

A Comparison between Large Tissue Bite Vs Small Tissue Bite in Midline Abdominal Wound Closure

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I. Introduction

Midline incisions has advantage of rapid and wide access to the abdominal cavity with minimal damage to muscles, nerves, and the vascular supply of the abdominal wall, hence causing minimal long-term morbidity.¹ However, wound complications after any laparotomy increases burden on resources of the health care system.² Wound complications after laparotomy include surgical site infection, stitch abscess, incisional hernia, wound dehiscence, evisceration.¹ Wound infection and wound dehiscence after laparotomy are likely to be followed by incisional hernia within months or perhaps a few years.

Acute wound failure (wound dehiscence or a burst abdomen) refers to postoperative separation of the abdominal musculoaponeurotic layers. It is among the most dreaded complications faced by surgeons and of greatest concern because of the risk of evisceration, the need for immediate intervention, and the possibility of repeat dehiscence, surgical wound infection, and incisional hernia formation. Acute wound failure occurs in approximately 1% to 3% of patients who undergo an abdominal operation. Dehiscence most often develops 7 to 10 days postoperatively but may occur any time after surgery from 1 to more than 20 days.³

When attempts are made to compare objectively the relative merits of some of these methods in ordinary clinical practice, difficulties are encountered due to various factors affecting the outcome of midline abdominal closure. These factors can be categorized into two groups: patient factors and surgical factors. The patient factors include age, body mass index, chronic illness, cancer, infection, anaemia, scurvy, and increased intraabdominal pressure. Usually, it is not possible to control these factors. The factors which can be controlled are surgical factors which include the type of incisions, suture material, and the mode of closure. It is in this area that the surgeon must concentrate his efforts to minimize wound complications.⁴

It is recommended that incisions should be closed with a suture length (SL) to wound length (WL) ratio (the ratio of the length of the suture used through the length of the wound) of at least 4. When the SL to WL ratio is less than 4, the risk of herniation is 3 times higher.^{5,6,7} The ratio depends on the size of each stitch and the stitch interval. Thus, a ratio of at least 4 can be achieved with many small stitches placed at close intervals or by incorporating a larger amount of tissue into stitches placed at greater intervals⁸.

Large stitches are usually recommended because experimental studies have shown that stitches placed at least 10 mm from the wound edge produces a stronger wound.⁹ This has been attributed to inflammatory changes in tissue close to the wound edge diminishing its suture-holding capacity.¹⁰ But it has also been found that large stitches are associated with a high rate of surgical site infection and incisional hernia.¹¹ Large stitches were found to compress or cut through soft tissue included in the stitch, thereby increasing the amount of necrotic tissue and hence increase the chances of infection.¹² The risk of incisional hernia may be increased with the use of a long stitch length because the stitch slackens, which allows wound edges to separate. But these studies are based on studies that did not consider the effect of the suture length (SL) to wound length (WL) ratio.

However, in a recent experimental study that also took into account the effect of the SL to WL ratio, stitches placed 3 to 6 mm from the wound edge produced a stronger wound after 4 days when inflammatory changes would be at their peak compared with stitches placed at least 10 mm from the wound edge.¹³ Recent study shows that short stitch length has lower risk of surgical site infection, wound dehiscence and incisional hernia.⁸

This study was conducted to compare large tissue bites versus small tissue bites in midline abdominal wound closure keeping suture length to wound length ratio of at least 4:1

II. Aims And Objectives

To Compare The Outcome Of Midline Abdominal Wound Closure After Using Small Tissue Bites Versus Large Tissue Bite With Reference To

1. Wound Dehiscence
2. Surgical Site Infection.

III. Materials And Methods

A Prospective study will be conducted in Swami Vivekanand Subharti University Subharti Medical College, Meerut from October 2019 to July 2021, for abdominal surgical problems needing either elective or emergency surgery.

Out of 80 patients, 40 patients will be randomized to have the abdominal wall closed by Using Small Tissue Bites technique and remaining 40 by Using Large Tissue Bites technique and they will be grouped as Group A and Group B respectively. The patients will be chosen randomly, irrespective of their age, sex, and nature of disease to these two groups.

INCLUSION CRITERIA

- Patients aged 18 years and above.
- Patients posted for laparotomy, either elective or emergency.

EXCLUSION CRITERIA

- Patients with co-morbid conditions like immunocompromised patients, patients on cancer chemotherapy, immunotherapy and on long term steroids.
- Patients who underwent previous midline incision.
- Patients with a pre-existing abdominal wall hernia

IV. Methodology

Patients will be randomized to wound closure with either a small or large tissue bites alternatively into groups A and B. In group A, large tissue bites will be placed at least 10 mm from the wound edge and 10 mm apart. In group B, small tissue bites will be placed 5-7 mm from the wound edge and 5-7 mm apart and include only the aponeurosis in the stitches without peritoneum. Continuous sutures with no.1 polypropylene suture on round body needle will be used in both the groups to close the abdomen.

