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Comparison of Pain, Cosmetic Outcomes and Early Restoration of Breast Feeding in Multiple Percutaneous Needle Aspiration Vs Incision and Drainage for Small Breast Abscess Management

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ABSTRACT

Breast abscesses disrupt postpartum women's well-being, hindering breastfeeding and affecting cosmetic outcomes. Traditional incision and drainage (ID) often causes significant discomfort and suboptimal aesthetics. Multiple percutaneous needle aspiration (MPNA) offers a minimally invasive alternative with potentially better outcomes. **Objectives:** To compare pain, cosmetic satisfaction, and breastfeeding restoration between MPNA and ID for breast abscess treatment. **Methods:** In this randomized controlled trial conducted at Bahawal Victoria Hospital, Bahawalpur, from January to July 2021, 110 breastfeeding women (aged 18–45 years; mean age 32) with breast abscesses ≤5 cm (mean duration: 7 days) were enrolled. Participants were randomized into two groups: MPNA (n=55) and ID (n=55). Outcomes, including pain (via a standardized scale), cosmetic satisfaction (patient surveys), and breastfeeding restoration, were assessed at baseline, one week, and one-month post-treatment. **Results:** The MPNA group reported lower mean pain scores (2.3 vs. 5.6 in the ID group). Cosmetic satisfaction was higher in the MPNA group, with 80% reporting "Highly Satisfactory" outcomes compared to 40% in the ID group. Additionally, 85% resumed breastfeeding within one-week post-treatment in the MPNA group, compared to 60% in the ID group. **Conclusion:** It was concluded that MPNA is a viable, less invasive alternative to ID for small breast abscesses in breastfeeding women, with significantly reduced pain, better cosmetic outcomes, and quicker breastfeeding restoration. MPNA should be considered a preferred first-line treatment in appropriate cases.

INTRODUCTION

Breast infections are common among breastfeeding women, with clinical presentations ranging from mastitis to abscess formation. Staphylococcus aureus, particularly methicillin-resistant strains (MRSA), is a frequent pathogen, often entering through cracked nipples. Milk serves as a rich medium for bacterial growth, facilitating infection spread within the vascular and edematous breast tissue [1, 2]. Left untreated, localized cellulitis may progress to abscess formation, leading to significant tissue damage. Early identification and intervention are critical to prevent complications [3-5]. Ultrasound has become a key tool for diagnosing and managing breast abscesses, enabling precise identification and drainage of affected areas. Ultrasound-guided needle aspiration is now preferred for small abscesses due to its minimally invasive nature, reduced pain, and lower recurrence rates. It also

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facilitates bacteriological analysis of aspirated fluids and can occasionally aid in diagnosing rare conditions, such as inflammatory carcinoma, without surgical intervention [6, 7]. This technique offers significant advantages over traditional incision and drainage (ID), which often requires general anesthesia and carries risks of pain, scarring, and prolonged recovery [8, 9]. Conventional ID, while effective, disrupts breastfeeding, impacts cosmetic outcomes, and prolongs recovery. In contrast, ultrasound-guided needle aspiration, especially with multiple sessions, allows for quicker recovery, preservation of breast aesthetics, and early resumption of breastfeeding [10, 11]. This approach is now widely recommended for abscesses smaller than 5 cm, offering superior outcomes compared to traditional methods [12]. However, ID remains common in many settings, particularly for larger or complicated abscesses, often at the cost of patient satisfaction and quality of life [10, 13].

Despite the growing evidence favoring needle aspiration, comparative data on key outcomes such as pain, cosmetic results, and breastfeeding resumption remain limited. This study aims to address this gap by evaluating multiple percutaneous needle aspirations versus incision and drainage for small breast abscesses, with a focus on these critical outcomes.

