Original Research Article

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Conventional incision and drainage versus incision and drainage with primary closure in acute abscess: a prospective study

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ABSTRACT

Background: An abscess is a common surgical condition. Abscesses may occur anywhere in the body. Surgical treatment of subcutaneous and soft tissue abscesses includes percutaneous aspiration, incision and drainage without primary closure, incision and drainage with primary closure with drain. The present study was planned to compare conventional method of incision and drainage with incision and drainage with primary closure in cases of acute - abscesses.

Methods: A total of 100 patients with acute abscesses were included in the study and randomized into 2 groups with 50 patients in each group. The present study was carried out to compare the conventional method of incision and drainage with incision and drainage with primary closure of the wounds in acute abscesses with regards to wound healing, post-operative pain, duration of hospital stays and recurrence rates.

Results: Wound healing was significantly faster in incision and drainage with primary closure $(9.18\pm0.941 \text{days})$ as compared to conventional method of incision and drainage $(16.66\pm1.944 \text{ days})$ [p <0.05]. Mean hospital stay with convention method of incision and drainage was 7.12 ± 0.718 days and with primary closure was $4.0\pm0.728 \text{days}$ (p <0.05). Mean VAS was significantly less in primary closure as compared with conventional method. Decreasing trend in VAS was observed on day 3, day 5 and day 7 (p value 0.000). Recurrence rate of an abscess was seen in 5 cases in conventional method and 2 cases in primary closure (p >0.05).

Conclusions: Author have observed a significant difference noted in time taken for wound healing, postoperative pain, hospital stay and recurrence rate between two groups.

Keywords: Acute abscesses, Incision and drainage, Primary closure, Wound healing

INTRODUCTION

An abscess is a common surgical condition.¹ It is a collection of pus that has accumulated within a tissue because of an inflammatory process in response to either infectious process or foreign material like infected needles, bullet wounds or infected wooden materials.² It is defensive reaction of the tissue to prevent the spread of infection to other parts of the body. The organism or foreign materials kill the local cells resulting in the release of cytokines which trigger inflammatory response

and draw large number of blood cells to area and increase regional blood flow.³ Clinically it is a painful fluctuant soft tissue mass surrounded by firm granulation tissue and erythema.⁴

Predisposing factors to abscess formation include impaired host defense mechanisms, the presence of foreign bodies, tissue ischemia or necrosis, hematoma or excessive fluid accumulation in tissue. Intravenous drug use is another important risk factor with rates reported as high as 65% in this population.⁵ Trauma is also important

factor for abscess formation like infected needles in case of gluteal abscesses which cause implantation of bacteria into deeper structures.

Abscesses may occur anywhere in the body and the nature of infective organisms varies with particular site of abscess formation. Subcutaneous abscess is typically poly-microbial in nature. Staphylococcus aureus and group A beta haemolytic streptococci are most commonly involved aerobic microorganisms. Commonly isolated anaerobes include Bacteroides, *Pepto-cocci*, *Pepto-streptococci*, *clostridium sp.*, *lactobacillus sp.* and fusobacteria. *Staphylococcus aureus* is most commonly involved organism.⁶

For the treatment of subcutaneous and soft tissue abscesses, options include percutaneous aspiration, incision and drainage without primary closure, incision and drainage with primary closure with drain. Out of these incision and drainage without primary closure remains the preferred choice but it leaves an ugly scar, delay wound healing and dressings are painful.⁷

But this long held dogma was first challenged by Ellis in 1951 who describe primary closure of incision and drainage of abscess. Primary closure causes fast healing, less pain and better scar as compared to conventional method of incision and drainage.^{8,9}

The present study was planned to compare conventional method of incision and drainage with incision and drainage with primary closure in cases of acute - abscesses.

METHODS

After Institutional ethical committee approval, the present comparative prospective study was conducted in the department of General Surgery, in our institution during the period of January 2014 to October 2015. A total of 100 patients with acute abscesses were included in the study after taking written informed consent. The study population was randomly divided using computer generated randomization into 2 groups with 50 patients in each group.

