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A comparative study between USG guided aspiration and incision and drainage of breast abscess

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Abstract
Introduction: Breast abscess is a major cause of morbidity in developing countries especially among lactating mothers. It is the most common benign breast problem in pregnancy and puerperium. The aim of this study is to evaluate the efficacy of USG guided aspiration and compare its outcomes with the traditional incision and drainage.
Materials and Methods: The study involved 60 consenting female patients with a diagnosis of breast abscess who were divided randomly into two groups of aspiration and incision and drainage.
Results: USG guided aspiration is a minimally invasive technique for the management of breast abscess and has better outcomes in terms of post operative complications, hospital stay and healing time and resumption of lactation. It is the preferred modality in the management of breast abscess.

Keywords: Breast abscess, USG guided aspiration, incision and drainage

Introduction
A breast abscess is a localized collection of purulent material within the breast.It can be a complication of mastitis. Breast abscess is a major cause of morbidity in developing countries and its treatment continues to be a challenge. The incidence of breast abscess ranges from 0.4 to 11% of all lactating mothers although it can occur in non- lactating females as well [1]. It is the most common benign breast problem in pregnancy and puerperium.Breast abscesses are most commonly caused by Staphylococcus aureus and manifest as acute breast pain, tenderness, fever with erythema and cellulitic changes over the breast surface. Ultrasound plays an important role in confirmation of the clinical diagnosis of breast abscess.They also characterize abscesses with respect to their size and presence of loculations and thus aids in management.
Traditionally, the standard of treatment of breast abscess involved incision and drainage under antibiotic cover which is done under general anaesthesia [2]. It still remains the gold standard of treatment as per some studies. Following this, the patient experiences postoperative pain, wound complications and scar formation, frequent dressing and loss of lactation as mothers tend to avoid breast feeding after treatment. With this continuously tried method of incision and drainage, the recurrence rate is still high [3]. It has been reported that breast abscesses are amenable to needle guided aspirations which can be attempted before the conventional I and D procedure [4].

Aims and Objectives
1. To evaluate the efficacy of ultrasound guided percutaneous aspiration in treating breast abscess.
2. To compare the outcome of incision and drainage versus USG guided aspiration of breast abscess in terms of hospital stay, healing time, regular dressings and cosmetic outcome.

Materials and Methods
The study involved 60 female patients admitted in General Surgery ward with a diagnosis of breast abscess. Written informed consent was obtained from all the subjects before enrolment in the study. All patients included in the study were subjected to detail history taking and clinical examination. Findings were noted in case proforma. Diagnosis was confirmed based on ultrasonography of both breasts. Haemogram, renal function tests, urine examination, chest x-ray and ECG was done. Lactational status of all female patients was noted.

Patients were randomly allotted into 2 groups

1. Group 1- Underwent incision and drainage
2. Group 2- Underwent ultrasound guided needle aspiration/ reaspiration of abscess cavity

All patients were given appropriate antibiotic coverage primarily with injection Cloxacillin 500mg IV BD and injection Metronidazole 100mg IV TDS. Patients undergoing incision and drainage of abscess were posted for surgery under sedation or general anesthesia if required. The frequency of aspiration for the group that underwent needle guided aspiration of abscess cavity was recorded. Pus culture and sensitivity was sent for patients from both groups and antibiotics thereafter modified accordingly. Ultrasound scan of the breast was done on day 3 post drainage/aspiration to rule out residual abscess. Postoperative pain was calculated using Numerical Rating Scale wherein the patient's intensity of pain is graded on a scale of 0 to 10. A score of 1-3 is considered mild pain, 4-6 is considered moderate pain and above 7 is considered as severe pain. Each patient was analysed on the basis of lactational status, size of breast on USG, side and quadrant of breast involved, residual abscess edema or collection on postoperative day 3, post procedure pain as calculated on Numerical Rating Scale, recurrence of abscess at two weeks post procedure, resumption of lactation (in case of lactating females), hospital stay and healing time, post procedure complications, pus culture and sensitivity and patient satisfaction regarding the procedure.

