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Comparison of the Outcome of Needle Aspiration Versus Traditional Incision and Drainage in the Treatment of Breast Abscess

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[1]Study Design, writeup, proofreading Literature review, data analysis, data collection,[3]Supervision

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A B S T R A C T

Background: Breast abscesses are localized purulent collections that have traditionally been treated using incision and drainage (I&D). Nonetheless, there is a tendency toward advanced minimally invasive procedures such as ultrasound-guided needle aspiration to decrease the morbidity of postoperative procedures and enhance aesthetic results.

Objectives: To compare the clinical and functional, as well as cosmetic outcomes of ultrasound-guided needle aspiration with the traditional I&D of the treatment of breast abscesses.

Duration: Three months (26-12-2025 to 02-04-2026).

Methodology: A randomized controlled trial was conducted in the Surgery Department at the DHQ Teaching Hospital, Mirpur. 106 female patients (30-80 years old) were recruited into the study with known cases of breast abscesses. Group 1 (n=53) underwent ultrasound-guided needle aspiration under local anaesthesia, and Group 2 (n=53) underwent the traditional I&D procedure under general anaesthesia. The main outcomes were length of stay, healing period, residual abscess on day 7, and recurrence on day 14, in the presence of metabolic comorbidities. Significance was set at $p \leq 0.05$.

Results: Group 1 experienced a considerably shorter stay of 0-1 day than Group 2 (2-5 days) ($p < 0.001$). Group 1 (5-10 days) showed a faster healing process than Group 2 (12- 20 days). Although Group 1 had higher residual fluid on day 7 (43.4%), there were two recurrences at day 14 (3.8%), whereas Group 2 had four recurrences (7.5%) ($p = 0.678$). Group 1 demonstrated cosmetic results that were universally excellent or good, without scarring, unlike Group 2.

Conclusion: Ultrasound-guided needle aspiration is superior to conventional I&D. It significantly reduces hospitalisation and recovery time, minimises pathological recurrence, and achieves superior cosmetic outcomes. Ultrasound-guided needle aspiration is a safe and effective alternative.

Key Words: Breast Abscess, Cosmetic Outcome, Healing Kinetics, Incision and Drainage

Introduction

Breast abscess is a serious, focal concentration of purulent exudates in the parenchyma of the breast and is encircled by a dense pyogenic membrane.[1] It is a frequently diagnosed benign breast disease, mostly due to severe localized bacterial mastitis.[2] Staphylococcus aureus is the most common microbiological culprit, and recent statistics indicate that Methicillin-Resistant strains are on the rise worldwide.[3] Its pathogenesis is complicated; it is usually associated with subareolar duct ectasia, periductal mastitis, or chronic inflammation that develops because of prolonged tobacco use. [4,5] It is associated with a painful clinical course, severe erythema, oedema, hyperthermia, excessive tenderness, and fluctuance, which significantly worsen the patient's quality of life. [6]

Traditionally, the surgical incision and drainage of a mature breast abscess have served as the gold standard for mechanical abscess decompression.[7] Its surgical efficacy is highly reliable, but the biomechanical and physiological costs to the patient are definitely immense.[8] Incision and drainage are based on secondary intention healing, hence involving a long period of tissue healing.[9] This standard intervention requires frequent painful dressing changes, long hospitalization, and is linked with high chances of mammary fistulas, fibrotic scarring, and permanent interference with the nipple-areolar complex. [10]

Studies have attempted to address this deficiency and have demonstrated more favourable clinical outcomes. In one of these investigations, the introduction of ultrasound-guided needle aspiration into routine therapy led to a positive outcome, as the lactation resumption rate increased to 91 per cent compared with 20 per cent. [11] Similarly, a study by another team found that percutaneous aspiration not only shortened the overall healing period but also reduced pain

better than open surgery.[12] However, these benefits were not universally observed; for instance, Pal et al. (2023) did not report the same benefits in massive multiloculated lesions. The contrast between the two things demonstrates that numerous medical aspects are involved. The effectiveness of treatment methods is also influenced by various physiological factors in the environment.[13]

The findings demonstrate that more local research is required. This research is used to ascertain the best treatments in various groups. Because of the impossibility of always turning to surgery and the fact that people do not want to lose breast shape and functionality, making the medical treatment as effective as possible is of great importance.