Patients in Group A were treated by conventional incision and drainage and patients in Group B were treated by incision and drainage with primary closure of the wound. Primary objective was to compare the conventional method of incision and drainage with incision and drainage with primary closure of the wounds in acute abscesses with regards to wound healing and post-operative pain while secondary objective was to record duration of hospital stay and recurrence rate

Inclusion criteria were all patients with acute superficial abscesses attending surgical Out Patient Department (OPD) and casualty.

Patients suffering from systemic diseases like diabetes, immunodeficiency, anemia and patients on steroids were excluded from the study. Patient with deep seated abscesses (e.g. intra-abdominal abscess, pelvic), thoracic, intracranial abscess, abscess cavity of internal diameter (I.D.) of more than 5cm and patients with systemic signs of infection (such as fever, chills, and hypotension) were also excluded from the study. In each patient detailed history and thorough clinical examination was carried out.

Patients were prepared preoperatively by giving injection tetanus toxoid and xylocaine sensitivity test (XST). Anesthesia was given depending on the site and age. e.g. local, regional, spinal, general anesthesia. Patients were given injection amoxicillin (1000mg) in combination with potassium clavulanate (200mg), 1.2gm intravenous (i.v.) before induction of anesthesia. Skin was cleaned with 10% povidone iodine solution and draped. Incision was taken at the most prominent site and abscess cavity was drained. Pus was collected in sterile syringe and sent for culture and sensitivity. Abscess cavity was drained, curetted and irrigated with povidone iodine and hydrogen peroxide. After draining the abscess, ID of the abscess cavity was measured using a sterile suture material measuring the distance between the opposite walls of the abscess cavity.

In group A abscess was packed with ribbon gauze soaked in povidone iodine and hydrogen peroxide while in group B abscess was primarily sutured with polyamide nylon. Vertical mattress sutures were taken keeping multiperforated negative suction drain in the cavity.

Postoperatively in both the groups injection diclofenac sodium 75mg single dose was given and then continued with tab. diclofenac sodium 50mg twice a day for 3 days and thereafter SOS to maintain analgesia. In both the groups injection amoxicillin (1000mg) in combination with potassium clavulanate (200mg) 1.2 gm i.v. given 12hrs for 2 days and then continued with Tab. for 3 more days. After the culture reports were available, as per culture sensitivity report antibiotics were changed accordingly for next five days.

In group A dressings were done daily. Cavity was cleaned with povidone iodine and hydrogen peroxide, then scraped and packed with ribbon gauze soaked with povidone iodine and hydrogen peroxide. The length of ribbon gauze was gradually made smaller depending on the size of the cavity to allow obliteration of cavity. However, in group B first dressings were done on second day and then as and when required. Suction drain was removed after the discharge from abscess cavity was minimal (less than 5ml/day) and the sutures were removed between 7th-14th day after confirming that the suture line was healthy.

In group A healing time was recorded from time of incision till the complete obliteration of abscess cavity

and in group B healing time was recorded from time of incision till suture removal after confirming that skin edges were properly approximated. Post-operative pain was assessed using visual analogue score (VAS) on day 1, 3, 5 and 7. Pain was labeled as mild (VAS 0-3), moderate (VAS 4-6) and severe (VAS 7-10) As patients were operated on day of admission on emergency basis, the duration of hospital stay was calculated from day of admission till the day of discharge. On follow up at 1, 2 and 3 months recurrence was noted in both the groups. A recurrence was defined as the development of further abscess; sinus or fistula after wound was healed. Data from the present study was systematically compiled using Microsoft excel worksheet, continuous data were summarized as means, standard deviations (SDs), and results were calculated using student t test and Chi Square tests.

RESULTS

In present study most, common age group for occurrence of abscess was 21-30 years. Youngest patent age is 11 years and oldest age is 79 years. In the present study out of 50 patients, 30 were males and 20 were females in conventional method of incision and drainage and out of 50 patients 31 were males and 19 were females in primary closure. Males to females ratio in conventional method was 1.5:1 and in primary closure was 1.6:1. In present study abscesses of size <5 cm were included in group A and B. Both groups were comparable in terms of age, gender and size of abscess as shown in Table 1.

