

Original Research Article

Assessment of open versus closed modalities of breast abscess treatments: a cross sectional comparative study

Aaditya M. Parakh, Mahendra K. Diwakar*

Department of Surgery, Government Medical College, Rajnandgaon, Chhatisgarh, India

Received: 28 March 2018

Accepted: 04 May 2018

***Correspondence:**

Dr. Mahendra K. Diwakar,

E-mail: mk.diwakar@rediffmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Breast abscesses, localized collection of pus in the breast, are most common in young lactating women. Objectives of the study were to compare open versus closed modalities of treatment of breast abscess and to isolate the commonest organism responsible for breast abscess.

Methods: A cross sectional prospective study was conducted in Department of Surgery or Department of Obstetrics and Gynecology from October 2009 to October 2011 among the breast abscess cases (both open and closed). The study was conducted in a group of 84 cases of breast abscess, divided in to two groups, the open group comprising of 46 cases and closed group comprising of 38 cases.

Results: The incidence of abscess was most commonly seen in young women between the age group 15 – 25 years (59.5%). Breast abscess was found more commonly in lactating women (78.6%), with the mean duration of lactation of 24.93 days. The most common side involved was the right breast (64.28%). The upper half of the breast, predominantly the upper outer quadrant (58.33%) was affected, least common being lower inner quadrant (3.57%).

Conclusions: On comparing the two methods of treatment of breast abscesses, the primary closure technique was superior to the conventional technique in terms of duration of healing, post operative pain, number of dressings required, length of hospitalization and post operative complications and quality of healing.

Keywords: Breast abscesses, Open method, Primary closure technique, *Staphylococcus aureus*

INTRODUCTION

A breast abscess is a localized collection of pus in the breast; usually occur in breastfeeding woman due to trauma and mastitis.¹ Breast abscesses are most common in young lactating women.² The incidence of abscesses in young women during their lactational period ranges from 0.4 to 11%.³ Mostly researchers reported *Staphylococcus aureus* is among the common cause for the infection.⁴

For the treatment of breast abscesses, surgical incision and drainage are usually carried out under a general anaesthesia, is a traditional method of treatment.³ Breaking down any loculi and draining the pus material from the cavity by incision of the swelling is the most

common method which follows the irrigation of cavity and either left open and packed with gauze or approximated around a drain.⁵ Benson et al reported an alternative to this method that involves incision over the abscess, breaking down loculations, the wall of the cavity is scraped as thoroughly by using a curette to remove its lining granulation tissue and then suturing closed of the abscess cavity.⁶ Surgical incision and drainage is the gold standard treatment. So the technique which should be used for the treatment depends on preference and experience of the treating physician.

Objectives of the study were to compare open versus closed modalities of treatment of breast abscess in terms of different aspects including duration and quality of

healing, number of dressings required, length of hospitalization, post-operative complications, etc and to isolate the commonest organism responsible for breast abscess and sensitivity of organisms for antibiotic.

METHODS

A cross sectional prospective study was designed to compare the breast abscess cases (both open and closed) admitted in Department of Surgery or Department of Obstetrics and Gynecology from October 2009 to October 2011. All the studied cases were subjected to clinical assessment using signs, symptoms and laboratory criteria, which were recorded in the pro-forma. The patients satisfied inclusion and exclusion criteria were selected for the study.

All breast abscess cases with the overlying skin of abscess intact were included in the study and the exclusion criteria were skin necrosis where primary suturing is not possible, burst open abscesses, multiple abscesses, recurrent abscesses after a previous surgical drainage, abscesses associated with underlying malignancy, tuberculosis etc and associated co-morbid condition like Diabetes Mellitus, H.I.V., Hepatitis B, etc. Total 84 cases were selected for the study and divided into two groups, the open group and the closed group. Out of which 46 were allocated in the open group which were treated by incision, drainage and packing and the remaining 38 cases were allocated in closed group, treated by primary closure technique with a drain *in situ*.

