Original Research Paper

Volume - 15 | Issue - 10 | October - 2025 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

General Surgery

COMPARATIVE STUDY OF CONVENTIONAL INCISION DRAINAGE VERSUS INCISION DRAINAGE WITH PRIMARY CLOSURE AND DRAIN PLACEMENT FOR TREATMENT OF ACUTE ABSCESSES

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ABSTRACT Acute abscesses are commonly treated by incision and drainage with secondary healing, which often leads to prolonged recovery and patient discomfort. This prospective randomized study compared conventional incision and drainage versus incision and drainage with primary closure and drain placement in 78 patients aged 10–85 with acute superficial abscesses, evaluating wound healing, hospital stay, microbiology, and recurrence. Patients were assigned to Group A (conventional incision and drainage) or Group B (incision and drainage with primary closure and drain), and data on demographics, comorbidities, abscess site, incision length, drainage volume, and culture results were recorded. Outcomes were analyzed using t-tests and chi-square tests with $p < 0.05$ considered significant. Both groups were comparable in age, sex, comorbidities, and abscess distribution. Methicillin-sensitive Staphylococcus aureus was the most commonly isolated organism (38.46% in Group A, 25.64% in Group B). Mean wound healing time was significantly shorter in Group B (8.41 ± 2.85 days) compared to Group A (19.28 ± 4.54 days; $p < 0.0001$), and hospital stay was also reduced (7.78 ± 1.33 vs. 9.84 ± 2.70 days; $p = 0.0001$). Recurrence rates at 1, 2, and 3 months were low and similar in both groups. Incision and drainage with primary closure and drain placement accelerates healing, shortens hospitalization, improves patient comfort, and allows earlier return to routine activities.

KEYWORDS : Abscess, Incision and Drainage, Primary Closure, Drain Placement.

INTRODUCTION

An abscess is a common surgical condition defined as a localized collection of pus within tissues, usually resulting from bacterial infection or introduction of foreign material such as contaminated needles, bullet fragments, or wooden splinters. It represents a host defense mechanism to contain infection and prevent systemic spread. Local tissue destruction triggers release of pro-inflammatory cytokines, initiating an inflammatory cascade, increasing vascular permeability, and recruiting neutrophils. Clinically, abscesses present with pain, erythema, localized swelling, and fluctuation on palpation.[1,2] Multiple factors predispose to abscess formation, including impaired immunity, retained foreign bodies, tissue necrosis, hematoma, and fluid accumulation. Intravenous drug use is a significant risk factor, with reported incidence up to 65%. Most subcutaneous abscesses are polymicrobial, with Staphylococcus aureus and group A β-hemolytic streptococci predominant, often accompanied by anaerobes such as Bacteroides and Clostridium species.[1,3,4] Abscesses cause considerable morbidity, leading to repeated visits, painful wound care, hospital admissions, and lost productivity. In low- and middle-income countries, delayed presentation and inadequate drainage increase risks of cellulitis, septicemia, and chronic sinus formation.[5] Incision and drainage remains the gold standard. Conventional incision and drainage with secondary healing delays wound closure, increases discomfort, and affects cosmetic outcomes.[1] Ellis first proposed incision and drainage with primary closure in 1951, demonstrating faster healing, reduced pain, and improved cosmesis.[6] This study compares conventional incision and drainage with incision and drainage followed by primary closure and drain placement in acute abscess patients.

MATERIALS AND METHODS

This randomized prospective trial was conducted in the Department of General Surgery at MGM Medical College, Aurangabad, over two years after obtaining Institutional Ethical Committee approval. Seventy-eight patients aged 10–85 years with acute superficial abscesses were included, while those with systemic diseases, immunodeficiency, anemia, steroid therapy, or deep-seated abscesses were excluded. Participants were randomly assigned to Group A (conventional incision and drainage) or Group B (incision and drainage with primary closure and drain placement) using the lottery method. Patients underwent detailed history and examination, with preoperative tetanus toxoid and xylocaine testing. Anesthesia was provided based on age and abscess location. Postoperative assessments were done on days 1, 3, 5, and 7. Healing time was recorded, and data were analyzed using t-tests and chi-square tests ($p < 0.05$).

RESULTS:

The mean age of participants was 43.61 ± 18.98 years in Group A and 41.97 ± 16.21 years in Group B, with no statistically significant difference between the groups ($p = 0.6827$). In terms of sex distribution, Group A included 41.02% females and 58.97% males, while Group B had 35.90% females and 64.10% males, with the difference also being statistically insignificant ($p = 0.6443$).

The distribution of comorbidities was comparable between the two groups. In Group A, 3 patients (7.69%) had diabetes mellitus, 1 patient (2.56%) had hypertension, 5 patients (12.82%) had both diabetes mellitus and hypertension, and 30 patients (76.92%) had no comorbidities. In Group B, 2 patients (5.13%) had diabetes mellitus, 2 patients (5.13%) had hypertension, 1 patient (2.56%) had both conditions, and 34 patients (87.18%) had no comorbidities. Statistical analysis showed no significant difference between the groups ($p = 0.2408$), indicating that the baseline comorbidity profiles were comparable.

In Group A, perianal abscesses were most common (25.64%), followed by breast and lower limb (17.95% each). Group B showed a more varied distribution, with lower limb and perianal abscesses being most frequent (17.95% each). The difference in site distribution between groups was not statistically significant ($P = 0.058$). The detailed distribution is illustrated in table 1.

