ABSTRACT

OBJECTIVES: To compare the risk of burst abdomen in emergency laparotomy for acute abdomen in abdominal wound closure by interrupted X technique versus traditional continuous closure.

STUDY DESIGN: A Quasi experimental study.

PLACE AND DURATION OF STUDY: At Surgical Unit II of Rawalpindi General Hospital, Rawalpindi during the period of 1 year from 1st June to 30th May 2008

METHODOLOGY: 80 patients who were operated for acute abdomen were divided into two treatment groups (Group A B) with 40 patients in each group without gender discrimination. Convenience non probability sampling was used and patients included in 2 groups on alternate basis. In group A patients after laparotomy the abdominal wound was closed with continuous suturing technique by polypropylene No 1. In group B patients after laparotomy the abdominal wound was closed with interrupted X technique by polypropylene No 1.

RESULTS: Age ranged from 18 to 60 years with peak age group between 19 to 40 years. 56 patients (67.5 %) were male and 24 patients (32.5 %) were female. Burst abdomen occurred in 4 (10%) patients of group A, and 1 patient (2.5%) in group B (p=.359).

CONCLUSION: Statistically there is no difference in the risk of burst abdomen after closure of midline laparotomy wound in cases operated in emergency for acute abdomen by using interrupted X technique of closure as compare to continuous closure.

KEY WORDS: Acute abdomen, Midline laparotomy, Burst abdomen, Continuous Stitch, Interrupted X Stitch

INTRODUCTION

Acute abdomen is the commonest emergency seen in the emergency department. Acute abdomen designates sign and symptoms of intra abdominal diseases usually best treated by surgical operation. Common surgical causes of acute abdomen include peritonitis, intestinal obstruction, and intestinal perforation, blunt and penetrating trauma to abdomen. Due to acute abdomen the patient may develop septicemia, fluid and electrolyte imbalance, dehydration and anemia. And if the pathophysiological process remains unchecked it can lead to high mortality and morbidity. In the management of patient with acute abdomen proper history, examination and evaluation, investigations and resuscitation is required. In the pre-operative period providing intra-venous fluids and correction of deranged electrolytes resuscitates patient. If needed blood or products of blood are transfused. Intravenous antibiotics are given according to the diagnosis and involved organisms. After that for the definite treatment surgical intervention is carried out.

For the surgical treatment of acute abdomen laparotomy is done in most of the cases, such as intestinal obstruction, gut perforation, perforation of peptic ulcer, and blunt abdominal trauma to abdomen and penetrating injuries to abdomen. The most commonly used and recommended method of emergency laparotomy is midline laparotomy. In the post operative phase there may be numerous surgical postoperative complications, among them burst abdomen is a very serious postoperative complication which affects a substantial number of cases. Available international statistics suggest that an average incidence of burst abdomen is 1-2% after midline emergency laparotomy while the risk of burst abdomen in underdeveloped countries like Pakistan is much higher that is 5.9%. Some regional studies have shown even higher incidence than 5.9% in emergency surgery as compare to elective. There are lots of factors that contribute for the development of burst abdomen. These factors include type of surgery, intra abdominal sepsis, nutritional status of the patient, post operative course of the patient, co morbid factors and surgical technique. Among all the factors in emergency laparotomy surgical technique is the major factor and it can be manipulated. For midline laparotomy wound closure most commonly and traditional method of closure is continuous closure done with non-absorbable, polypropylene 1, suture.
There are lots of studies carried out to search an ideal method of closure of midline laparotomy wound. Some of the recent studies undertaken in India suggest that new interrupted X technique for abdominal closure after midline laparotomy, significantly reduces the risk of burst abdomen. There is no such study available in Pakistan in which continuous closure and interrupted X closure are compared for the risk of burst abdomen after emergency midline laparotomy. Keeping in view the fact a comparative study was conducted in Surgical Unit II of Rawalpindi General Hospital to compare the risk of burst abdomen with continuous versus interrupted X suturing in emergency laparotomy wound.

