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Original Research Article

Role of subcutaneous suction drain in reducing surgical site infections after emergency laparotomy

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ABSTRACT

Background: One of important morbidity postoperatively is surgical site infection and the important cause is collection of blood and serous fluids which can get infected and this factor is even more important in emergency laparotomies. our prospective randomised study compares the incidence of surgical site infection in post emergency abdominal surgical wounds with subcutaneous suction drains versus those in whom drain was not placed.
Methods: A prospective interventional study of 100 subjects done in department of surgery at rural tertiary centre. on the basis of exclusion and inclusion criteria patient were randomly selected for cases (with post-operative suction drain) and controls. subcutaneous drain in emergency setting play significant role in reducing the incidence of surgical site infection which is significant statistically.
Results: 24% of patients in drain group develop surgical site infections. 50% of patients in non-drain group develop infection. Incidence of infection in drain group was lower than the no drain group (p value 0.05) and was statistically significant.
Conclusions: Subcutaneous drain in emergency laparotomy play significant role in reducing the incidence of surgical site infection.

Keywords: Emergency laparotomies, Subcutaneous drain, Surgical site infection

INTRODUCTION

Surgical site infection (SSI) previously termed postoperative wound infection is defined as that infection presenting up to 30 days after a surgical procedure if no prosthetic is placed and up to 1 year if a prosthetic is implanted in the patients.[1] Surgical site infections (SSI) are still a major problem in general surgery, because they are responsible for significant discomfort for patients and excess morbidity and mortality, which also translates into a financial burden on the health system. In some reports SSI was found to be second only to urinary tract infection as the commonest hospital acquired infection and actually the most commonly encountered form of nosocomial infection in surgical patients.[2-4] The risk of developing SSI is multifactorial and include the degree of microbial contamination of the operation site indicated by wound class as clean, clean contaminated, contaminated and dirty, and also by patient age, length of surgery, pre-operative shaving of the operative site, hypothermia and co morbidities e.g. diabetes and obesity.[5]

The objective of this study was to compare the incidence of incisional surgical site infections in post emergency abdominal surgical wounds with subcutaneous suction drains versus those in who subcutaneous drains are not used.

METHODS

A prospective consecutive 30 days interventional study of 100 subjects (50 drain group and 50 no-drain groups).

This prospective case series was conducted at UPUMS, Saifai, Etawah, Uttar Pradesh, a rural tertiary care centre, between 1st January and 30 May 2017.

All of the 100 patients admitted to emergency department who underwent laparotomy within 24 of admission and above 18 years were included in the study. The demographic data of the patients and the diagnostic criteria were collected. Other data including ASA classification. Smoking history, use of prophylactic antimicrobial agents, the type and duration of surgery, clinical evaluation of wound (considered infected if there was pus discharge or redness and swelling with fever) were recorded on a data sheet.

The skin incision was performed with a scalpel; subcutaneous fat was dissected by electrocautery. The wound was irrigated with 2000 mL of saline solution just before skin closure. The fascia/muscle layer was closed by continuous loop ETHILON and the skin was closed by 3-0 ETHILON. There were no differences in the surgical procedures between the latter a prior period, except that a suction drain was inserted along the entire length of the subcutaneous tissue. The exit of the drain was separated from the incisions. The suction drain was removed on postoperative day five.

SSI cases were diagnosed within 30 postoperative day by ICT according to the centers for disease control and prevention (CDC) criteria:

- Purulent drainage with or without laboratory confirmation from the superficial incision
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
- At least one of the following signs or symptoms of infection: Pain or tenderness, localized swelling, redness, or heat and superficial incision were deliberately opened by surgeon, unless the incision was culture-negative; and
- Diagnosis of s-SSI by the surgeon or ICT.

RESULTS

Total no. of patients taken in the study were 100 and they were selected randomly for cases and controls. Out of these 100 patients 72 were male and 38 were female. 37% patients developed surgical site infection post emergency abdominal surgery. Out of 50 patients in the 'drain' group (cases), 33 were male and 17 were females, and 12 patients (24%) developed surgical site infection. Out of these 12 patients 9 were males and 3 were females. Out of 50 patients in the 'no drain' (controls) group, 39 were males and 11 were females, and 25 patients (50%) developed surgical site infection. Out of these 25 patients 21 were male and 4 were females. The median times of removal of suction drain were postoperative day five (range 2-12).