Following data will be collected: 1. Patient's age and sex. 2. Body mass index. 3. History of Diabetes mellitus, Chronic Obstructive Pulmonary Disease. 4. Haemoglobin, serum albumin and serum bilirubin, blood urea and serum creatinine. 5. Type of surgery. 6. Length of the suture used to close the midline incision. 7. Length of the wound. 8. Suture length to wound length ratio will be calculated. 9. Postoperative wound complications e.g., wound dehiscence and surgical site infection

Wound dehiscence is defined as fascial separation with or without protrusion of abdominal contents.

Surgical site infection is defined according to the criteria of the Centers for Control and Prevention and is classified as deep or superficial. Patients will be followed up on outpatient basis to look for any surgical site infection or wound dehiscence. Patients who develop wound complications during hospital stay will be treated on individual basis in the form of local wound care and antibiotic as per culture sensitivity.

V. Observation And Result

The present study was performed by enrolling 80 patients who underwent abdominal surgery through a midline incision. These patients were randomized to wound closure with either a short or long tissue bites by using sealed envelopes, opened before surgery (double blinding). In group A, large tissue bites were placed at least 10 mm from the wound edge and 10 mm apart. In group B, small tissue bites were placed 5-7 mm from the wound edge and 5-7 mm apart and which included only the aponeurosis in the stitches. Continuous sutures were applied using no.1 polypropylene suture on round body needle in both the groups

Surgical site infection:-

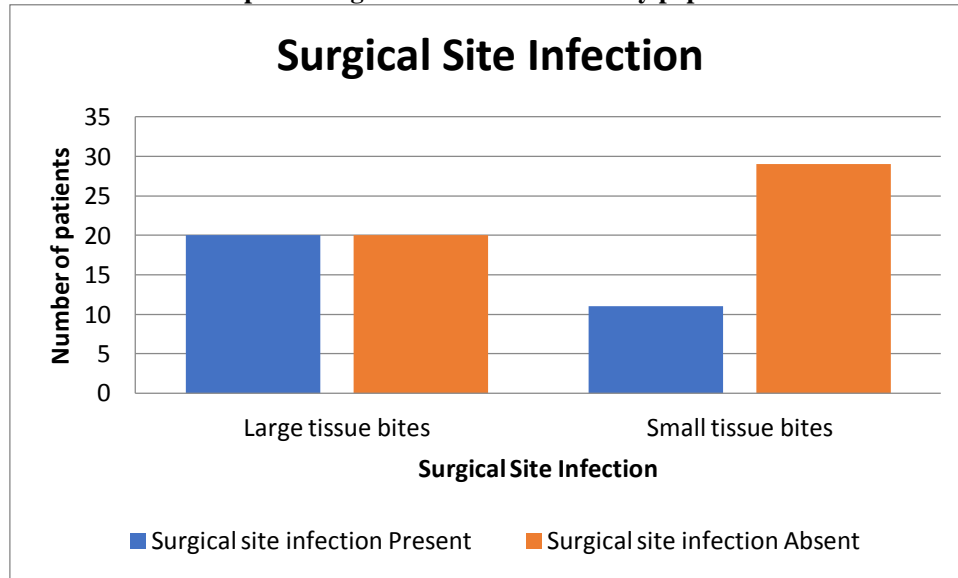
The surgical site infection was found to be present in 20 patients in large tissue bites group. The surgical site infection was found to be present in 11 patients in small tissue bites group. The surgical site infection was found to be more in large tissue bites group. The difference between the surgical site infection in both the groups were found to be statistically significant. (p value = 0.014). (Table 1)

Table 1: Surgical site infection in study population

Surgical site infection	Large tissue bites	Small tissue bites	p value
Present	20	11	
Absent	20	29	
Total	40	40	0.014*

