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Evaluation of postoperative outcomes following primary suction closure for breast abscess

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Abstract

Background: Breast abscess is a common inflammatory condition among lactating women. Although initial stages of breast abscess can be managed through antibiotics, surgery may be required in the presence of advanced stages in the form of incision and drainage with or without placement of surgical drain. This study was carried out to evaluate the outcomes between open and closed incision and drainage.

Methods: This randomized control trial was carried out among 60 cases clinically diagnosed breast abscess. The participants were randomly allocated to experiment group (30 patients) consisting of closed primary suction closure and control group (30 patients) open incision and drainage. Postoperative outcomes in terms of recurrence, pain, secondary infection and duration of hospital stay were recorded.

Results: Postoperative pain was present among six participants in the experimental group as compared to 18 participants in the control group, none of the participants in the experimental group experienced residual abscess, scar formation or secondary infections. Moreover, the mean duration of hospital stay among experimental group was 9.1 days as against 11.6 days in the control group.

Conclusion: Considering the potent clinical, surgical and financial advantages associated with closed primary suction closure, this method may be routinely used for effective management of acute breast abscess, especially in lactating women.

Keywords: Breast abscess, incision and drainage, postoperative pain, primary suction closure

Introduction

Breast abscess is an acute inflammatory condition of the breast which occurs due to infection and inflammation of the breast tissue. Clinically, breast abscess manifests as painful and erythematous swelling in the breast which may drain through the skin of nipple duct opening. It is therefore, essential to identify and treat the abscess as early as possible to avoid various complications. Breast abscess is commonly seen in lactating women following trauma or mastitis, although it can occur in certain high risk non-lactating women with immuno compromised state. Another important risk factor is smoking, although its etiopathogenesis is yet to be proved ^[1]. The incidence of abscess in young lactating women may vary from 0.5 to 11% ^[2]. Staphylococcus aureus being abundantly present in skin is responsible for abscess formation in majority of the instances. Other than S. aureus, the other common organisms involved in pathogenesis of breast abscess include S. epidermidis, Streptococci, peptostreptococci and bacteroides ^[2]. The management of breast abscess is critical as delayed treatment may be associated with complications such as sinus formation and drainage of pus over the surface.

Although initial stages of breast abscess can be managed through antibiotics, surgery may be required in the presence of advanced stages in the form of incision and drainage with or without placement of surgical drain. The management has been evolving and in recent times minimally invasive techniques, percutaneous placement of drain and repeated aspirations of breast abscess are becoming immensely popular among treating surgeons. This minimally invasive procedure is associated with decreased morbidity and chances of early return to breast feeding. Benson *et al.* reported an alternative to the conventional method of incision and drainage that involves incision over the abscess, followed by breaking down of the locations and scraping the wall of the cavity thoroughly by using a curette to remove its lining granulation tissue and then suturing closed ends of the abscess ^[3]. The principle behind this management was proposed by Ellis *et al.*, who observed that the wall of abscess prevented access of blood in the abscess cavity and if

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this wall was curetted then the cavity could be filled with antibiotic allowing safe closure [4]. This proposed method, termed as primary suction closure is supported by many authors who demonstrated its usefulness in the management of breast abscess. Advantages of closure technique are quick healing rate, less hospital stay, no greater recurrence than the conventional method, better scar formation and finally reduced cost of material and may be recommended as an alternative treatment that is superior to the conventional technique [5]. The present study was taken up to compare the outcomes between conventional incision and drainage and primary suction closure.

Objectives

This study was carried out to evaluate the outcomes between conventional incision and drainage and primary suction closure in terms of

- Post-operative pain
- Residual abscess
- Duration of hospital stay
- Time required for complete healing
- Appearance of scar

Methodology

Study setting and participants

This study was carried out as a single blind, randomized controlled trial among the patients admitted to the Department of General Surgery of our tertiary teaching institution with a diagnosis of breast abscess for a period of two years between October 2017 to September 2019.

Selection criteria

All the patients clinically diagnosed with breast abscess during the study period were taken up for the study. Patients diagnosed with antibioma were excluded.

Study procedure

The study consisted of two groups- the experiment group, wherein the patients underwent primary suction closure technique and the control group, where breast abscess was managed using conventional technique of incision and drainage.

Sample size and sampling technique

A total of 60 breast abscess patients who were admitted during the study period and fulfilled selection criteria were selected by convenience sampling. The participants were randomly allocated to the experiment group and control group using computer generated random numbers. There were 30 participants in each group.

Ethical approval and informed consent

Approval was obtained from the institutional ethics committee prior to the commencement of the study. Each participant was explained in detail about the study and informed consent was obtained prior to the data collection.

Experimental procedure

Conventional incision and drainage

Drainage was done with intravenous sedation or short general anaesthesia by placing corrugated drain was followed up with repeated dressings in post-operative period. Pus was sent for culture and sensitivity.