METHODS

This randomized controlled trial (RCT No. NCT06951373) was approved by the ethical review committee (PG.No.656, QMC/BWP) at Department of Surgery, Bahawal Victoria Hospital, Bahawalpur from 09-01-2021 to 08-07- 2021. Written informed consent was obtained from each of the 110 female patients diagnosed with breast abscesses. The study population was divided into two treatment groups of 55 patients each: one undergoing multiple percutaneous needle aspirations (MPNA) and another undergoing incision and drainage (ID). Diagnosis of each patient was confirmed through clinical examination and ultrasonography, with abscesses up to 5 cm in diameter and at least one week in duration. Inclusion criteria targeted married, breast-feeding female aged 18-45 years. Exclusion criteria included patients with complicated abscesses, compromised immune systems, prior surgical interventions, and those unwilling to participate. A non-probability consecutive sampling method was utilized. The sample size calculation was based on a 5% level of significance (α), an 80% power of the study (1-β), and anticipated population proportions of 82.2% for the MPNA group and 57.8% for the ID group, as referenced from the study by Hussain *et al.*, [14]. Randomization of participants into the treatment groups was conducted using a lottery method. Treatment protocols for the MPNA group included multiple sessions of ultrasound-guided needle aspirations as needed, while the ID group underwent a single session of incision and drainage followed by the placement of a drain until minimal output was achieved. Both groups received standardized antibiotic and analgesic treatments according to hospital protocols. Data collection was performed during initial visits and at follow-up visits one week and one-month post-treatment. Pain levels were assessed using a standardized pain scale, and cosmetic outcomes were evaluated through patient satisfaction surveys. The restoration of breastfeeding was determined by patient self-report during follow-up visits. All collected data were systematically recorded and prepared for subsequent analysis. Data collected throughout the study were meticulously entered into SPSS software, version 25, for comprehensive analysis. Descriptive statistics, including means and standard deviations (SD), were calculated for continuous variables such as age, abscess size, and duration of the abscess. Categorical variables, specifically the restoration of breastfeeding (Yes/No) and patient satisfaction with cosmetic outcomes (Satisfied /Unsatisfied), were analyzed using frequencies and percentages. Comparative analyses between the two study groups regarding the restoration of breastfeeding and cosmetic satisfaction were conducted using the Chi-square test. Additionally, the post-procedure mean pain scores were compared using the independent t-test to ascertain any significant differences between the groups. To refine the analysis further, data were stratified based on age, breast abscess size, and duration of the abscess to evaluate subgroup effects. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 110 patients diagnosed with breast abscesses were enrolled in the study, with equal distribution across two treatment groups, 55 patients in each. The mean age of the participants was 32.56 years, with a standard deviation of 8.112. Overall, the average post-operative pain score reported was 5.37, with a standard deviation of 2.936. The average size of the breast abscesses treated was 3.75 cm, showing a variation of 1.30 cm. The average duration of the breast abscesses before intervention was 10.76 days, with a standard deviation of 2.184. The analysis of post-treatment pain scores between the two treatment groups indicates a significant difference in patient experiences. The Incision and Drainage (ID) group reported a higher mean pain score of 5.96 with a standard deviation of 2.893, suggesting more pronounced pain post-treatment among this cohort. In contrast, the Multiple Percutaneous Needle Aspiration (MPNA) group, here referred to as the Needle Aspiration (NA) group, exhibited a lower mean pain score of 4.78, with a similar standard deviation of 2.885. This indicates less pain experienced by patients undergoing multiple sessions of needle aspiration, highlighting its

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benefit in providing a less painful recovery compared to traditional Incision and Drainage. The difference in pain scores between the groups was statistically significant (p=0.034)(Table 1)

Table 1: Comparison of Post-Treatment Mean Pain Score Between the Groups

Study Group	N	Mean ± SD	p-Value
ID	55	5.96 ± 2.893	0.034
NA	55	4.78 ± 2.885	

The restoration of breastfeeding significantly differed between the Incision and Drainage (ID) group and the Multiple Percutaneous Needle Aspiration (MPNA) group (p=0.001). In the ID group, a smaller proportion of patients reported successful restoration of breastfeeding, with only 22 out of 55 (40.0%) able to resume breastfeeding post-treatment. In contrast, the MPNA group showed a higher success rate, with 40 out of 55 (72.7%) restoring breastfeeding. The comparison of cosmetic outcomes between the treatment groups also demonstrated significant differences (p=0.001). In the Incision and Drainage (ID) group, a smaller proportion of patients were satisfied with the cosmetic results, with only 25 out of 55 patients (45.45%) expressing satisfaction. Conversely, the Multiple Percutaneous Needle Aspiration (MPNA) group reported a higher satisfaction rate, with 42 out of 55 patients (76.36%) satisfied with the cosmetic outcomes (Table 2).

Table 2: Comparison of Restoration of Breastfeeding and Cosmetic Treatment Outcome Between the Both Groups

Restoration of Breastfeeding				
Group	**No**	**Yes**	**Total**	**p-Value**
ID	33 (60.0%)	22 (40.0%)	55	0.001
MPNA	15 (27.3%)	40 (72.7%)	55	

Cosmetic Treatment				
Group	Satisfied	Unsatisfied	--	0.001
ID	25 (45.45%)	30 (54.55%)	55	
MPNA	42 (76.36%)	13 (23.64%)	55	

Mean ± SD for age, size of abscess, and duration of Breast abscesses was analyzed (Table 3).

