Original Research Article

A comparative study between closure by layers vs mass closure in midline laparotomy incision

Saurabh Chauhan[1], Brahma Nand[2], Azad Kumar Mourya[2]*, Babita Chauhan[3]

[1]Associate Professor, Department of Surgery, Government Medical College, Shivpuri, Madhya Pradesh, India
[2]Senior Resident, Department of Surgery, Government Medical College, Shivpuri, Madhya Pradesh, India
[3]Anesthesiologist, Department of Anesthesiology, District Hospital Shivpuri, Madhya Pradesh, India

Received: 12-03-2021/ Revised: 03-05-2021/ Accepted: 26-05-2021

Abstract

Background: A laparotomy wound is closed in layers co-opting the various layers anatomically. The present study was conducted to compare mass closure versus layered closure of midline laparotomy incisions. **Material & Methods:** 40 patients undergoing laparotomy were divided into 2 groups of 20 each. Group I patients underwent mass closure and group II underwent layered closure of laparotomy incision. Post- operative complication in both groups was recorded. **Results:** Group I had 12 males and 8 females and group II had 11 males and 9 females. Common intra-abdominal pathologies were upper GI malignancy in10, lower GI malignancy in 7, hydratid cyst of liver in 4, splenic abscess in 6, achalasia cardia in 3, GERD in 5, splenomegaly in 3 and Volvulus in 2. The difference was significant (P< 0.05). Common post- operative complications was wound infection seen in 1 in group I, seroma 1 in group II, hematoma 2 in group I, incisional hernia 1 in group II and button hole hernia 1 each in group I and II. The difference was non- significant (P> 0.05). **Conclusion:** Mass closure of midline laparotomy incisions was more effective as compared to layered closure.

Keywords: Layered closure, Mass closure, Midline laparotomy

Introduction

Traditionally, a laparotomy wound is closed in layers co-opting the various layers anatomically. A new method of closure, namely single layer closure technique such as mass closure technique has come into vogue[1]. In this technique, all the layers of the abdominal wall except the skin and subcutaneous tissue are sutured in one layer. Skin is approximated separately with interrupted sutures[2].

The practical value of any method of abdominal closure can be judged only when it is used in unselected patients by all surgeons who close abdominal wounds irrespective of their degree of training. The current choice for closure of emergency and elective laparotomies in most centers is a continuous mass closure technique using a non-absorbable suture material[3]. Despite the advances in surgical technique and materials, abdominal fascial closure had remained a procedure that often reflects A surgeon's personal preference with reliance on traditional and anecdotal experience[4]. In abdominal surgery, wisely chosen incisions and correct methods of making and closing such wounds are factors of great importance[5].

Any mistake, such as badly placed incision, inept methods of suturing, or ill-judged selection of suture materials, may result in serious complications such as hematoma formation, infection, stitch abscess, an ugly scar, an incisional hernia, or, worst of all, complete disruption of the wound[6].The present study was conducted to compare mass closure versus layered closure of midline laparotomy incisions.

Material & Methods

The present study comprised of 40 patients undergoing laparotomy of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 20 each. Group I patients underwent mass closure and group II underwent layered closure of laparotomy incision. Post- operative complication in both groups was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

**Correspondence*
Dr. Azad Kumar Mourya
Senior Resident, Department of Surgery, Government Medical College, Shivpuri, Madhya Pradesh,India
E-mail: mouryaazad@gmail.com