Percutaneous suction drainage

Under local anesthesia infiltration given below the lower

palpable margin of abscess, a small incision was made with lister sinus forceps. All loculi were cleared and complete abscess cavity was irrigated with betadine and hydrogen peroxide. A 16F suction drain was inserted to abscess cavity. The perforated portion of drainage tube was shortened to fit in abscess cavity. The drain was fixed to skin with the help of silk 2-0 and suction was applied. Pus was sent for culture and sensitivity. Breast feeding was encouraged when the study participant was a lactating mother. When the volume of pus discharge was reduced to less than 10 ml drain was removed.

Data collection

A structured interview schedule was used to obtain clinical and demographic information regarding the study participants. The participants were randomly allocated to the experimental/control group. After obtaining informed consent, the procedure was carried out. The participants were periodically examined at first, second and fourth post-operative week. Outcomes of the surgical technique in terms of post-operative pain, residual abscess, duration of hospital stay, time required for complete healing and appearance of scar were clinically evaluated by the principal investigator. Post-operative pain was assessed using visual analog scale and analgesic requirement.

Data analysis

Data was entered and analysed using SPSS ver. 20 software. The clinical outcomes were expressed as percentages. Comparison between the two surgical techniques was carried out using chi square test. A p value <0.05 was considered statistically significant.

Results

This study was carried out among 60 patients clinically diagnosed with breast abscess of which 30 participants were allocated to the experimental group and 30 participants were allocated to the control group. Both the groups were similar in characteristics. The mean age of the participants in experiment group was 34.1±7.9 years and the same among controls was 38.1±9.7 years. The clinical characteristics of the study participants is given in table 1. Among the experimental group, swelling was present in 80% of the participants, and pain was present in 70% of the participants. In the control group, swelling was present in all the participants (100%) while pain was present in 80% of the participants.

The distribution of the outcome parameters between the two groups is given in figure -1. While post-operative pain was present among six participants in the experimental group as compared to 18 participants in the control group, none of the participants in the experimental group experienced residual abscess, scar formation or secondary infections. Moreover, the mean duration of hospital stay among experimental group was 9.1 days as against 11.6 days in the control group. Similarly, the average time taken for complete healing was 10.7 days in the experiment group as against 15.4 days in the control group.

The culture results for both the groups is given in table 2. Majority of the organisms in the experimental group was E. coli (50%) followed by proteus (30%) and S. aureus (20%). Among the controls, the most common organism isolated was Multidrug resistant Staphylococcus aureus (MRSA) infections (60%) followed by E. coli and S. epidermidis (20% each). The observed difference was statistically significant ($p < 0.05$)

The association between various outcome parameters and type of intervention is given in table 3. There was a strong association between the choice of intervention and the outcome

parameters. None of the participants in experimental group experienced residual abscess, scar formation and secondary infection compared to the participants in the control group. The observed difference was statistically significant ($p < 0.05$)

The comparison between the interventions in terms of duration of hospital stay and time for complete healing is presented in table 4. There was a statistically significant difference between the groups, wherein the experimental group demonstrated shorter duration of hospital stay and shorter time for complete healing compared to the control group ($p < 0.05$)

Table 1: Clinical characteristics of breast abscess

S. No	Characteristics	Experiment (N=30)		Control (N=30)	
		N	%	n	%
1	Site of abscess				
	Left	10	33.3	17	56.7
	Right	20	66.70	13	43.3
2	Swelling				
	Present	24	80.0	30	100.0
	Absent	6	20.0	0	0
3	Pain				
	Present	21	70.0	24	80.0
	Absent	9	30.0	6	20.0

Table 4: Comparison between the two groups in terms of duration of stay and healing:

S. No	Parameter	Group	Mean	Percentile 25	Percentile 75	Mean Rank	Mann-Whitney Test	P-value
1	Duration of hospital stay	Experiment	9.1	7	12	24.8	279	0.010*
		Control	11.6	10	15	36.2		
2	Time for complete healing	Experiment	10.7	9	12	23	225	0.001*
		Control	15.4	12	21	38		

*statistically significant

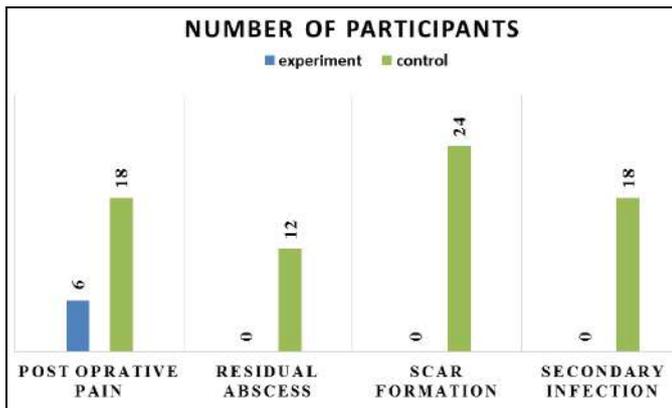


Fig 1: Distribution of outcome parameters between both the groups

Discussion

This study was primarily carried out to evaluate the post-operative outcomes between conventional incision and drainage and primary suction closure. The mean age of the study participants in the present study was 34 years. The mean age was similar in various studies done by AF Christensen *et al.* (36 years) [6]. In the present study, right sided breast abscess was common in 55% (33 patients) and left sided breast abscess were present in 45% (27 patients).

