



COMPARING ABDOMINAL WALL CLOSURE BY MASS CLOSURE OR LAYERED CLOSURE

General Surgery

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ABSTRACT

The purpose of this study was to determine the better closure method between mass closure and layered closure. **Aim:** To study the abdominal closure methods and compare single layer mass closure and multilayered closure in midline abdominal incisions. **Methods And Materials:** 60 patients were enrolled between the ages of 25 to 65 years undergoing laparotomy by median or para-median incisions in both emergency and elective settings. Patients were randomized into two groups. Group A included wound closure in a single layer mass closure method. While group B included patients who underwent a conventional layered closure. The wound was examined on 3rd, 5th, 7th day and the condition of wound noted. During the postoperative period, the patients were examined for abdominal distension, seroma and wound infection were noted. Regular examination of the wounds for signs of wound gaping and burst abdomen were done. Patients were followed up every month up to 6 months for an incisional hernia. **Conclusion:** We concluded that mass closure has less incidence of postoperative wound infection, wound dehiscence, lesser incidence of incisional hernia and lesser time is taken for mass closure. **Aim:** To study the abdominal closure methods and compare single layer mass closure and multilayered closure in midline abdominal incisions while evaluating the benefits and complications of single layer mass closure and multilayered closure of midline laparotomy wounds.

KEYWORDS

Abdominal Wall Closure, Layered Closure, Mass Closure

INTRODUCTION:

The anterior abdominal wall extends from the costal margins and xiphoid process superiorly to the iliac crests, pubis and pubic symphysis inferiorly. The anterior abdominal wall is made up of Skin, Superficial Fascia, Deep Fascia, External Oblique muscle, Internal Oblique muscle, Transversus Abdominis muscle, Rectus Abdominis muscle, Rectus sheath, Fascia Transversalis, Extraperitoneal Fat, Parietal Peritoneum.^(1,2)

Suture cut through the tissues if the wound is closed by using small bites and not enough length of suture is left in the wound for later wound expansions. A wound length may increase up to 30% in abdominal distension. So adequate reserve of suture length in the wound is necessary to allow this lengthening to occur and to ensure a resulting minimal rise in tension between the sutures and tissues. Wound disruption because of cutting out of sutures can be prevented by use of nonabsorbable continuous sutures at 1 cm intervals and SL: WL (suture length: wound length) ratio of 4:1 or more (Jenkins rule) . Wound disruption is associated with the use of SL: WL ratio of 2:1 or less- lower the ratio more is the risk of burst abdominal wound.^(3,4)

Rare peritoneal defect heals rapidly. Recently published European Hernia Society guidelines on abdominal wall closure recommends a single layer of aponeurosis.⁽⁵⁾

Monofilament sutures nylon or prolene should be used. Loop suture eliminates all the knots except one.⁽³⁾ There are certain patient risk factors for a dehiscence and incisional hernia which includes obesity, malignancy, old age, smoking, diabetes mellitus, malnutrition, malignancy and use of steroid. These factors contribute to delayed wound healing and decreased collagen synthesis.^(6,7) Despite advances in surgical techniques and materials, abdominal fascia closure has remained a procedure that often reflects a surgeon's individual predilection with reliance on conventional and anecdotal experience. The present study assesses the advantages of single layer closure in comparison with the conventional layered closure by operative time and postoperative morbidities such as wound infection, burst abdomen and incisional hernia.

METHODS AND MATERIALS:

In this prospective randomized analytical study, 60 patients were enrolled between the ages of 25 to 65 years undergoing laparotomy by median or para-median incisions in both emergency and elective settings. Immunocompromised patients and patients with comorbidities were excluded along with patients who underwent a re-exploration.

Patients were randomized into two groups. Group A included wound closure in a single layer mass closure method where peritoneum and linea alba were taken in a single bite, 1 cm from the cut margins, in a continuous fashion using a PDS-0, in a midline incision and peritoneum, endo-abdominal fascia, posterior layer of rectus sheath, the medial fibres of rectus abdominis muscle and anterior layer of rectus sheath were sutured as a single layer in a paramedian incision using nylon no.1.

