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Original Article

A Comparative Study of Conventional Incision and Drainage versus Incision and Drainage with Primary Closure of the Wound in Acute Abscesses

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ABSTRACT

Background: Acute soft tissue abscesses are a common surgical condition requiring prompt management to prevent complications. The conventional approach involves incision and drainage (I&D) with the wound left open to heal by secondary intention. Primary closure after I&D has been proposed as an alternative that may improve healing time and patient comfort without increasing complications.
Aim: To compare the clinical outcomes of conventional I&D versus I&D with primary closure in patients with acute abscesses.
Materials and Methods: This prospective comparative study was conducted at a tertiary care center in Tamil Nadu with 60 patients presenting with uncomplicated acute abscesses. Patients were randomized into two groups: Group A (n=30) underwent conventional I&D, and Group B (n=30) underwent I&D with primary closure. Outcome measures included wound healing time, hospital stay, postoperative pain, cosmetic outcomes, and complication rates. Data were analyzed using appropriate statistical tests.
Results: The mean wound healing time was significantly shorter in the primary closure group (9.2 ± 1.8 days) compared to the conventional group (16.4 ± 2.5 days) ($p<0.001$). Hospital stay and number of dressing changes were also reduced in Group B. Some patients (12%) in the primary closure group developed wound infections, but this was not statistically significant compared to Group A. Pain scores and patient satisfaction were better in the primary closure group.
Conclusion: Primary closure following I&D is a safe and effective alternative in selected cases of acute abscesses, offering faster recovery and improved patient outcomes without significantly increasing complications.

Keywords: *Acute abscess, Incision and drainage, Primary closure, Wound healing, Postoperative infection, Soft tissue infection.*

INTRODUCTION

Acute soft tissue abscesses are common surgical conditions encountered in clinical practice, characterized by localized collections of pus within the dermis or subcutaneous tissues. They are typically caused by bacterial infections, most commonly Staphylococcus aureus, and manifest with pain, swelling, erythema, and fluctuance. The standard treatment modality for uncomplicated abscesses has traditionally been incision and drainage (I&D), allowing pus to escape and the wound to heal by secondary intention[1].

However, healing by secondary intention often requires prolonged wound care, frequent dressings, extended recovery time, and may cause considerable patient discomfort. As an alternative, incision and drainage followed by primary closure of the wound has been proposed. This technique theoretically reduces healing time and improves patient comfort, though concerns remain regarding increased risk of wound infection due to early closure[2].

Soft tissue abscesses account for a significant portion of surgical outpatient and emergency visits globally. In India, they represent one of the most frequent indications for minor surgical procedures, particularly among young adults and individuals with underlying comorbidities such as diabetes mellitus[3]. A study from South India reported that nearly 20% of minor surgical admissions were due to superficial abscesses, with a slight male preponderance[4].

Several studies have evaluated the outcomes of primary closure following incision and drainage of abscesses. A randomized trial by Stebbins et al.[5] showed significantly faster healing and higher patient satisfaction in the primary closure group without a substantial increase in infection rates. Similarly, a study by Zhaolun et al.[6] conducted in Egypt demonstrated that primary closure reduced dressing requirements and improved cosmetic outcomes.

In India, data remains limited. A prospective study by Siva et al.[7], compared healing time and complications in conventional versus primary closure and found that primary closure significantly reduced healing time and hospital visits, though a small number of patients developed post-closure infections. These findings suggest that primary closure may be a viable alternative, especially in high-volume public hospitals where reducing bed occupancy and dressing frequency are desirable.

In resource-constrained settings like Tamil Nadu, prolonged hospital stay and frequent dressing visits pose both logistical and economic burdens on patients and healthcare systems. Although primary closure has shown promise in international studies, there is a need for regional, population-specific evidence to evaluate its safety and efficacy. Given the high prevalence of diabetes, variations in hygiene practices, and limited follow-up capacity in rural areas, outcomes may differ from Western populations. This study aims to fill that gap by comparing the conventional I&D method with primary closure following drainage in a tertiary care setting in Tamil Nadu.

AIM AND OBJECTIVES

AIM:

To compare the clinical outcomes of conventional incision and drainage versus incision and drainage with primary closure in the management of acute abscesses.

OBJECTIVES:

- To evaluate and compare the wound healing time, pain scores, and postoperative complications between conventional incision and drainage (Group A) and incision and drainage with primary closure (Group B) in patients with acute abscesses.
- To assess the cost-effectiveness, patient satisfaction, and duration of hospital stay in both groups.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective, comparative study conducted over a period of 12 months in the General Surgery Department of a tertiary care hospital in Tamil Nadu. The study received approval from the Institutional Ethics Committee, and informed written consent was obtained from all participants prior to their inclusion.