Detailed history was taken regarding complaints, duration, severity, onset of symptoms, mode of onset, progression of symptoms, change in pattern at time of presentation. Enquiries were made about history of diabetes and immuno-compromised state was done. Patient were also asked about personal habits regarding diet, sleep, bowel and bladder habits. Detailed history was taken regarding lactational status of the patient, parity of the patient and similar past history. Detailed general physical examination done regarding built, nutritional status, hydration, general appearance and presence of systemic illness. Vitals signs were recorded in each case. Systemic examination done to rule out any systemic disease.

Through local examination was done by inspection and palpation of the breast with the status of the regional lymph nodes. Routine blood and urine investigations were done in all cases. All cases were screened for HIV and Hepatitis- B for safety of the medical personal and if found positive those cases were excluded.

All patients received a loading dose of antibiotic (inj. Amoxicillin + clavulanic acid 1.2 gms intravenous), 1 hr before the contemplated procedure. Patient should be kept nil orally for 5 to 6 hours before the procedure. All abscesses were drained under short general anaesthesia or general anaesthesia depending upon age and general

condition of the patient and site of abscess. Stab incision is made over the most prominent and most dependent part of the abscess cavity. A pair of artery forceps or sinus forceps is forced into the abscess cavity, the blades are gradually opened and pus is extruded out. Pus is collected using a sterile swab or a syringe for isolating the type of microorganisms for culture and sensitivity. Finger is now introduced into the abscess cavity to break the loculations, for free drainage of pus. Drain all the accessible purulence using external pressure, suction or irrigation. Using a curette, the wall of the cavity is scraped as thoroughly as possible to remove unhealthy granulation tissue and hydrogen peroxide irrigation was given. Wound was well irrigated with copious amount of warm sterile solution.⁷

Now two different methods of packing were applied. Packing of the abscess cavity in open method, is a common method and sterile tapes, gauze or sponges were used in this method to pack the full extent after incision and drainage. Packs should be wet-to-dry dressing with normal saline changed twice a day until the wound heals from the base up. Closed method, an alternative method to the packing of abscess cavity, where one can obliterate the abscess cavity by placing a negative suction drain no. 16 (Romovac) inside the cavity and closing incised wound with interrupted vertical mattress skin suture with non absorbable suture. The dressing of the wound is inspected after 24 to 48 hours after the incision and drainage procedure. Subsequent dressing was be done twice a day, once daily or on alternate days depending on the soakage of the dressing and condition of the wound. Inj. Amoxicillin and clavulanic acid 1.2 gms Intravenous were given, two times a day for three days.

In open group dressings were done till complete healing or epithelisation occurred or till secondary suturing is done. The frequency of dressing was decided upon soakage from the wound. Patients were allowed to breast feed their child from affected breast after complete healing of abscess and were asked for review on O.P.D. basis weekly; up to 6 weeks. In closed group dressing were done once in 2 or 3 days till the healing occurred. The drain removal was done when drain stopped coming after confirming that there is no blockage. Breast feeding from affected breast is allowed after drain removal. Suture removal was done usually on 8th or 9th postoperative day.

The cases were analysed using descriptive statistics and inferential statistics using chi-square test and z-test for difference between two means. The statistical software used in the analysis was SPSS (statistical presentation system software) version 17.0 and Graph Pad Prism 4 and the results were tested at 5% level of significance.

RESULTS

A cross sectional prospective study was carried on 84 cases and among them 46 were treated by open method

and remaining 38 were carried out their treatment by closed method. Distribution of patients according to their age and the two methods of packing are presented in

Table 1. Maximum no. of cases i.e. 50 (59.5%) were observed in the 15-25 yrs of age group followed by patients more than 26-35 years (19.05%).

Table 1: Distribution of patients according to their age and different methods of packing (n=84).

Age (yrs)	Open		Closed		Total		
	No. of cases	%	No. of cases	%	No. of cases	%	
15-25	28	60.87	22	57.89	50	59.52	
26-35	6	13.04	10	26.32	16	19.05	
36-45	2	4.35	6	15.79	8	9.52	
45+	10	21.74	0	0.00	10	11.90	
Total	46	100	38	100	84	100	
Mean Age						28.80	

Table 2: Distribution of patients as per their symptoms, lactation history, side of breast abscess and quadrant involved (n=84).