Table 1: Comparison group A and group B.

Parameter	Group A Mean± SD (n=50)	Group B Mean± SD (n=50)
Age (years)	41.04±17.271	40.22±16.361
Gender(male/female)	30/20	31/19
Size of abscess (cm)	4.084±0.5270	4.136±0.597.

In the present study based on location of abscess the most common site was upper and lower extremity in both groups which was 44% in conventional method and 26% in primary closure followed by anterior abdominal wall >breast abscess >axillary abscess (Table 2). Site of abscess in both groups is shown in Table 2.

Table 2: Location of abscesses in group A and group B.

Site	Group A	Group B
Ant. abdominal wall	8	7
Ant. chest wall	2	2
Upper limb including axilla	19	13
Breast	8	9
Lower limb including gluteal	13	18
Back	-	1
Total	50	50

In present study staph aureus was most common organism involved in abscess. Organism wise distribution of cases in group A and group B is shown in Table 3.

Table 3: Organism wise distribution of cases in group A and group B.

Organism	Group A (n=50)	%	Group B (n=50)	%
E. coli	9	18	10	20
K. pneumonia	5	10	5	10
MSSA	2	4	1	2
MRSA	7	14	6	12
Pseudomonas	8	16	4	8
Polymicrobial	9	18	16	32
No growth	10	20	8	16

Wound healing was significantly faster in incision and drainage with primary closure (9.18±941days) as compared to conventional method of incision and drainage (16.66±1.944 days) Mean hospital stay was significantly less in primary closure as compared to conventional method of incision and drainage. Hospital stay, wound Healing and recurrence in both groups is shown in Table 4.

Table 4: Postoperative findings in Group A and Group B.

Variables	Group A Mean±SD	Group B Mean±SD	P value
Wound healing (days)	16.66±1.944	9.18±.941	< 0.05
Hospital stay (days)	7.12±0.718	4.0±0.728	< 0.05
Recurrence (Absent/ present)	39/5	46/2	>0.05

Postoperative VAS is shown in table 5. Mean VAS was significantly less in primary closure as compared with conventional method.

Table 5: Day wise comparison of visual analogue score (VAS) in Group A and Group B.

	Group A	Group B	
VAS	Mean± SD (N=50)	Mean± SD (N=50)	P value
DAY 1	7.40 ± 0.756	4.52 ± 0.580	0.000
DAY 3	5.42 ± 0.758	3.36 ± 0.485	0.000
DAY 5	3.90±0.641	2.32±0.471	0.000
DAY 7	2.76±0.555	1.06 ± 0.242	0.000

DISCUSSION

Cutaneous abscesses are responsible for a major number of emergency department visits and incidence is increasing. In the past a basic surgical principle has been that a highly contaminated or infected wound should never be closed by primary intention. ¹⁰ Hence conventional treatment of subcutaneous abscess was incision and drainage followed by secondary healing by granular tissues and reepithelization. But many evidences are now available in the literature in support of immediate primary closure following incision and drainage in cases of acute abscesses. Several authors have highlighted advantages of primary closure method following incision and drainage in terms of early wound healing, lesser hospital stay, lesser pain, better scar and decreased recurrence rate in such patients. ¹¹⁻¹³

The present study was carried out to compare the conventional method of incision and drainage with incision and drainage with primary closure of the wounds in acute abscesses with regards to wound healing, post-operative pain, duration of hospital stays and recurrence rates.

In present study mean age (years) in conventional method of incision and drainage was 41.04 with standard deviation±17.27 and mean age in primary closure 40.22 with standard deviation±16.36 (Table 1). In the present study males to females ratio in conventional method was 1.5:1 and in primary closure was 1.6:1 (Table 1).