Both groups were compared based on the above mentioned factors to assess the better method of management of breast abscess and the comparative charts and parameters have been documented and analysed.

Observations and Results

Table 1: Distribution according to age group

Sr. No	Age distribution (Years)	Number of patients	Percentage	Mean age of the patients (Years)
1	11-20	11	18.33%	28.7 years
2	21-30	25	41.66%	
3	31-40	16	26.66%	
4	41-50	8	13.33%	
Total		60	100%	

From above table it is evident that the most commonly affected age group in our study is 21-30 years. Mean age of patients in our study group is 28.7 years.

Table 2: Distribution of patients according to Lactational status

Lactational Status	No. of Patients	Percentage	Ratio of lactating to non-lactating females
Lactating	31	51.66%	
Nonlactating	29	48.33%	1.06
Total	60	100%	

Lactating females are more commonly affected than nonlactating females in our study. The ratio of lactating to non-lactating females is 1.06.

Table 3: Distribution of lactating and nonlactating females between the two groups of incision and drainage and aspiration

Lactational Status	Incision and Drainage	Percentage	Aspiration	Percentage
Lactating	16	53.33%	15	50%
Nonlactating	14	46.67%	15	50%
Total	30	100%	30	100%

From the above table it is evident that there is near equal distribution of lactating and nonlactating females between the two groups.

Table 4: Distribution according to side and quadrant of breast involved

Sr. No.	Side and quadrant of breast	Number of patients	Percentage
1	Left upper outer quadrant	8	13.33%
2	Left upper inner quadrant	8	13.33%
3	Left lower outer quadrant	7	11.66%
4	Left lower inner quadrant	6	10%
5	Right upper outer quadrant	6	10%
6	Right upper inner quadrant	8	13.33%
7	Right lower outer quadrant	9	15%
8	Right lower inner quadrant	8	13.33%
	Total	60	100%

From the above table it is evident that right lower outer quadrant of breast is most commonly involved with 15% patients.

Table 5: Distribution according to size of breast abscess on Ultrasound

Sr. No	Size of breast Abscess	I and D	Aspiration	Total	Percentage
1	2cm x 2cm	00	02	02	3.33%

2	2cm x 3cm	00	01	01	1.66%
3	3cm x 2cm	00	02	02	3.33%
4	3cm x 3cm	01	01	02	3.33%
5	3cm x 4cm	01	01	02	3.33%
6	4cm x 2cm	02	02	04	6.66%
7	4cm x 3cm	03	01	04	6.66%
8	4cm x 4cm	04	02	06	10%
9	4cm x 5cm	03	02	05	8.33%
10	4cm x 6cm	03	01	04	6.66%
11	5cm x 3cm	03	03	06	10%
12	5cm x 4cm	03	02	05	8.33%
13	5cm x 5cm	02	03	05	8.33%
14	6cm x 5cm	01	02	03	5%
15	6cm x 6cm	01	01	02	3.33%
16	7cm x 5cm	01	01	02	3.33%
17	7cm x 6cm	01	01	02	3.33%
18	7cm x 7cm	00	01	01	1.66%
19	10cm x 8cm	01	00	01	1.66%
20	11cm x 11cm	00	01	01	1.66%
	Total	30	30	60	100%

From the above table it is evident that 11cmx11cm is the largest abscess of the aspiration group and 10cmx8cm is the largest abscess of the Incision and Drainage group.

Table 6: Frequency of aspiration in the group that was treated with USG guided aspiration

Sr. No	Frequency of aspiration	Number of patients	Percentage
1	One time	15	50%
2	Two times	11	36.66%
3	Three times	3	10%
4	Four times	1	3.33%
	Total	30	100%

Only one patient in the aspiration group required 4 aspirations.15 patients (50%) required a single aspiration.

