

Comparison between continuous vs. interrupted x-suture for midline laparotomy wound closure

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Introduction: Midline laparotomy incision for emergency or elective surgery allows satisfactory and quick exposure to all quadrants. Wound dehiscence, burst abdomen and incisional hernia are some of the common post-operative complications. Apart from patient's factor suture material and method of closure are main factor related to these complications. This study compares the continuous sutures and interrupted x-type sutures in mass closure of midline laparotomy wound.

Materials and method: Comparative prospective hospital based study was conducted in a tertiary health centre of west India for 12 months after ethical approval and obtaining informed written consent. In control group continuous closure was performed, and in study group Interrupted closure was done to close the midline laparotomy incision. Early complications were

noted and after discharge patients were followed up at 15 days, 3 months, 6 months and 1 year interval. Data was collected in a pre-structured pre-tested Performa. Analysis was done using Microsoft excel and statistical software SPSS.

Results: Total 120 patients participated in the study. Contamination of incision site was not statistically significant in both the groups. The hospital stay of almost 10 days was also similar in both groups. There was no significant difference in incidence of wound infection. Occurrence of wound dehiscence and incisional hernia was significantly higher in continuous suture group as compared to interrupted X suture group.

Conclusion: Interrupted X suture prevented the occurrence of wound dehiscence and incisional hernia significantly as compared to continuous suture in our study. A larger randomized control trial with a longer follow up period is needed.

Key Words: Continuous suture; X-interrupted suture; Wound dehiscence; incisional hernia

INTRODUCTION

Midline laparotomy incision is the commonest abdominal incisions in both emergency and elective surgery. It is simple in technique, allows satisfactory exposure to all quadrants, quick exposure with minimal blood loss [1].

The commonest complication of median laparotomy is wound dehiscence and burst abdomen. Burst abdomen is considered when intestine, momentum or other viscera are seen in the abdominal wound following midline laparotomy due to separation of the abdominal musculo-aponeurotic layer. It is a serious post-operative complication. These complications are associated with major postoperative morbidity. Apart from patient's factor suture material and method of closure are also related to these complication [2]. Tissue damage should be minimum and can be achieved by avoiding abdominal wall muscle in the closure. The ratio of suture bites vs. suture advancement should be 4:1.3 Mass closure of abdominal wall is superior to layered closure [3]. Non-absorbable sutures have risk of sinus formation and found to have no significant difference in the development of incisional hernia formation, wound dehiscence, or surgical site infection as compared with slowly absorbing monofilament suture [4,5].

Elective patients with adequate nutritional status and otherwise free from risk factors related to dehiscence, type of closure may not be so important, but in emergency patients with multiple risk factors for developing dehiscence or burst abdomen, it may prove decisive. There is no best wound closure method that would be suitable for all situations. Therefore, the correct choice of suturing technique is vital. A marked reduction in the incidence of burst abdomen can be achieved by utilizing employing a correct technique of abdominal closure [6].

This study tries to evaluate prospectively the continuous sutures with interrupted x-type sutures in mass closure of midline laparotomy wound

with non-absorbable monofilament suture polypropylene in patients undergoing midline laparotomy and its effectiveness.

MATERIALS AND METHOD

Comparative prospective hospital based study was conducted in a tertiary health centre of west India for 12 months after ethical approval. All patients scheduled to undergo a midline laparotomy for emergency or elective reasons were included in the study after obtaining informed written consent. Patients younger than 18 years of age and Patients who had undergone a previous laparotomy for any condition or had an incisional hernia or burst abdomen at presentation were excluded from the study.

In control group continuous closure was performed using no. 1 vicryl suture, care being taken to place each bite 1.5 to 2 cm from the linea alba edge with successive bites being placed 1 cm from each other. The edges of linea alba was gently approximated without strangulation with an attempt to keep a suture to wound length ratio of 4:1 as shown in Figure 1.

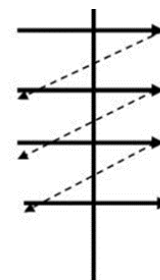


Figure 1) Continuous closure.

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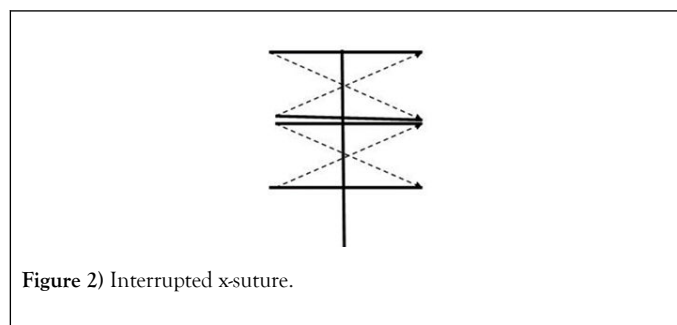
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In study group Interrupted closure was performed using no. 1 vicryl suture, as shown in Figure 2.