Methodology

It was a randomised controlled trial conducted at the Divisional Headquarters Teaching Hospital, Mirpur, AJK, over 3 months from 26 December 2025 to 2 April 2026. The Hospital Ethics Committee also approved the Ethical issues involved in the study, and all subjects provided written informed consent prior to enrolment. We have selected 106 patients, which provides 90% statistical power and an alpha of 10% based on results from other residual abscess studies. The calculation was performed using SPSS version 22. The sample size was calculated with an alpha of 10%; a stricter significance level of $p \leq 0.05$ was applied in the final data analysis to minimize Type I errors.

The inclusion criteria were a female patient aged 30 to 80 years with a clear diagnosis of an acute abscess of the breast with a definite diagnosis by ultrasound images. The levels of clinical parameters and symptom severity were measured at baseline, and patients were then randomly assigned to their respective interventional cohorts using a sealed, opaque envelope system. Individuals were ineligible to participate in the study if they were pregnant, lactating, had already had breast cancer, had undergone localized radiation, or had severe immunocompromising conditions of the systemic type.

The procedures were standardized using a set of clinical protocols: the aspiration group received outpatient ultrasound-guided drainage with a 16G needle and 1% lignocaine, and the surgical group received a Hiltons incision and drainage with gauze packing in the casualty theatre under general anaesthesia. Premature pus was sent for culture and sensitivity testing, and every patient was started on initial empiric antibiotic and analgesic therapy, which was later adjusted based on laboratory findings. Follow-up ultrasonography was then performed on day 7 to assess for residual fluid, and the best results were those blinded by a senior radiologist at the 14-day follow-up to determine overall clinical recovery. Successful healing was defined as a completely closed surgical site with no sonographic or clinical evidence of recurrence. This concealment technique removed observational bias, and the primary investigator entered all final data in an organized manner.

Results

The research was conducted on 106 patients who were treated and reported to the General Surgery Division of the Divisional Headquarters Teaching Hospital in Mirpur, Azad Jammu and Kashmir. The mean age of the population was 56.2 years; 55 rural and 51 urban patients accounted for 51.9% and 48.1%, respectively. Each group had 53 patients. Both groups were close in age, with the average age of Group 1 and Group 2 at 53.3 and 59.1, respectively. The findings were not significant between the two groups.

There was a high rate of obesity. Of all patients, 60 (about 56.6%) were clinically obese: 54.7% in Group 1 and 58.5% in Group 2. An unusual observation was made regarding the primary sonographic results: 43.4% of residual fluid was found in patients who underwent the aspiration procedure (Group 1), and 5.7% in the operative patients (Group 2). All the details are in Table 1

Table 1: Demographic Characteristics of Patients in the Research (n = 106)

Variable	Group 1 (Aspiration)	Group 2 (I&D)	*p*-value
Age (years)	53.3 ± 15.6	59.1 ± 14.8	0.06
Residence			
Rural	27 (50.9%)	28 (52.8%)	0.84
Urban	26 (49.1%)	25 (47.2%)	
History of Obesity			
Yes	29 (54.7%)	31 (58.5%)	0.69
No	24 (45.3%)	22 (41.5%)	

and 2. Cohort 1 obtained much better results. Group 1 had more patients who recovered

completely than Group 2 (Table 3). Group 2 had 49 patients (92.5%) who completely recovered without recurrence, whereas Group 1 had 51 patients (96.2%). There were also differences in healing times in the two groups. The average of Group 1 reduced to 7.68 days. Group 2 did not improve much, and their recovery was extended to 16.72 days. These same numbers are shown in Table 4. Pathological recurrence was not universally observed, though it was present in 2 patients in Group 1 (3.8%). In Group 2, it remained at 4 people, or 7.5 per cent of the group.

