PRIMARY VERSUS DELAYED CLOSURE OF LAPAROTOMY WOUND

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ABSTRACT

Background: It remains to be argued that the delayed primary wound closure (DPWC) of laparotomy incisions during abdominal septic operations can reduce the incidence of surgical site infection in comparison to primary wound closure (PWC).

Objectives: To compare the outcome result of primary and delayed primary closure of abdominal wound in patients who underwent midline Laparotomy for peritonitis.

Method and Material: Total of116 patients with generalized peritonitis satisfying the inclusion criteria were studied. The patients were at random assigned to two groups by lottery method. Patients In group A(58)underwent a primary closure of midline abdominal wound after laparotomy and patients in group B(58) were treated daily with10% povodine iodine dressing, followed by delayed primary closure of midline abdominal wound . Each patient was evaluated postoperatively to determine the development of surgical site infection (SSI) for 28 days. The composed data was analyzed in SPSS version 22, Chi Square test was performed and P-value of $\geq$ 0.05 was considered insignificant.

Results: All (116) patients were randomized into two groups of 58 patients in each group A and B. In group A, the age range was from 15 to 62 years. The average age was 31.1 $\pm$11.2 years, while in group B, the age range was from 15 to 66 years. The average age was 30.1$\pm$10.3 years.

In group A, 22 (37.1%) patients were men and 36(62.9%) patient women. the proportion of men and women was 1:1.6 while in group B 37(63.8%) patients were men and 21(36.2%) women. the Male / female ratio was 1.7:1.

SSI developed In 22 (37.9%) patients in group A, and 8 (13.7%) patients in group B. The SSI between two group was statistically significant (p value $<$0.05)

Conclusion: Delayed primary closure is more effective than primary closure in contaminated and dirty abdominal wound.

Key words: Peritonitis,laparotomy,wound closure,SSI.

INTRODUCTION

Peritonitis is one of the most common surgical emergencies encountered by general surgeon's worldwide[1,2]. With the advancement in medicine and technology mortality due to peritonitis has decreased to an average of 30–40%[3]. Common causes of peritonitis are perforated peptic ulcer,ileal perforation, appendicitis, abdominal trauma, necrotizing enterocolitis and peritoneal dialysis[4-7], and also due to the free released of bile and pancreatic enzyme into the lining of the peritoneal cavity[7].

Resuscitation followed by surgery remains the cornerstone of the treatment of peritonitis[8]. In the adult patients a vertical Medline incision is the preferred choice for most patients with generalized peritonitis because it provides access to whole peritoneal cavity[8]. Abdominal incisions for peritonitis are classified as dirty and lead to high chances of Surgical Wound Infection/ surgical site infection (SSI), burst abdomen and incision hernia.

The two methods of closing the Abdominal Wound are primary wound closure (PWC) and delayed primary wound closure (DPWC)[8 9]. To date, the optimal method of closing contaminated and dirty wounds remains controversial[10].

Surgeons have a different opinion on the recommended technique for wound closure after contaminated surgeries[11,12]. Randomized controlled trials in the wound closure technique in contaminated surgeries have yielded varying results. Few people are in favor of delayed primary closure while others have advocated the technique of primary closure of the wound after irrigation and antibiotic coverage.

OBJECTIVES

To compare the outcome result of primary and delayed primary closure of abdominal wound in patients who underwent midline laparotomy for peritonitis.

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METHOD & MATERIAL

From first February 2017 to 30 June 2018 this prospective, comparative study was conducted on patients admitted for the treatment of generalized peritonitis in Medical Teaching Institution Mardan Medical Complex and Bacha Khan Medical College (MTI, MMC, and BKMC), a Tertiary Care hospital in Mardan division KPK Pakistan. The inclusion criteria are all patients of both sexes over 15 year of age with generalized peritonitis. We excluded Diabetic patients, steroid users, patients with chronic liver or renal disease, patients with HIV/AIDS and those who do not wish to include them in the study.

Patient data were recorded on a proforma specifically prepared for this study. written Informed consent was obtained from patients after a full explanation of the details of the disease process, treatment options, possible side effects and complications in either group. They were informed of their right to withdraw from the trial at any time. The Institutional Ethics Committee of MTI, MMC and BKMC gave the approval of the study.

Peritonitis is the infection of peritoneal lining characterized by abdominal pain (on history), guarding, rigidity and tenderness (on clinical examination) confirmed during laparotomy, caused by infection or perforation of a visceral organ or penetration of peritoneal cavity by a foreign body[13].

Primary wound closure: In this wound was closed at the end of the surgery with interrupted prolene 2/0 sutures, and the stitches were opened on the tenth day after surgery.

Delayed primary wound closure: In this case, the wound closed on the fifth day after the operation with daily betadin dressing for 3 to 5 days. The stitches were opened on 10th day of secondary closure.

