

## Comparison of Outcome of Ultrasound guided Percutaneous Aspiration and Surgical Incision & Drainage of Acute Lactational Breast Abscess

Yusra Ashraf, Arslan Sharif, Muhammad Adnan Munir, Muhammad Hasnat Akhtar, Muhammad Soman, Samra Haroon

Department of Surgery, Combined Military Hospital Kharian/National University of Medical Sciences (NUMS) Pakistan

### ABSTRACT

**Objective:** To compare outcome of USG-guided percutaneous aspiration with surgical incision & drainage in Acute Lactational Breast Abscess.

**Study Design:** Quasi-experiment study.

**Place and Duration of Study:** Department of Surgery, Combined Military Hospital, Kharian Pakistan, from Sept 2022 to Feb 2023.

**Methodology:** All patients with acute lactational breast abscess were enrolled in study. Patients were distributed in 2 groups after opting preferred treatment technique and patients planned for ultrasound guided percutaneous drainage under local anesthesia were kept in group A whereas patient to be treated by traditional surgical incision and drainage under general anesthesia were in group B. Procedural outcomes in term of postoperative pain, healing time and cosmetic satisfaction were assessed in both groups.

**Results:** Among 44 females were enrolled in study, minimum age was 22 years and maximum were 45 years with mean age of  $32.82 \pm 6.50$  years and  $33.41 \pm 6.60$  years in group A and group B respectively ( $p$ -value = 0.772). Postoperative pain was same on 1st post-op day in both groups ( $p$ =0.019) while pain was much less in group A in comparison to group B on 2nd and 3rd post-op day ( $p$ -value = 0.0157). Healing time was less in group A who were treated by USG guided aspiration  $10.41 \pm 4.8$  days whereas in group B (surgical I & D) healing time was prolonged  $18.32 \pm 2.9$  days ( $p$ -value < 0.001).

**Conclusion:** Ultrasound guided percutaneous aspiration of lactational breast abscess is associated with less postoperative pain, quick healing and better cosmetic outcome and patient satisfaction.

**Keywords:** Breast Abscess, Incision and Drainage, Mastitis, Percutaneous Aspiration, USG Guided Aspiration.

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### INTRODUCTION

Breast abscess is a localized inflammatory accumulation of infectious material (pus) in the breast tissue or overlying breast skin.<sup>1</sup> It usually develops when mastitis or cellulitis doesn't settle or respond to conventional medical treatment. Sometimes localized abscess is first presentation of mastitis especially in lactating mothers.<sup>1</sup> Breast abscess in females of reproductive age usually and commonly is lactational but non-lactational breast abscess can also develop which are usually seen in obese, smoker females and associated with underlying systemic diseases such as diabetes mellitus, autoimmune diseases, steroid induced or could be traumatic.<sup>2</sup> The overall incidence of lactational mastitis is 2-3% of lactating mothers and the incidence of breast abscess formation is 5-11% of females with mastitis.<sup>3</sup> The risk factors associated with lactational breast abscess include maternal age >30 years, first pregnancy, gestational age >41 years,

mother's tobacco use, diabetes mellitus.<sup>4</sup> The most common etiological pathogen of breast abscess is *Staphylococcus aureus* but *Staphylococcus epidermidis*, *Streptococcus pyogenes*, *Escherichia coli*, *Bacteroides* species, *Pseudomonas aeruginosa* and Anaerobes also have been isolated in breast abscess cases. *Proteus mirabilis*, *Mycobacterium* and *Actinomycosis* are rare but recognized causative micro-organisms in cases of breast abscess.<sup>5</sup>

Traditionally treatment for mastitis is antibiotics and *Staphylococcus aureus* being the most common causative pathogen allows empirical antibiotic therapy without microbiological culture and sensitivity.<sup>6</sup> Breast abscess formation owing to failed antibiotic therapy for mastitis, warrants the drainage of breast abscess either percutaneous needle aspiration or surgical incision and drainage (I & D) with culture and sensitivity followed by antibiotic course.<sup>7</sup> Surgical drainage has remained the mainstay of antibiotic-resistant abscess which is usually done under general anesthesia and requires base line investigations followed by pre anesthesia assessment. On the other

