



EFFECT OF SUBCUTANEOUS NEGATIVE PRESSURE DRAIN ON SURGICAL SITE INFECTION AFTER EMERGENCY LAPAROTOMY: A PROSPECTIVE RANDOMIZED COMPARATIVE STUDY

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ABSTRACT

Background: Surgical site infection (SSI) is a major postoperative complication following abdominal surgery and contributes significantly to postoperative morbidity, prolonged hospital stay, and increased healthcare costs. Emergency laparotomy procedures are associated with a higher risk of SSI due to contamination from gastrointestinal contents and compromised physiological status of patients.^{1,2} **Methods:** A prospective randomized comparative study was conducted in a tertiary care teaching hospital over six months. Seventy-four patients undergoing emergency laparotomy were randomized into two groups. Group A (n=37) received a subcutaneous negative pressure drain prior to wound closure, whereas Group B (n=37) underwent wound closure without drain placement. Patients were monitored for surgical site infection, wound complications, and duration of hospital stay. **Results:** Surgical site infection occurred in 5.4% of patients in the drain group compared with 27% in the non-drain group (p=0.024). Wound inflammation was more common in the control group (32.4%) compared with the drain group (10.8%). The mean hospital stay was significantly shorter in the drain group (3.92 days) compared with the control group (5.49 days) (p<0.01). **Conclusion:** Subcutaneous negative pressure drainage significantly reduces surgical site infection and postoperative hospital stay following emergency laparotomy.

Keywords: Surgical Site Infection, Emergency Laparotomy, Subcutaneous Drain, Negative Pressure Drainage.

INTRODUCTION

Surgical site infections (SSI) remain one of the most common healthcare-associated infections worldwide and are responsible for significant postoperative morbidity and increased healthcare costs.¹ According to the Centers for Disease Control and Prevention, SSI refers to an infection occurring at or near the surgical incision within 30 days after surgery or within one year if an implant is placed.² SSIs account for approximately 14–16% of hospital-acquired infections and nearly 38% of infections among surgical patients.³ The burden of SSI is particularly high in developing countries where limited resources, delayed presentation of patients,

and contaminated surgical procedures contribute to higher infection rates.⁴

Emergency laparotomy procedures are associated with a particularly high risk of SSI. Conditions such as perforation peritonitis, intestinal obstruction, abdominal trauma, and intra-abdominal sepsis often result in contamination of the surgical field with gastrointestinal flora.^{5,6}

The development of SSI is multifactorial. Factors such as bacterial contamination of the surgical wound, tissue ischemia, hematoma formation, seroma accumulation, and the presence of subcutaneous dead space contribute significantly to infection.⁷ Accumulation of fluid within this dead space provides an ideal environment for bacterial growth and subsequent wound infection.⁸

Several strategies have been recommended to reduce the incidence of surgical site infection, including appropriate antibiotic prophylaxis, meticulous surgical technique, maintenance of asepsis, and



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adequate wound drainage.^{9,10} Subcutaneous negative pressure drainage has been suggested as an effective technique to remove wound collections and eliminate dead space, thereby reducing the risk of infection.¹¹

Subcutaneous suction drains help evacuate blood, serous fluid, and inflammatory exudate from the wound, which may reduce bacterial colonization and promote wound healing.¹² However, the routine use of drains remains controversial, as some studies have reported benefits while others have shown minimal impact on SSI incidence.^{13,14}

Therefore, the present study was conducted to evaluate the effectiveness of subcutaneous negative

pressure drainage in reducing surgical site infection following emergency laparotomy.

MATERIALS AND METHODS

Study Design

Prospective randomized comparative study.

Study Setting

Department of General Surgery, SMBT Institute of Medical Sciences and Research Centre, Nashik, Maharashtra, India.

Study Duration

Six months.

Sample Size

Seventy-four patients undergoing emergency laparotomy.

Study Groups

Table 1. Distribution of Study Groups

Group	Intervention	Number
Group A	Subcutaneous negative pressure drain	37
Group B	No drain	37

Inclusion Criteria

Patients aged 20–60 years undergoing emergency laparotomy.