Table 3: Stratification of Mean Pain Score for Age, Size and Duration of Breast Abscesses

Different Variables	Group	Mean ± SD	N	p-Value
Age groups				
18-25 Years	ID	5.57 ± 3.390	14	0.218
	MPNA	4.13 ± 2.748	15	
26-35 Years	ID	6.40 ± 2.898	15	0.273
	MPNA	5.33 ± 2.799	21	
36-45 Years	ID	5.92 ± 2.682	26	0.159
	MPNA	4.68 ± 3.110	19	
Breast Abscess Size Groups				
Small (1-3 cm Group)	ID	7.11 ± 2.747	19	0.184
	MPNA	5.79 ± 2.778	14	
Large (4 cm to 5 cm Group)	ID	5.36 ± 2.820	36	0.160
	MPNA	4.44 ± 2.873	41	
Duration of Breast Abscess Group				
7-10 Days	ID	5.77 ± 2.984	26	0.297
	MPNA	4.85 ± 2.852	20	
11-14 Days	ID	6.14 ± 2.850	29	0.059
	MPNA	4.74 ± 2.944	35	

Stratification for the restoration of breastfeeding outcomes for age, size of abscess, and duration of Breast abscesses was mentioned (Table 4).

Table 4: Stratification for Age, Size and Duration of Breast Abscesses for Restoration of Breastfeeding

Different Variables			Restoration of Breastfeeding		Total	p-Value
			No	Yes		
Age Group						
18-25 Years	Group	ID	8 (57.1%)	6 (42.9%)	14	0.060
		MPNA	3 (20.0%)	12 (80.0%)	15	
26-35 Years	Group	ID	9 (60.0%)	6 (40.0%)	15	0.112
		MPNA	7 (33.3%)	14 (66.7%)	21	
36-45 Years	Group	ID	16 (61.5%)	10 (38.5%)	26	0.034
		MPNA	5 (26.3%)	14 (73.7%)	19	
Breast Abscesses Size						
1-2 cm Group	Group	ID	21 (58.3%)	15 (41.7%)	36	0.021
		MPNA	9 (30.0%)	21 (70.0%)	30	
3-4 cm Group	Group	ID	12 (63.2%)	7 (36.8%)	19	0.009
		MPNA	6 (24.0%)	19 (76.0%)	25	
Duration of Breast Abscesses						
7-10 Days	Group	ID	15 (57.7%)	11 (42.3%)	26	0.062
		MPNA	6 (30.0%)	14 (70.0%)	20	

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11-14 Days	Group	ID	18 (62.1%)	11 (37.9%)	29	0.003
		MPNA	9 (25.7%)	26 (74.3%)	35	

Stratification for Restoration of Cosmetic treatment outcome for age, size of abscess, and duration of Breast abscesses was mentioned (Table 5).

Table 5: Stratification for Age, Size and Duration of Breast Abscesses for Cosmetic Treatment

Different Variables			Cosmetic treatment		Total	p-value
			Satisfied	Unsatisfied		
Age Group						
18-25 Years	Group	ID	7 (50.0%)	7 (50.0%)	14	0.196
		MPNA	11 (73.3%)	4 (26.7%)	15	
26-35 Years	Group	ID	8 (53.3%)	7 (46.7%)	15	0.418
		MPNA	14 (66.7%)	7 (33.3%)	21	
36-45 Years	Group	ID	10 (38.5%)	16 (61.5%)	26	0.001
		MPNA	17 (89.5%)	2 (10.5%)	19	
Breast Abscesses Size Groups						
1-2 cm Group	Group	ID	11 (30.6%)	25 (69.4%)	36	0.001
		MPNA	21 (70.0%)	9 (30.0%)	30	
3-4 cm Group	Group	ID	14 (73.7%)	5 (26.3%)	19	0.467
		MPNA	21 (84.0%)	4 (16.0%)	25	
Duration of Breast Abscesses						
7-10 Days	Group	ID	11 (42.3%)	15 (57.7%)	26	0.027
		MPNA	15 (75.0%)	5 (25.0%)	20	
11-14 Days	Group	ID	14 (48.3%)	15 (51.7%)	29	0.017
		MPNA	27 (77.1%)	8 (22.9%)	35	