A large bite was taken outside-in 2 cm from the cut edge of linea 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 was subsequently crossed or looped around the free end of suture (Figure 2) and continued outside-in, diagonally at 90 to the first diagonal. The two ends tied just tight enough to approximate the edges of linea alba taking care not to include bowel or momentum between the edges. This created two X like crosses-one on the surface and another deep to linea alba. The next X suture was placed 1 cm away from the previous one. Henceforth, in a 14 cm long wound, 3 X-sutures were applied.

Early complications were noted and after discharge patients were followed up at 15 days, 3 months, 6 months and 1 year interval. Data was collected in a pre-structured pre-tested Performa. Analysis was done using Microsoft excel and statistical software SPSS.

RESULTS

Total 120 patients participated in the study. The mean age of patients was 45 years and the range was 18 yrs. to 98 yrs. The male to female ratio was 1.7:1.

Most common operative procedure in both the groups was exploratory laparotomy. Other procedure involved were Abdominoperineal resection, Esophagectomy, Extended Hemicolectomy, Feeding Jejunostomy, Low anterior resection, Nissan Fundoplectomy, Rt. Hemicolectomy, Rt. Nephrectomy, Trans abdominal hysterectomy, Whipples Procedure and Splenectomy.

The CBC, RBS, Serum Urea, Creatinine, Albumin and Bilirubin (Total or Direct) were higher and Hemoglobin was slightly lower in interrupted X-suture group as compared to continuous suture group, but it was not statistically significant.

Contamination of incision site was not statistically significant in both the groups (Table 1).

TABLE 1: Type of contamination in surgical site in both groups.

Contamination	Interrupted (group I)	X-suture Continuous suture (group II)
Clean	35	40
Dirty	25	20
Total	60	60

The hospital stay of almost 10 days was also similar in both group. In post-operative period, there was no significant difference in incidence if wound infection. Occurrence of wound dehiscence and incisional hernia was significantly higher in continuous suture group as compared to interrupted X suture group (Table 2).

TABLE 2: Wound in surgical site in both groups.

Wound	Interrupted suture (group I)	X-Continuous suture (group II)	p-value
Wound infection	13	17	0.4562
Wound dehiscence	2	13	0.0112*
Incisional Hernia	0	29	<0.0001***

DISCUSSION

"I dressed the wound and God healed them" is the famous saying of Ambrose Parre (1510-1590). It is every surgeon's desire that after suturing the wound, it should heal without any complications. More than 2 million laparotomies are executed per annum in the US, with a reported incidence of incisional hernia 2% to 11% [7]. Since the dawn of the history of surgery many different varieties of suture materials and techniques have been tried and advocated at different times. No one suture material or method has given a total satisfactory result as far as vertical abdominal incisions are concerned.

Although the choice of technique may not be that significant in elective patients who are nutritionally sufficient, do not have any risk factor for dehiscence and are well prepared for surgery, however it may prove vital in emergency patients who often have multiple risk factors for developing dehiscence and the strangulation of the sheath is the proverbial last straw in precipitating wound failure [8]. The present study was undertaken to assess the proportion wound dehiscence, Burst abdomen and incisional hernia in post midline laparotomy patients, using Interrupted X suture vs. Continuous suture technique in sheath closure.

In our study 120 patients were divided in two groups to evaluate the effect of two different suture techniques. Demographically both the group were comparatively similar which reduced the effect of confounding factor. The mean age of patients was 45 years which was similar to the study done by Al-Faouri et al. [9]. Male to female ratio was 1.7:1 in our study which was not significantly different from the study done by Al-Faouri et al. in 2017 but Srivastava et al. in 2004 had higher male to female ratio (3:1) [10].

The wound infection, dehiscence and incisional hernia were mostly occurred in continuous suture group as compared to interrupted X-suture group in our study. The wound dehiscence and incisional hernia was statistical significant ($p=0.0112$ and $p<0.0001$ respectively).

Similarly Richards et al. found that rate of dehiscence was higher (2.0%) in the continuous suture group as compared to for the interrupted suture group (0.9%) [11]. Gupta et al. [12] and Navneet et al. [13] also concluded the similar result. Conflict to this, Hodgson et al. [14] found that there were no differences in the incidence of wound dehiscence or wound infection with respect to suture material or method of closure.

Similar to our study, Van et al. found that closure by continuous suture was followed by significantly more incisional hernias than closure by interrupted suture ($p<0.009$) [15].

CONCLUSION

Intra-peritoneal sepsis, cough, uremia, wound infection, and necrosis of linea alba are significant predictors of wound dehiscence and burst abdomen. In presence of these symptoms, the risk of abdominal wound dehiscence can be reduced to less than one-third by using interrupted sutures. Interrupted sutures significantly reduced occurrence of wound dehiscence and evisceration, this reduced the need for urgent revision surgery and development of incisional hernia. A larger randomized control trial with a longer follow up period is advised.

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