**METHODOLOGY**

This study was conducted in Surgical Unit II of Rawalpindi General Hospital. Rawalpindi General Hospital is a 700 bedded teaching hospital attached to Rawalpindi Medical College. Surgical Unit II has 60 beds with three emergencies and three outdoor admission days in addition to alternate Sundays for emergency. There are two operation days each week for elective surgery. This Quasi Experimental study was conducted in period of 1 year from 1st June to 30th May 2008. A total of 80 patients of either sex between ages of 18 to 60 years, who were operated for acute abdomen through midline laparotomy, were included in study. 80 patients were divided into two treatment groups A and B with 40 patients in each group. Non probability convenience sampling was used and patients were included in two groups on alternate basis. Non probability convenience sampling technique was use for sampling technique. This study included all adult patients in the age range from 18-60 years and operated for emergency laparotomy for acute abdomen due to intestinal obstruction, abdominal trauma, or intestinal perforation. The patients were operated by same level of surgeon and under same type of anesthesia. Patient with age less than 18 or above 60 years, patient with history of laparotomy & patients with co morbid conditions including malignancy, malnutrition, diabetes mellitus, end stage renal disease, cirrhosis of liver, chronic obstructive pulmonary disease, ischemic heart disease were excluded from the study.

**Data Collection:** Patient of either sex between the ages of 18 to 60 years were selected in emergency department of Rawalpindi General Hospital. Complete history and examination was done. Patients diagnosed as a case of acute abdomen with a need of emergency laparotomy. Detail of procedure was discussed with the patients and informed consent was obtained. These patients were operated (mid line laparotomy) in emergency operation theatre of Rawalpindi General Hospital. 80 patients were divided into two treatment groups A and B with 40 patients in each group. Non probability convenience sampling was used and patients were included in two groups on alternate basis. In group A patients after laparotomy the abdominal wound was closed with continuous suturing technique by polypropylene No. 1. In group B patients after laparotomy the abdominal wound was closed with interrupted X technique by polypropylene No. 1. All patients were examined for burst abdomen on 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 15th postoperative. The laparotomy wound was considered normal if no signs of burst abdomen appear till the 15th postoperative day. Burst abdomen was noticed by consultant surgeon and data was recorded by 4th year post graduate trainee on a pre-designed proforma.

**Interrupted X technique:** It is performed by polypropylene no 1. A large bite is taken outside in; 2 cm from the cut edge of line alba. The needle emerged on the other side from inside out diagonally 2 cm from the edge and 4 cm above or below the first bite. This strand is crossed or looped around the free end of the suture and continued outside in, diagonally at 90° to the first diagonal. The two ends are tied just tight enough to approximate the edges of line alba. The next X suture is placed 1cm away from the previous one.

**Data Analysis:** Data was entered into SPSS software version 16. Mean ± standard deviation was calculated for age. Frequencies and percentages were presented for gender and diagnosis of the patient. Chi square test was applied to compare the burst abdomen in two groups. p value showed expected count less than 5, therefore Fisher exact test was used to compare the burst abdomen in two groups. p value less than or equal to .05 was considered statistically significant.

**RESULTS**

There were total of 80 patients who were operated (mid line laparotomy) for acute abdomen in Surgical Unit II of Rawalpindi General Hospital from 01-06-2007 to 31-12-2007. Out of these 80 patients there were 54 (67.5%) males and 26 (32.5%) females with the ratio of 2.07:1. In group A there were 11(27.5%) females and 29(72.5%) males, while in group B there were 15(37.5%) females and 25 males (62.5%),(Figure - 1). Patients were between the ages of 18 to 60 years with the mean age of 33.37 and standard deviation of ± 12.7, maximum age was 58 year and minimum was 19 years. Highest number of patients was between the ages of 19 to 40 years. Lowest figure was between the ages of 50 to 60 years (Figure - 2). In 80 patients operated for acute abdomen the diagnosis of different diseases and there percentages were mentioned in Table - I. Maximum number of cases operated for intestinal obstruction and perforated appendix and minimum number of cases for intra abdominal abscess.

In group A patients serosanguinous discharge from wound was present in 3 (7.5%) cases of burst abdomen while in group B it was negative (Figure - 3).In group A patients evisceration from wound was present in 4 (10%) patients of burst abdomen while in group B patients it was present in 1 (2.5%) patient. Wound healed satisfactorily in 36 patients while burst abdomen occurred in 4 (10%) patients (Figure-4). All the patients with burst abdomen had evisceration and 3 patients had serosanguinous discharge from the midline wound 39 patients of group B had satisfactory wound healing while 1 (2.5%) patient developed burst abdomen (Figure-4). There was evisceration but no serosanguinous discharge from the laparotomy wound of the patient that developed burst abdomen.
TABLE-I: DIAGNOSIS OF PATIENTS WHO UNDERWENT EXPLORATORY LAPAROTOMY THROUGH MIDLINE INCISION (n=80)

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intestinal obstruction</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td>Perforated appendix</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td>Peptic ulcer perforation</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>Ileal perforation</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Blunt abdominal trauma</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Penetrating abdominal trauma</td>
<td>10</td>
<td>12.5</td>
</tr>
<tr>
<td>Intra abdominal abscess</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