Table 7: Residual abscess, edema or collection on day 3 (POD 3)

Sr. No.	POD 3 USG	I and D	Percentage	Aspiration	Percentage	p value
1	Normal	02	6.67%	20	66.67%	
2	Residual abscess, edema or collection	28	93.33%	10	33.33%	P < 0.0001 Highly significant
	Total	30	100%	30	100%	

28 patients (93.33%) in the Incision and Drainage group had a residual abscess, collection or edema on USG on postoperative day 3 whereas only 10 patients (33.33%)who had been managed with USG guided aspiration had residual USG changes on postoperative day 3.There is hence a statistically highly significant difference between the two groups.

Table 8: Postoperative pain on 0-10 Numerical Rating Scale

Sr. No.	Postoperative pain on NRS	I and D	Percentage	Aspiration	Percentage
1	Mild (NRS 1-3)	05	16.67%	30	100%
2	Moderate (NRS 4-6)	21	70%	00	0%
3	Severe (NRS 7-10)	04	13.33%	00	0%
	Total	30	100%	30	100%

Table 9: Comparision of moderate or severe postoperative pain between the two groups

Sr. No.	Procedure	Moderate or Severe postoperative pain	Percentage	p value
1	Incision and Drainage	25	83.33%	*P*< 0.0001
2	Aspiration	0	0%	Highly significant

The above table shows that 25 patients (83.33%) in the Incision and Drainage group had moderate to severe pain postoperatively while no patient in the aspiration group had moderate or severe pain. There is a statistically significant difference between both groups.

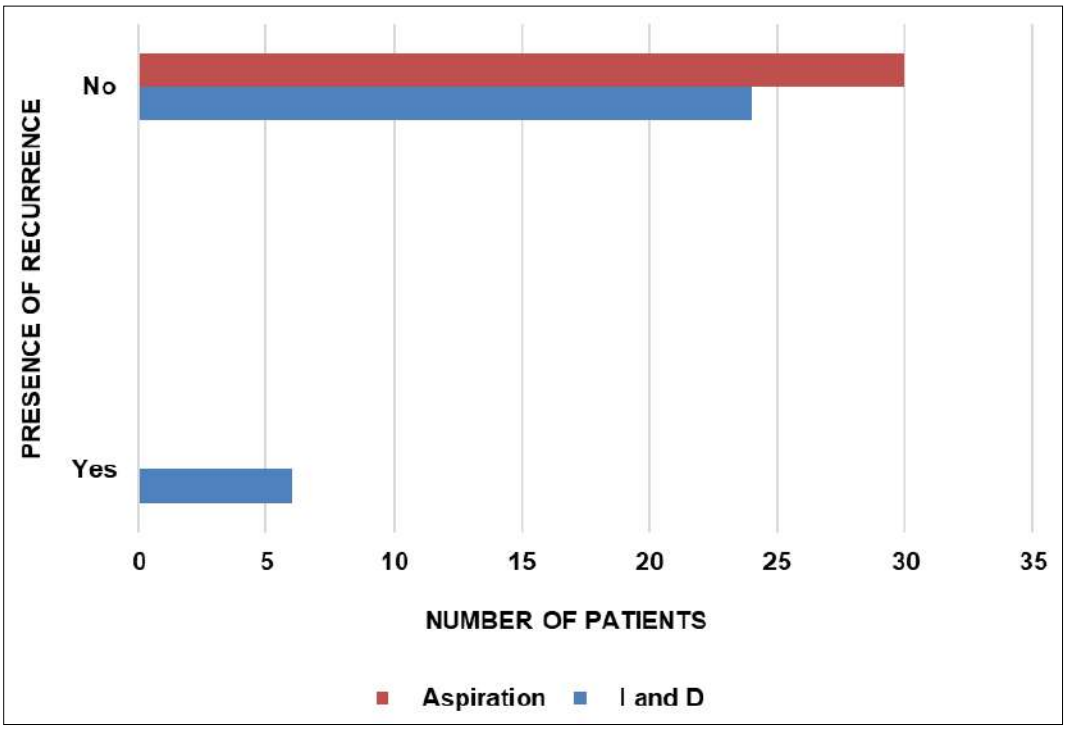

Chart 1: Comparison of recurrence of abscess amongst the two groups

In our study, there was a recurrence in breast abscess in 6 patients (20%) in Incision and Drainage group. No recurrences were found in Aspiration group. The resulting difference is not statistically significant.

