International Surgery Journal
Naik AK et al. Int Surg J. 2022 Mar;9(3):616-619
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20220631

Original Research Article

Role of subcutaneous suction drain in reducing surgical site infection in emergency laparotomy

Arun K. Naik*, Arya S. V., Ashok K. Sharma

Department of General surgery, VMMC and Safdarjung Hospital, New Delhi, India

Received: 09 December 2021
Revised: 03 January 2022
Accepted: 20 January 2022

***Correspondence:**
Dr. Arun K. Naik,
E-mail: arunn091@gmail.com

ABSTRACT

Background: Surgical site infection (SSI) is a major postoperative wound complications associated with open abdominal surgery and is related to increased morbidity, mortality and healthcare costs. A subcutaneous suction drain reduces the dead space in the subcutaneous tissue plane and thereby prevents accumulation of fluid and seroma formation. In this study we observed the role of subcutaneous drain in reducing SSI in emergency laparotomies.
Methods: Prospective randomized comparative study comprising of 108 patients on the basis of inclusion and exclusion criteria. 54 patients were called cases in whom subcutaneous suction drain was placed and 54 patients were called controls in whom no drain was placed. Antibiotic prophylaxis was given to all patients. Surgical site infection (SSI) was diagnosed and graded using Southampton wound grading system.
Results: 24% of cases and 46% of controls developed SSI, 9% of cases and 33% of controls developed wound dehiscence and mean duration of hospital stay was 6days in cases and 10days in controls. All above parameters were statistically significant with $p<0.05$.
Conclusions: Subcutaneous suction drain is effective in reducing surgical site infection (SSI), wound dehiscence and mean duration hospital stay in emergency laparotomies.

Keywords: Surgical site infection, Subcutaneous suction drain, Emergency laparotomy

INTRODUCTION

Surgical site infection (SSI) earlier known as postoperative wound infection is defined as a wound infection that occurs either within 30 days after an operative procedure or within a year if an implant was implanted inside the patient, and the infections are most likely secondary to the surgical procedure.[1] SSIs have been proven to be responsible for up to 20% of nosocomial infections, with 5% incidence across all invasive surgical procedures and up to 30-40% in major abdominal surgeries, depending on the level of contamination.[2] Surgical site infections are responsible for increased morbidity, mortality patient discomfort and dissatisfaction, increased health care costs and wound related complications.[3] Numerous risk factors responsible for SSI have been identified. Main factors are smoking, obesity, diabetes, malnutrition, high level of contamination, inappropriate antibiotic prophylaxis etc. There are three types of SSI: superficial incisional involving skin and subcutaneous tissue, deep incisional SSI involving fascial and muscle layers and organ/space SSI occurring in any part handled during the operative procedure.[4] Routine measures like hand washing, minimising shaving, skin preparation and antibiotic prophylaxis known to reduce the risk of SSI.[5] Presence of serous fluids, haematoma or any dead space in the incisional wounds acts as a good culture media and enhances the risk of SSI. So negative suction in the subcutaneous area has been found to reduce the risk of

infection by removing infectious content and removing seroma.[6] Hence we are conducting this study to evaluate the use of subcutaneous suction in reducing SSI after emergency laparotomies (class III and class IV) in terms of rate of SSI, wound dehiscence and duration of hospital stay.

Aim

To evaluate the "role of subcutaneous suction drain in reducing surgical site infections in emergency laparotomies".

Objectives

Primary objective

To study the rate of surgical site infections using Southampton wound scoring.

Secondary objective

To study the incidence of wound dehiscence. To study the duration of hospital stay.

METHODS

Type of study

Prospective randomized comparative study.

Study centre

Department of General Surgery, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi from 2019 to 2022. Before starting the study ethical clearance was obtained.

Inclusion criteria

Age more than 18 years. Patients having class III and class IV surgical wounds.

Exclusion criteria

Age less than 18 years and above 75 years. Patients having class I and class II surgical wounds. Accidental removal of drain. Patients who have died in immediate postoperative period. Immunocompromised state.

Sample size

The sample size was 54 per group.

All patients presenting of surgical emergency who fit into inclusion criteria were included in this study. After taking the required demographic data of the patient, a detailed clinical history of the patient was obtained. Thorough general and local examination was done and adequately resuscitated if needed. Required investigations like routine blood investigations, chest x-ray, abdominal x-ray and USG abdomen were done. Patients were taken exploration in OT once diagnosed clinically or radiologically after giving prophylactic dose of antibiotic. Midline incision was given mostly with scalpel and subcutaneous tissue dissected with electro-cautery. After entering the peritoneum amount and nature of contamination noted and thorough peritoneal lavage given using warm saline and main pathology was addressed and abdominal drain was placed at the end. Rectus sheath was closed using PDS and 16F Romo-vac suction drain was placed in the subcutaneous plane and fixed in position in cases where as no drain was placed in controls and skin was closed using nylon 2.0 suture or skin staples.

