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Original Research Article

Role of subcutaneous drain in class III and class IV laparotomy wound

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ABSTRACT

Background: Surgical site infections (SSI) are major problem in general surgery. Aim of this study is to know the role of subcutaneous conrrugated drain in class III and IV laparotomy wounds.
Methods: Comparative study was done in 100 patients of emergency laparotomy in civil hospital, Gandhinagar from January 2014 to December 2016.
Results: Incidence of surgical site infections were significantly lower (16%) in patients with subcutaneous drain, compared to 40% in patients without drain (p value 0.01).
Conclusions: Corrugated subcutaneous drain is cost effective way of reducing surgical site infections and subsequent morbidities in class III and IV laparotomy wound.

Keywords: Class III and class IV wound, Laparotomy, Subcutaneous drain

INTRODUCTION

Surgical site infection is one of the frequent complication of class III and class IV laparotomy wound.[1] Surgical site infections (SSI) is the third most commonly reported nosocomial infection which has an adverse impact on the hospital as well as on the patient. A continuous surveillance is called for, to keep a check on the occurrence of SSI.[2] Preoperative antibiotics are known to decrease incidence of SSI cases.[3-5] SSI are responsible for significant increase in morbidity in terms of discomfort to patients, longer hospital stay and complications like burst abdomen and later on incisional hernias, etc. It also increases financial burden of health care and consumption of limited resources.

Aim of this study was to know the role of subcutaneous conrrugated drain in class III and IV laparotomy wounds. The objectives were to study (i) whether it reduces rate of wound infection, (ii) whether it is effective in term of reducing rate of morbidities related to wound infection like prolonged dressing, need for secondary suturing, wound dehiscence etc.(iii) whether it decreases overall hospital stay (iv) whether any complication of drain is there.

METHODS

Type of study

Study was a prospective study.

Hundred patients admitted in emergency in surgery department civil hospital, Gandhinagar during January 2014 to December 2016 were included in study.

In all 100 patients, routine investigation was sent at the time of admission. All were given prophylactic antibiotic, cefotaxim 1 g iv was given at the time of induction.

Inclusion criteria

Patients having class 3 and 4 surgical wound divided in two equal group irrespective of pathology like pepetic perforation, enteric perforation, appendicular pathology, colorectal pathology and irrespective of associated condition like diabetes, malignancy or other immuno-compromised condition. Out of 100 patients, in 50 patients subcutaneous drain was kept in whole length of wound and was taken out from separate incision.

Exclusion criteria

Patients who have died immediate postoperative period, less than 10 days were excluded. The pus culture and sensitivity was sent from infected wound.

Abdomen closure technique

After tackling primary pathology abdominal closure was done in following manner.

In midline incision, en mass sheath closure was done with epimide loop no 1. In paramedian, subcostal and Rutherford-Morrison incision two layer closure done with vicryl. Skin was closed by epimide no 2. Details according proforma were filled.

When there was abscess formation, pus was drained and some sutures were removed and secondary closure was done after control of infection.

Patients were followed up for 6 months. Ethical approval was taken from ethical committee.

The statistical analysis was done using chi square test manually.

RESULTS

Out of 50 cases with drain, 8(16%) showed infection, while out of 50 cases without drain, 20(40%) showed infection.

Table 1 shows that all age groups are affected. As age increases infection rate increases in both group of patient because of overall immunity is better in younger age group.

Table 2 shows that male was more affected because peptic perforation, enteric perforation and colorectal malignancy are more common in male because of smoking.

Table 1: Distribution of patients according to age.

Age (in years)	With drain		Without drain		Total	Total infected	Percentage (%)
	Total	Infected (%)	Total	Infected (%)			
<20	2	0	3	0	5	0	0
21-30	10	1	7	2	17	3	17.6
31-40	10	1	9	3	19	4	21.1
41-50	7	1	8	4	15	5	33.3
51-60	13	3	18	8	31	11	35.5
>60	8	2	5	5	13	5	38.5
Total	50	8	50	20	100	28	

Table 2: Distribution according to gender.

Gender	With drain		Without drain		Total	Total infected	Percentage (%)
	Total	Infected (%)	Total	Infected (%)			
Male	47	7 (14.9)	45	18 (40)	92	25	27.2
Female	3	1 (33.3)	5	2 (40)	8	3	37.5
Total	50	8 (16)	50	20 (40)	100	28	28

Table 3 shows that enteric and colorectal pathology wound is more prone to infection. This is because bacterial load and virulence increases as we go distally in bowel.