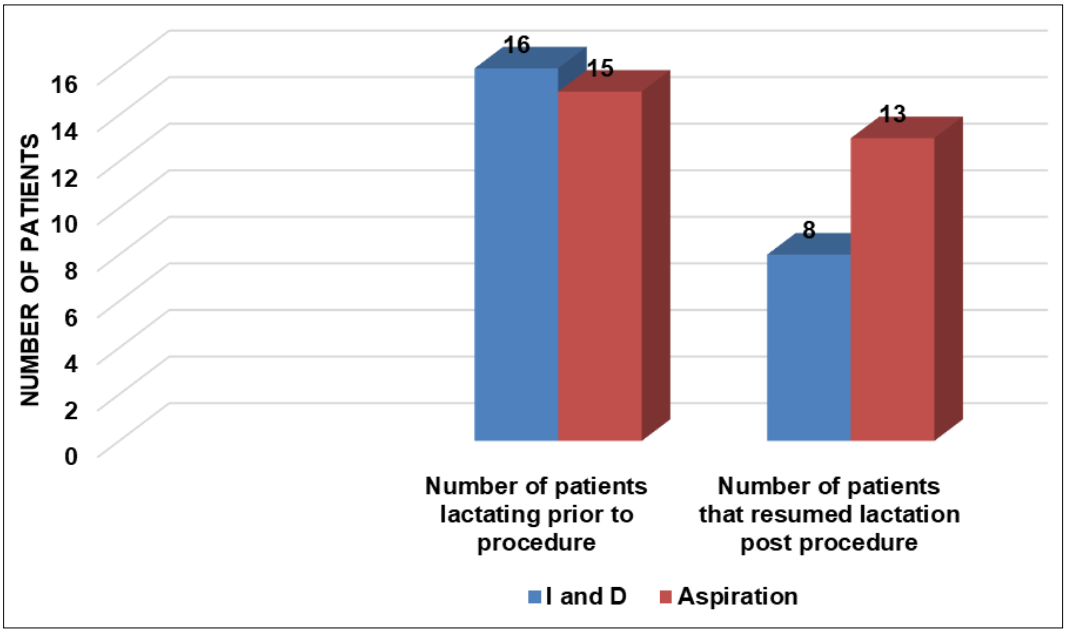

Chart 2: Comparision between Incision and Drainage and Aspiration with respect to Resumption of lactation

From the above table it is evident that 8 patients (50%) resumed lactation after Incision and Drainage whereas 13 patients (86.66%) resumed lactation after Aspiration. The resulting difference is statistically significant.

Table 12: Comparision between Incision and Drainage and USG guided aspiration with respect to hospital stay and healing time

Sr. No.	Hospital stay and Healing time	I and D	Aspiration	p value
1	Mean number of days required in the hospital for healing	9.60	4.73	$P < 0.0001$
2	Standard Deviation	3.80	1.59	Highly significant

From the above table it is evident that the mean number of days required for hospital stay and healing in Incision and Drainage group is 9.60 days whereas that in Aspiration is 4.73 days. The resulting difference is statistically significant.