Patients were followed up for 30 days postoperatively and wound is examined for any evidence of surgical site infections and graded using Southampton Wound Grading Score. Daily drain output monitoring done and sutures released and pus drained if needed. Pus C/S sent and antibiotic given accordingly. Drain was removed on POD3 if there was no SSI.

Cases and controls were mainly compared in terms of incidence of surgical site infection, wound dehiscence and mean duration of hospital stay.

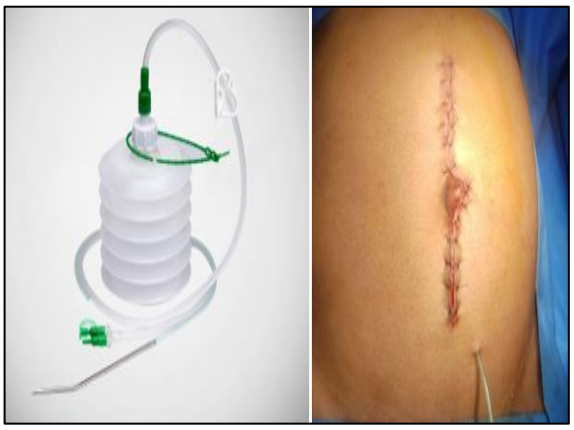

Figure 1: Romovac suction drain Fig-2: Skin closure with subcut drain.

The data was compiled and analyzed using MS Excel (R) office 365, Graph Pad prism 8.4.2 and Statistical package for social sciences (SPSS) version 25. Descriptive statistics were presented in the form of proportions/percentages for categorical variables and mean standard deviation for continuous data variables. Fisher Exact test/Chi square test was used for the comparison of proportions (Categorical variables). Continuous variables were analyzed using the Mann Whitney test/student T test (Independent group/Unpaired data) and Wilcoxon sign rank test/Paired T test (for paired data) based on the normality of the data. $P<0.05$ was considered significant.

RESULTS

The mean age was 33.22±9.09 years old in the control group while mean age was 33.96±9.12 years old for the subcutaneous drain group. Age was not statistically significant.

Table 1: Age related parameters.

Age related parameters	Control group	Sub Cut Drain +	P value
Number of patients	54	54	
Mean age	33.22	33.96	0.6737
SD	9.09	9.12	
Minimum	20.00	19.00	
Maximum	58.00	54.00	

Table 2: Gender distribution.

Gender	Control group	Sub Cut Drain +	P value
Female	16 (29.62)	19 (35.18)	0.5389
Male	38 (70.38)	35 (64.82)	
Grand total	54	54	

Table 3: Surgical site infection rate.

Surgical site infection	Control group	Sub Cut Drain +	P value
None	29 (53.70)	41 (75.92)	0.0161
Present	25 (46.30)	13 (24.08)	Chi Sq. – 5.791
Grand total	54	54	

Table 4: Duration of hospital stay.

Duration of hospital stay	Control group	Sub Cut Drain +	P value
Mean duration of hospital stay	10.61	6.91	0.0001
SD	5.93	3.10	T = -4.063
Minimum	5.00	4.00	
Maximum	33.00	18.00	

There were 25 (46.30%) patients who developed in surgical site infection in control group while 13 (24.08%) had surgical site infection and the difference was statistically significant.

The mean duration of hospital stay is 10.61±5.93 days for the control group while subcutaneous drain group had a lower duration of stay for mean of 6.91±3.10 days.

Table 5: Wound dehiscence.

Wound dehiscence	Control group	Sub Cut Drain +	P value
No	36 (66.67)	49 (90.74)	0.0024
Yes	18 (33.33)	5 (9.26)	Chi sq. – 9.247
Grand total	54	54	

Control group had wound dehiscence in 18 cases (33.33%) while subcutaneous drain group had 5 cases (9.26%) and the difference was statistically significant.

DISCUSSION

A surgical site infection (SSI) continues to be major concern in the practice especially in case of emergency laparotomies. Surgical site infection has a large impact on morbidity and mortality associated with wound infection related complications. In this study we observed the role of subcutaneous suction drain in reducing SSI in emergency laparotomies.

In our study we observed that 13 (24.08%) patients out of 54 cases and 25 (46.08%) of controls developed SSI which was statistically significant with p value-0.0161. Similar findings were shown by the studies carried out by Kagita et al, SSI was reported as 12.50% in cases and 69.44% in controls with significant p-value-0.0001.[7] Patel et al study shown incidence of SSI as 16% in patients with drain and 40% in patients without drain which was statistically significant with pvalue-0.01.[8] Study by Wani JN et al also showed same results with rate of SSI in cases as 15.3% and 30% in controls with statistically significant p value- 0.002.[9] In contrast, studies by Nasta et al and Manzoor et al reported that there was no use of subcutaneous suction drain in preventing surgical site infections.[10,11]

In our study we observed that the mean duration of hospital stay was found to be 6.91±3.10 in cases and 10.61±5.93 days in controls. This was found to be strongly significant statistically with p value -0.0001. Similar results were shown by the studies carried out by Patel et al showed average duration of hospital stay as 10.1 days in cases with drain and 13.2 days in controls with significant p value- 0.05.8 Zhuang J et al study concluded that inpatient stay was 9.64±4.15 in cases and 12.26±5.55 days in control group which was statistically significant with p value-0.004.[12] Manoharan et al showed mean duration of hospital stay as 9.17 in patients with drain and14.17 in cases without drain.[13] Study by Kagita et al showed that the postoperative hospital stay was not statistically significant with p value-0.346.7