DISCUSSION

The purpose of abdominal wound closure is to restore the anatomy and physiology of the abdominal wall. The end result must be an abdominal wall with sufficient strength and without functional restrictions. The ideal technique for abdominal wound closure is yet to be established. For decades, personal preferences and local traditions, rather than evidence-based medicine, have determined how surgeons perform abdominal wound closures. Abdominal wound closures should be performed in a manner to minimize complications such as burst abdomen, incisional hernia, and persistent sinus. It should be comfortable to the patient and leave a reasonably aesthetic
scar. It should also be technically so simple that the results are as good in the hands of a surgical trainee as those of a master surgeon.8,9

Burst abdomen after midline laparotomy is associated with high morbidity, which in turn increases the hospital stay and cost effectiveness of the patient.10 Most of the contributing factors of the burst abdomen are controllable for the elective patients while in emergency cases these factors like malnourishment, co morbid conditions and septicemia cannot be corrected before emergency surgery.10,11

In demographic comparison of results of our study we had 67.5% males and 32.5% females included in our study while a study conducted by Zahid Memonet al.10 showed identical results regarding gender distribution of patients. They had 68.2% males and 31.8% males patients operated for laparotomy in their study. The age distribution of patients in our study and above mentioned study is different. We had maximum patients in the age range of 19 to 40 years while they had maximum in 10 to 25 years; this difference is due to our exclusion criteria of age.

Internationally the incidence of burst abdomen is 1-2% in mid line laparotomies.10 While in our set up the incidence is quite high. It is 6.8% as reported by Waqaret et al.11 Another study was conducted by Shaikh S colleagues in 2005 in which study 300 patients of midline laparotomy were observed for burst abdomen. Result showed overall 5.33% of burst abdomen. Emergency laparotomies had a high frequency i.e. 7% as compared to elective, which was 2%. In our study 80 patients operated in emergency were observed for burst abdomen. Two different techniques of abdominal closure were used and the patients were monitored for two weeks for burst abdomen.

According the results in continuous suturing group 4 out 40 patients (10%) developed burst abdomen. While in interrupted X technique 1 out 40 patients (2.5%) developed burst abdomen. Statistical comparison between the two groups was insignificant (p = .359) Like our study, Srivastava and colleagues introduced the interrupted X technique. In their study comparison of continuous closure with interrupted X technique was done.12 In emergency patients interrupted X group had only 1 patient with burst abdomen, while in continuous suturing technique 8 patients developed burst abdomen (p=.028). Similarly another Chandra et-al. also showed the similar results of comparison of interrupted X and conventional continuous suturing techniques.13 They report edan overall incidence of 8.3% of burst abdomen, while patients in interrupted X suturing group had an incidence of 4.5% and conventional continuous suturing group had very high incidence of 15.7%. The results obtained from other studies and our studies are statistically different because sample size was small and duration of study was limited as compared to these studies. But like our study the incidence is quite low in interrupted X group in above mentioned 2 studies.

Many randomized trials have been done in the West for wound complications following the use of continuous or interrupted closure and reported no difference in the two techniques.21 Weiland DE and colleagues in another Meta-analysis of 12,249 patients of laparotomy recommended interrupted closure of abdominal wound in high risk patients i.e. of peritonitis, ileus and malnourished.22

The results of our study had showed statistical insignificance (p=359) between the two Groups of patient but it has clinical significance, because of the difference in the percentages of burst abdomen in two techniques. Another important impact of the interrupted technique is for the patients who are re-operated. Sometimes a patient may need re-laparotomy whenever there is intrabdominal collection or suspicion of leak of repair or anastomosis. For re exploration in continuous abdominal closure all the stitches are removed and then again whole wound is closed causing more tissue damage and increases operating time. While in interrupted closure of abdomen whenever re exploration required selected 1 or 2 stitches can be removed and after management, closure is done in less time causing minimal tissue damage.

CONCLUSION

Statistically there is no significant difference in risk of burst abdomen after emergency laparotomy for acute abdomen by using interrupted X technique for abdominal wound closure as compared to continuous suturing.

RECOMMENDATIONS

Although there is no statistical difference in two techniques but clinically it is significant. So it is recommended to close the abdominal wound of emergency laparotomy with Interrupted X technique in our set up, because emergency patients are high risk patients for burst abdomen.

Further research on this topic should be carried out by increasing the sample size and duration of study, so that significant results can be achieved.

REFERENCES


6. Abdullah M, Firmansyah MA. Diagnostic approach and