Table 13: Comparison between Incision and Drainage and USG guided aspiration with respect to post procedure complications

Sr. No.	Post procedure Complications	I and D	Percentage	Aspiration	Percentage	p value
1	Scarring	17	56.67%	0	0	
2	Breast asymmetry	4	13.33%	2	6.66%	$P < 0.0001$
3	Formation of mammary fistula	3	10%	0	0	Highly Significant
4	Sepsis	1	3.33%	0	0	
5	None	5	16.66%	28	93.33%	
	Total	30	100%	30	100%	

From the above table it is evident that 25 patients (83.33%) experienced complications after Incision and Drainage whereas 2 patients (6.66%) experienced complications after aspiration. The resulting difference is statistically highly significant.

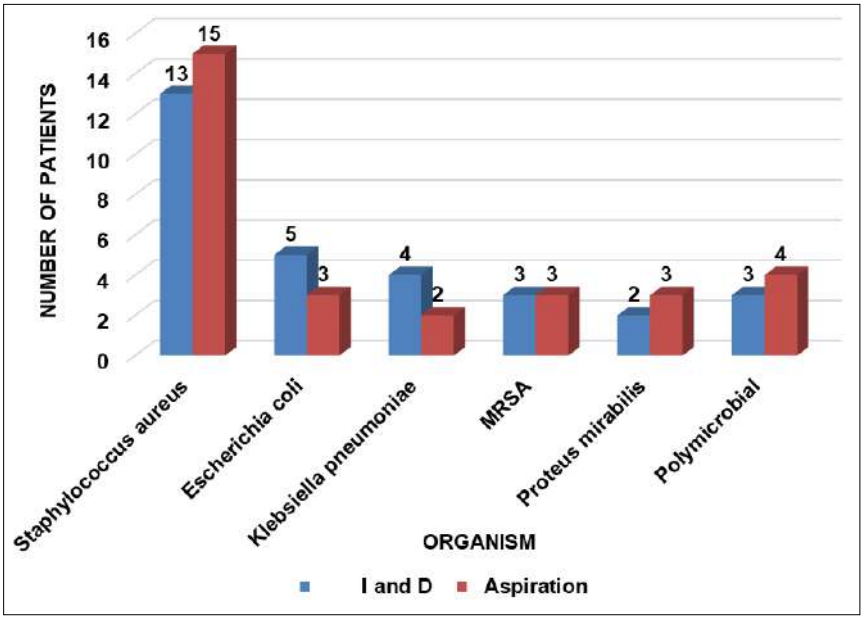

Chart 3: Comparison between Incision and Drainage and USG guided aspiration with respect to organisms grown on culture

From the above table it is evident that Staphylococcus aureus is the most common organism grown on culture in both groups of patients.

Post procedure patient satisfaction between Incision and Drainage and Aspiration

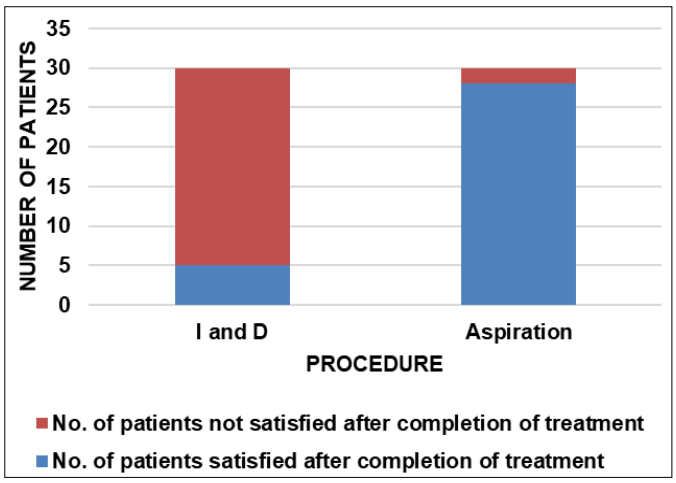

Chart 4: Comparison of post procedure patient satisfaction between Incision and Drainage and Aspiration

From the above table it is evident that 5 patients (16.67%) were satisfied after treatment in the incision and drainage group and 25 patients (83.33%) were satisfied after treatment in aspiration group. The resulting difference is statistically highly significant.