	Open		Closed		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
Symptoms						
Pain	46	100	38	100	84	100
Swelling	44	95.65	38	100	82	97.62
Fever	38	82.61	32	84.21	70	83.33
Lactational history						
Present	30	65.2	36	94.7	66	78.6
Absent	16	34.8	2	5.3	18	21.4
Side of breast abscess						
Right	28	60.87	26	68.4	54	64.28
Left	18	39.13	12	31.6	30	35.71
Quadrant involved						
Upper Outer	26	56.52	23	60.52	49	58.33
Lower outer	11	23.91	10	26.32	21	25
Upper inner	8	17.39	3	7.89	11	13.10
Lower inner	1	2.17	2	5.26	3	3.57

Distribution patients according to the symptoms, history of lactation, side and site of breast abscess are tabulated in Table 2. In the present study, pain was present in 100% of patients, 82 (97.6%) out of 84 patients had swelling and 70 (83.3%) patients complained history of fever on presentation. Out of 46 cases operated by open method, 30 (65.2%) cases were lactating mothers, while 16 (34.8%) cases were non-lactating and 36 (94.7%) cases out of 38 cases operated by closed method were lactating mothers, while 2 (5.3%) case was non-lactating. Thus, out of 84 patients, 66 (78.6%) were lactating with a mean duration of lactation of 24.93. Abscess on right side is more common (64.28%) then on left side (35.71%). Among those 54 cases had abscess in right side, 28 cases were operated by open while 26 operated by closed method. Maximum no. of patients 49 (58.33%) had breast abscess in the upper outer quadrant followed by 21 (25%) cases in the lower outer quadrant, 11 (13.10%) cases in

the upper inner quadrant, and 3 (3.57%) case in the lower inner quadrant.

Table 3: Distribution of cases according to culture report.

Culture report	Open		Closed		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
Coag+ Staph	32	69.56	28	73.7	60	71.42
No Growth	12	26.08	8	21.05	20	23.80
<i>E. coli</i>	2	4.34	2	5.3	4	4.76

From the results of distribution of cases as per the culture report which are presented in Table 3, it was found that the most common organism found was coagulase positive *Staphylococci*, in 60 (71.42%) out of 84 cases. In the

study in 20 (21.05%) cases no organism was grown in the culture i.e. it was a sterile culture. In 4 cases (4.76%) *E. coli* species was grown in culture.

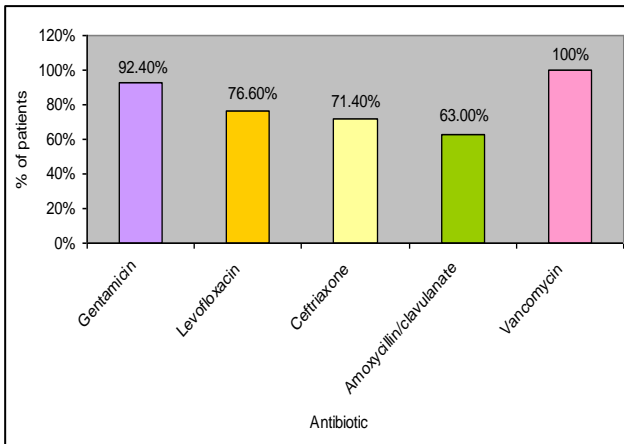


Figure 1: The sensitivity pattern of *S. aureus* to the antibiotics.

The total number of dressings in the open category was 14.52, whereas in the closed category it was 3.35 (Table 4). Thus less number of dressings is required in closed group (3.31 times) than in open group (14.52 times).

The difference of mean duration of analgesia given between the open and the closed group was 5.97 days (results shown in Table 5). Thus less analgesia is required

by patients treated by closed group than by patients treated by open group.

Table 4: Total number of dressings.

