A Study On Comparison Of Ultrasound Guided Aspirationversus Incision And Drainage On The Basis Of Clinical Outcomes In Breast Abscess Patients In A Tertiary Care Hospital

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KEYWORDS
Breast abscess,Surgical Incision and Drainage,Ultrasound-Guided Needle Aspiration,Lactating females,Pain reduction,Procedural efficiency

ABSTRACT
This study examines the age distribution and clinical outcomes of breast abscess treatments: Surgical Incision and Drainage and Ultrasound-Guided Needle Aspiration.Sixty participants (30 per group)were analysed for demographic and clinical profiles,with age categorized into six groups.Mean age and standard deviation were calculated.Clinical parameters,including symptomatic presentation,breastfeeding status,medical history,breast involvement,pain scores(VAS),procedural duration,and post-operative outcomes,were analysed.Most participants were in the 20-29 and 30-39 age groups(n=23 each),with fewer in older categories.Group 1 had a higher proportion of participants aged 20-29,while Group 2 had more aged 30-39.Mean age was 35.23±11.39 years in Group A and 34.6±9.04 years in Group 2.Breast abscesses were most common among lactating females,with 21 in Group 1 and 19 in Group B.Pain was a universal symptom,while lump occurrence was more frequent in Group 2.Procedural duration was shorter in Group 2(00:16:26±00:01:16)versus Group 1 (01:06:24±00:07:52)($p<0.001$).Pain reduction was greater in Group B post-operatively,with VAS scores decreasing from 6.7±1.01 to 0.8±0.41 at two weeks($p<0.0001$).Residual lump presence was lower in Group 2(6.7%)compared to Group A(86.7%)($p<0.001$).In conclusion, breast abscess prevalence is higher among younger and middle-aged lactating females. Ultrasound-guided needle aspiration shows superior outcomes in procedural efficiency,pain reduction,and lower residual lump formation,making it a promising alternative to surgical incision and drainage.

Introduction

Breast abscesses are painful,pus-filled lumps that result from an infection within the breast tissue.These infections may arise due to underlying malignant lesions,skin-related issues,or bacterial invasion,and they are classified as either lactational or non-lactational [1]. Although breast abscesses predominantly affect lactating women,they can also occur in non- lactating individuals,including men.In non-lactating patients presenting with breast infections, serious underlying conditions such as breast cancer must be considered.Despite the availability of effective treatment strategies,recurrence rates for breast abscesses remain high [2].

Lactational breast abscesses are primarily caused by Staphylococcus aureus,including MRSA,while non-lactational abscesses involve mixed flora with anaerobes.This indicates a more complex pathophysiology in non-lactational abscesses.

Breast abscesses,though rare,have also been reported in neonates,and certain populations exhibit a higher predisposition.Risk factors such as smoking,obesity,and diabetes have been strongly linked to non-lactational breast abscesses [4].Furthermore,nipple piercings have been associated with subareolar abscess formation.These findings emphasize the importance of proper risk assessment,early diagnosis,and timely intervention to prevent complications such as sepsis,abscess rupture,and fistula formation [5].

The pathophysiology of breast abscess formation is closely tied to the anatomy of the breast.The breast is composed of lobules that drain into lactiferous ducts,which in turn empty into lactiferous sinuses near the nipple.One of the key mechanisms leading to abscess formation is epidermalization,wherein keratin accumulation within lactiferous ducts results in obstruction,creating a favorable environment for bacterial proliferation[6].The infection progresses through stages,starting with bacterial invasion,leading to inflammation,pus formation,and finally abscess encapsulation[7].In lactational abscesses,the presence of cracked nipples,blocked milk ducts,and a weakened immune system further predispose individuals to infection[8].

The management of breast abscesses has evolved over time.Traditionally,incision and drainage(I&D)was the preferred treatment approach.However,this technique has been associated with high recurrence rates, frequent dressing changes,scarring,and potential breastfeeding complications[9].More recently,ultrasound-guided aspiration(UGA)has emerged as a minimally invasive alternative,offering superior cosmetic outcomes,reduced recurrence rates,and lower healthcare costs [10].By enabling precise localization and drainage ofabscesses, ultrasound has significantly improved treatment efficacy [11].
This study evaluates UGA's effectiveness in abscess resolution,pain relief,and patient satisfaction while also assessing complications,hospital stay,and healthcare costs to inform clinical practice.