Table 2: Clinical Presentations and Comorbidities

Comorbidity/Finding	Group 1	Group 2	Total Frequency (%)
Diabetes Mellitus	20	25	45 (42.5%)
Hypertension	28	29	57 (53.8%)
Dyslipidemia	30	27	57 (53.8%)
Residual Fluid (Day 7)	23	3	26 (24.5%)

Table 3: Recovery Outcomes at 14 Days

Outcome	Group 1 (Needle Aspiration)	Group 2 (I&D)	*p*-value
Fully Recovered	51 (96.2%)	49 (92.5%)	0.678
Recurrence	2 (3.8%)	4 (7.5%)	

Table 4: Kinetic Recovery Metrics

Metric	Group 1 (Mean ± SD)	Group 2 (Mean ± SD)	*p*-value
Hospital Stay (Days)	0.47 ± 0.50	3.47 ± 0.95	<0.001*
Total Healing (Days)	7.68 ± 1.80	16.72 ± 2.40	<0.001*

Another important outcome, critical to pitting the two treatments against each other, was the cosmetic outcomes. At the end of the aesthetic outcomes, 100% of patients in Group 1 achieved positive results; 27 patients (50.9%) recorded excellent results, and 26 patients (49.1%) recorded good results. On the other hand, Group 2 had a major problem of postoperative scarring and aesthetic degradation. Group 2 had 0 patients with an excellent rating and 16 patients (30.2%) with a poor cosmetic outcome. The rest of the surgical group patients had fair or good outcomes, which strongly depended on their underlying metabolic comorbidities. If one wants to see everything on the table, Figure 1 compares recovery rates, and Figure 2 shows variation in healing time. The substantial decrease in recurrence in Group 1 (3.8%) compared with Group 2 (7.5%) is summarised in Figure 3.