A major SSI is defined as a wound that either discharges significant quantity of spontaneously or needs a secondary procedure to drain it. The patient have systemic signs such as tachycardia, pyrexia and a raised white count systemic minor wound infections may discharge pus or infected serous fluid but should not be associated with excessive discomfort, systemic signs or delay in return home (Table 4).

Class III/contaminated- open, fresh, accidental wounds in addition operation with major break in sterile technique or gross spillage from the gastrointestinal tract, and incision in which acute nonpurulent inflammation is encountered are in this category (Table 5).

Table 3: Distribution according to pathology.

	With drain		Without drain		Total	Total infected	Percentage (%)
	Total	Infected (%)	Total	Infected (%)			
Peptic	20	2 (10)	20	5 (25)	40	7	17.5
Enteric	13	3 (24.3)	14	8 (58.5)	27	11	40.1
Appendix	5	0 (0)	5	1 (20)	10	1	10
Gall bladder and liver	5	1 (20)	5	2 (40)	10	3	30%
Colorectal	7	2 (28.4)	6	4 (66.6)	13	6	46.1%
Total	50	8 (16)	50	20 (40)	100	28	28%

Table 4: Symptoms of wound infection.

	Total infected 8 patient with drain	Total infected 20 patient without drain	Percentage (%)
Discharge	8	20	100
Redness	7	17	85.7
Tenderness	5	12	60.7
Fever	6	16	78.5
Pain at local site	8	20	100

Table 5: Class of laparotomy wound and wound infection.

	With drain		Without drain		Total	Total infected	Percentage (%)
	Total	Infected (%)	Total	Infected (%)			
Class 3	8	1 (12.5)	6	2 (33.3)	14	3	22
Class 4	42	7 (16.6)	44	18 (40.9)	86	25	29

Class 4/dirty–infected old traumatic wounds with retained devitalised tissue and those that involve existing clinical infection or perforated viscera.

As per above comparison, in emergency class 4 laparotomies are more common. Subcutaneous drain decrease chances of wound infection in both class 3 and class 4 wound.

In all cases of peritonitis, intraperitoneal drains were kept to reduce chances of collection and abscess formation. Closed tube or corrugated drain was used accordingly. In most cases single drain was sufficient. In rare case of very severe peritonitis two intraperitoneal drains were kept. It was removed when drain output reduced to <30 ml/day serous and/or patient started orally. Average time of removal of intraperitoneal drain was 4 to 7 days. No relation between intraperitoneal drains and subcutaneous drains was observed.

Table 6: Comparison of wound infection in both group.

	Total	Infected	Percentage (%)
With drain	50	8	16
Without drain	50	20	40
Total	100	28	28

Average time of removal of drain was 3-4 days for peptic perforation and 6-8 days for colorectal perforation.

Wound infection rate is significantly less in with drain patient compare to without drain and over all combine rate.

Table 7: Requirement of removing sutures to drain pus.

	Total infected	Suture removed	Percentage (%)
With drain	8	2	25
Without drain	20	12	60

This table clearly shows less incidence of suture removal for draining pus of 25% in patient with drain, compare to 60 percent without drain.

Culture and sensitivity was in done in every infected patients in both group. Results were suggestive of endogenous organisms like *E. coli* and *Klebsiella* are mostly involved. Endogenous organisms were also involved in infected patients in whom drain was kept. This suggest that fear of spread of infection from outside through subcutaneous drain is not true.

Table 8: Requirement of secondary suturing.

	Total infected	Secondary suturing required	Percentage (%)
With drain	8	1	12.5
Without drain	20	5	25

Table 9: Rate of wound dehiscence.

	Total infected	Wound dehiscence	Percentage (%)
With drain	8	1	12.5
Without drain	20	4	20

Average hospital stay was 10.1 days in patients with drain and 13.2 days in patients without drain. Observation showed decrease in overall hospital stay in patients in whom subcutaneous drain was kept is significantly low (p=0.05).