While group B included patients who underwent a conventional layered closure in which peritoneum was closed with Vicryl by continuous sutures, and the linea alba were closed similarly with Nylon No. 1. in a midline incision and the peritoneum and posterior layer of rectus sheath was closed with Vicryl by continuous sutures. The anterior layer of rectus sheath was closed with Nylon No. 1 by continuous sutures in a para-median incision.

The skin was closed with non-absorbable material like Ethilon using interrupted mattress sutures or staplers in both groups of patients. All patients received post-operative antibiotics. The wound was examined on 3rd, 5th, 7th day and the condition of wound noted. During the postoperative period, the patients were examined for abdominal distension, vomiting, hiccup and chest infection. Seroma and wound infection were also be noted. Regular examination of the wounds for signs of wound gaping and burst abdomen were done. Patients were followed up every month up to 6 months for an incisional hernia.

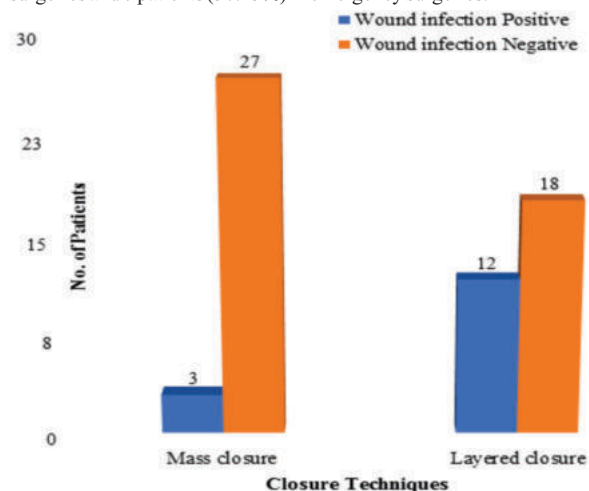
RESULT:

In our single institute study comparing 60 patients prospectively according to method of wound closure, we analyzed maximum patient were of age group 25-35 years (33%) and out of 60, 43 were male (71.6%).

In the category of mass closure group, out of the 30 patients 9 underwent elective surgery whereas 21 patients underwent emergency surgery. Similarly in the layered group, out of the 30 patients 7 underwent elective surgery whereas 23 patients underwent emergency surgery. Overall 73.3% of the patients under the study underwent emergency surgery while 26.7% of the patients underwent elective surgery.

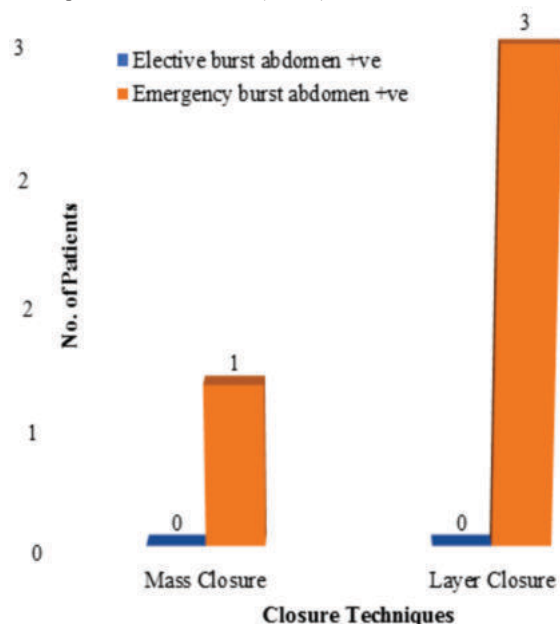
The required time for closure of the incision (average incision length 10-12 cms) in the mass closure group was an average of 16.57±1.194 minutes (range 12-20 minutes) whereas in the layered closure group the average time taken for closure of the incision was 27.53±3.758 minutes (range 20-30 minutes).

Overall the rate of infection in this study was 35%. The infection rate in the mass closure group was 13.33% as compared to 36.67% in the layered closure group. (p-value **0.007** < 0.05). In group A only 1 patient (11.11%) developed wound infection in an elective setting whereas 3 patients (14.29%) developed wound infection in emergency surgeries. In group B 4 patient (57.14%) developed wound infection in elective surgeries and 7 patients (30.43%) in emergency surgeries.