Group	Mean number of dressing	P value
Open	14.52	P value=0.000
Closed	3.31	Significant

Table 5: Duration of analgesia given.

Group	Mean number of days	z-value
Open	13.08	7.47
Closed	7.8	P value=0.000 Significant

In the study, the mean duration of drain removal in the closed group was 4.10 days and the mean duration of suture removal was 8.15 days. In the open group no drain or suture material was used in the management. Out of 84 cases, wound dehiscence was seen in 4 (4.76%) cases. These were seen in the patients treated by closed method 4 (10.5%) out of 38 cases. No wound dehiscence was seen in the open group.

Among the total cases, total recurrence was seen in 8 (9.52%) cases from which 3 (6.52%) cases out of 46 cases in open group and in 5 (13.15%) cases out of 38 cases in closed group.

Table 6: Recurrence of breast abscess.

	Open		Closed		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
Recurrence	3	6.52	5	13.15	8	9.52
No recurrence	43	93.48	33	86.85	76	90.48
Total	46	100	38	100	84	100

χ^2 value=2.00, p=0.15, NS, p>0.05

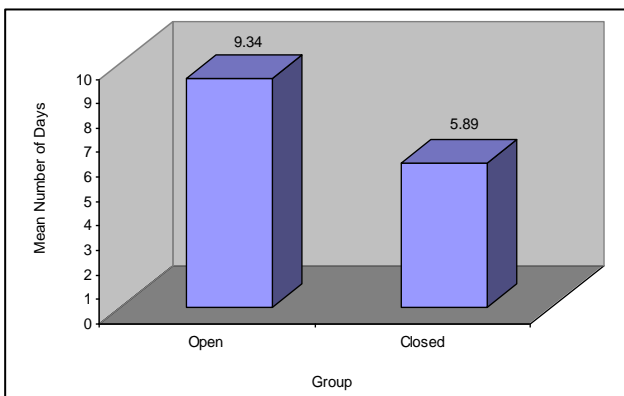


Figure 2: Duration of hospital stay.

29 cases out of 46 in the open group healed by secondary intention and 17 cases needed secondary suturing where as in the closed group out of total 38 cases, 34 (89.5%) healed by primary intention and 4 (10.5%) cases healed by secondary intention.

The mean duration of hospital stay in open group was 9.34 days as compared to closed group of 5.89 days (Figure 2). The difference in the mean total hospital stay between the open and closed group was 3.4 days.

DISCUSSION

A cross sectional prospective study was designed to compare open versus closed modalities of treatment of breast abscess in terms of different aspects and to isolate

the commonest organism responsible for breast abscess. The patients admitted in Department of General Surgery or Department of Obstetrics and Gynecology, from October 2009 to October 2011 and satisfied inclusion and exclusion criteria were selected for the study. A total of 84 cases of breast abscess were selected and divided into two groups including open group with 46 cases who underwent open drainage of the abscess and 38 cases in the closed group who underwent incision drainage with primary closure with a suction drain *in situ*.

From the results, it was found that the age group of the patient having maximum number of breast abscess, was between 15-25 years of age (59.5%) and the least in the age group between 36-45 years. These results corroborates with the past studies, which showed the mean age to be 22.3 years.⁸ The disease essentially affects the women of child bearing age group.

Symptoms including pain, a palpable swelling and associated fever are common in an abscess anywhere in the body including the breast. In this study, the predominant symptom was pain which was present in all 84 cases (100%) of breast abscess. A palpable swelling was present in 82 cases (97.6%) out of 84 cases in the study. Associated fever was present in 70 cases (83.3%) out of 84 cases. History of lactation was present in 78.6% of cases in the study, suggesting that the stasis of the milk and carrier state of the infant plays a key role in the development of breast abscess. Newton et al reported similar findings in their study.⁹ They mention three factors of importance in the development of breast abscess including trauma, stasis and infection. The mean duration of lactation in the study was noted to be 23.93 days, which was similar with the study done by Dener et al.¹⁰

