

Original Research Article

ROLE OF SUBCUTANEOUS SUCTION DRAIN IN REDUCING THE INCIDENCE OF SURGICAL SITE INFECTION IN EMERGENCY LAPAROTOMY INCISIONS –A PROSPECTIVE OBSERVATIONAL STUDY IN A TERTIARY CARE HOSPITAL.

Ashiq Hussain Raina¹, Mudasir Habib², Aijaz Ahmad³, Raqib Rashid⁴

¹Senior Resident, Department of Surgery, Government Medical College Srinagar, Jammu and Kashmir, India.

²FNB Minimal Access Surgery Resident, Department of Surgery, Government Medical College Srinagar, Jammu and Kashmir, India.

³Senior Resident, Department of Surgery, Government Medical College Srinagar, Jammu and Kashmir, India.

⁴Postgraduate Scholar, Department of Surgery, Government Medical College Srinagar, Jammu and Kashmir, India.

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Corresponding Author:

Dr. Aijaz Ahmad,
Department of Surgery, Government
Medical College Srinagar, Karan
Nagar, Srinagar- 190010, Jammu and
Kashmir, India.
Email:draijaz37@gmail.com.

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ABSTRACT

Background: Surgical site infections (SSIs) represent a significant postoperative complication following emergency laparotomies, leading to increased morbidity, prolonged hospital stay, higher healthcare costs and increased incidence of incisional hernias later on. The dead space in abdominal wounds can accumulate serous fluid, blood that can become a medium for bacterial growth. Subcutaneous suction drain helps in reducing this risk by minimizing dead space and preventing accumulation of fluid and seroma formation.

Material and Methods: A Prospective observational case-control study comprising of 104 patients, was conducted in the Department of Surgery, Government Medical College Srinagar over a period of three years from September 2020 to September 2023. A total of 104 patients were included in the study with 52 patients as cases in whom subcutaneous suction drain was placed and 52 patients as controls in whom no drain was placed. Antibiotic prophylaxis was given to all patients. Surgical site infection (SSI) was diagnosed and graded using the Southampton wound grading system.

Results: The incidence of SSI and wound related complications were significantly lower in the cases group (23.1 %) compared to the control group (48.1%). Hospital stay in subcutaneous drain group was 6.7 (SD 2.93) days as compared to control group where it was 11.2 (SD 3.48) days. Likewise in group A (drain group) wound dehiscence occurred in 9.6% of cases and in group B it was 32.7%. All these parameters were statistically significant (p value < 0.05).

Conclusion: Our study demonstrates that subcutaneous suction drain reduces SSI in emergency laparotomies, resulting in shorter hospital stays, and lower rates of wound dehiscence.

Keywords: Surgical site infection, emergency, laparotomy, suction drain, dehiscence.

INTRODUCTION

Surgical site infection (SSI) is a significant complication that can arise in the postoperative period, particularly in patients undergoing emergency abdominal surgeries. According to the

Center for Disease Control and Prevention, an SSI is defined as an infection that occurs within 30 days following a surgical procedure, or within one year if an implant is involved and the infection is believed to be related to the surgery.^[1] SSIs account for up to 20% of nosocomial infections, with a 5% incidence

across all invasive surgical procedures, and they can reach 30-40% in major abdominal surgeries, influenced by the level of contamination.^[2] The impact of surgical site infections is substantial, contributing to increased morbidity, patient discomfort and dissatisfaction, elevated healthcare costs, and complications related to wound healing.^[3] Several risk factors associated with SSIs include smoking, diabetes, obesity, malnutrition, and higher levels of contamination. SSIs can be categorized into three types: superficial incisional (affecting the skin and subcutaneous tissue), deep incisional (involving the fascial and muscle layers), and organ/space SSI (occurring in any area that was handled during the surgery).^[4] Routine preventive measures, such as hand hygiene, minimizing shaving, proper skin preparation, and the use of prophylactic antibiotics, have been shown to reduce the risk of SSIs.^[5] Research has indicated that leaving dead space during abdominal incision closures can lead to the accumulation of serous fluid and blood, increasing the risk of infection. The placement of subcutaneous suction drains helps prevent fluid accumulation, thereby potentially reducing infection rates. In light of this, we are conducting a study to evaluate the role of subcutaneous suction drains in reducing the incidence of SSIs following emergency abdominal surgeries (especially in laparotomies classified as Class III and Class IV wounds). This study will examine the rates of SSIs, wound dehiscence, and the length of hospital stays, with Southampton grading being utilized to assess the severity of SSIs.