**Correspondence:** Dr Yusra Ashraf, Department of Surgery, Combined Military Hospital Kharian Pakistan

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hand, now ultrasound guided percutaneous needle aspiration is being done under local anesthesia which doesn't require pre anesthesia fitness or general anesthesia and give better cosmetic results with quick healing time.<sup>8</sup> Breast abscess has high recurrence rate of 39-50% when treated with standard surgical I&D and even higher rate in needle aspiration technique.<sup>9</sup> Risk factors of recurrence and failed aspiration treatment includes poor hygiene, large abscess > 5cm, multiple loculations, underlying systemic illness, antibiotic resistance and treatment delay.<sup>10</sup> Therefore, simultaneous pus and blood culture and sensitivity with target antibiotic therapy and follow up review is needed in complicated and recurrent cases.<sup>11</sup>

The rationale for conducting this study was to assess and compare the two treatment techniques of acute lactational breast abscess, the conventional surgical incision and drainage method and alternative ultrasound guided percutaneous needle aspiration in terms of postoperative pain, healing time and cosmetic results and patient satisfaction.

## METHODOLOGY

This Quasi-experimental study was conducted in the department of surgery, Combined Military Hospital (CMH) Kharian Pakistan from Sept 2022 to Feb 2023 following approval from Hospital ethical committee IRB (certificate number 514). Sample size of 44 was calculated based on an estimated prevalence of 3% for lactational breast abscess among lactating mothers,<sup>3</sup> with a margin of error of 5% and 95% confidence interval, assuming a population size of 10,000. Sampling technique was consecutive (non-probability) sampling.

**Inclusion Criteria:** All lactating mothers of age 20-45 years of age with clinical and radiological diagnosis of acute lactational breast abscess, with no underlying systemic illness presenting to CMH Kharian during study period were included in the study.

**Exclusion Criteria:** Non-lactating females with acute or chronic breast abscess, lactating mothers with chronic or recurrent breast abscess, abscess larger than 10cm, necrotic skin overlying abscess, ruptured abscess, underlying chronic systemic illness such as Diabetes mellitus, autoimmune disease, suspicious lesion or malignancy, immunocompromised patients were all excluded from the study.

All lactating females with acute breast abscess presenting to CMH were evaluated with ultrasonography for diagnosis and assessment of breast abscess size. All patients fulfilling inclusion cri-

teria were offered both USG-guided aspiration under local anesthesia and surgical incision and drainage under general anesthesia method of treatment. They were explained pros and cons of both techniques. Total 44 patients with lactational breast abscess were enrolled over period of 6 months divided in 2 groups of 22 patients in each group. Patients selecting USG guided aspiration under local anesthesia were placed in group A and those undergoing surgical I & D under general anesthesia were in group B. Baseline investigations including CBC, coagulation profile, LFTs, RFTs and Hepatitis B & C serology were done in all patients. Pre-anesthesia assessment was sought in all group B patients. All the patients were also prescribed antibiotic treatment as well.

Group A patients were managed in ultrasound room, Radiology Department as outpatient cases. A small area adjacent to breast abscess was anesthetized by local anesthetic agent 1% lignocaine under aseptic measures. Abscess was aspirated under ultrasound guidance with 16 G needle and 20ml syringe. Initial aspirated pus was sent for culture and sensitivity. Aspiration was repeated until there was no significant residual pus left. Procedure was converted to surgical incision and drainage if there was thick pus or patient was not cooperated. After procedure, the patients were discharged on same day with oral antibiotic and analgesics. Patients were called for follow up and antibiotics were changed according to culture and sensitivity in patients not responding to empirical antibiotics.

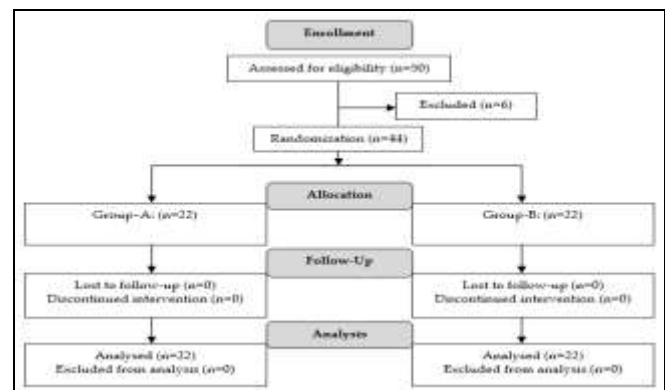


Figure-1: Patient Flow Diagram (n=44)

Patients in Group B were admitted in ward one day prior and managed by surgical incision and drainage under GA in operation theatre after overnight NPO. Patients were positioned supine and breast was swabbed and draped. A small skin depth incision was made over the most pointing area of

abscess and pus was drained. Initial aspirate was sent for culture and sensitivity like in group A patients. Patient was transferred back to ward after post op recovery and started on oral antibiotics and analgesics postoperatively. All patients were discharged on same day after 6 hours of post-op monitoring with advice to follow up and undergo daily wound dressing until complete healing. Antibiotics were changed as per culture and sensitivity report if indicated by clinical response to antibiotic.