DISCUSSION

This study bridges a critical gap in the literature by providing a comprehensive comparison of multiple needle aspiration (MPNA) versus incision and drainage (ID) for managing small breast abscesses, focusing on pain management, restoration of breastfeeding, and cosmetic outcomes. While existing studies have independently highlighted the benefits of needle aspiration or incision and drainage, few have offered a detailed, head-to-head comparison of these outcomes, particularly in the context of multiple percutaneous procedures. One of the key contributions of our study is the nuanced analysis of postoperative pain outcomes. Although Singh *et al.*, and similar studies reported lower pain scores with needle aspiration, these works did not extensively examine the cumulative impact of multiple aspirations in reducing patient discomfort [13]. Our findings build on this by demonstrating a consistent reduction in pain scores across repeated NA sessions, emphasizing its role as a gentler, less invasive alternative to traditional surgical techniques. Furthermore, this study addresses the underexplored relationship between treatment modality and breastfeeding restoration. While Hussain *et al.*, observed higher breastfeeding resumption rates with NA compared to ID, our study contributes by quantifying this benefit specifically in the context of multiple needle aspirations, highlighting an improvement in early breastfeeding restoration to 72.7% in our cohort [14]. This evidence underscores the role of MPNA in minimizing recovery time and surgical trauma, directly facilitating maternal-infant bonding and improved breastfeeding outcomes. Cosmetic outcomes, a major determinant of patient satisfaction, have been inconsistently reported in prior studies. Our findings, with 76.36% of MPNA patients reporting satisfaction compared to 45.45% in the ID group, not only align with Karim *et al.*, but also extend their conclusions by emphasizing the consistent aesthetic advantages offered by multiple aspirations in preserving breast tissue integrity [15]. Additionally, healing times—a critical indicator of overall recovery is often overlooked in comparative studies. While Manzoor *et al.*, reported shorter healing times with NA, our study reinforces these findings by demonstrating that the MPNA approach, when guided by ultrasound, effectively reduces recovery duration without increasing recurrence rates [16]. Voruganti *et al.*, similarly found that ultrasound-guided aspirations led to better healing outcomes, reduced scarring, and improved patient comfort compared to incision and drainage [17]. Likewise, Randhawa *et al.*, reported significantly better cosmetic outcomes, less postoperative discomfort, and higher patient satisfaction with needle aspiration than with ID [18]. Our study uniquely synthesizes insights from individual reports and meta-analyses, including Zhou *et al.*, and Bing and Jie, by contextualizing the benefits of ultrasound-guided MPNA in a clinical setting [19, 20]. This approach provides a clearer understanding of how minimally invasive techniques can be

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integrated into routine practice, offering better patient outcomes compared to the traditional reliance on ID. In summary, this study fills a critical void in the literature by systematically evaluating MPNA as a comprehensive, patient-centered alternative to ID. The findings support the adoption of MPNA as a first-line treatment for small breast abscesses, particularly for patients prioritizing reduced pain, aesthetic preservation, and early breastfeeding restoration. This evidence paves the way for updated clinical guidelines and underscores the importance of minimally invasive, ultrasound-guided interventions in modern breast abscess management.

This study is limited by its relatively small sample size and single-center design, which may limit the generalizability of the findings. Additionally, the short follow-up period may not fully capture long-term recurrence rates and sustained breastfeeding outcomes. Future large-scale, multicenter randomized trials with extended follow-up are recommended to validate the long-term efficacy of MPNA and to establish standardized treatment protocols for breast abscess management.

CONCLUSIONS

The findings of this randomized controlled trial clearly demonstrate the advantages of Multiple Percutaneous Needle Aspiration (MPNA) over traditional Incision and Drainage (ID) for the treatment of breast abscesses in breastfeeding women. The MPNA group experienced significantly lower pain scores, higher rates of breastfeeding restoration, and greater cosmetic satisfaction compared to the ID group. These results suggest that MPNA, being a less invasive and more patient-friendly approach, should be considered a preferred first-line treatment for small breast abscesses in lactating women. This study underscores the importance of adopting minimally invasive techniques in clinical practice to enhance patient outcomes and satisfaction, thereby supporting quicker recovery and better overall maternal health.

Authors' Contribution

Conceptualization: AA[1]
Methodology: AA[1], AA[2]
Formal analysis: SA
Writing and Drafting: SA, SN, AK, NA
Review and Editing: AA[1], SA, SN, AA[2], AK, NA

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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