



## EFFECTIVENESS OF INTERMITTENT RECTUS CLOSURE IN EMERGENCY MIDLINE LAPAROTOMY IN PREVENTING WOUND DEHISCENCE AND INCISIONAL HERNIA

**Dr.C.Ganga**

M.S Associate professor, Department of Surgery, Government theni medical college, theni.

**Dr. R. Vaitheeswaran\***

M.S Assistant professor, Department of Surgery, Government theni medical college, theni. \*Corresponding Author

**ABSTRACT** Midline laparotomy is the most common technique used in both elective as well as in emergency surgeries. Single centre, prospective study conducted in 60 patients who underwent emergency midline laparotomy for various emergency conditions, 30 patients in which Interrupted rectus closure was applied. Continuous rectus closure was applied for remaining 30 patients. They were followed up in the early post operative period and 2, 4, 6, 12 weeks and 6 months post operatively. Out of 60 patients, 7 were developed wound dehiscence in continuous rectus closure group, while only 3 in intermittent rectus closure were developed wound dehiscence. 2 patients were developed burst abdomen in continuous closure group. 2 of our patients from the continuous group were developed incisional hernia, 1 from intermittent group was developed incisional hernia. Therefore, Interrupted rectus closure using non absorbable suture material overweighs the disadvantages of the continuous suturing technique particularly in midline laparotomy in emergency setting. Hence the technique should be considered.

**KEYWORDS :** laparotomy , complications , rectus closure , post op complications

### 1. INTRODUCTION :

Midline laparotomy is the most common technique used in both elective as well as in emergency surgeries. As it is the simplest technique and provides good exposure of all quadrants of abdomen with minimal loss of blood. Though it is the easiest technique, wound dehiscence is one of the most common and dreadful complication associated with midline laparotomy. It is also a major cause of postoperative morbidity of the patient. Patient factors such as malnutrition, anemia, and sepsis play major role than method of closure and selection of suture material. In elective surgeries, patients are optimized and all those risk factors predisposing to wound dehiscence are addressed preoperatively and corrected. So the type of closure may not be as important when compared to emergency surgeries. In case of emergency surgeries, patients are not optimized adequately; frequently they have co-morbid conditions, which predispose them for developing post operative complications like wound infection, wound gaping and wound dehiscence. Few factors are crucial while doing fascia closure such as adequate space between the sutures, taking adequate depth of rectus, abdominal muscle relaxation during rectus sheath closure and closure without much tension. Acute wound failure is prevented by paying careful attention to those factors. Interrupted closure of fascia is one of the wisest choices in very high-risk patients especially in emergency laparotomy. If primary closure of fascia is not possible without undue tension, it is better to go for alternative methods of closure. Retention sutures were used mainly in the past, to prevent or to treat burst abdomen. But it is used less commonly today, as many surgeons are opting for alternative approaches like synthetic mesh or bio-absorbable tissue scaffold nowadays.

### 2. AIMS :

To evaluate the effectiveness of intermittent rectus closure in emergency midline laparotomy by comparing with continuous rectus closure and its effectiveness in preventing wound dehiscence and incisional hernia in our institution.

### 3. METHODS & MATERIALS

A total of 60 patients undergoing emergency midline laparotomy were selected for this study, after getting written and informed consent. They were divided equally into 30 cases each in the Group A (intermittent rectus closure) and Group B (continuous rectus closure). Follow up of study patients was done for a period of not less than 6 months postoperatively. All patients satisfying inclusion criteria, admitted in Department of General Surgery, Govt. Theni Medical College, for a period of 12 months from January 2019 to January 2020. It is a single centre, prospective comparative randomized study.

#### Eligibility criteria:

##### 1) Inclusion criteria:

Patients, who are undergoing for emergency midline laparotomy for any condition, will be included in this study after obtaining oral and written consent.

### 2) EXCLUSION CRITERIA:

Patients who have undergone previous laparotomy for any condition or those with incisional hernia or burst abdomen at presentation and not willing to undergo this study will be excluded from the study.

#### Preoperative evaluation:

All the patients who were included in the study underwent preoperative investigations essential for the preanaesthetic check-up fitness. These included complete hemogram, Random Blood Sugar, Blood Urea and Serum Creatinine, Serum electrolytes, total bilirubin, alkaline phosphatase, SGOT/SGPT, total proteins with serum albumin, x-ray abdomen (erect and supine), Chest x-ray, Electrocardiogram.