There were no severe complications associated with the insertion of the suction drain. The incidence of surgical site infection in drain group was lower than the no drain group, which was statistically significant (p value 0.05). Age, sex, duration of surgery, blood transfusion, diabetes mellitus, smoking history, body mass index, blood loss during surgery, stoma, pre and post-operative albumin level were not significant.

Table 1: Distribution of patients in the study

Distribution of patients	
Total no. of patients	100
Total no. of male patients	72
Total no. of female patients	38
No. of patients without drain(controls)	50
No. of patients with drain (cases)	50
% of patients that developed infection in drain group	24
% of patients that developed infection in non-drain group	50
Overall % of patients that developed infection	37

Table 2: Outcome of the study.

Outcomes	
% of patients that developed infection in drain group	24%
% of patients that developed infection in nondrain group	50%
Overall % of patients that developed infection	37%

DISCUSSION

SSI is one of the most serious infectious complications of surgery. Study consideration is to remove the blood and serous fluids from the wound by drains before fluids can get infected.[6] This concept is frequently implemented in clinics. However, a meta-analysis showed that prophylactic subcutaneous drainage to prevent wound complications is not efficient in gynecology.[7] Laparotomies carry a higher risk of wound infection and a combined rate of 15% has been reported in upper and lower gastrointestinal surgery, over three times the average risk.[9] On the other hand, there have so far been few reports on the efficacy of prophylactic subcutaneous drain for the prevention of s-SSI following emergency surgery. It is generally thought that the incidence of s-SSI is related to amount of bacterium of the wound, formation of hematoma, pool of effusion, potential subcutaneous dead space, disturbance of the local circulation, and the amount of bacterium in the surgical organ.[8]

A subcutaneous drain might reduce the amount of bacterium around the wound and remove residual effusion and blood from the wound that could serve as a medium for bacterial growth. A closed drain is an active

drain that employs the power of suction. The luminal obstruction of such drains increases with time, and drainage becomes poor 48 h after insertion.[8]

Numerous risk factors for developing a SSI have been identified. Current smokers are at a 30% increased risk of SSI after major colorectal procedures and smoking cessation reduces SSI.[10,11] Body Mass Index and obesity have also been linked to increased risk of SSI with studies showing wound complication rates in some procedures rising from 7% up to 23% due to obesity.[12,13] More specifically, depth of subcutaneous fat has been shown to be a strong risk factor for SSI and has been shown to be a useful predictor for SSI risk.[14,15] Many other factors including nutrition and diabetes control, certain comorbidities, ASA class, and operation time have been identified as important factors affecting SSI.[15,16]

Various interventions have been proposed with a view to reducing SSIs. A number of them are used in routine practice. Hand washing, minimising shaving, skin preparation, and preoperative antibiotics have all gained acceptance in the surgical community.[17] Use of drains after surgery however has declined in recent times. It has been shown that drains provide no advantage after cholecystectomies, inguinal hernia repairs, and various other types of surgery.[18] Use of drains, however, is still popular after abdominoperineal excision of rectum and repair of incisional hernias due to inconclusive evidence and surgeon preference.[19] They are still used in some major plastic surgery procedures as they are thought to reduce collections in closed spaces.[20]

It has been postulated that the presence of hematoma, serous fluid, and dead space in surgical incisional wounds increases the risk of infection as this acts as a culture medium.[21] Subcutaneous drains have been used to reduce the risk of infection. However, the use of postoperative subcutaneous wound drainage is not universally accepted. In addition, drains may not be efficacious and cause discomfort and increased hospital stay on their own.

The National Emergency Laparotomy Audit (NELA) is a new initiative in the United Kingdom to audit and subsequently reduce complication rates after emergency laparotomies.[22] SSIs remain a major problem after emergency laparotomies and would be within the remit of NELA. This would further highlight the significance of interventions that reduce SSI in emergency laparotomies.

Fujii et al, included high risk patients, including emergency laparotomies, and patients with thick subcutaneous fat and the risk ratio showed a reduction in the SSI rate in the drain group (RR 0.37 (0.15-0.9).[15] Imada et al, showed no significant difference in SSI incidence when using a drain in all patients; however there was a reduction in SSIs in the high risk patient group from 15% to 8%.[23] It has also been reported by Soper et al, that the depth of subcutaneous fat in a patient is an independent risk factor for SSI.[14] It may therefore be possible that subcutaneous drains may be of benefit in high risk and/or obese patients and this is not evident in the meta-analysis due to underpowering.

In this study drain placement reduces the SSI significantly.

CONCLUSION

Subcutaneous drains in emergency setting play significant role in reducing the incidence of surgical site infections statistically.

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