

Original Article

Outcome of Abdominal Wound Closure Following Continuous and Interrupted Suture in Elective Laparotomy

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Abstract :

Closure is a crucial factor in laparotomy wound. Fascial layers provide the major tensile strength in wound closure. Poor wound healing and development of wound infection in incisional wounds are the common complications of open abdominal surgery. Continuous fascial closure commonly practiced and the interrupted closures are also practiced by some surgeon with an assumption that it causes less pain and less wound infection. The aim of this study was to determine the rate of postoperative wound infection and severity of wound pain following interrupted and continuous abdominal wound closure. A comparative cross-sectional study was done at the Department of surgery, Sylhet MAG Osmani Medical College Hospital from 1st July 2007 to 30th June 2008. A total 100 patients of clean-contaminated elective laparotomy were selected. The patients were randomly divided into two groups. Every odds number was included in group-I (interrupted suture) and every even number was included in group-II (continuous suture). Total 14% wound infection was detected in interrupted suture group where as wound infection was 18% in continuous suture group of wound closure. Though the wound infection is higher in group-II but the difference of wound infection is not statistically significant between two groups. The wound pain assessed in seven postoperative days was higher in continuous closure group than interrupted group but the difference was not significant. There is no significant difference of wound infection and wound pain between interrupted and continuous suture group in clean-contaminated laparotomy.

Key words : Abdominal wound, Closure, Laparotomy, Continuous, Suture, Interrupted Suture.

Introduction :

Secure abdominal wound closure depends on the repair of musculofascial layer of abdominal wall. Musculofascial layer of abdominal wall consist of external abdominal, internal abdominal and transverse abdominal muscles and their aponeurosis. In the midline incision-linea alba, right paramedian and right subcostal incision-anterior and posterior layer of rectus sheath of the musculofascial layers was involved.

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Closure of the laparotomy wound which influence outcome of wound repair. The common postoperative outcome of an abdominal wound closure is satisfactory wound healing. Postoperative complication like wound infection, wound pain, wound disruption and incisional hernia have been related to advanced age, anaemia, hypoproteinaemia, use of steroids, uraemia, malnutrition, malignant neoplasms, type of operation, type of incision, method of closure, and type of suture materials used¹.

Surgical procedures or local tissue damage with consequent release of algescic substances like prostaglandins, histamine, serotonin, bradykinin, 5-hydroxytryptamine (5HT), lactic acid, substance-P that generate noxious stimuli and initiate post operative wound pain².

Continuous wound closure is rapid and more leaks proof and being more expedient but result in a decrease blood supply to the fascial edges³. The Continuous suture has the disadvantage of being a single suture line holding the fascia together and most of wound dehiscence occurs because sutures cut through the

fascia. Suture failure also occurs due to few stitches and placed too close to the edges⁴. Moreover if wound infection occurs the entire fascial layer will be disrupted and which increase the morbidity and hospital stay of the patient.

Interrupted closure is more time-consuming to perform and isolating the tension to each individual stitch but the technique ensures correct suture placement and precise coaptation of edges. It is less likely to devascularize the incision margin. Interrupted sutures have the advantage that they can be removed individually if infection or haematoma formed⁵.

We designed the study as randomized fashion between two methods of abdominal wound closure (interrupted and continuous closure) and to compare outcome of wound infection and wound pain between them. To minimize the influence of suture materials we used same suture materials in similar level of fascial closure in both group of patients.

Materials and Methods :

It is a comparative cross-sectional study conducted in department of Surgery in Sylhet M A G Osmani Medical College Hospital from 1st July 2007 to 30th June 2008. Patients of elective laparotomy those fulfill the inclusion and exclusion criteria were given arbitrary number, every odds number of patient was included as group-I and even number of patient was included as group-II. Group-I had done interrupted fascial closure and Group-II continuous fascial closure.

All the patients were assessed and diagnosed before operation from history, physical examination and necessary investigations. Inform written consent was taken from every patient after explaining the purpose of data collection. The patient was performed laparotomy under general anaesthesia through either of the vertical incision (upper midline, right upper para-median) and right sub-costal incision. After performing the definite operation, abdominal wound was closed in layers as follows:

Patients of Group-I, In case of right upper paramedian and right sub-costal incision peritoneum and posterior layer of rectus sheath and in case of upper midline incision peritoneum closed continuously by chromic 1/0 catgut. Anterior layer of rectus sheath of both upper right paramedian and right sub-costal incision and linea alba of midline incision closed interruptedly with 1/0 polyglactin (vicryl, size1/0; Ethicon, Division of Johnson & Johnson Ltd, Aurangabad, India).

Patients of Group-II, peritoneum and posterior layer of rectus sheath of right upper paramedian and right sub-costal incision and peritoneum of upper midline incision were closed by 1/0 catgut continuously and anterior layer of rectus sheath of both upper right-paramedian and right sub-costal incision and linea alba of upper midline incision were closed with 1/0 polyglactin continuously. In sub-cutaneous tissue no suture was used in both groups. Skin was closed by interrupted mattress sutures with 2/0 braided silk in both groups. In all case diathermy used for haemostasis and drainage tube inserted (if necessary) through separate stab wound. Injection ceftriaxone (50mg/kg body weight) administered intravenously at the time of induction of anaesthesia in all cases and continued as therapeutic measure till oral supplement, then tablet cefixime 200mg was given twice daily until discharge the patient.

Results :

Outcome of the study were as follows:

Table-I shows, demographic characteristics of two groups. In our study female participant was higher than male. There was no statistical significant difference in the sex, average age, body mass index and haemoglobin concentration between interrupted and continuous closure group.