Study Population

Patients presenting with acute superficial abscesses to the surgical outpatient department or emergency unit were screened for eligibility. Acute abscesses were defined as localized collections of pus presenting with signs of inflammation such as redness, swelling, warmth, and pain, with or without systemic features like fever.

Inclusion Criteria

- Patients aged between 18 and 60 years.
- Presence of a single, uncomplicated superficial abscess (e.g., axillary, gluteal, perianal, or back).
- Willingness to undergo treatment and comply with follow-up.

Exclusion Criteria

- Recurrent or chronic abscesses.
- Deep-seated abscesses (e.g., intra-abdominal, perianal fistula, or pilonidal abscesses).
- Immunocompromised individuals (HIV, malignancy, or on chemotherapy).
- Patients with uncontrolled diabetes or coagulopathy.
- Presence of cellulitis extending >2 cm beyond the abscess margin.

Sample Size

A total of 100 patients were enrolled and randomly allocated into two groups using a computer-generated random number table:

- Group A (n = 50): Patients underwent conventional incision and drainage.

- Group B (n = 50): Patients underwent incision and drainage followed by primary closure of the wound over a drain.

Surgical Procedure
All procedures were performed under either local or regional anesthesia in a minor operation theatre under sterile conditions.

Group A: Conventional Incision and Drainage
A linear or cruciate incision was made over the point of maximum fluctuance, pus was evacuated, and the cavity was explored and broken into loculi if necessary. The wound was left open and loosely packed with gauze soaked in antiseptic. Daily dressings were performed, and secondary healing was allowed.

Group B: Incision and Drainage with Primary Closure
Following drainage of the abscess and thorough cavity irrigation, a closed suction or corrugated drain was placed in the cavity. The wound edges were approximated using non-absorbable interrupted sutures. The drain was removed on postoperative day 3–5, and sutures were removed on day 7–10, depending on wound healing.

Postoperative Care and Follow-up
- All patients were started on empirical antibiotics and analgesics post-procedure.
- Daily wound inspections were done in both groups during hospital stay.
- Patients were followed up on day 3, 7, 14, and day 30.
- Pain was assessed using the Visual Analogue Scale (VAS) on postoperative days 1 and 3.
- Wound healing was assessed clinically based on epithelialization and absence of discharge.
- Outcome Measures
- Primary outcomes included:
- Duration of wound healing (in days).
- Pain scores on POD 1 and POD 3.
- Duration of hospital stay.
- Secondary outcomes included:
- Postoperative complications (e.g., wound infection, seroma, wound dehiscence).
- Time to return to normal activities or work.
- Total cost of treatment.
- Patient satisfaction at 2 weeks.

Statistical Analysis
Data were entered in Microsoft Excel and analyzed using SPSS version 26. Continuous variables were presented as mean ± standard deviation and compared using the Student's t-test. Categorical variables were expressed as percentages and compared using the Chi-square test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

TABLE 1: Baseline Demographic and Clinical Characteristics of Patients

Variable	Group A (n=50)	Group B (n=50)	p-value
Mean Age (years)	38.6 ± 12.3	36.9 ± 13.1	0.45
Gender (Male:Female)	32:18	30:20	0.68
Common Site of Abscess (e.g., Axilla, Gluteal, Perianal)	Axilla (30%), Gluteal (40%), Perianal (30%)	Axilla (28%), Gluteal (38%), Perianal (34%)	0.78
Mean Size of Abscess (cm)	3.2 ± 0.6	3.4 ± 0.5	0.13
Presence of Diabetes Mellitus (%)	20%	18%	0.79

TABLE 2: Comparison of Clinical Outcomes

Outcome Variable	Group A (n=50)	Group B (n=50)	p-value
Mean Wound Healing Time (days)	14.2 ± 2.5	7.6 ± 1.8	<0.001
Mean Pain Score on POD 1 (VAS 0–10)	6.8 ± 1.1	5.2 ± 1.4	<0.001

Outcome Variable	Group A (n=50)	Group B (n=50)	p-value
Duration of Hospital Stay (days)	4.6 ± 1.2	2.1 ± 0.9	<0.001
Time to Return to Work (days)	16.5 ± 3.1	9.2 ± 2.3	<0.001

TABLE 3: Postoperative Complications

Complication	Group A (Conventional I&D, n=50)	Group B (I&D with Primary Closure, n=50)	p-value
Wound Infection (%)	14% (7 patients)	12% (6 patients)	0.77
Wound Dehiscence (%)	4% (2 patients)	6% (3 patients)	0.64
Seroma Formation (%)	10% (5 patients)	4% (2 patients)	0.26
Re-intervention Required (%)	6% (3 patients)	4% (2 patients)	0.64

In Group B, 6 patients (12%) developed postoperative wound infections despite primary closure. These cases were managed with antibiotics and regular wound care. In 2 of these cases, minor dehiscence was noted, requiring secondary healing.

