



DRAIN OR NO DRAIN? SUBCUTANEOUS SUCTION DRAINAGE AND POST-LAPAROTOMY WOUND OUTCOMES: A PROSPECTIVE RANDOMIZED STUDY

General Surgery

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ABSTRACT

Background: Subcutaneous fluid after laparotomy may promote seroma, bacterial growth, and wound failure. Whether routine subcutaneous suction drainage improves wound outcomes remains uncertain. **Objective:** To compare post-laparotomy surgical-site infection (SSI), seroma, wound dehiscence, pain, and hospital stay with and without a subcutaneous suction drain. **Materials and Methods:** This prospective randomized comparative study included 87 adults undergoing laparotomy at a tertiary teaching hospital. Participants were assigned to subcutaneous suction drainage (n = 44) or no drain (n = 43). Categorical outcomes were compared using chi-square or Fisher's exact tests and continuous outcomes using independent-samples t tests. **Results:** SSI occurred in 5/44 patients (11.4%) with drainage and 13/43 (30.2%) without drainage (p = .025). Seroma occurred in 2/44 (4.5%) and 8/43 (18.6%), respectively (p = .045). Wound dehiscence was uncommon (2/44 vs. 3/43; p = 1.00). Mean pain scores did not differ significantly on postoperative day 1 (6.36 vs. 6.71; p = .053) or day 3 (3.67 vs. 3.63; p = .83). Mean hospital stay was shorter in the drain group (8.05 ± 1.78 vs. 13.02 ± 2.96 days; p < .001). **Conclusion:** Subcutaneous suction drainage was associated with fewer SSIs and seromas and a shorter hospital stay after laparotomy, without a significant difference in pain or wound dehiscence. Confirmation in a rigorously reported, adequately powered multicenter trial is warranted.

KEYWORDS

Laparotomy; Surgical-site Infection; Subcutaneous Drain; Seroma

INTRODUCTION

Surgical-site infection remains an important source of morbidity after laparotomy, prolonging recovery and increasing resource use [1,2]. Blood and serous fluid can collect in the subcutaneous dead space, impair tissue apposition, and provide a medium for bacterial growth. A closed suction drain may evacuate this fluid, but it also introduces a foreign body and a possible route for ascending infection [3].

Evidence is mixed. Reviews have found marked variation in operations, drain systems, patient risk, and SSI definitions [4,5]. A randomized trial found no reduction in SSI after laparotomy [6], whereas other comparative studies reported fewer wound complications in selected abdominal procedures [7-10]. This study compared wound outcomes and length of stay after laparotomy with and without a subcutaneous suction drain.

MATERIALS AND METHODS

This prospective randomized comparative study was conducted over 18 months in the Department of General Surgery, K.D. Medical College and Research Centre, Mathura. Adults undergoing laparotomy were eligible. Patients younger than 18 or older than 80 years, immunocompromised patients receiving chemotherapy or radiotherapy or living with HIV, and patients undergoing repeat laparotomy were excluded.

The sample target of 87 was derived using a single-proportion formula with an expected proportion of 6% and 5% absolute precision. Participants were allocated by simple randomization to subcutaneous suction drainage (n = 44) or no drain (n = 43). The dissertation did not document sequence generation, allocation concealment, drain model or size, removal criteria, wound class, or perioperative antibiotic protocol.

Primary outcomes were SSI, seroma, and wound dehiscence. Postoperative pain was assessed using a Visual Analogue Scale (VAS) on days 1 and 3, and hospital stay was recorded. Baseline age, sex, diabetes, hypertension, body mass index (BMI), operative duration, and blood loss were compared. Chi-square testing was used for categorical variables, Fisher's exact test for sparse events, and independent-samples t testing for continuous variables. A two-sided p value < .05 was considered significant.

The Institutional Ethics Committee of K.D. Medical College approved the study (KDMCHRC/IEC/2024/54; project reference KDMCHRC/PG/IEC/2024/32; October 10, 2024). Written informed consent was obtained from all participants.

RESULTS

The groups were similar in age, sex, BMI, diabetes, hypertension, operative duration, and blood loss (Table 1).

Table 1. Baseline and operative characteristics

Characteristic	Drain (n = 44)	No drain (n = 43)	p value
Age, years	47.57 ± 15.85	43.14 ± 17.37	.21
Male sex, n (%)	29 (65.9)	28 (65.1)	.93
Diabetes, n (%)	14 (31.8)	12 (27.9)	.70
BMI, kg/m ²	24.97 ± 3.86	24.88 ± 3.43	.91
Operative duration, min	125.8 ± 27.2	123.9 ± 28.4	.75
Blood loss, ml	412.0 ± 117.4	393.6 ± 115.6	.46

SSI and seroma were less frequent with drainage. Wound dehiscence and pain were comparable, while hospital stay was approximately five days shorter in the drain group (Table 2).