Table I : Demographic Characteristics of Both Groups.

Parameters	Group-I (n = 50)	Group-II (n = 50)	P value
Sex : Male	17 (34%)	21 (42%)	P>0.05($\chi^2=1.07,df=1$)
Female	33 (66%)	29 (58%)	
Age (Years) : Mean (SD)	42.5 (12.8)	43.2 (10.4)	P>0.05(t=0.57)
BMI (Kg/m ²) : Mean (SD)	21 (2.0)	21.4 (2.3)	P>0.05(t=0.84)
Haemoglobin (gm/dl): Mean (SD)	11.9 (1.8)	12.1 (1.5)	P>0.05(t=0.78)

Group I= Interrupted closure, Group II= Continuous closure

Table 2 shows total infection in group-I was 7 (14%) and in group-II was 9 (18%). Among these disturbed healing was 4 (8%), minor infection was 1 (2%), moderate infection was 2 (4%) in group-I and where as disturbed healing was 4 (8%), minor infection was 2 (4%), moderate infection was 3 (6%) in group-II. There was no significant difference of wound infection between two groups.

Table 2 : Rate and Categories of Wound Infection in Group-I and Group-II

Categories of wound infection (based on ASEPSIS score)	Group-I No. & rate of infection	Group-II No. & rate of infection	P value
Disturbed healing (Asepsis score 11-20)	4 (8 %)	4 (8 %)	P > 0.05
Minor infection (Asepsis score 21-30)	1 (2 %)	2 (4 %)	(X ² =1.19,df=2)
Moderate infection (Asepsis score 31-40)	2 (4 %)	3 (6 %)	

Table 3 shows, severity of wound pain between group-I and group-II. Moderate pain was more in interrupted group and severe wound pain more in continuous group. But no significant difference between two groups was found.

Table 3 : Severity of wound pain between two groups

Severity of pain	Group-I	Group-II	P value
Mild pain (VAS score 30 or less)	0	0	P>0.05 (X ² =3.16,df=1)
Moderate pain (VAS score 31- 69)	10	3	
Severe pain (VAS score 70 or more)	40	47	

Table 4 shows difference of wound pain between vertical and subcostal incisions. Vertical incisions were 21 and subcostal incisions were 29. Pain score between two groups of incision were not significantly different.

Table 4 : Comparison of wound pain between vertical and subcostal incision in group-I

Parameters	Incisions		P value
	Vertical (n = 21)	Subcostal (n = 29)	
VAS score: Mean (DS)	75 (4)	73 (8)	P>0.10 t=0.66, df=1

Table 5 shows, difference of wound pain between vertical and subcostal incisions. Vertical incisions were 20 and subcostal incisions were 30. Pain score between two groups of incision were not significantly different.

Table 5 : Comparison of wound pain between vertical and subcostal incision in group-II

Parameters	Incisions		P value
	Vertical (n = 20)	Subcostal (n = 30)	
VAS score: Mean (DS)	78 (5)	79 (4)	P>0.10 (t=0.79, df=1)

Discussion :

The ideal suturing method should prevent incisional hernia, wound dehiscence, without increasing wound infection, wound pain or the formation of suture sinus. But the ideal method of abdominal fascial closure has yet to be determined. Local custom dictates and subsequently conditions how surgeons close abdominal wounds. These local customs are influenced by senior surgeon¹⁰.

Total sex distribution of patient in this study was 38% male and 62% female of which male 17 (34%) and female 33 (66%) in interrupted group (group-I); male 21 (42%), and female 29 (58%) in continuous group (group-II) (Table-I). In our study only elective laparotomies included. In elective cases gallstone diseases were predominant and which is common in female than male, for this region proportion of female participations were more than male. Though the female patients were more but there was no statistical difference of sex in between two groups.

In the present study most of the patients were in fifth decade. Average age for the total study group was 42.8 years and of which mean age 42.5 years (SD 12.8) in group-I and 43.2 years (SD 10.4) in Group-II (Table-I). Mean age was 46.85 and 46.5 years in an study by Orr JW⁶ and was 52.8 and 54.1 years in other study by Richards PC¹ in interrupted and continuous group respectively. They include both emergency and elective operations and all age group of patients. Though there is disparity of mean age between the reference group but found no significant difference between continuous and interrupted group.

In continuous closure suture cause high pressure through the whole suture line and deteriorates tissue blood supply and in interrupted closure isolating the tension to each stitch. In our study total wound infection in interrupted closure was 7 (14%) and continuous closure was 9 (18%) (Table II). Though wound infection rate is higher in group-II than group-I but the difference was not statistically significant. This finding is consistent with study of Orr JW and Wissing J^{6,8}.

Wound pain is related to tissue ischaemia, as continuous closure method is associated with ischaemia of tissue. Immediate after operation in continuous closure there is more tissue oedema, high tissue tension and due to ischaemic response there is high release of chemical mediators which causes more postoperative pain. Postoperative wound pain in group-I was less in compare with group-II but no significant difference was observed (Table III).

Wound pain score in vertical incision was 75 (SD 4) and subcostal incision was 73 (SD 8) in group-I (Table-V) and wound pain score in vertical incision was 78 (SD 5) and subcostal incision was 79 (SD 4) in group-II (Table-VI). There was no significant difference of the severity of wound pain between vertical and oblique incision in two groups of patients.

Conclusion :

This study show there was no significant difference of wound infection and wound pain between continuous and interrupted fascial closure.

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