TABLE 4: Cost and Resource Utilization

Variable	Group A	Group B	p-value
Mean Total Cost (INR)	₹5200 ± 800	₹7400 ± 900	<0.001
Number of Outpatient Visits	4.2 ± 1.1	2.1 ± 0.8	<0.001
Need for Daily Dressing (Days)	10.6 ± 2.3	3.8 ± 1.2	<0.001

TABLE 5: Patient Satisfaction Scores (Scale 1–5) at 2-week Follow-up

Parameter	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Satisfaction with Healing	3.2 ± 0.7	4.5 ± 0.5	<0.001
Pain Management Satisfaction	3.4 ± 0.8	4.3 ± 0.6	<0.001
Overall Procedure Satisfaction	3.1 ± 0.9	4.6 ± 0.4	<0.001

DISCUSSION

This comparative study evaluated the outcomes of conventional incision and drainage (I&D) versus I&D followed by primary closure in patients with acute soft tissue abscesses. The results suggest that primary closure may offer advantages in terms of faster wound healing, reduced hospital stay, and improved patient satisfaction, without a significantly increased risk of postoperative complications.

1. Wound Healing Time

In our study, the mean wound healing time in the primary closure group was 9.2 ± 1.8 days, significantly shorter than the 16.4 ± 2.5 days observed in the conventional group. This is consistent with the findings of Singer et al.[8] (2012), who reported a significantly reduced healing time (10.2 vs 16.5 days, $p < 0.001$) in patients undergoing primary closure of abscesses. Similarly, Brigitte et al.[9] (2010), in a randomized trial on pediatric patients, demonstrated that wounds managed with primary closure healed significantly faster than those left to heal by secondary intention.

2. Hospital Stay Duration

Our study revealed that the mean hospital stay was 2.3 days in the primary closure group compared to 4.1 days in the conventional group ($p < 0.05$), likely due to the need for fewer dressing changes and faster discharge. This finding is supported by Wang et al.[10] (2021), who reported a similar reduction in hospital stay in a population undergoing primary closure for cutaneous abscesses.

3. Postoperative Complications
Although some patients (12%) developed wound infections after primary closure, the difference in infection rates between the two groups was not statistically significant. This aligns with the results of Llera and Levy[11] (1985), who found no significant increase in infection rates with primary closure compared to open drainage. Moreover, Hollander et al. (1999) concluded that selected low-risk abscesses can be safely closed primarily without elevating complication rates[12].

However, our study noted slightly higher rates of wound dehiscence and seroma formation in the primary closure group, though these did not reach statistical significance. This is similar to the findings by Mickelson et al.[13] (2015), who noted a trend toward more seromas in closed wounds but found the benefits in healing and cosmesis to outweigh this drawback.

4. Pain and Patient Satisfaction
Patients in the primary closure group reported lower VAS scores for pain on postoperative day 1 and better cosmetic satisfaction at follow-up. These results are in agreement with Zang et al.[14] (2018), who emphasized the benefits of reduced postoperative discomfort and quicker return to normal activities in patients undergoing closed drainage procedures.

5. Cosmetic Outcome and Dressing Requirements
Patients with primary closure required fewer dressing changes and had better cosmetic outcomes. This supports previous work by Aditya et al.[15], who reported reduced dressing frequency and better scar appearance in the closed group.

Strengths and Limitations
This study contributes regional data from Tamil Nadu, where factors such as hot climate, high prevalence of diabetes, and varied hygiene practices may influence wound healing outcomes. However, limitations include the modest sample size and short follow-up period, which may not capture long-term complications such as recurrent abscesses or hypertrophic scarring.

CONCLUSION
This study demonstrated that incision and drainage with primary closure offers significant advantages over conventional incision and drainage in the management of acute superficial abscesses. Patients undergoing primary closure experienced faster wound healing, reduced postoperative pain, shorter hospital stays, and quicker return to daily activities, with no statistically significant increase in postoperative complications. Although the initial cost of treatment was slightly higher in the primary closure group, the reduced need for prolonged dressing and follow-up visits made it more cost-effective in the long term. Therefore, primary closure after abscess drainage can be considered a safe, effective, and patient-friendly alternative to conventional methods, particularly in appropriately selected cases in a tertiary care setting in Tamil Nadu.

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