In our study 5 (9.26%) patients out of 54 cases and 18 (33.33%) patients out of 54 controls developed wound dehiscence either in the form of wound gap or wound dehiscence and it was statistically significant with p

value-0.0024. Similar results were given by studies conducted by Wani et al where 12% of cases and 45.3% of controls developed wound dehiscence with significant p value<0.001.[14] Khan et al study has shown that 14% of the patients with drain and 42% patients without drain reported wound dehiscence with significant p value-0.002.[15] Study by Alsafrani et al has contraindicated the above findings.[16]

There are potential limitations of this study. Relatively small sample size limiting the generalisations of study results is the main one. This study was conducted in a single centre. There are many other known risk factors which contribute to SSI not included in this study.

CONCLUSION

The results from the present study show that the subcutaneous suction drain is useful in reducing surgical site infections, wound dehiscence and mean duration of hospital stay which ultimately reduces healthcare costs in emergency laparotomies especially class 3 & class 4 surgical wounds, however larger group studies are required for better results.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Alkaaki A, Al-Radi OO, Khoja A, Alnawawi A, Alnawawi A, Maghrabi A, et al. Surgical site infection following abdominal surgery: a prospective cohort study. Can J Surg. 2019;1:111-7.
2. NICE, "Clinical Guideline 74—prevention and treatment of surgical site infection," NICE, October 2008, http://www.nice.org.uk/nicemedia/pdf/CG74NICEguideline.pdf. Accessed on 20 July 2021.
3. Astagneau P, Rioux C, Golliot F, Brücker G.INCISO Network Study Group. Morbidity and mortality associated with surgical site infections: results from the 1997-1999 INCISO surveillance. J Hosp Infect. 2001;48(4):267-74.
4. Townsend C M, Beauchamp R D, Evers B M, Mattox K L. Surgical infections and antibiotic use: Sabiston textbook of Surgery: The biological basis of modern surgical practice. 21st ed. Amsterdam: Elsevier. 2021;224-5.
5. Diana M, Hubner M, Eisenring MC, Zanetti G, Troillet N, Demartines N. Measures to prevent surgical site infections: what surgeons (should) do. World J Surg. 2011;35(2):280-8.
6. Drains. Dead Space Management in Complications in Surgery. Mulholland MW, Doherty GM (ed). 2nd ed., Philadelphia, Pa., USA: Wolters Kluwer, Lipincott William & Wilkins Health. 2011;148.
7. Kagita R, Mulla SA, Pai BS, Desai M. Subcutaneous negative pressure versus simple closure of skin incision following an emergency laparotomy: a randomized control study. Int Surg J. 2019;6:1230-7.
8. Patel PR, Koyani HB. Role of subcutaneous drain in class III and class IV laparotomy wound. Int Surg J. 2019;6:1495-9.
9. Wani JN, Bhat JA. Role of Negative Suction Subcutaneous Drains in Contaminated Abdominal Surgeries. J Gastrointest Dig Syst. 2019;9(1):587.
10. Nasta AM, Deolekar SS, Bajaj JS. Role of subcutaneous drains in reducing the incidence of incisional surgical site infections post emergency abdominal surgery-a prospective study of 100 cases. Int J Health Sci Res. 2015;5(9):119-24.
11. Manzoor B, Heywood N, Sharma A. Review of Subcutaneous Wound Drainage in Reducing Surgical Site Infections after Laparotomy. Surg Res Pract. 2015;2015:715803.
12. Zhuang J, Zheng W, Yang S, Ye J. Modified subcutaneous suction drainage to prevent incisional surgical site infections after radical colorectal surgery. Transl Cancer Res. 2020;9(2):910-7.
13. Manoharan GV, Sivakumar T, Kumar MA. Evaluation of the use of Subcutaneous Drains to prevent Wound Complications in Abdominal surgeries. Int Surg J. 2018;5:1368-72.
14. Wani JN, Bhat JA. Role of Negative Suction Subcutaneous Drains in Contaminated Abdominal Surgeries. J Gastrointest Dig Syst. 2019;9(1):587.
15. Khan AQ, Mahesh Kodalkar. Role of Negative Suction Drain in Subcutaneous Plane in Reducing Laprotomy Wound Infection. International Journal of Science and Research. 2016;5(1):692-4.
16. Alsafrani TA, Alabbasi AA, Dabroom AA, Alhothali MM, Alresini KA, Aboalsamh GA, et al. The Effectiveness of Superficial Drain to Reduce Surgical Site Infection in Colorectal Surgery. Cureus. 2021;13(8):e17232.

Cite this article as: Naik AK, Arya SV, Sharma AK. Role of subcutaneous suction drain in reducing surgical site infection in emergency laparotomy. Int Surg J 2022;9:616-9.