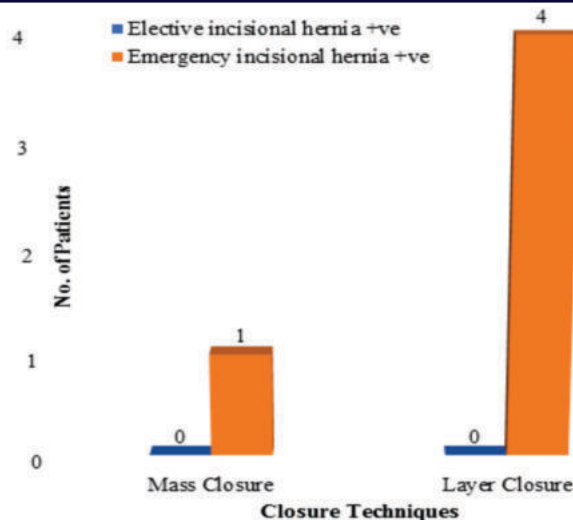
Graph 5: Relationship between closure technique and wound infection

The rate of wound dehiscence in this study was 6%. Wound dehiscence rate in the layered closure group was 10% whereas it was 3.3% in the mass closure group. This was found to be statistically not significant ($p=0.078 < 0.05$). In the mass closure group, 1 patient developed wound dehiscence. In the category of layered closure group, none of the patients who underwent elective surgery developed wound dehiscence while 3 patients who underwent emergency surgery developed wound dehiscence (13.0%).



Graph 7: Incidence of Burst Abdomen in relation to the closure technique

The rate of incisional hernia in this study was 8.5%. The rate of incisional hernia in the category of layered closure was 13.33% as compared to 3.3% in the mass closure category. This was found to be statistically not significant ($p \text{ value } 0.150 > 0.05$). In group A, 0 patients who underwent elective surgery, whereas 1 (4.8%) patient who underwent emergency surgery developed incisional hernia. Similarly, in group B, 0 patients who underwent elective surgery, whereas 4 (17.39%) patients who underwent emergency surgery developed incisional hernia.



Graph 10: Incidence of Incisional Hernia in relation to the closure technique

DISCUSSION:

The main observations regarding wound infection, wound dehiscence (burst abdomen) and incisional hernia rates in the two groups and the time taken for closure were studied in detail.

The average time taken for closure of abdominal wound using mass closure technique was 16.57 minutes (range 12 to 20 minutes) as compared to 27.53 minutes (20 to 30 minutes) in layered closure. It was statistically found to be significant.

Choudhary et al and Sanjeev et al compared wound infection rates and concluded 22.5% and 12% in mass closure vs 47.5% and 48% in layered closure respectively. In our study the results were similar, 13.33% in mass closure and 36.67% in layered closure.

Similarly on comparing incidence of burst abdomen in shows 3.3% in mass closure and 10% in layered closure. Kirk et al and Ausobsky et al showed 0.31% and 0.6% in mass closure and 3.88% and 1.48% in layered closure respectively, which was comparable to our result.

Sharma et al showed 0.4% and 1.6% cases of incisional hernia for mass closure and layered closure respectively. Shittu et al showed 0% cases in mass closure and 1.9% in layered closure. Similarly in our study 3.33% cases were from mass closure group and 13.33% were from layered closure group.

CONCLUSION:

Our study compares the efficacy of mass closure and layered closure of midline laparotomy and its effects on wound healing. The study analyzed the wound complications (wound infection, burst abdomen and incisional hernia) and time taken for each closure. We concluded that mass closure has less incidence of postoperative wound infection than the layered closure. Mass closure had apparently less incidence of postoperative wound dehiscence than its counterpart, also mass closure appears to have less incidence of incisional hernia when compared to layered closure. We also concluded that time consumption is less for mass closure of the midline laparotomies than those required for layered closure also mass closure has got better patient compliance than the layered closure.

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