Currents study revealed right side of breast was affected in 64.28% of cases out of 84 cases where as left side was affected in 35.7% of cases. The upper outer quadrant of breast was involved in 49 cases (58.33%) out of 84 cases in the study, the lower outer in 21 cases (25%) was the next most common site. The least common site involved in the breast abscess in the study was found to be lower inner quadrant which accounted for 3 cases out of 84 cases. Similar finding was reported by Ajao et al, which informed that maximum number breast abscess occur in upper half of the breast.¹¹

Pus drained from the abscess cavity was sent for culture and sensitivity in all the cases. In the study, 60 cases (71.42%) of 84 grew coagulase positive staphylococcus as the organism, 20 cases (23.80%) had no growth, i.e. the pus was sterile and 4 cases had *E. coli* species as culture organism. These findings are consistent with studies done by O'Hara et al which showed that the most common organism was found to be coagulase positive staphylococcus.¹² This is because coagulase positive *Staphylococcus* is the most common organism in the oropharynx of the feeding infant.

The organisms (coagulase positive *Staphylococcus*) sensitivity was 100% with Vancomycin, 91.66% with Gentamicin, 76.6% with levofloxacin, 71.6% with Ceftriaxone and 63% with Amoxicillin/clavulanate and other antibiotics were less sensitive. Here taking the safety profile of Amoxicillin/clavulanate in lactating and pregnant women we choose Amoxicillin/clavulanate as antibiotic of choice for both the groups. These results were in accordance with study by Onwubiko et al.¹³

More frequent and number of dressing were required in the open group patients as compared to the closed group patient, who required dressing every alternate day or once in 3 days depending on the soakage of the dressing. In the open group the mean number of dressing required were 14.52, as compared to the closed group, mean number of dressing being 3.31. The mean duration of analgesics given to the patients of open group was 13.8 days, where as that of closed group was 7.8 days. The patient in open group had to undergo daily dressing for a prolonged period of time which required analgesics. In the closed group after suture removal the patient required less frequent analgesics as analgesic drugs were given till patient were pain free.

The results of this study revealed the mean duration of drain removal was 4.10 days in closed group, which was similar to the results reported by Khanna et al.¹⁴ In the study the mean duration of suture removal was 8.51 days. This result was similar to study published by Rangabashyam from Chennai, who documented average healing time of 7 days in breast abscess.¹⁵ This is because in closed group the healing occurred by primary intention which takes shorter time as compared to healing by secondary intention in the open group which takes a longer time.

The failure rate in the study was judged by recurrence in the open group and closed group. In open group recurrence is seen in 3 (6.52%) cases out of 46 cases and in closed group 5 cases (13.15%) out of 38 cases recurrence is seen, which was managed like open group subsequently. The failure could be attributed to inadequate curettage of the abscess cavity at the time of surgery. Khanna et al reported failure in 3% of cases in their study.¹⁴ Macfic et al documented a recurrence rate of 11.4% with primary closure technique and 7.3% with open drainage.¹⁶

The outcome of the study was judged on healing by primary intention and healing by secondary intention or by secondary suturing, in closed and open group respectively. The healing by primary intention was seen in 34 cases (89.5%) of total 38 cases of closed group and 4 cases (10.5%) of closed group heal by secondary intention after wound dehiscence. In open group healing occurred by secondary intention in 29 cases (63.04%) out of 46 cases and rest 17 cases (37%) needed secondary suturing.

In the present study, the mean duration of hospital stay in the open group was 9.3 days which was higher than in closed group of 5.89 days. This was because the patient in closed group required lesser number of dressings as compared to open group and could be discharged from the hospital early. Abraham et al reported similar results in his study. Study done by Khanna et al showed mean duration of hospital stay of 7.2 days in closed group, which is comparable to this study.¹⁴

In closed group, in 34 (89.5%) cases, healing was with linear scar without distortion of breast. In 4 cases (with wound dehiscence) healing occurred by secondary intention where scar was irregular. In Open group cases wound healing was by secondary intention or secondary suturing and the scar were irregular and ragged. There was pigmentation in the scar also. So, quality of healing in closed group was found to be good.