P value < 0.05 is considered statistically significant

Graph 1: Surgical site infection in study population



Wound dehiscence:-

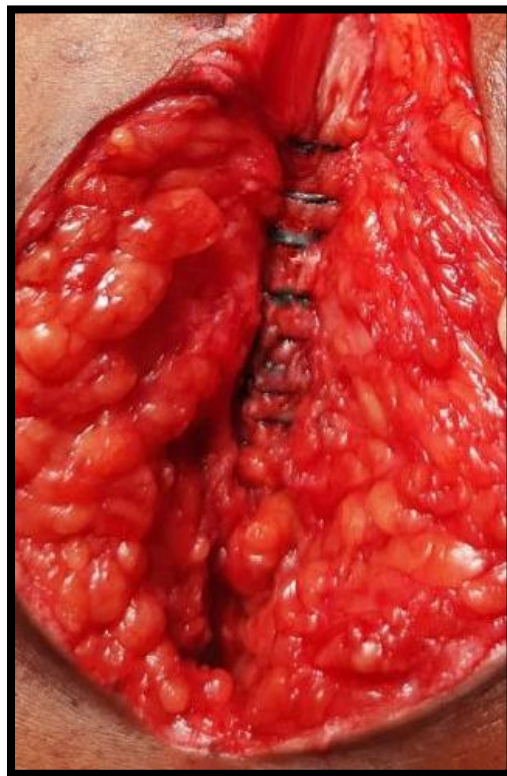
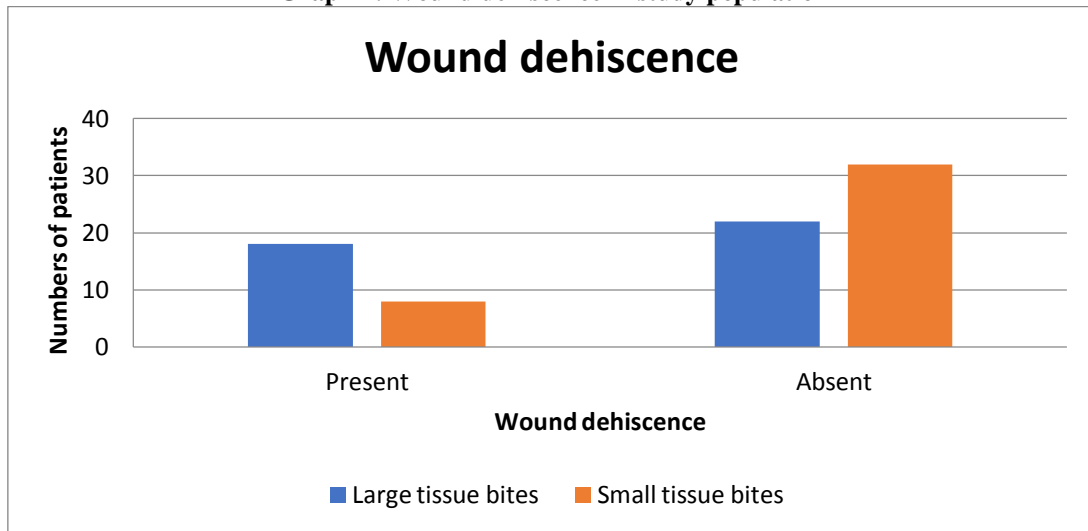
Wound dehiscence was found to be present in 18 patients in large tissue bites group. Wound dehiscence was present in 8 patients in small tissue bites group. The wound dehiscence was found to be present more in large tissue bites group. The wound dehiscence was found to be significantly different in both the study groups (p value = 0.016). (Table 2)

Table 2: Wound dehiscence in study population

Wound dehiscence	Large tissue bites	Small tissue bites	p value
Present	18	8	
Absent	22	32	
Total	40	40	0.016*

P value < 0.05 is considered statistically significant

Graph 2: Wound dehiscence in study population



SMALL TISSUE BITES



LARGE TISSUE BITES



SURGICAL SITE INFECTION



WOUND DEHISCENCE

VI. Discussion

Surgical site infection (SSI)

The surgical site infection was found to be present in 20 patients in large tissue bites group. The surgical site infection was found to be present in 11 patients in small tissue bites group. The surgical site infection was found to be more in large tissue bites group. The difference between the surgical site infection in both the groups were found to be statistically significant. (p value = 0.014). In study done by Milbourn et al,⁵ 10.2% patients in long stitch length group and 5.2% patients in short stitch length group had surgical site infection. This difference was statistically significant with p value of 0.02. The results presented by Albertsmeier M et al.¹³ were in contrast with the present study where the significant relation could not be established between the study groups.

Wound Dehiscence

Wound dehiscence was found to be present in 18 patients in large tissue bites group. Wound dehiscence was present in 8 patients in small tissue bites group. The wound dehiscence was found to be present more in large tissue bites group. The wound dehiscence was found to be significantly different in both the study groups (p value = 0.016). In study done by Milbourn et al.⁵ 0.3% patients in long stitch length group and none of the patients in short stitch length group had surgical site infection. This difference was statistically insignificant with p value of more than 0.99.

In conclusion, the small bites suture technique is more effective than the traditional large bites suture closure technique for prevention of incisional hernia in midline incisions. The small bites technique is not associated with more pain or adverse events and should be considered the standard closure technique for midline incisions. Analysis of long-term results of this trial will help clarify the impact of suture technique on hernia development.

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