Superficial surgical site infection (SSI): It was detected by the presence of the following characteristics in the 28 days following the operation.

1. Pain greater than 3 on the visual analogue scale detected by the history (1 corresponds to the minimum and 10 to the maximum).
2. Redness at the site of the wound, as shown by the clinical examination.
3. Purulent flow of the wound confirmed by laboratory culture.

The treatment protocol for peritonitis is resuscitation and Surgery (laparotomy). In the adult patients a vertical Medline incision is the preferred choice for most patients with generalized peritonitis because it provides access to whole peritoneal cavity. Abdominal incisions for peritonitis are classified as dirty and lead to high chances of Surgical Wound Infection/surgical site infection (SSI), burst abdomen and incision hernia.

A total of 116 consecutive patients satisfying the inclusion criteria were studied. All patients had a detailed history followed by a complete physical examination and a complete set of routine investigations. Patients were at random assigned into two groups by the lottery method. Group A(58)Patients underwent a primary closure of midline abdominal wound after laparotomy and group B(58) patients underwent daily 10% povodine iodine dressing for 5 days followed by a delayed primary closure of midline abdominal wound.

During surgery, pus and abdominal secretions were collected for culture and sensitivity. The abdominal cavity was irrigated with 4 to 6 liters of normal saline. Patients in both groups received intravenous infusion, third generation cephalosporin and metronidazole, these were modified accordingly to the result of the culture and the sensitivity and were continued for at least 7 to 10 days.

Post operatively all patients were kept in surgical ward under observation for 8 to 10 days and then discharged. The follow up visit was recommended to all patients on day 5, 14 and 28 post closure to detect outcome results in both groups in terms of surgical site infection.

The composed data was analyzed in SPSS version 22, Chi Square test was performed and P-value of $\geq$ 0.05 was considered insignificant. The study population was statistically described using absolute case numbers and percentages, while central tendencies were described using means, medians, standard deviations and ranges.

RESULTS

This study aimed to compare the outcome results of the primary wound closure to the delayed primary wound closure of midline laparotomy wound for peritonitis in surgical department MTI, MMC, BKMC. The patients were at random assigned into two equal groups A&B. Group A patients underwent PWC with prolene 2/0 while in the group B fascia(linea Alba) was closed and the skin wound was left open and daily dressing done with 10% povidone-iodine soaked gauze for three to four consecutive days, followed by closure of the skin wound on 5th post op day.

In group A age range was from 15 to 62 years. Mean age was 31.1(STD11.2) years, while in group B age range was from 15 to 66 years. Mean age was 30.1 (STD.10.3) years. There was no significant difference of age in two groups (p value=0.60).

In group A 22 (37.1%) patients were male whereas 36 (62.9%) patient were female. Male to female ratio was 1:1.6 while in group B 37 (63.8%) patients were male and 21(36.2%) were female. Male to female ratio was 1.7:1 in this group.

In study group A, out of n=58, 36 (62.1%) Patients

Table 1: Rate of SSI in Two Groups

	Surgical site infection		
	NO SSI n (%)	SSI n (%)	Total n (%)
Group A	36 (62.1%)	22(37.9%)	58 (50%)
Group B	50 (86.3%)	8(13.7%)	58 (50%)
Total	86 (74.1%)	30 (25.9%)	116 (100%)

(P value <0.0001)