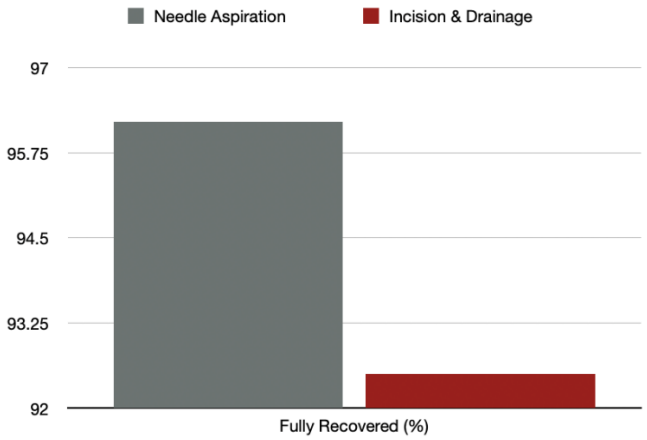

Figure 1: Recovery Rates at 14 Days

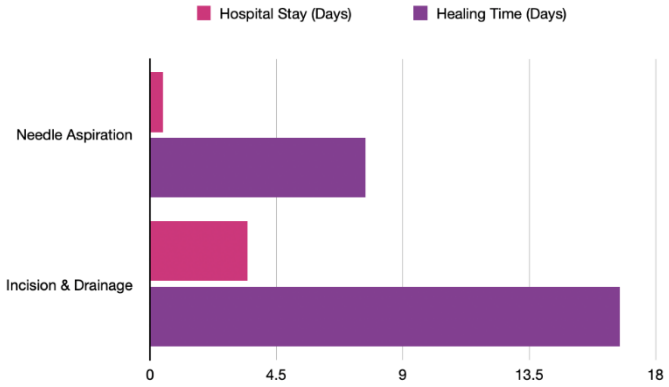

Figure 2: Hospital Stay and Healing Time

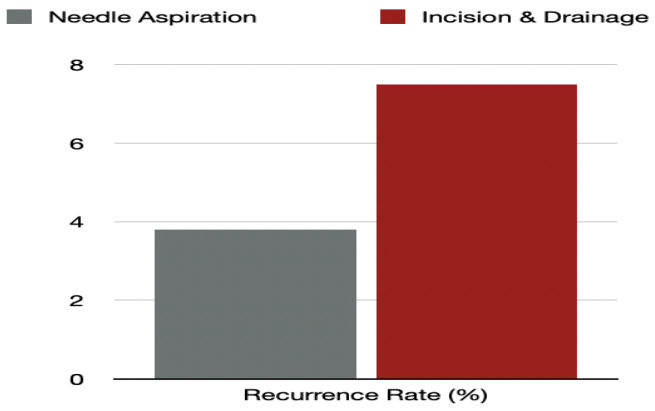

Figure 3: Pathological Recurrence at 14 Days.

Discussion

The results of this randomized controlled trial provide strong evidence for the accuracy of the decompression theory of breast abscess treatment compared with radical tissue disruption. Though managing the classical management of breast abscesses has been well researched, this randomized controlled trial

provides strong evidence on the notion that minimally invasive techniques have drastically better patient outcomes. The findings of our study on traditional therapy, which is to widely open the cavity and heal with secondary intention to prevent reaccumulation, also reveal the need to conserve the skin's topical protective layer and the internal structural matrices. It was because of a definitive healing rate of 96.2% with specified Needle Aspiration and 92.5% with Incision and Drainage (p = 0.678).

Hassan et al. (2024) have also reported similar results, concluding that in a vast majority of patients who obtain treatment in the form of the abscess is treated with the use of abscess therapy (which, as previously noted, consists of abscess aspiration), the patient recovers without further recurrence; a much higher percentage of the patients who only undergo incision and drainage experience the failure, at 36.7%. The concept of broadening therapeutic methods involving percutaneous approaches is also supported by this correspondence with the current study.[14] In a similar study, Qureshi et al. (2022) in Pakistan found very high initial success rates for ultrasound-guided aspiration as the primary intervention. They reported a cumulative single-aspiration resolution rate of 82.2% across patient demographics (15). The study reveals that specific decompression enhances prompt physiological wound recovery, irrespective of the local flora identified in various studies.

Complicated ductal networks are present in the parenchymal breast tissue, posing a grave challenge for tissue repair. They are networks that interfere with tissue repair processes in the case of cutting up and have not been properly maintained. Based on their hypothesis, Abid et al. (2024) assume that high-virulence microorganisms, including Staphylococcus aureus, can quickly acquire secondary infections at open surgical sites that are not closed, thereby obstructing local cellular repair and sustaining chronic inflammation.[16] The sheer trauma of a huge incision poses a serious problem that retards to a crawl the process of the physiological matrix sealing the tissue gap. Internal bacterial infection was conclusively cured with needle aspiration, and the painful mechanical tension, which initially led to severe guarding, was relieved instantly. Ultrasound-guided aspiration will serve as a highly specific biological catalyst, fulfilling its desired purpose of controlling the source without causing a large secondary defect. The number of people receiving the aspiration treatment showed a significant reduction in hospital admissions, with their average hospitalization dropping to 0.47 days. The control group had no rapid discharges and spent an average of 3.47 days in bed. These aspiration outcomes are indisputably explicit in their constituent impacts on demonstrating clinical superiority.

Our results confirm those of Manzoor et al. (2022), who found that patients recovered remarkably quickly following needle methods, even though, in conventional clinical dogma, non-surgical resolution was historically more favourable. They concentrated on preservation of breast contour only, and patient satisfaction rate was tremendous with little scarring as compared to standard surgery.[17] However, the difference in the day 7 residual fluid in our trial, 43.4% in the aspiration arm and 5.7% in the surgical arm, should be put into context. This difference can readily be attributed to the simple physiological fact that an open, aspirated cavity will spontaneously secrete sterile, serous inflammatory exudate, which is harmlessly resorbed. In contrast, a gaping surgical wound cannot retain fluid. Nevertheless, in our test, the ineffectiveness of surgical monotherapy in the total prevention of reinfection with Group 2 patients (7.5% true pathological recurrence rating) is an extremely alarming revelation that open surgical management parties possess an inherent morbid danger profile in extremely predisposed individuals.