Table 1. Distribution Of The Site

Site	Group A, n (%)	Group B, n (%)	P value
Abdomen	4 (10.26)	4 (10.26)	0.0580
Back	0 (0)	6 (15.38)	

Breast	7 (17.95)	2 (5.13)	
Chest	1 (2.56)	2 (5.13)	
Forehead	1 (2.56)	0 (0)	
Gluteal	6 (15.38)	3 (7.69)	
Lower limb	7 (17.95)	7 (17.95)	
Neck	0 (0)	1 (2.56)	
Perianal	10 (25.64)	7 (17.95)	
Pre-auricular	1 (2.56)	0 (0)	
Scrotum	0 (0)	4 (10.26)	
Upper limb	2 (5.13)	3 (7.69)	

The mean incision length was 5.64 ± 3.20 cm in Group A and 6.48 ± 2.39 cm in Group B, with no statistically significant difference (P = 0.193).

The mean drainage volume was 81.79 ± 117.12 ml in Group A and 54.10 ± 27.40 ml in Group B, with no significant difference (P = 0.1546).

MSSA was the most common organism in both groups (38.46% in Group A, 25.64% in Group B), followed by E. coli (20.51% each). Klebsiella, Pseudomonas, MRSA, and Streptococcus showed varying distributions, with polymicrobial infections equal in both groups (10.26%). The difference was not statistically significant (P = 0.4421). The detailed distribution is shown in Table 2.

Table 2. Distribution Of Organisms Between Groups

Organisms	Group A, n (%)	Group B, n (%)	P value
E. Coli	8 (20.51)	8 (20.51)	0.4421
Klebsiella	6 (15.38)	3 (7.69)	
MRSA	2 (5.13)	4 (10.26)	
MSSA	15 (38.46)	10 (25.64)	
Polymicrobial	4 (10.26)	4 (10.26)	
Pseudomonas	3 (7.69)	5 (12.82)	
Streptococcus	1 (2.56)	5 (12.82)	

Wound healing was significantly faster in Group B (8.41 ± 2.85 days) compared to Group A (19.28 ± 4.54 days) (P < 0.0001). Similarly, the mean hospital stay was shorter in Group B (7.78 ± 1.33 days) than in Group A (9.84 ± 2.70 days), showing a highly significant difference (P = 0.0001).

Recurrence rates at 1, 2, and 3 months were low and comparable between the groups, with no statistically significant difference at any time point (P > 0.05). The detailed distribution is shown in Table 3.

Table 3. Distribution Of Recurrence Between Groups

Time intervals	Recurrence n, (%)		P-value
	Group A	Group B	
1 month	1 (2.56)	2 (3.57)	0.7972
2 months	2 (3.57)	1 (2.56)	0.7972
3 months	1 (2.56)	1 (2.56)	1.0000

DISCUSSION

This study compared conventional incision and drainage with primary closure and drain placement regarding wound healing, hospital stay, microbiology, and recurrence. Mean age and sex distribution were comparable between groups, consistent with previous studies showing abscesses commonly affect young to middle-aged adults, with no significant gender predilection.[7,1]

Most participants had no comorbidities, with diabetes and hypertension being the most common when present; their distribution did not differ significantly between groups (p = 0.2408), minimizing confounding.[8] Diabetes is a known risk factor for recurrent skin and soft tissue infections due to impaired immunity and delayed healing. Anatomically, perianal abscesses predominated in Group A, while Group B showed more varied sites, including back and scrotum, consistent with literature.[9] Differences in site distribution were not statistically significant, indicating successful randomization.

The mean length of incision and drainage volume were slightly higher in Group B but did not reach statistical significance, which may reflect variations in abscess size rather than procedural differences. These findings are in agreement with previous work by Singh A et al. [1], who noted that abscess size does not always correlate with drainage outcomes when appropriate surgical technique is used.

Microbiological analysis revealed Staphylococcus aureus (MSSA) as the most frequently isolated organism, followed by E. coli, which is consistent with global data identifying MSSA as the primary cause of community-acquired abscesses.[10] Interestingly, Group B had a slightly higher proportion of MRSA and Streptococcus species, although the difference was not statistically significant (p = 0.4421). This emphasizes the need for empiric antibiotic coverage targeting Gram-positive organisms, especially in high-risk or recurrent cases.[11]

A key finding of this study was the significantly shorter wound healing time in Group B (8.41 ± 2.85 days) compared to Group A (19.28 ± 4.54 days, p < 0.0001), supporting previous evidence that primary closure with drainage promotes faster healing and earlier return to daily activities.[1,6] Hospital stay was also significantly reduced in Group B (p = 0.0001), reflecting better patient satisfaction and lower healthcare costs. Recurrence rates were low and comparable at 1-, 2-, and 3-month follow-up, indicating that primary closure with proper drainage and antibiotics does not increase recurrence.[1,6] This approach is thus a safe, effective alternative.

CONCLUSION

Incision and drainage with primary closure and drain placement is a safe, effective alternative to conventional incision and drainage. It significantly reduces wound healing time and hospital stay without increasing recurrence. Baseline characteristics were comparable between groups, demonstrating improved patient outcomes, faster recovery, and reduced hospital burden.

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