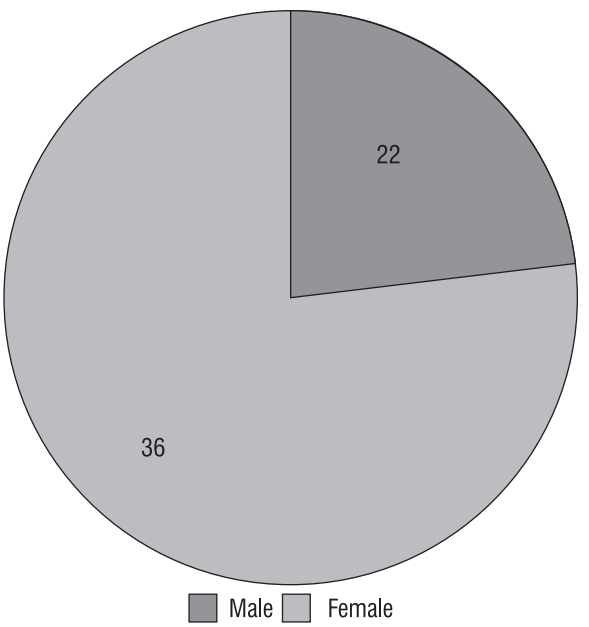

Figure 1: Gender distributions of the patients, in Group A

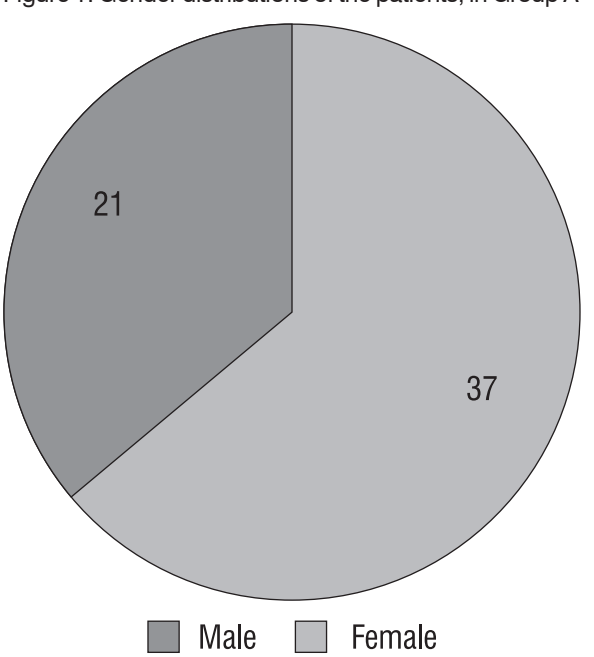

Figure 2: Gender distributions of Patients, in Group B

had normal wound healing and 22(37.9%) patients developed SSI. In study group B out of n=58, 50(86.3%) patients had normal wound healing and 8(13.7%) patients developed SSI. There was statistically significant difference between two groups in terms of surgical site infection.(p value<0.0001).

DISCUSSION

The SSI rate for dirty abdominal wounds is approximately 40% and the best method of wound closing remains controversial. The two methods of wound closure are primary and delayed primary closure. Wound infections are considered a major public health problem worldwide and cause thousands of deaths each year in the developed countries[14]. Surgical site infections are, along with urinary tract infections, pneumonia and blood borne infections, ranked second among nosocomial infections[14]. Almost no surgical intervention is immune to the risk of surgical site infection despite advances in surgical techniques, the use of antibiotic prophylaxis and efforts to control it[15]. It has been reported that almost 5% of patients who undergo some type of surgery develop surgical site infections (SSI), two thirds of which are incisional SSI.

Laparotomy wounds can be divided into clean, clean contaminated, contaminated, or dirty. The SSI rate is high in contaminated and dirty laparotomy wound, as shown by various local and international studies. Dirty abdominal wounds related to perforated appendicitis, other perforated viscera, traumatic injuries, or intra-abdominal abscesses were included. The Existing data show that the high SSI rate in dirty abdominal wounds is 40-60% when they are closed primarily. The secondary wound closure of dirty wound was frequently used during the First World War long before the discovery of antibiotics. Although this technique is beneficial in war wounds, it has not been used frequently in civilian practice[16]. DPWC although better than PWC but it is associated with patient fear especially in young age and most of the surgeon are reluctant to leave wound open[17].

In our study, there is no difference in the SSI rate in a particular age or gender group which is also supported by local and international literature on this subject.

A total of 22 patients (37.9%) developed SSI in group A, while in group B 8 (13.7%) patients developed SSI .These findings are consistent with several local and international studies that also show a high rate of SSI when the wound is closed primarily compared to DPWC[18-20].

A prospective randomized study of 70 patients with dirty abdominal incisions showed that SSI developed in 51.43% of incisions closed primarily compared to 25.71% for delayed primary closure[19]. In another study Infections rate were significantly more common

in the Primary wound closure (42.5%) versus delayed wound closure(2.7%)(p = 0.0000375)[20]. The results of these studies corresponding to the results of our study . However, the infection rate of the wound is much higher than our results[19].

Mukhtar Ahmad,Kishwar Ali, Humera Latif, et al conducted a study of 158 patients. There was a significant association between wound infection and the type of wound closure (delayed primary closure 6.3% versus primary closure 39.2%,p<0,0001).They Concluded that delayed wound closure has better results than primary closure[21].

In contrast to the studies in favor of DPWC,some authors opposes this.The study of Stephen M.Cohn, Giovanni Giannottia et al Demonstrated that in DPWC group the chances of staphylococcus wound infection increases(17%) and most patients reluctant to this procedure. Length of the hospital stay and hospital charges was also more in DPC groups[22].

Some aspect of DPWC may reduce the rate of SSI, such as improved blood flow to the wound edge, which is growing more rapidly in the first few days, resulting in increased resistance to infection by supplying functional phagocyte in the site of the wound during first 4 to 5 days[16].

CONCLUSION

There were significant differences between primary wound closure and delayed primary wound closure group in laparotomy for peritonitis. Delayed primary wound closure is better and more effective in preventing superficial surgical site infection and associated morbidity. This technique should be used to close the contaminated and dirty abdominal Wound.

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