#### Procedure:

Patients were first examined in the surgery triage wherein detailed history was collected from the patient if possible or the relative accompanying the patient. Patients were then subjected to essential general physical and detailed systemic examination. All the necessary available investigations were done to confirm the diagnosis and assessment purpose. After initial aggressive resuscitation, patients were then shifted to operation theatre for emergency midline laparotomy. All patients were given pre-operative dose of antibiotics (preferably cephalosporins) 30 minutes before surgery which were continued in the post-operative period also. Exploratory laparotomy was carried out through a midline vertical incision. The incision was made in skin using blade no. 22 mounted on bard-parker handle. The length of the incision was standardized starting from 15cm with subsequent increments of 5 cm. The measurement of the same was done using a metallic scale which was kept and sterilized in glutaraldehyde to be taken out only at the start of the procedure for measurement. The incision was further developed in layers using electrocautery dividing the subcutaneous adipose tissue.

The peritoneum was opened up between two hemostats with the help of metzenbaum scissors. The peritoneum along with the rectus sheaths were opened up with electrocautery over the surgeons fingers. According to the intra-operative findings, procedure was carried out as a life saving measure. Variable number of peritoneal drains were kept and fixed to skin and taken out at the level of umbilicus lateral to the rectus muscle. Thorough wash of peritoneal cavity was done with warm normal saline till the effluent was clear enough.

Rectus closure was done in continuous or intermittent manner. Time taken for rectus closure was noted. The total length of the suture material used during procedure was noted along with the suture pieces which got wasted while tying knots or while dividing suture. The net length of the suture material was calculated subsequently by subtracting the length of the wasted pieces from the total length used. Suture length: wound length ratio was subsequently computed. The skin suturing was done with non-absorbable monofilament suture material. Wound dressing was done with sterile gauze.

The primary dressing was removed after 48 hours postoperatively. The wound were inspected daily for signs of infection and dehiscence before each dressing. Swab cultures from the wound were sent for microbiological culture and antibiotic sensitivity on evidence of any signs of infection. According to the culture and sensitivity report, patients were started on antibiotics if they showed any systemic sign of infection (eg: fever, sinus tachycardia, elevated WBC count >11000 cells per cubic millimetre).

If wound dehiscence develops, wound dressing was done daily till healthy granulations develop. After which, secondary suturing would be done under sterile aseptic precautions using non-absorbable monofilament suture material. If burst abdomen develops, retention suturing of abdomen will be done en masse using 1' Prolene. Daily wound dressing and intravenous antibiotics were given according to wound culture & sensitivity report

**Evaluation parameters:**

1. Operative time: Time taken for abdominal fascia closure was noted (from the start of the closure to the close of the abdominal fascia).
2. Length of suture material: Suture material length used was calculated by subtracting the length of suture material remaining at the end of fascia closure from the total length of suture taken at the start of procedure. For interrupted closure, suture length was calculated by subtracting the length of suture material remaining at the end of closure and the suture material length that were wasted while dividing suture after tying knots from the total length of suture taken at the start of procedure.
3. Suture length to wound length ratio: The length of the suture material used divided by the length of the incision made.
4. Wound dehiscence is defined as post operative missing continuity of the abdominal fascia with bursting open or splitting along sutured lines.
5. Wound infection was defined as redness; wound gaping with purulent discharge, or collection which requires management with antibiotic or surgical intervention.
6. Time taken for wound to be fit for secondary suturing was noted. Appearance of healthy granulation tissue with no wound infection, considered as healthy wound.

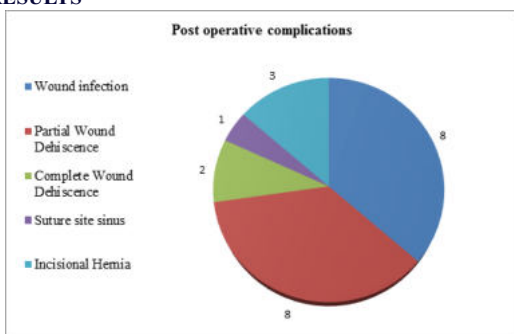
**Follow up:**

Patients were followed up by asking them attend surgical outpatient department or through phone contact if appearance in person is not possible. They were re-evaluated at 2, 4, 6 and 12 weeks and 6 months postoperatively. The patients were examined for following complications:

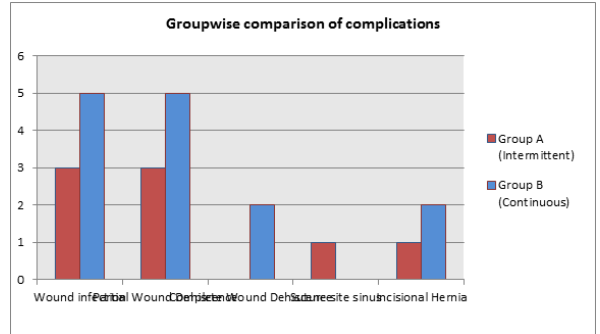
1. Wound infection
2. **Suture sinus:** Defined as abnormal protrusion of underlying suture threads through an intact skin with serous or seropurulent discharge. It may or may not require removal.
3. **Burst abdomen/Incisional hernia:** Defined as postoperative evidence of a fascia dehiscence after completed superficial wound healing with or without prolapse of abdominal organs.