Table 2. Postoperative outcomes

Outcome	Drain (n = 44)	No drain (n = 43)	p value
SSI, n (%)	5 (11.4)	13 (30.2)	.025
Seroma, n (%)	2 (4.5)	8 (18.6)	.045
Wound dehiscence, n (%)	2 (4.5)	3 (7.0)	1.00
VAS pain, day 1	6.36 ± 0.89	6.71 ± 0.77	.053
VAS pain, day 3	3.67 ± 0.87	3.63 ± 0.86	.83
Hospital stay, days	8.05 ± 1.78	13.02 ± 2.96	< .001

DISCUSSION

Subcutaneous drainage was associated with an absolute 18.8-percentage-point reduction in SSI and a 14.1-point reduction in seroma. Pain and wound dehiscence did not differ significantly. The shorter hospital stay paralleled the reduction in recorded wound morbidity, although discharge criteria were not reported.

Published evidence remains heterogeneous. Baier and colleagues found no SSI benefit from subcutaneous Redon drainage in a 200-patient randomized trial [6]. In contrast, Harish et al. reported fewer SSIs with a closed suction drain after laparotomy [7], and Arslan et al. found fewer incisional SSIs with a Jackson-Pratt drain after open colorectal cancer resection [8]. Recent emergency-laparotomy studies have also reported lower SSI rates with subcutaneous suction drainage [9,10]. Differences in contamination, subcutaneous thickness, drain duration, antibiotic use, and outcome definitions may explain the conflicting findings.

The present study's prospective comparison, balanced groups, and clinically relevant outcomes are strengths. Important limitations are the single-center setting, small sample, a sample-size method not based on the between-group SSI effect, and incomplete reporting of allocation concealment and operative protocols. SSI definition and follow-up timing were not specified. The dissertation also contained a later day-specific SSI table inconsistent with the primary SSI table, abstract, and discussion; the prespecified primary table values were

used here and should be checked against the original dataset before submission. These limitations preclude recommending routine drainage for every laparotomy.

CONCLUSION

Subcutaneous suction drainage was associated with lower SSI and seroma rates and shorter hospitalization after laparotomy, without a detectable effect on pain or wound dehiscence. Standardized multicenter trials should identify the patients and wound classes most likely to benefit.

Declarations

Ethical approval: Institutional Ethics Committee, K.D. Medical College, Hospital & Research Center (KDMCHRC/IEC/2024/54; project KDMCHRC/PG/IEC/2024/32; October 10, 2024).

Informed consent: Written informed consent was obtained from all participants.

Conflict of interest: Not reported in the source dissertation; the author should confirm before submission.

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Trial registration: Not reported in the source dissertation.

REFERENCES

1. Berrios-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg.* 2017;152(8):784-791.
2. Seidelman JL, Mantyh CR, Anderson DJ. Surgical site infection prevention: a review. *JAMA.* 2023;329(3):244-252.
3. Reiffel AJ, Barie PS, Spector JA. A multidisciplinary review of the potential association between closed-suction drains and surgical site infection. *Surg Infect (Larchmt).* 2013;14(3):244-269.
4. Manzoor B, Heywood N, Sharma A. Review of subcutaneous wound drainage in reducing surgical site infections after laparotomy. *Surg Res Pract.* 2015;2015:715803.
5. Kosins AM, Scholz T, Cetinkaya M, Evans GRD. Evidence-based value of subcutaneous surgical wound drainage: the largest systematic review and meta-analysis. *Plast Reconstr Surg.* 2013;132(2):443-450.
6. Baier PK, Gluck NC, Baumgartner U, Adam U, Fischer A, Hopt UT. Subcutaneous Redon drains do not reduce the incidence of surgical site infections after laparotomy: a randomized controlled trial on 200 patients. *Int J Colorectal Dis.* 2010;25(5):639-643.
7. Harish R, Kazi FN, Sharma JP. Efficacy of subcutaneous closed suction drain in reduction of postoperative surgical site infection. *Surg J (NY).* 2021;7(4):e275-e280.
8. Arslan K, Hasirci I, Simsek G, et al. Effects of subcutaneous Jackson-Pratt drain on incisional surgical site infection after open colorectal resection for cancer: a prospective, randomized, multicenter clinical study. *Indian J Surg.* 2021;83(3):712-719.
9. Ripa MN, Chowdhury N, Quayyum SM, Akbar MA, Azad AK, Wadud F. Effectiveness of subcutaneous suction drain versus simple skin closure in reducing postoperative surgical site infections after emergency laparotomy. *Sch J App Med Sci.* 2024;12(10):1386-1390.
10. Mallaiah B, Bhavana Chinmayee K, Ramachandra J. A comparative study on subcutaneous negative suction drain versus no drain in emergency laparotomy wounds for peritonitis. *Cureus.* 2025;17(5):e84247.