MATERIALS AND METHODS

This was a Prospective case-control study comprising of 104 patients on the basis of inclusion and exclusion criteria with 52 cases and 52 controls. The present study was conducted in the Department of surgery, Government Medical college Srinagar, a tertiary centre in Kashmir over a period of three years, from September 2020 to September 2023. All patients presenting to our surgical emergency who fit into inclusion criteria and need emergency laparotomy 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 patients were adequately resuscitated if needed before surgery. Required investigations were done to establish the diagnosis. Patients were taken for exploration in emergency operation Theatre once diagnosed clinically and radiologically. A prophylactic dose of antibiotic was given before the surgery. Midline laparotomy incision were made mostly with scalpel and subcutaneous tissue and sheath was cut with electrocautery. After entering the peritoneal cavity amount and nature of contamination was noted and thorough

peritoneal lavage was given using warm saline and main pathology was addressed, abdominal drain was placed at the end before closing the wound. Rectus sheath was closed using non-absorbable sutures usually prolene, and 16F Romo-vac suction drain was placed in the subcutaneous plane and fixed in position and these were included in cases, and in patients where no drain was placed were taken as controls. Skin was closed using skin staplers and a gauze dressing was kept over the wound. Drain was removed on postoperative day 3 or 4. Follow-up was done upto 30 days post surgery and any infection developed was graded as per Southampton grading. In case any pus collection developed it was drained by removing the skin staplers and pus was sent for culture and sensitivity and patients were treated with appropriate antibiotics. Cases and controls were mainly compared in terms of incidence of surgical site infection, wound dehiscence and mean duration of hospital stay.

Inclusion Criteria

1. All patients aged above 18
2. Class III and IV surgical wounds

Exclusion Criteria

1. Age less than 18 years
2. Class I and II surgical wounds
3. Diabetic Patients
4. Patients on immunosuppressants.



Figure 1: suction drain in subcutaneous space



Figure 2: Suction drain in subcutaneous tissue

RESULTS

Table 1: Age distribution of study patients in two groups

Group	N	Mean	SD	Range	P-value
Group A	52	35.3	7.83	20-57	0.802
Group B	52	34.9	8.35	20-60	

Group A (Subcutaneous Drain Group); Group B (Control Group)

The mean age was 34.9 SD8.35 in control group and 35.3 SD7.83 for the subcutaneous drain group. Age was not statistically significant in our study.

Table 2: Gender distribution of study patients in two groups

Gender	Group A		Group B		P-value
	No.	%age	No.	%age	
Male	35	67.3	32	61.5	0.539
Female	17	32.7	20	38.5	
Total	52	100	52	100	

Table 3: Surgical site infection (SSI) rate in two groups

SSI	Group A		Group B		P-value
	No.	%age	No.	%age	
Present	12	23.1	25	48.1	0.007*
Absent	40	76.9	27	51.9	
Total	52	100	52	100	

*Statistically Significant Difference (P-value<0.05)

There were 25 (48.1%) patients who developed surgical site infection in control group (group B) while 12 (23.1%) had surgical site infection in subcutaneous drain group (group A) and the difference was statistically significant.

Table 4: Duration of hospital stay (Days) in two groups

Group	N	Mean	SD	Range	P-value
Group A	52	6.7	2.93	3-14 Days	<0.001*
Group B	52	11.2	3.48	5-24 Days	

*Statistically Significant Difference (P-value<0.05)

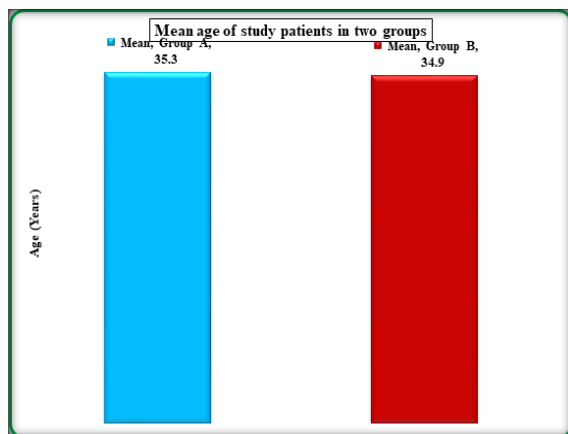
The mean duration of hospital stay was 6.7 SD 2.93 in group A (subcutrain) and 11.2SD 3.48 days in group B (control group).

Table 5: Wound dehiscence in two groups

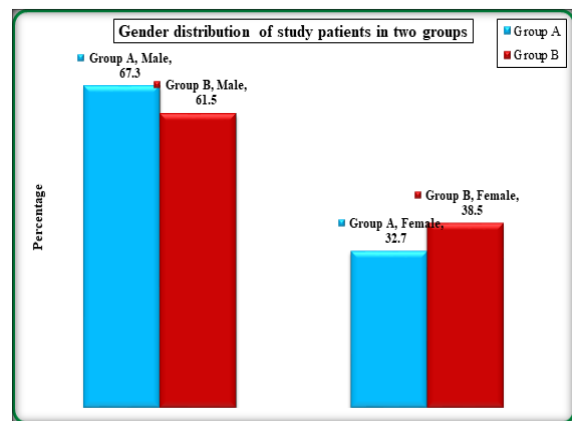
Wound dehiscence	Group A		Group B		P-value
	No.	%age	No.	%age	
Present	5	9.6	17	32.7	<0.001*
Absent	47	90.4	35	67.3	
Total	52	100	52	100	

*Statistically Significant Difference (P-value<0.05)