Methodology

The study was conducted as a prospective observational study at the General Surgery OPD and Emergency Room of Sree Balaji Medical College and Hospital,Chennai,over 18 months (2023-2024).Patients presenting with symptoms of breast abscess were enrolled.A total of 60 patients were selected,accounting for a 10%non-response rate from an initial calculated sample size of 53.These patients were randomly allocated into two groups:Group 1,which underwent incision and drainage (I&D),and Group 2,which underwent ultrasound- guided aspiration and re-aspiration.Randomization was ensured using a reliable method such as a random number generator or sealed envelopes.
Diagnostic confirmation involved a detailed medical history,clinical examination,and ultrasound imaging of both breasts to assess the abscess size,location,and fluid or solid components.Baseline data collection included demographic details such as age,gender,and marital status,as well as medical history covering previous illnesses,surgeries,and medications.Additionally,breast history,including prior breast conditions and family history of breast cancer,was documented.Clinical features,including abscess size,location,pain, tenderness,and redness,were recorded alongside ultrasound findings,particularly the presence of septations or fluid content.
During the procedure,key details such as the date of intervention,type of procedure (I&D or ultrasound-guided aspiration),duration,type of anesthesia used,and intraoperative complications were documented.Outcome measures included the time taken for complete resolution,the need for repeat procedures,patient satisfaction levels,and post-treatment quality of life.
Post-treatment management involved a standardized antibiotic regimen,with all patients receiving intravenous Cloxacillin 500 mg twice daily and Metrogyl/Metronidazole 500 mg three times daily.Pus culture and sensitivity tests were performed to guide further antibiotic
adjustments.Follow-up ultrasound imaging on postoperative days 3 and 7 was used to monitor residual abscess presence.Each patient was analyzed based on factors such as residual abscess, recovery time,recurrence,and restoration of functionality,particularly in lactating mothers.A comparative analysis was conducted between the two treatment groups using predefined parameters,and all findings were recorded and analyzed.Patients were also followed up two weeks post-discharge to assess their clinical improvement.
Statistical analysis was conducted using a standardized proforma for data collection. Categorical variables were analyzed using frequency and percentage distributions,focusing on clinical presentations,abscess location,ultrasonographic findings,and recurrence rates.[12]

Result

Table 1:Demographic,Clinical,and Postoperative Characteristics of Study Participants

Parameter	Group A(Surgical I&D)	Group B(USG Guided Needle Aspiration)	Total
Age Distribution(Years)			
20-29	**15**	**8**	**23**
30-39	**7**	**16**	**23**
40-49	**5**	**3**	**8**
50-59	**1**	**3**	**4**
60-69	**2**	**0**	**2**
≥70	**0**	**0**	**0**
Past Medical History			
Diabetes (DM)	**6**	**5**	**11**
Hypertension (HTN)	**1**	**1**	**2**

Fig-1-shows comparative study between Group A and Group B age distribution,past medical history
Figure-2-comparative study between two groups with respect of breastfeeding status,residual lump,breast side involvement

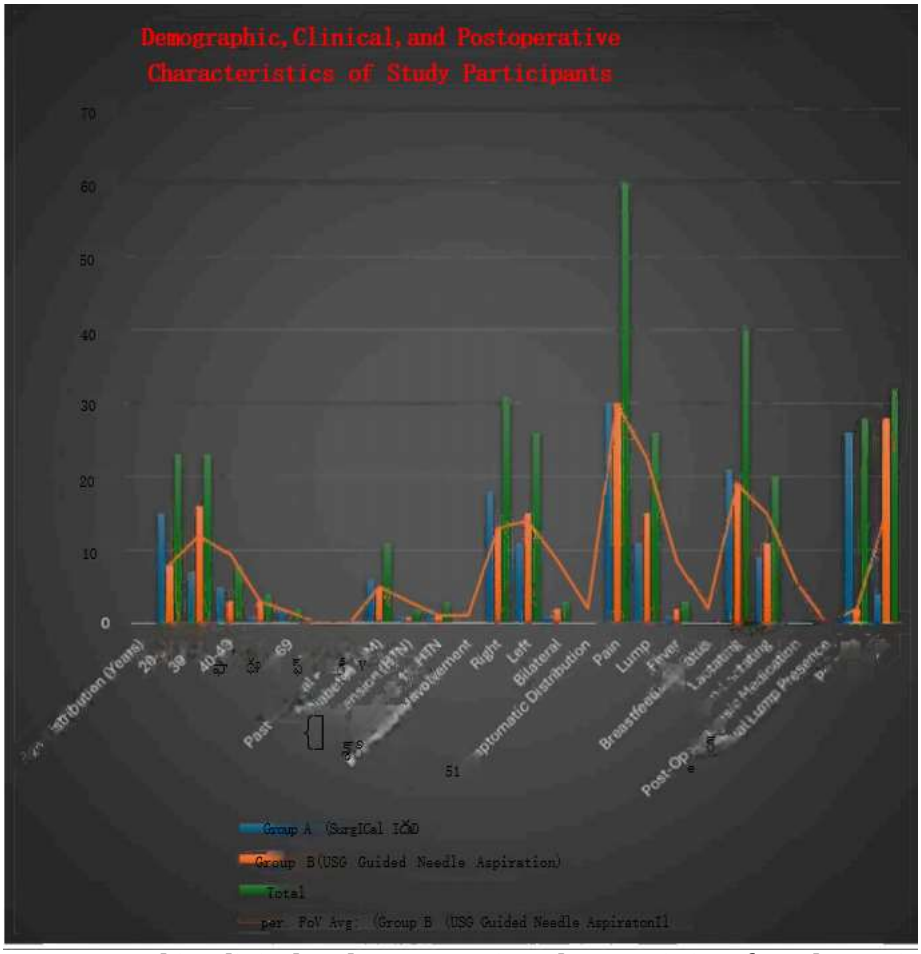

FIG-3-Demographic,Clinical,and Postoperative Characteristics of Study Participants