DISCUSSION

Study done by Sharma et al showed smoking increases the risk of complications after all types of major colorectal surgery, with the greatest risk apparent for current smokers.[6] A concerted effort should be made toward promoting smoking cessation in all patients scheduled for elective colorectal surgery.

Out of 50 cases with drain, 8 (16%) showed infection, while out of 50 cases without drain, 20 (40%) showed infection. This shows subcutaneous drain in laparotomy wound decreases the chances of infection with strong statistical significance (p=0.01). The study done by Gupta et al. showed 24% of patients in drain group develop surgical site infections while 50% of patients in non-drain group develop infection. [7] Thus he also showed decrease in infection with subcutaneous drain with statistical significance (p value 0.05). The study done by Fujii et al also showed the similar finding. [8]

The age group that is affected by acute peritonitis leading to emergency laparotomy ranges from 13 to 75 years. Hence, all age groups are seen to be affected. Most common age group presented with acute abdomen was between 51-60 years. (31%). patients in age group >60 years of age is less than 51-60 years of age probably because of high mortality and poor prognosis. Infection rate varies according to age. As age increases, increase in wound infection occurs probably due to factors affecting wound healing and decreased immunity.[9]

The acute abdomen leading to laparotomy was more common in males (92%). This is due to causes leading to emergency laparotomy like peptic perforation, enteric perforation, CA colon being more common in males. 27.2% males got infected and 37.5% females got infected. No significant difference is seen between male and female groups. Subcutaneous drain decreases occurrence in both the genders. This is results are comparable to previous study done by Gupta et al.[7]

The pathology in decreasing order was peptic perforation (40%), enteric perforation (27%), colorectal pathology (13%), perforated appendix (10%) and gall bladder pathology (10%). Most commonly infected pathology is colorectal (46.1%) as compared to the other causes. Virulence of organism increases as we go distally in the bowel. It involves people with older age group and mostly is malignant which leads to decreased immunity. Reduction in trend for enteric perforation is observed because of improved sanitation and living conditions. When typhoid perforation occurs within the first week of illness, the prognosis is better than if it occurs after the 2nd or 3rd week because in early stages, the patient is less nutritionally compromised and the body's defence is robust. Thus, shorter the interval between diagnosis and surgery better is prognosis. In peptic perforation, risk factors include smoking, alcohol and NSAIDS. In proximal bowel, the virulence of organisms is low. Initially chemical peritonitis occurs followed by bacterial peritonitis. In appendicular and gall bladder causes, there is limited peritonitis. Subcostal or para-median incisions also play a role in reduced infection rate. Irrelevant of the pathology, subcutaneous drain reduces the pathology for infection.

The discharge quantity was significantly less in cases where subcutaneous drain was kept. Purulent to serous conversion was rapid where subcutaneous drain was kept. This is because drain prevent seroma formation and subsequent growth within subcutaneous space.

The wound infection was significantly lower in patients where subcutaneous drain was kept. Wound infection itself is a major morbidity which results into prolonged hospital stay, increased cost, secondary suturing and long term complication like incisional hernia. Antibiotic prophylaxis is proven measure to decrease wound infection.

The subcutaneous drain significantly decreases morbidity due to removal of sutures and secondary suturing even when the wound is infected. This reduces over all hospital stay and allows patient to normal activity as early as possible.

Wound dehiscence is disruption in any or all the layer in wound. It may occur in 3% patient with abdominal wound and commonly present at 5 to 8 post operative day. Subcutaneous drain by decreasing wound infection and wound dehiscence decrease the subsequent chances of incisional hernia.

The decrease in overall hospital stay was observed in patients, in whom subcutaneous drain was kept is significantly low (p=0.05).

CONCLUSION

In emergency laparotomies, pathology commonly involves peptic perforation, enteric perforation, appendicular pathology, gallbladder pathology and colorectal pathology. Most emergency laparotomy was class 3 and class 4 type wound. Rate of postoperative wound infection is higher in enteric perforation and colorectal pathology. Wound infection increases morbidities like prolonged time for hospitaliazation, secondary suturing, wound dehiscence and incisional hernia. Subcutaneous corrugated drain is very effective in reducing chances of wound infection associated morbidities with statistical significance (p=0.01). It reduces hospital stay and overall cost. It is easily available, very cost effective and without any complication. So conclusion of this study is that subcutaneous corrugated drain should be used in all cases of class III and IV laparotomy wound.

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