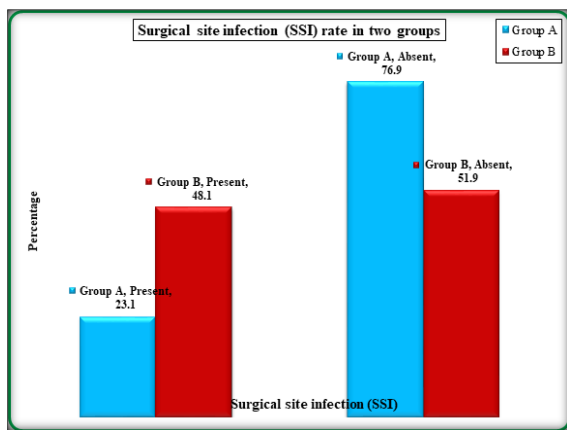
Group A had wound dehiscence in 5 patients (9.6%) and group B had in 17 patients (32.7%) and the difference was statistically significant.



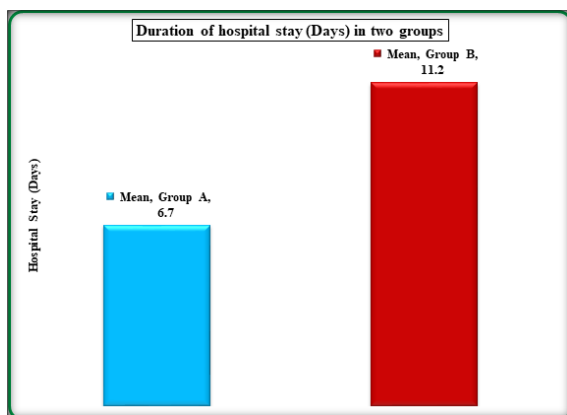
Graph 1:



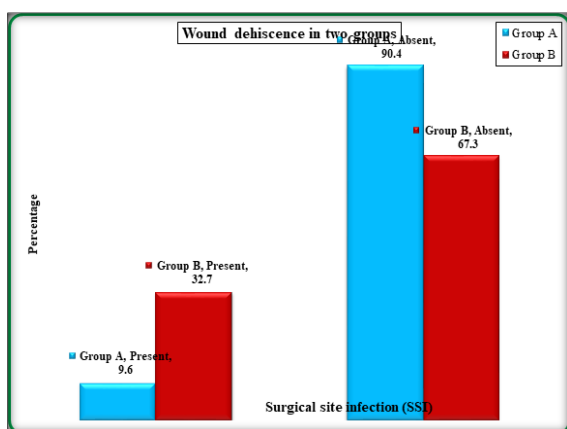
Graph 2:



Graph 3:



Graph 4:



Graph 4:

Statistical Methods: The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar diagrams. The Shapiro-Wilk test was applied to test the normality of data. Student's independent t-test or Mann-Whitney U-test, whichever feasible, was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A P-

value of less than 0.05 was considered statistically significant.

DISCUSSIONS

Surgical site infection (SSI) is a major healthcare problem associated with emergency open abdominal surgery and results in increased morbidity, prolonged hospital stay, increased healthcare costs, and these patients are at increased risk of developing incisional hernia later. A negative pressure subcutaneous drain in the surgical wounds after surgery reduces dead space in subcutaneous tissue by preventing accumulation of fluid.^[6] In this study we observed the role of subcutaneous suction drain in reducing SSI in emergency laparotomies.

In this study we observed that 12 patients out of 52 in cases and 25 out of 52 in control group developed SSI with p-value of 0.007 which is statistically significant. Similar findings were observed in study done by Naik. Arun k et al. SSI was (24.08%) in cases and 46.08% in controls with p value-0.0161.^[7] Kagita et al, reported SSI of 12.50% in cases and 69.44% in controls with significant p-value-0.0001.^[8] 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 p value-0.01.^[9] 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.^[10]

In our study we observed that the mean duration of hospital stay was 6.7 (SD 2.3) days in cases and 11.2 (SD 3.48) days in controls. This was found to be significant statistically with p value < 0.001. Zhuang J et al in their study observed that in patient stay was 9.6 (SD 4.15) days in cases and 12.2 (SD 5.55) days in control group which was statistically significant with p value 0.004.^[11]

R. Harish et al in their study observed that the mean duration of stay of the patients in the case group was 8.84 ± 2.85 days and mean duration of stay of the patients in the control group was 11.2 ± 4.85 days with p value 0.004.^[12] Manoharan et al showed mean duration of hospital stay as 9.17 in patients with drain and 14.17 in cases without drain.^[13]

In our study 5 (9.6%) patients out of 52 cases and 17 (32.7%) patients out of 52 controls developed wound dehiscence either in the form of wound gap or wound dehiscence and it was statistically significant with p value < 0.001. 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]

CONCLUSION

Our study demonstrates that the placement of subcutaneous suction drain in emergency settings helps in reducing the incidence of surgical site infection following laparotomy incisions, however large group studies are needed for better results.

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Conflict of interest: None declared

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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