



A comparative study of mass closure vs layered closure in midline laparotomy incisions

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ABSTRACT

Aim: The goal of this study is to examine the differences and similarities between mass closure and layered closure of midline laparotomy wounds.

Material and methods: This research included a total of 100 different patients. Mass closure was performed on fifty patients, and layered closure was executed on the remaining fifty patients. Midline vertical incisions, the number of elective laparotomies performed, and the percentage of PDS suture material used were all similar between the two groups.

Results: The age group beyond 60 years (31%) was shown to be the most susceptible in this research, followed by the age group below 30 years (22%). There were 64 male patients and 36 female patients out of a total of 100, making the female to male ratio 1.77:1. In this particular research, incisions made both above and below the midline were used most often. The mean amount of time needed to close a wound is longer in the layered closure group, which is statistically significant when compared to mass closure. As compared to layered closure, mass closure is the most cost-effective option. The incidence of early and late problems is somewhat higher in the multilayer closure group as compared to the mass closure group; however, this difference is not statistically significant.

Conclusion: As compared to layered closure, the mass closure technique is a more cost-efficient, safe, and successful approach for closing midline laparotomy wounds. It also requires less time to complete than layered closure, which is linked with less post-operative problems.

Keywords: Mass closure, layered closure, midline laparotomy incisions

Introduction

In spite of the developments that have been made in surgical technique and materials, abdominal fascial closure has remained a treatment that often reflects the personal choice of

the surgeon and relies heavily on both conventional experience and anecdotal evidence.¹ While doing abdominal surgery, the incisions that are made must be carefully selected, and the surgeon must use appropriate techniques for opening and sealing the wounds. Any error, such as an ill-placed incision, incompetent methods of suturing, or ill-judged selection of suture materials, can result in serious complications. These complications include the formation of a hematoma, infection, stitch abscess, an ugly scar, an incisional hernia, or, worst of all, complete disruption of the wound.

There is still a need for research on the most effective way to close abdominal wounds. It need to be technically straightforward to such an extent that even a novice can produce outcomes on par with those produced by an experienced professional.² The results of many of the trials that were conducted for the purpose of determining the best technique for abdominal fascial closure were inconsistent, and the trials lacked the necessary statistical power to demonstrate any significant treatment differences. As a result, many surgeons were left uncertain about the topic.³ The optimal method for closing the abdominal incision should be quick, uncomplicated, and economical, and it should also be capable of avoiding problems at both the early and the advanced stages. The purpose of the current study is to compare the two methods of laparotomy wound closure, known as mass closure and layered closure, with regard to post-operative complications, the amount of time required for wound closure, and cost effectiveness in both groups. Additionally, the study will attempt to determine which method is the more effective of the two.

Material and methods

The current prospective comparison research was carried out at the department of surgery after receiving consent from the institutional ethical committee. This research included a total of 100 different patients. Mass closure was performed on fifty patients, and layered closure was executed on the remaining fifty patients. Midline vertical incisions, the number of elective laparotomies performed, and the percentage of PDS suture material used were all similar between the two groups.

Inclusion criteria

No matter their gender or age, all patients over the age of 18 and up to 70 who had laparotomies performed via a midline incision were considered for inclusion in the research.

Exclusion criteria

- This research did not include any patients who required emergency surgery.
- All patients older than 70 years old and less than 18 years old
- All immune-compromised individuals having laparotomy

At admission, a comprehensive clinical examination and a complete history were conducted as required by the proforma. After conducting an interview with the patient directly, a history was written down that included the patient's age, gender, education, employment, domicile, socioeconomic position, symptoms, and connected illnesses. In order to corroborate the clinical diagnosis in each and every patient, the appropriate laboratory and radiographic examinations were carried out. There were a total of 100 patients who had laparotomy, and out of those 100 patients, mass closure was performed on 50 patients, and layered closure was performed on the other 50 patients.

Mass closure: During the mass closure procedure, the posterior rectus sheath, the anterior rectus sheath, and the parietal peritoneum were all approached as a single layer using PDS in a continuous flowing stitch pattern without any interlocking.

Layered closure: In this case, all of the processes were the same as they were for the mass closure, with the exception that the peritoneum was closed as a distinct layer, and other layers were closed as a separate layer with PDS by taking continuous running sutures without interlocking them.

Data Analysis

After being input into sheets using Microsoft Excel, the data that were obtained were analyzed using a statistical program designed for use in the social sciences (SPSS-version 25.0.) On the basis of the analysis and observations made, conclusions were developed, which were then discussed and contrasted with other pertinent literature.

Results

During the course of the trial, a total of one hundred patients with intra-abdominal pathology who were scheduled to undergo laparotomy via a midline incision were enrolled.