For qualitative data, significant difference between means was computed by using t-test. To see significant difference for proportions for qualitative data, chi-square was applied. For quantitative data, significant difference between the means was calculated by ANOVA followed by post-hoc test if the data was normally distributed otherwise Kruskal-Wallis test was applied. Data will be expressed as mean, median.

**4. RESULTS**



**Figure 1: Post Operative Complications**



**Figure No 2: Groupwise Comparison Of Complications**

There was no statistically significant difference in wound infection between two groups using Chi-Square test ( $X^2 = 2.098$ , 'P' value .147,  $P > .05$ ).

**5.DISCUSSION & CONCLUSION**

In an emergency life saving procedures, closure of abdominal wound can be temporary or permanent based on the patient's general condition, the nature of the disease process or cause leading to surgery. In general, primary permanent closure is possible for clean and non-contaminated wounds with healthy local tissue conditions. But those conditions requiring re-exploration or a patient with abdominal compartment syndrome, temporary closure is preferred. This study assesses the continuous and interrupted closure method of rectus sheath in emergency midline laparotomy. The variables used in this study were post-operative wound infection, wound dehiscence, suture sinus and incisional hernia. Out of 60 patients in this study, 5 patients (17%) with continuous rectus closure were developed wound infection while only 3(10%) with interrupted rectus closure had wound infection. Out the 60 patients, 5 patients (17%) with continuous rectus closure were developed partial wound dehiscence while only 3(10%) with interrupted rectus closure had partial wound dehiscence. Out of 60 patients in this study, only 2(7%) patients were developed burst abdomen (complete wound dehiscence) in continuous rectus closure group. No complete wound dehiscence had occurred in intermittent rectus closure group. Incisional hernia in the follow up period of 6 months was found in 2 patients with continuous rectus closure while only one patient with interrupted rectus closure had incisional hernia. The chances of burst abdomen occurred is 1/46 (2.17%) in interrupted group and 8/54 (14.8%) in continuous group according to study which was conducted by Srivastav et al on 100 patients undergoing emergency laparotomy, the difference being statistically significant. Richards et al also concluded that statistically significant difference in incidence of burst abdomen is present in infected wounds than in non-infected wounds ( $p < 0.02$ ). Presence protein energy malnutrition widely in the Indian population may be the aggravating factor. The problem gets compounded further with the onset of chronic illnesses like tuberculosis, typhoid, cancer etc. Many patients have been affected by co-morbid conditions like anemia, poor nutritional status, diabetes, tuberculosis, cancer. These factors affect the process of wound healing directly or indirectly. Also post operative pulmonary complications, hemodynamic instability play major role in the development of wound healing. In peripheral health centers, patients are managed on conservative treatment often, as a result they frequently present with complications and in a state of septicemic/hypovolemic shock. State of Haemodynamic instability has been described as a significant risk factor for burst abdomen. Other similar studies like Phillippo et al carried out a study and demonstrated that the incidence of wound infection in continuous rectus closure and intermittent rectus closure was 42.2% and 41.1% respectively; rate of wound dehiscence between two groups was 5.4% and 22%. Rate of occurrence of incisional hernia between two groups was 3.4% and 36.7%. So according to this study, continuous rectus closure was better than interrupted rectus fascia closure. Another similar study, conducted by Ashish Sharma et al found that the incidence of wound infection in continuous fascia closure and intermittent fascia closure was 52% and 20% respectively; Rate of wound dehiscence between two groups was 32% and 12%. Rate of occurrence of incisional hernia between continuous and intermittent group was 36% and 8%.5 respectively. So according to this study, interrupted rectus closure was better than continuous rectus closure. Seiler CM et al conducted same study and found that the incidence of wound infection in continuous and intermittent was 19.4% and 12.7% respectively; wound dehiscence

was 3% and 2% while occurrence of incisional hernia was 8.4% and 15.9% between two groups. So according to this study, interrupted rectus closure was better than continuous rectus closure. Single centre, prospective study conducted in 60 patients who underwent emergency midline laparotomy for various emergency conditions, 30 patients in which interrupted rectus closure was applied. Continuous rectus closure was applied for remaining 30 patients. They were followed up in the early post operative period and 2, 4, 6, 12 weeks and 6 months post operatively.

Out of 60 patients, 7 were developed wound dehiscence in continuous rectus closure group, while only 3 in intermittent rectus closure were developed wound dehiscence. 2 patients were developed burst abdomen in continuous closure group. 2 of our patients from the continuous group were developed incisional hernia, 1 from intermittent group was developed incisional hernia.

Therefore, Interrupted rectus closure using non absorbable suture material overweighs the disadvantages of the continuous suturing technique particularly in midline laparotomy in emergency setting. Hence the technique should be considered.

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