In the present study post-operative pain was measured according to visual analogue scale and analgesic requirement. In experiment group reduced post-operative pain was observed in majority of the participants (80%) when compared to patients who underwent open drainage 40% ($p < 0.05$). Similar findings

Table 2: Comparison of culture results between the two groups:

S. No	Characteristic bacterial growth	Experiment (N=30)		Control (N=30)		Chi sq	p value
		n	%	n	%		
1	E. coli	15	50.0	6	20.0	42.8	0.0001*
2	MRSA	0	.0	18	60.0		
3	Proteus	9	30.0	0	.0		
4	S. aureus	6	20.0	0	.0		
5	S. Epidermidis	0	.0	6	20.0		

*statistically significant

Table 3: Association between outcome parameters and intervention:

S. No	Outcome	N	Experiment		Control		Chi sq	p value
			N	%	n	%		
1	Post-operative pain							
	Present	24	6	20.0	18	60.0	10.0	0.001*
	Absent	36	24	80.0	12	40.0		
2	Residual abscess							
	Present	12	0	.0	12	40.0	15.0	0.0001*
	Absent	48	30	100.0	18	60.0		
3	Scar formation							
	Minimum	36	30	100.0	6	20.0	40.0	0.0001*
	Maximum	24	0	.0	24	80.0		
4	Secondary infection							
	Present	18	0	.0	18	60.0	25.7	0.0001*
	Absent	42	30	100.0	12	40.0		

*statistically significant

were observed in studies done by Edino *et al.* and Sudharshan Odiyaetal [7, 8]. In post-operative period open incision and drainage had more pain due to repeated dressings, which was absent in closed drainage. Moreover, the participants in the experiment group did not have residual abscess when compared to open drainage where there was 20% residual abscess. Residual abscess was absent in the experimental group due to continuous negative suction created in the walls of abscess cavity, thereby preventing residual secretions. With significant p value of 0.001, Khanna *et al.* reported residual abscess in 3% of cases in their study [9]. Kaushal S *et al.* had three patients with residual abscess [10]. Chandika *et al.* had no residual abscess in closed drainage but present in conventional incision and drainage [11]. Study done by Khanna YK *et al.* showed residual abscess in 6% of cases of primary closure and study done by Dubey V *et al.* showed residual abscess in 4.4% of cases of primary closure [9, 12].

In present study no recurrence is seen in the experiment group and there was one case of recurrence out of 25 cases (4%) in control group. Similar findings were observed in study by Anirrudha K where recurrence was three times more in cases of conventional incision and drainage as compared to primary closure [5]. Similar findings were observed in the study by Khanna *et al.* [9]. In the present study, closed drainage had better and minimal cosmetic scarring when compared to open drainage which had maximum scarring. Scarring was minimal in closed drainage due to minimal exposure and handling of tissues. With significant p value 0.001, the study findings were supported by Abraham *et al.* and Khanna *et al.* [9, 13]. Dieter Ulitzsch *et al.* reported 96% of patients with closed drainage had better

cosmetic results ^[14]. According to Chandika *et al.* needle aspiration is highly accepted modality. Which was said to cause minimum scar ^[11].

In the study mean duration of hospital stay and time required for complete healing is of significance ($p < 0.001$). Similar finding was observed in a study conducted by Abraham *et al.* which observed that hospitalization was reduced by 40-60% in closed drainage. In the present study closed drainage group had no secondary infection when compared to open drainage group which was due to exposure of tissues to external environment. With a secondary infection of 30% in the open drainage ($p < 0.01$) culture and sensitivity shown *E. coli* (50%) as the predominant organism in the closed drainage and MRSA in 60% of open drainage group. Presence of MRSA infections further increases the complications and challenges for medical management.

Conclusion

Closed drainage is a cost-effective alternative method of treatment to incision and drainage in breast abscess patients. Conventional incision and drainage of breast abscess leads to more pain, delayed healing and prolonged cessation of breast feeding. Since breast abscess is more common in young women, scar is a major concern and therefore closed drainage can be a preferred option which leaves behind a better scar, and breast regains its suppleness very fast. Furthermore Post operative pain, Scar formation, Residual abscess, Secondary infection, time for complete healing and hospital stay are better with closed drainage of breast abscess. Above all, closed drainage helps initiate breast feeding early, thereby ensuring quality of life and increased willingness to this management technique.

Declaration

Conflict of interest – nil

Funding –nil

Ethical approval –obtained

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