The sample was anatomically and demographically high in the number of patients with complicated metabolic syndromes, namely, clinical obesity (56.6%) and dyslipidemia (53.8%). This atypical distribution is most likely the direct impact of the diet and sedentary lifestyle, which are becoming dominant in Azad Jammu Kashmir. Defective microvascular perfusion is among the primary reasons for delayed healing in these cohorts because the rates of diabetes and obesity are astronomical. A massive surgical incision is normally linked to significant and persistent wound bed injury, sloughing agony, and secondary nosocomial

colonization in metabolically deficient women, and our information clearly exhibited flawless curative recuperation in the aspiration cluster, even in the presence of such precise heavy comorbidities. This means that the aetiology of surgical failure in our particular area may rely heavily on the hazardous production of large, open, fabricated wounds in diabetic or obese patients, rather than solely on the initial bacterial burden; therefore, the absolute use of closed-cavity aspiration to avoid further disastrous infection of traumatic injuries. It has a severe clinical implication for environments that are resource-deprived, like in Pakistan.

Incision and drainage is accepted as the end-of-treatment option for the massive or chronic abscess. However, it carries a heavy risk of permanent cosmetic deformity, morbid mammary fistula, and deep psychological trauma. The authors noted that surgical drainage could be considered a reliable method of mechanical evacuation, but long-term irreversible alterations in breast structure are imminent; therefore, conservative optimization is the most essential first-line defence.[6] By exponentially increasing the success rate of percutaneous medical therapy, which is now the standard of care, modern surgical teams can effectively reduce the burden of operative casualties and spare patients the harsh systemic risks of general anaesthesia.

This research is not without its shortcomings. The study is also narrow in scope, as it included only 106 specific patients. The research process was completed within 14 days of the postoperative follow-up, and this was extremely challenging for conducting a rigorous study of long-term symptom recurrence patterns or delayed fibrotic contractures. The authors rated internal bacterial clearance based on strict clinical and sonographic assessment of fissure healing, as the researchers did not conduct continuous longitudinal microbiological testing after the first surgery. The research findings are limited in generalizability across the world because the researchers conducted their clinical research in only one region. The proposed interventional study certainly demands more extensive research in different settings, using prevailing laboratory analyses and additional microbiological studies to provide the medical community with more comprehensive information on the longitudinal effects experienced by participants.

Conclusion

The research proves that targeted ultrasound-guided needle aspiration in the acute treatment of breast abscesses is more effective than other therapeutic interventions. Aspiration therapy achieved a very high healing rate of 96.2 per cent, compared with 92.5 per cent with monotherapy using incision and drainage. When a minimally invasive technique is incorporated into the regular management regimen, it shortens the healing period, reduces pain, and enhances preservation of cosmetic anatomy. Patient safety was ensured, and there was no increase in adverse events, as the aspiration regimen did not increase them. The evidence also supports the implementation of ultrasound-guided needle aspiration therapy, as it can be adopted as the treatment of choice for acute breast abscesses, offering a more effective alternative to surgical intervention and, by extension, enhancing overall patient outcomes and quality of life.

LIMITATIONS & RECOMMENDATIONS

There are a few limitations that limit the analysis and the possible future applicability of the results. Despite the strength of the applied research methodology, including random assignment to identify effective interventions and provide clear guidance to institutions operating with limited resources, specific limitations warrant discussion. The independent variable was restricted to one centre, had a medium sample size, and did not measure bacterial load reductions using microbiological cultures. The follow-up of less than 14 days was insufficient to predict long-term outcomes or late recurrence. Future researchers should overcome these limitations by adopting multicenter designs, precise bacteriological measurements, and prolonged follow-up periods, as these approaches can further substantiate the findings. Better processes for therapeutic delivery can also reduce the need for surgical intervention in settings with limited healthcare resources.

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