CONCLUSION

The study was carried out among 84 patients of breast abscess who were admitted in Department of surgery and Department of obstetrics and gynaecology during their treatment by either conventional open drainage or primary closure technique. From this study it can be concluded that, the commonest age group affected was between 15-25 years, pain was the most common presenting complaint followed by swelling and fever in many cases. Majority of patients were lactating mothers but breast abscess could present in a non-lactating women as well. Right side breast was more commonly affected and abscess formation was more commonly seen in upper half of breast.

The most common organism found in culture was coagulase positive *Staphylococci* and found sensitive to Vancomycin, Gentamicin, levofloxacin, Ceftriaxone and Amoxicillin/clavulanate in decreasing order and other antibiotics were found to be less sensitive. Primary closure technique requires less number of dressings and less duration of postoperative analgesia with early resume to normal activity and breast feeding from affected breast.

Dressing in conventional method is painful and causes discomfort to the patient. Primary closure technique has a major drawback of failure, but the failure rates are acceptable. The duration of hospital stay and nursing care was less in primary closure technique as compared to open method of treatment.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rizzo M, Peng L, Frisch A, Jurado M, Umpierrez G. Breast abscesses in nonlactating women with diabetes: clinical features and outcome. *Am J Med Sci.* 2009;338(2):123-6.
2. Lam E, Chan T, Wiseman SM. Breast abscess: evidence based management recommendations. *Expert Rev Anti Infect Ther.* 2014;12(7):753-62.
3. Benson EA. Management of breast abscesses. *World J Surg* 1989;13:753-6.
4. Eryilmaz R, Sahin M, Hakan Tekelioglu M, Daldal E. Management of lactational breast abscesses. *Breast.* 2005;14:375-9.
5. Bates T, Down RH, Tant DR, Fiddian RV. The current treatment of breast abscesses in hospital and general practice. *Practitioner.* 1973;211:541-7
6. Benson EA, Goodman MA. Incision with primary suture in the treatment of acute puerperal breast abscess. *Br J Surg.* 1970;57(1):55-8.
7. Duncan JT, Walker J. *Staphylococci aureus* in the milk of nursing mothers and the alimentary canal of their infants. *J Hyg.* 1942;42:474.
8. Knott FA, Blaiklet JB. The control of staphylococcal aureus infection in a maternity department. *J Obst & Gyn. Brit Emp.* 1944;51:386
9. Newton M, Newton NR. The let-down reflex in human lactation. *J Paediat.* 1948;33:698.
10. Dener C, Inan A. Breast abscess in lactating women. *Wrd J Surg.* 2003;27(2):130-3.
11. Ajao OG, Ladipo JK, Al- Siagh AA, Malatani T. Primary closure of breast abscess compared with the conventional gauze packing and daily dressings. *West Afr J Med.* 1994;13(1):28-30.
12. O'Hara RJ, Dexter SP, Fox JN. Conservative management of infective mastitis and breast abscesses after ultrasonographic assessment. *Br J Surg.* 1996;83:1413-4.
13. Onwubiko NE, Sadiq NM. Antibiotic sensitivity pattern of *Staphylococcus aureus* from clinical isolates in a tertiary health institution in Kano, Northwestern Nigeria. *The Pan Afr Med J.* 2011;8:4.
14. Khanna YK, Khanna A, Arora YK, Mathur G, Heda RR, Bhandari DR, Jhangi RN. Primary closure of lactational breast abscess. *J Indian Med Assoc.* 1989;87(5):118-20.
15. Rangabashyam N. Current management of acute soft tissue abscess. *Ind J Surg.* 1981;46:26-38.
16. Macfie J, Harvey J. The treatment of acute superficial abscesses: a prospective clinical trial. *Br J Surg.* 1997;64:264-6.

Cite this article as: Parakh AM, Diwakar MK. Assessment of open versus closed modalities of breast abscess treatments: a cross sectional comparative study. *Int Surg J* 2018;5:2142-7.