The healing time was noted in both groups which is complete resolution with improvement of clinical symptoms and signs. In both groups, patients were advised to restart breastfeeding on both breasts as soon as possible as they could tolerate the pain. All patients were followed up in outpatient department on days 1, 2, 3 and 7 until complete resolution and then after 1 month of complete resolution. At every follow up, clinical assessment of symptoms and signs was done to assess recovery, and if there was no clinical improvement then ultrasound was repeated to detect residual pus collection.

In group A patients, if clinical symptoms and signs persisted, re-aspiration was done and if persisted more than 2 weeks from first attempt it was considered as treatment failure (incomplete resolution) and hence converted to conventional surgical incision and drainage.

During follow up visits, all patients were asked regarding pain following 1st, 2nd and 3rd post-op day using verbal numerical rating score. After recovery and complete resolution of abscess and wound healing, all patients were asked regarding cosmetic result satisfaction.

Patient's age, operating time, postoperative pain, healing time, recurrence and cosmetic satisfaction was noted in all patients. Data were entered and analyzed using Statistical Package for Social Sciences version 23 (SPSS v23). Continuous variables including age, operating time, healing time, and postoperative pain scores were expressed as mean  $\pm$  standard deviation. Independent samples t-test was used to compare continuous variables between the two treatment groups (Group A and Group B). Categorical variables including recurrence and cosmetic satisfaction were analyzed using Chi-square test. A  $p$ -value  $\leq 0.05$  was considered statistically significant.

This study included 44 female patients with acute lactational breast abscesses. There was no statistical difference in the age of patients in both groups, with a mean age of  $32.82 \pm 6.53$  years and  $33.41 \pm 6.63$  years in

group A and group B respectively ( $p$ -value = 0.767). Operating time was noted and compared in both groups (Table-I).

**Table-I: Comparison of Operating time in both groups (n=44)**

| Parameters            | Study Groups     |                  | $p$ -value |
|-----------------------|------------------|------------------|------------|
|                       | Group A (n=22)   | Group B (n=22)   |            |
| Age (Years)           | $32.82 \pm 6.53$ | $33.41 \pm 6.63$ | 0.767      |
| Operating Time (Mins) | $25.50 \pm 3.77$ | $20.36 \pm 2.83$ | <0.001     |

Healing time was observed in both groups which was considered as complete resolution of symptoms and signs after the procedure which was comparatively longer in group B patients with surgical incision and drainage with a mean of  $18.32 \pm 2.90$  days in comparison to group A ultrasound guided aspiration patients  $10.41 \pm 4.80$  days ( $p$ -value < 0.01) (Table-II).

**Table-II: Comparison of Healing time in both groups (n=44)**

| Parameters          | Study Groups     |                  | $p$ -value |
|---------------------|------------------|------------------|------------|
|                     | Group A (n=22)   | Group B (n=22)   |            |
| Healing time (days) | $10.41 \pm 4.80$ | $18.32 \pm 2.90$ | <0.01      |

Every patient was followed up after 1 month of complete recovery and inquired about outcome and cosmetic satisfaction of procedure. All 18 patients in Group A (excluding 4 failed cases) were satisfied with cosmetic result of the procedure whereas only 10(41.6%) patients among 24(including 4 recurrent cases of USG guided aspiration) patients of surgical incision and drainage group were satisfied from surgical incision and drainage in regard to cosmetic outlook because of post-surgical scar ( $p < 0.001$ ) (Table III).

**Table-III: Association of Cosmetic Satisfaction in both Groups (n=44)**

| Cosmetic Satisfaction | Study Groups   |                | $p$ -value |
|-----------------------|----------------|----------------|------------|
|                       | Group A (n=18) | Group B (n=24) |            |
| Yes                   | 18(100.0%)     | 10(41.6%)      | <0.001     |
| No                    | 0(0.0%)        | 14(58.3%)      |            |

## DISCUSSION

Breast is a secondary sex characteristic of women which needs care and personal hygiene to maintain symmetry, shape and normal functioning. Surgical incision and drainage remained the conventional method of treatment for breast abscess, however, it is associated with prolonged healing time unsatisfactory cosmetic outcome, and difficult breast feeding.<sup>12</sup> Ultrasound guided aspiration of breast abscess is a newer technique alternative to surgical drainage with

more quickly healing and satisfactory cosmetic outcome.<sup>12</sup> Ehab Fathy et al conducted a prospective study published in Egyptian Journal of Surgery, on 48 females with lactational breast abscess and concluded that ultrasound guided needle aspiration is associated with more operating time 18.05 minutes as compared to surgical incision and drainage time 12.92 minutes.<sup>13</sup> It was also observed in study that ultrasound guided technique had less healing time of 11.6 days than surgical drainage 22.21 days ( $p$ -value  $<0.001$ ).<sup>13</sup> Also in our study, it was observed that ultrasound guided aspiration had more operating time but less healing time with less postoperative pain in contrast to traditional surgical incision and drainage.