Exclusion Criteria

Patients with:

- Previous abdominal surgery
- Diabetes mellitus
- Malignancy
- Immunocompromised status
- Pregnancy

Surgical Procedure

Following completion of the primary surgical procedure and closure of the rectus sheath:

Group A:

A ROMOVAC suction drain was placed in the subcutaneous layer and brought out through a separate stab incision.

Group B:

The wound was closed in layers without drain placement.

Outcome Measures

Patients were monitored for:

1. Surgical site infection
2. Wound inflammation
3. Wound dehiscence
4. Duration of hospital stay

Statistical Analysis

Data were analyzed using SPSS version 26. Chi-square test and unpaired t-test were used to compare study groups. A p-value less than 0.05 was considered statistically significant.

RESULTS

Age Distribution

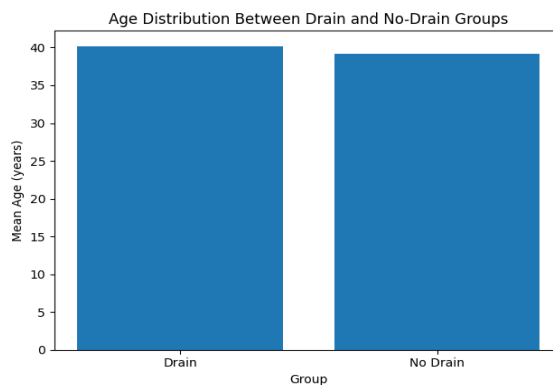


Table 2. Mean Age Distribution between Groups

Group	Mean age
Drain	40.2

No drain	39.17
No significant difference (p = 0.29).	

Incidence of Surgical Site Infection

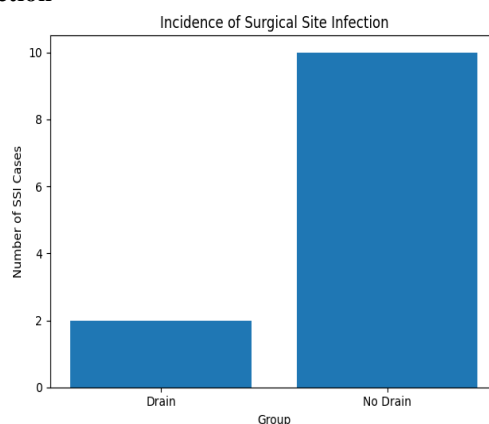


Table 3. Comparison of SSI between Study Groups

Group	SSI Cases
Drain group	2 (5.4%)
No drain group	10 (27%)
p = 0.024 (statistically significant)	

Postoperative Hospital Stay

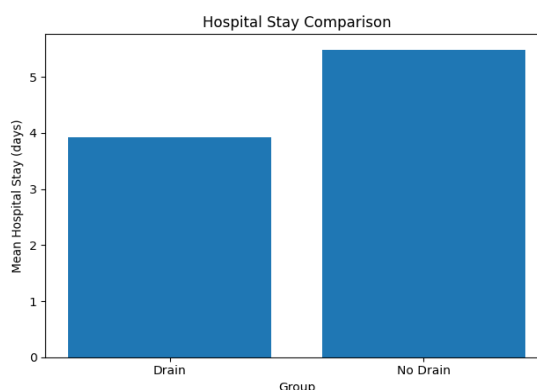


Table 4. Comparison of Mean Hospital Stay

Group	Mean Hospital Stay
Drain group	3.92 days
No drain group	5.49 days
p < 0.01 (statistically significant)	

DISCUSSION

Surgical site infection continues to be a major postoperative complication following abdominal surgery and contributes significantly to patient morbidity and prolonged hospitalization.¹⁵

In the present study, the incidence of SSI was significantly lower in patients who received a subcutaneous negative pressure drain compared with those who did not receive a drain. Emergency laparotomy procedures often involve contaminated surgical fields due to conditions such as intestinal perforation and peritonitis. These conditions

increase bacterial load within the wound and predispose patients to postoperative infection.¹⁶

One of the major mechanisms leading to SSI is the formation of dead space within the subcutaneous tissue. This space can accumulate blood or serous fluid, which provides a suitable environment for bacterial proliferation. Placement of a subcutaneous suction drain helps eliminate this dead space and facilitates removal of wound collections.¹⁷