Mean size of abscess (cm) in conventional method of incision and drainage is 4.084 ± 0.5270 and in primary closure mean size was 4.136 ± 0.597 (Table 1). In a study by Adam J Singer studied abscess size ranged from $1-15\text{cm}^2$ with median of 5cm^2 (IQR=4 to 10cm^2). 13

In the present study based on location of abscess the most common site was upper and lower extremity in both groups which was 44% in conventional method and 26% in primary closure followed by anterior abdominal wall >breast abscess > axillary abscess (Table 2). In a study by Edino et al the location of abscesses was most common on breast, followed by gluteal, on head and neck, on perianal, axilla and on inguinal region.¹⁴

In present study staph aureus was most common organism involved in abscess (Table 3). *E. coli* was found in 9 (18%) of cases in group A and 10 (20%) in group B. MRSA was found in 7 (14%) in group A cases and 6 (12%) of cases of group B. Poly-microbial growth was found 9 (18%) of group A and 16 (32%) of group B. No growth was found in 10 (20%) of group A and 8 (16%). In a study by Vishvanathan et al showed that coagulase positive S. areus was isolated from 69% of the cultures obtained and 21% of the cultures were sterilized from abscesses. ¹⁵

In present study wound healing was compared between two groups. Wound healing was significantly faster in incision and drainage with primary closure (9.18±0.941days) as compared to conventional method of incision and drainage (16.66±1.944 days) (Table 4). In study done by Singer AJ et al healing time was compared

between conventional method of incision and drainage to incision and drainage with primary closure. Mean healing time in conventional method of incision and drainage was 15 days and 7.8 days in incision and drainage with primary closure. This confirms that wounds with primary closer tend to heal early. Dubey V et al, in their study found that healing time for primary closure patients ranged from 7 days to 11 days, while incision and drainage healing time ranged from 12 days to 36 days and was comparable to present study. 16

Khanna YK et al in their study on gluteal abscess found that wound healing in primary closure group was in 7-10 days compared to incision and drainage group which was 30-50 days.¹⁷

In present study mean hospital stay with convention method of incision and drainage was 7.12±0.718 days and with primary closure was 4.0±0.728 days (Table 4). Mean hospital stay was significantly less in primary closure as compared to conventional method of incision and drainage. Similar finding was observed in a study conducted by Abraham N et al who compared open versus closed surgical treatment of abscesses. Hospitalization was reduced by 40-60% in group with closure of superficial abscess.¹³

In present study recurrence rate of an abscess was seen in 5 cases in conventional method and 2 cases in primary closure (Table 4). Although this difference in recurrence within group was statistically not significant but clinically it was more common in conventional incision and drainage as compare to primary closure. Similar finding was seen 100 cases of injection abscesses managed by primary closure technique. No patient in the series had second time anesthesia for a recurrent abscess in the same wound.¹⁷

In present study postoperative pain assessment was done by VAS and there was significant difference in VAS on postoperative day 1, day 3, day 5 and day 7 in conventional method and primary closure on comparing both the groups in present study (Table 5). Mean VAS was significantly less in primary closure as compared with conventional method. Decreasing trend in VAS was observed on day 3, day 5 and day 7. P value was highly statistically significant (P value<0.000). Similar finding was observed in a study conducted by Abraham N et al, authors concluded that in primary closure of acute superficial abscesses postoperative pain was significantly less. 13 Similar results were seen in a study by Malley O et al, they concluded that not packing simple cutaneous abscesses did not result in any increased morbidity, and patients reported less pain and used fewer pain medications than packed patients.8

Thus, in present study, we have observed a significant difference in time taken for wound healing, postoperative pain, hospital stay and recurrence rate between two groups thus saving the lengthy nursing care and hospital expenses. So, we recommend routine use of primary closure following incision and drainage as a preferred modality of intervention in abscesses of size less than 5cm. There is a need for a wider adaptation of primary closure techniques among surgeons.

CONCLUSION

Primary closure of abscesses is associated with less postoperative pain, decreased hospital stays, fastened healing and low recurrence rate and thus may be recommended as an alternative treatment to the conventional technique of incision and drainage.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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