In a study conducted by Prabhu Dayal et al postoperative pain assessment was done and compared between ultrasound guided aspiration and surgical drainage patients. He concluded that average pain on 3rd post-op day was 4.22 in needle aspiration group as compared to 5.72 in incision and drainage group.<sup>14</sup> Subsequently, on day 7, score was 1.73 in aspiration group and 3.89 in surgical drainage group.<sup>14</sup> In our study postoperative pain was assessed on post-op day 1, 2 and 3 by verbal numerical rating scale and found out that pain was same on 1<sup>st</sup> post-op day in both groups ( $p$ -value =0.019), on 2<sup>nd</sup> day pain was moderate with score of  $6.18 \pm 0.8$  in group A and whereas it was moderate to severe with score of  $7.41 \pm 0.6$  in group B patients ( $p$ -value  $<0.005$ ). On 3<sup>rd</sup> post-op day, pain was mild in ultrasound guided needle aspiration patients with score  $3.59 \pm 0.7$  in comparison of surgical incision and drainage group in which pain was moderate with score of  $5.86 \pm 0.6$  ( $p$ -value  $<0.005$ ) (Figure-2).



Figure-2: Post-operative Pain Assessment on subsequent Days

In a retrospective study conducted on 28 females with breast abscess by Rigourd V *et al.*, which stated that single aspiration was required in 64.3% cases with no recurrence.<sup>15</sup> The delay between abscess and drainage was associated with significantly higher need

for surgical drainage ( $p=0.0031$ ). Also, there was no significant difference in size of abscess between patient who was treated with needle aspiration alone and those who required surgical drainage ( $p=0.97$ ).<sup>15</sup> In another study, Javed *et al.*, stated that the recurrence rate was less after surgical drainage of breast abscess with no residual pus collections.<sup>16</sup> In a randomized control trail S.R.Randhawa *et al.*, stated that procedural success rate was 97.1% ( $n=34$ ) in ultrasound guided needle aspiration and 82.9% ( $n=29$ ) in surgical incision and drainage.<sup>17</sup> In our study recurrence was seen in needle aspirated patients as 4(18.2%) patients among 22 patients of group A were reported back with recurrence of abscess after 2 weeks of procedure in which surgical incision and drainage was done whereas no recurrence was seen in group B.

Falco conducted a study on 34 lactating mothers with acute breast abscess who were treated with ultrasound guided drainage of abscess with pigtail catheter.<sup>18</sup> He concluded that in well selected patients, ultrasound assisted technique is safe, well tolerated and cost effective treatment with better cosmetic outcome.<sup>18</sup> Similar study was conducted in Lady Reading Hospital, Peshawar by Syed IA *et al.*, in which it was seen that post-surgical complication including surgical scar, breast asymmetry, mammary fistula was significantly higher in patients who were treated by surgical drainage as compared to patients by needle aspiration ( $p$ -value  $<0.05$ ).<sup>19</sup> Hence, study concluded that USG guided percutaneous aspiration is more successful and cosmetically preferred technique for acute breast abscess.<sup>20,21</sup>

## LIMITATIONS OF STUDY

The authors are well aware of limitation of the study most important being the single center study and limited sample size. Also, it was conducted as a quasi-controlled study instead of randomized controlled trial (RCT). Further studies including RCTs with larger sample set to be done to compare outcome of USG-guided needle aspiration, percutaneous catheter drainage and conventional surgical incision and drainage technique.

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## CONCLUSION

Ultrasound guided needle aspiration under local anesthesia of acute lactational breast abscess is effective alternative to traditional surgical incision and drainage method in selected patients with less postoperative pain,

quick healing and better cosmetic outcome without pre-anesthesia workup and need of general anesthesia.

**Conflict of Interest:** None.

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**Authors' Contribution**

Following authors have made substantial contributions to the manuscript as under:

YA & AS: Data acquisition, data analysis, critical review, approval of the final version to be published.

MAM & MHA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MS SH: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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