The findings of the present study are consistent with previous studies. Patel et al. reported that the use of subcutaneous drains significantly reduced SSI rates in contaminated laparotomy wounds.¹⁸ Similarly,

Wani et al. demonstrated that subcutaneous suction drains decreased the incidence of wound infection following abdominal surgery.¹⁹

Naik et al. also observed that subcutaneous negative pressure drains reduced postoperative complications and shortened hospital stay following emergency laparotomy.²⁰

Recent studies have further highlighted the role of subcutaneous suction drainage in reducing wound complications and improving postoperative outcomes in abdominal surgery.^{21,22}

In addition to reducing infection rates, the present study also demonstrated a reduction in postoperative hospital stay in patients who received a drain. This finding may be attributed to the lower incidence of wound infection and faster postoperative recovery. However, the routine use of drains remains debated because drains may occasionally serve as a potential route for bacterial entry.²³ Therefore, appropriate patient selection and proper drain management are essential.

Limitations

The present study was conducted in a single institution with a relatively small sample size. Larger multicenter studies are required to confirm these findings and determine the optimal role of subcutaneous drainage in preventing surgical site infection.

CONCLUSION

Subcutaneous negative pressure drainage significantly reduces the incidence of surgical site infection following emergency laparotomy. The use of suction drains also contributes to shorter postoperative hospital stay. Selective use of subcutaneous drainage may therefore be beneficial in high-risk abdominal surgeries.

REFERENCES

1. Mangram AJ et al. Guideline for prevention of surgical site infection. *Infect Control Hosp Epidemiol.* 1999.
2. Horan TC et al. CDC definitions of surgical site infections. *Am J Infect Control.* 1992.
3. Owens CD, Stoessel K. Surgical site infections: epidemiology, microbiology and prevention. *J Hosp Infect.* 2008.
4. Allegranzi B et al. Burden of healthcare-associated infections in developing countries. *Lancet.* 2011.
5. Fry DE. Prevention of surgical site infection in abdominal surgery. *Am J Surg.* 2011.
6. Brook I. Microbiology of abdominal infections. *Dig Dis Sci.* 2008.
7. Ban KA et al. ACS guidelines for SSI prevention. *J Am Coll Surg.* 2017.

8. Anderson DJ et al. Strategies to prevent surgical site infections. *Infect Control Hosp Epidemiol.* 2014.
9. WHO. Global guidelines for prevention of surgical site infection. 2016.
10. Leaper DJ, Edmiston CE. Global guidelines for SSI prevention. *J Hosp Infect.* 2017.
11. Manzoor B et al. Subcutaneous wound drainage in abdominal surgery. *Ann R Coll Surg Engl.* 2015.
12. Coletta D et al. Subcutaneous suction drains for preventing SSI. *Int J Surg.* 2019.
13. Zhuang J et al. Subcutaneous suction drainage and SSI prevention. *World J Surg.* 2020.
14. Pai V et al. Subcutaneous drainage in preventing SSI. *J Clin Diagn Res.* 2019.
15. Kirkland KB et al. Impact of surgical site infections. *Infect Control Hosp Epidemiol.* 1999.
16. Kakati B et al. Microbiological profile of SSI. *J Clin Diagn Res.* 2013.
17. Khairy GA et al. Surgical site infection in teaching hospital. *Ann Saudi Med.* 2001.
18. Patel PR et al. Role of subcutaneous drain in contaminated laparotomy wounds. *Int Surg J.* 2019.
19. Wani JN et al. Subcutaneous suction drain in abdominal surgery. *Int J Surg.* 2019.
20. Naik AK et al. Subcutaneous suction drain in emergency laparotomy. *Int J Surg Sci.* 2022.
21. de Lissovoy G et al. Surgical site infection impact on hospital stay. *Am J Infect Control.* 2009.
22. Astagneau P et al. Morbidity associated with SSI. *Clin Infect Dis.* 2001.
23. Anderson DJ et al. Surgical site infection prevention strategies. *Infect Control Hosp Epidemiol.* 2014.

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