Table 1: Gender and age distribution

Gender	Number	Percentage
Male	64	64
Female	36	36
Age group (years)		
Below 30	22	22
30-40	18	18
40-50	18	18
50-60	11	11
Above 60	31	31

The age group beyond 60 years (31%) was shown to be the most susceptible in this research, followed by the age group below 30 years (22%). There were 64 male patients and 36 female patients out of a total of 100, making the female to male ratio 1.77:1.

Table 2: Intra-abdominal pathologies treated with midline laparotomy incisions.

Intra-abdominal pathologies	Number	Intra-abdominal pathologies	Number
Upper GI malignancy	21	Bleeding duodenal ulcer	2
Gastric outlet obstruction	5	Common bile duct stone	4
Hydatid cyst of liver	4	Lower GI malignancy	28
Splenic abscess	2	Volvulus	2
Pseudocyst of pancreas	5	Mesenteric cysts	5
Achalasia cardia	4	Retroperitoneal tumours	5
GERD	4	Soft tissue tumours	2
Splenomegaly	5	Carcinoma of bladder	2

Table 3: Distribution according to abdominal incisions

Abdominal incision	Number	Percentage
Upper midline	53	53
Mid midline	14	14
Lower midline	33	33

Upper and lower midline incisions are most commonly used in present study.

Table 4: Postoperative complications

Postoperative complications	Mass closure		Layered closure		P value
	Number	Percentage	Number	Percentage	
Hematoma	0	0	0	0	0.25
Seroma	0	0	2	4	
Wound infection	6	12	3	6	
Burst abdomen	2	4	2	4	
Incisional hernia	3	6	3	6	
Button hole hernia	0	0	0	0	
Suture sinus formation	0	0	2	4	

The incidence of early and late problems is somewhat higher in the multilayer closure group as compared to the mass closure group; however, this difference is not statistically significant.

Table 5: Closure time

Type of closur	Mean closure time (minutes	P value
Mass closure	17.01	<0.01
Layered closur	22.63	

The mean amount of time needed to close a wound is longer in the layered closure group, which is statistically significant when compared to mass closure. As compared to layered closure, mass closure is the most cost-effective option.

Discussion

The incidence of wound infection in the mass closure group was 12% in our current prospective analysis, which is similar to the rates seen in prior investigations.⁴⁻⁶ It is lower when compared to studies conducted by Leaper DJ et al. and Khan NA et al., and this might be because the sample size in the current research is rather small.^{7,8} According to the research carried out by Israelsson et al. and Bloemen et al., the incidence of wound infection in the mass closure group is 9.4% and 7.7% respectively.^{9,10} As compared to studies conducted by Ellis H et al (which found a wound infection rate of 5%) and Kendal et al (which found a wound infection rate of 5%) the rate of infection in the current research was greater. As compared to mass closure, layered closure has a higher incidence of wound infection. This may be because there is more tissue manipulation and more exposure of the wound to the environment and air.

In the group that had mass closure, the incidence of a ruptured abdomen was 4%. It is analogous to research that was carried out by Ellis H et al., Khan NA et al., and Murtaza B et al.¹¹ The incidence of a ruptured abdomen is four percent in the multilayer closure group, which is on line with the findings of previous research.^{2,5} In the current research, the incidence of incisional hernia as a result of mass closure was 6%; this figure is equivalent to that seen in earlier investigations.^{2,5,8,12} The incidence of incisional hernia in the layered closure group is 6%, which is higher compared to other studies; this may be because the sample size in the present study is smaller than in other studies.^{2,5}

In the current investigation, there was no incidence of suture sinus development in the group that had mass closure. In the studies that were carried out by krukowski et al. and Brolin et al., similar findings were reported. On the other hand, the incidence of suture sinus formation in the layered closure group in the present study is 4%, which is comparable with the study carried out by Wissing et al.^{4,12,13}

The current research found that the mean wound closure time for the mass closure group was 17.01 minutes. The findings of this study are comparable to those of Kendal et al.⁵ In the current study, the mean closure time for the layered closure group is 22.63 minutes, whereas in the study by Kendal et al., it was only 18 minutes. All of the faculty members were involved in the treatment of the patient, so there is a possibility that individual differences contributed to the slightly longer amount of time needed for the layered closure group in the present study. According to the findings of this study, the mass closure technique is superior to the layered closure technique in terms of its overall effectiveness. Both the research carried out by Ausobsky JR et al. and the study carried out by Pollock AV et al. came to very similar conclusions.^{14,15}

Conclusion

As compared to layered closure, the mass closure technique is a more cost-efficient, safe, and successful approach for closing midline laparotomy wounds. It also requires less time to complete than layered closure, which is linked with less post-operative problems.

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