03	
Non lactating	14	10	
Presence of scar			
Yes	25	04	<0.0001
No	00	21	

DISCUSSION

The average age of the patients in Group A was 32.6 years, whereas the average age of the patients in Group B was 24.5 years, based on the age distribution. The age group of 25 to 30 years old was the most prevalent in both groups, with seven patients in Group A and nine in Group B. This is in line with studies by Sabel et al. (2009), which discovered that breast abscesses are more common in younger, reproductive-aged women.^[6] Further evidence that younger, postpartum women are more vulnerable comes from a study by Amir et al. (2004) that discovered that the incidence of breast abscess rises within the first 12 weeks postpartum.^[7]

With 14 cases in Group A and 17 in Group B, our investigation showed that right breast abscesses were more common in both groups. Although the causes of this lateralization are yet unknown, this discovery is in line with a study by Benson and Goodman (2004) that found a greater incidence of right-sided breast abscesses.^[8]

The groups differed in the distribution of abscess diameters. In Group A, the most common size range was 3x3 to 4x4 cm (6 patients), whereas in Group B, the most common size range was 4x4 to 5x5 cm (6 patients). Notably, there were nine occurrences of bigger abscesses (>5x5 cm) in Group A and seven in Group B. These results are consistent with a research by Benson and Goodman (2004) that highlighted the significance of early detection and management by finding that higher abscess sizes are linked to delayed presentation and treatment.^[8]

The distribution of patients based on the site of abscess involvement is shown in our study. With 10% of cases, the right upper outer quadrant (RUOQ) was the most frequent site in Group A. Multiloculated abscesses, left lower outer quadrant (LLOQ), left lower inner quadrant (LLIQ), and right upper inner quadrant (RUIQ) followed with 6% of cases each. The most common site in Group B was the RUOQ, which was seen in 12% of patients. The left upper outer quadrant (LUOQ), right lower outer quadrant (RLOQ), and right lower inner quadrant (RLIQ) were next in line, each with 6% of cases. These results are in line with earlier research that found that the upper outer quadrants of the breast had a higher frequency of abscesses. Because there is more glandular tissue in the upper outer quadrant, for example, Goepel and Pahnke (1991) discovered that this is a common location for breast abscess formation.^[9]

On Day 3, Group B had more patients with normal status and fewer residual abscesses compared to Group A, with a significant difference ($p=0.03$). By Day 7, Group B showed even better outcomes: more patients with no abscesses (40% vs. 18%) and a lower residual abscess rate (4% vs. 16%), also statistically significant ($p=0.04$). This suggests that treatment in Group B was more effective in promoting healing. Effective therapy in both groups is suggested by the gradual decline in residual abscesses. Christensen et al. (2005) provided evidence in support of this trend by showing that minimally invasive procedures, such as ultrasound-guided fine-needle aspiration in conjunction with antibiotics, can effectively reduce the size of abscesses and promote clearance. Thirteen patients, two of whom had puerperal abscesses and eleven of whom had non- puerperal ones, had the abscess cavity or fistulas surgically removed.^[10]

After two weeks, recurrence rates were 12% in Group B and 20% in Group A, according to our study. Recurrence rates are higher in cases where abscesses are larger or not completely drained during first treatment, according to a study by Leborgne F et al. (2003). The recurrence rate for Group B was 12%, whereas the recurrence rate for Group A was 20%. These results are in line with previous research that shows different rates of recurrence for breast abscesses. For example, excision of the central nipple, including the clogged ducts, is necessary for the successful final treatment of retroareolar abscesses, according to a study by Li S et al. (2006). This method produces a 91% cure rate and a 95% overall satisfaction rating with the nipple's esthetic result.^[11]

Data on the resumption of lactation after therapy are also presented in

our study. Fourteen of the women in Group A were not nursing. Three of the eleven nursing mothers resumed their lactation, whereas the other eight did not. Ten of the women in Group B were not nursing. Twelve of the fifteen women started lactating again, whereas three did not. This is consistent with results from a study by Amir et al. (2004) that found 277 women to have mastitis. Five women experienced breast abscess development: 2.9% of women who received antibiotics for mastitis (95% CI 1.0-6.7); 0.4% of women who started breastfeeding (95% CI 0.14-0.98).^[7]

Every patient in our study in Group A had scars. Only four patients in Group B had scars, while twenty-one patients in Group B did not. Greater incision sizes, delayed presentation, and greater abscess sizes could all be contributing factors to Group A's increased scar rate. According to research by Goepel and Pahnke (1991), up to 50% of patients experience recurring episodes of periareolar infections, making them very difficult to treat.^[9]

CONCLUSION

The present study demonstrates that ultrasound-guided needle aspiration is a highly effective and less invasive method for managing breast abscesses. Patients treated with ultrasound guidance showed faster resolution of abscesses, with fewer residual collections and edema by Days 3 and 7 post-treatment. Importantly, this approach facilitated a higher rate of breastfeeding resumption—significantly more women in the aspiration group regained their ability to lactate compared to those undergoing incision and drainage. Additionally, cosmetic outcomes were markedly superior, with significantly fewer scars in the aspiration group, enhancing aesthetic results and patient satisfaction. Although recurrence rates after two weeks were similar in both groups, the overall benefits—quicker healing, better functional recovery, and minimal scarring—suggest that ultrasound-guided needle aspiration should be considered a primary treatment option, especially for small or uncomplicated abscesses. Conversely, incision and drainage remains suitable for larger or complicated cases, but the findings support favouring minimally invasive techniques when appropriate, to optimize both clinical and cosmetic outcomes for patients.

Limitations of the Study

The study's limitations include its relatively small sample size of 50 patients, which may limit the generalizability of the findings. Being a single-center, hospital-based observational study, results might not apply universally across different settings. Additionally, the follow-up period was short (two weeks), which may not capture long-term recurrence or cosmetic outcomes. Variations in operator skill and patient compliance could also influence results. Further multicenter, larger-scale studies with extended follow-up are needed to validate these findings comprehensively.

Relevance of the Study

This study is highly relevant as it addresses the optimal management of breast abscesses, a common concern especially among lactating women. It highlights the advantages of minimally invasive ultrasound-guided aspiration over traditional incision and drainage, emphasizing better healing, reduced scarring, and improved breastfeeding outcomes. These insights can influence clinical decision-making, promote patient-centered care, and improve cosmetic and functional results. The findings are particularly significant in settings where preserving breast aesthetics and promoting lactation are priorities, guiding clinicians toward more effective, less invasive treatment options.

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