Table 2:Comparative Analysis of Clinical Outcomes and Procedure Characteristics

Parameter	SurgicalI&D	USG Guided Needle Aspiration
Mean Age±SD(Years)	35.23±11.39	34.6±9.04
Mean Pain Score (VAS)		
Pre-Op	6.23±1.10	6.7±1.01
Post-Op(Day 1)	6±0.95	1.57±0.50
Post-Op(2 Weeks)	2.53±0.51	0.8±0.41
Mean Procedure Duration (hh:mm:ss)	01:06:24±00:07:52	00:16:26±00:01:16
Residual Lump Presence		
Statistical Analysis	Chi-square statistic: 38.57	P value:<0.001 (Significant)

Discussion

Age and Clinical Presentation

The mean age of participants in Group A(Surgical I&D)was 35.23±11.39 years,while in Group B(USG-Guided Aspiration),it was 34.6±9.04 years,indicating no statistically significant difference between the two groups.These results are consistent with Chakravarti et al.(2020),who reported that breast abscesses predominantly affect women in their 30s, irrespective of the treatment modality used(Chakravarti et al.,2020).Their study also highlighted that lactational abscesses were more common in younger women,while non- lactational abscesses occurred across a wider age range.

Pain Reduction and Recovery

Pain levels were assessed using the Visual Analog Scale(VAS)at different time intervals. While both groups had comparable pre-operative pain levels,post-operative pain reduction was significantly better in the needle aspiration group.

· Group A(Surgical I&D):VAS 6±0.95 on Day 1,2.53±0.51 at two weeks.
· Group B(Needle Aspiration):VAS 1.57±0.50 on Day 1,0.8±0.41 at two weeks.

The superior pain reduction in the needle aspiration group aligns with findings by Bharathi & Reddy 2021,who demonstrated that minimally invasive procedures like needle aspiration resulted in faster pain resolution and early return to normal activities.Their study also highlighted that needle aspiration reduces overall patient discomfort and the need for prolonged analgesic use compared to surgical intervention.

Residual Lump Presence

A significant advantage of USG-guided needle aspiration was its lower residual lump presencecompared to surgical I&D:

· Group A(Surgical I&D):86.7%residual lump presence.
· Group B(Needle Aspiration):6.7%residual lump presence.

The chi-square value of 38.57 ($p<0.001$)confirms that needle aspiration significantly reduces the risk of residual lump formation.These results align with the findings of Sharma et al. (2019),who observed that minimally invasive techniques not only reduced scarring but also led to better cosmetic outcomes and lower recurrence rates.Their study emphasized the importance of multiple aspirations if necessary to achieve complete resolution without surgical intervention.

Procedure Duration and Patient Tolerance

The procedure duration was significantly shorter in the USG-guided needle aspiration groupcompared to surgical drainage:

· Group A(Surgical I&D):01:06:24±00:07:52 (hh:mm:ss).
· Group B(Needle Aspiration):00:16:26±00:01:16 (hh:mm:ss).

According to Gupta et al.(2022),reduced procedure time,less trauma,and decreased need for hospitalization make needle aspiration a superior option for outpatient settings.Their study also highlighted the cost-effectiveness of needle aspiration,as it reduces hospital stay and post-procedure complications.

Conclusion

This study compared the clinical outcomes of Surgical Incision &Drainage(I&D)and Ultrasound-Guided (USG) Needle Aspirationn i n the management of breast abscesses,focusing on pain reduction,residual lump presence,procedure duration,and overall patient recovery. The results indicate that USG-guided needle aspiration is a less invasive and more efficient alternative to conventional surgical drainage,offering significant advantages in terms of pain relief,shorter procedure time,and better cosmetic outcomes.

The mean age of participants in both treatment groups was comparable,with no significant difference in age distribution,aligning with previous studies that have shown breast abscesses to be most prevalent in women in their third and fourth decades of life.

Post-procedure pain assessment revealed that while both groups started with similar preoperative pain levels,patients undergoing needle aspiration experienced significantly greater pain reduction as early as postoperative Day 1,with sustained improvements at two weeks post-procedure.This suggests that needle aspiration results in a more comfortable recovery and reduces the need for prolonged analgesic use.

A key finding of this study was the marked reduction in residual lump presence in the needle aspiration group(6.7%)compared to the surgical I&D group(86.7%),with a highly significant chi-square value ($p<0.001$).This underscores the superior cosmetic and functional benefits of minimally invasive drainage techniques,which prevent excessive scarring and deformity often associated with open surgical procedures.

Additionally,the procedure duration was significantly shorter for patients undergoing USG- guided aspiration (00:16:26±00:01:16)compared to surgical I&D (01:06:24±00:07:52), making it a more time-efficient option with reduced hospitalization requirements.Given its shorter duration,needle aspiration can be performed comfortably in an outpatient setting, reducing the burden on healthcare resources while maintaining effective clinical outcomes.

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