Discussion

This study was performed amongst 60 inpatients in the Department of General Surgery in our institution by fulfilling the inclusion criteria, over a period of two years. Breast abscesses are a common surgical problem. They can occur in both lactating and non-lactating females although the former is at a higher risk. They can present with localized pain, swelling and redness associated with a mass that may or may not be fluctuant. At a very early stage of presentation, mastitis can be conservatively treated with antibiotics but once an abscess is formed, surgical treatment with incision and drainage or aspiration of the abscess is essential.

Ranjeesh V *et al.* in his study of 60 patients with lactational breast abscesses reported that 32 patients (53.33%) were of the age group 21- 30 years [5]. This is comparable to the most commonly involved age group in our study. 32 patients (53.2%) in his study had left breast involvement and 28 patients (46.7%) had right breast involvement. His and other studies have also confirmed that there is near equal involvement of left and right breasts, similar to the finding in our study. The largest abscess in our study was of 11cmx11cm. It was managed by aspiration. Catherine S *et al.* in a retrospective review of breast ultrasound database from 2008 to 2010 identified 41 abscesses who underwent aspiration and came to a conclusion that even large abscesses can be managed with aspiration [6]. Chandika AB *et al.* in a study of 65 patients with breast abscess, noted 66.2% females to be lactating [7]. Although the two groups of incision and drainage and aspiration were comparable in terms of healing rate, ultrasound

guided aspiration was found to be a feasible. Most patients require a single aspiration. Some patients with larger abscesses require multiple aspirations. This finding in our study is comparable to the observation of Schwartz *et al.* who performed needle aspirations in 27 breast abscesses.26 18 (66.67%) abscesses were treated by single aspiration and 9 (33.33%) required multiple aspirations [8]. In a study conducted by Berna-Serna JD *et al.*, 22 cases of breast abscess were aspirated percutaneously out of which 19 (86.36%) required a single aspiration and only 2 (13.64%) required a second aspiration [9]. In our study, the observation of recurrence of breast abscess in case of incision and drainage procedure is comparable with Strauss *et al.* who studied 24 patients with 28 breast abscesses between 1997 and 2002 [10]. In the study 31% of patients who underwent incision and drainage had a recurrence of the abscess whereas no recurrence was found in patients who underwent aspiration. The conclusion of the study was that the aspiration group had a superior cosmetic result and shorter hospitalization, a finding that was observed in our study as well. Resumption of lactation is an important marker of functionality of the breast. In our study only 8 (50%) of the 16 lactating mothers who underwent incision and drainage resumed lactation whereas 13 (86.6%) of the 15 lactating mothers that underwent aspiration resumed lactation. Similar finding was observed by Prashant Kumar *et al.* where out of 20 lactating mothers with breast abscesses that were managed by incision and drainage 14 (70%) resumed lactation whereas 19 (95%) of patients treated with aspiration were able to breastfeed after treatment [11]. In our study the mean number of days required for hospital stay and healing in the incision and drainage group was 9.60 days whereas in the aspiration group was 4.73 days. This is comparable to the study of Karvande *et al.* who in a comparative study between aspiration and incision and drainage of 60 patients with breast abscesses came to a conclusion that there was a statistically significant difference between the healing time of the group treated by incision and drainage (7.60 days) and the aspiration group (4.27 days) [12]. Staphylococcus aureus was the most common organism isolated in cultures of the drained and aspirated abscesses. In a study of 50 cases that underwent aspiration, Singh *et al.* reported that Staphylococcus aureus was the most common organism isolated [13]. Hence the results of our study are comparable with that of well known authors.

Conclusion

From our study it was concluded that USG guided aspiration which is a minimally invasive technique for the management of breast abscess is a better alternative to Incision and Drainage being more efficacious with lesser number of days of hospital stay and healing and better cosmetic outcome. This has also been supported by other studies as well. Hence it should be the preferred first line of management in patients with breast abscess.

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