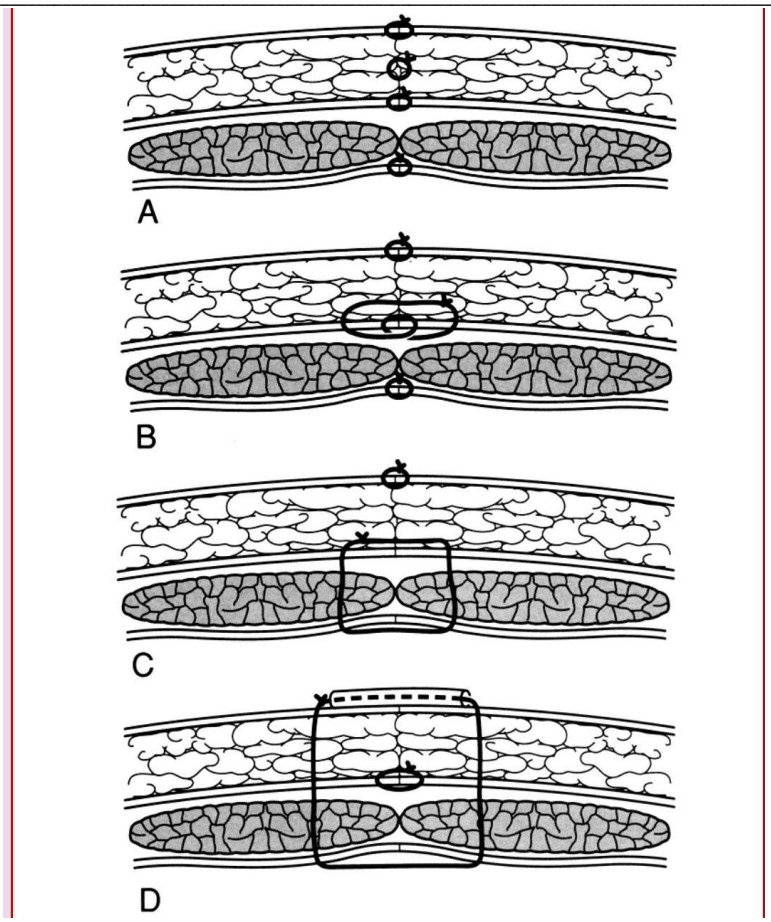

Fig 1:A.Layered closure. B. Modified Smead-Jones closure. C. Mass closure. D. Retention suture.

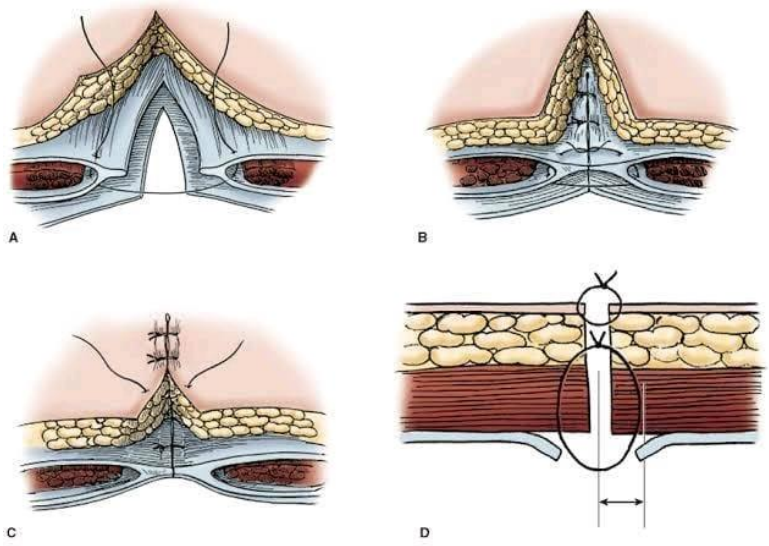

Fig 2:Abdominal wall closure. (A) single layer abdominal wall closure, containing rectus sheath and peritoneum; (B) Mass closure in progress; (C) skin closed as separate layer; (D) the sutures are inserted one CM apart and kept one CM away from the edge of incision.

Results

Table 1: Distribution of patients

Groups	Group I	Group II
Closure	Mass closure	Layer closure
M:F	12:8	11:9

Table 1 shows that group I had 12 males and 8 females and group II had 11 males and 9 females.

Table 2: Assessment of intra-abdominal pathologies

Intra-abdominal pathologies	Number	P value
Upper GI malignancy	10	0.01
Lower GI malignancy	7	
Hydratid cyst of liver	4	
Splenic abscess	6	
Achalasia cardia	3	
GERD	5	
Splenomegaly	3	
Volvulus	2	

Table 2, Fig 3 shows that common intra- abdominal pathologies were upper GI malignancy in10, lower GI malignancy in 7, hydratid cyst of liver in 4, splenic abscess in 6, achalasia cardia in 3, GERD in 5, splenomegaly in 3 and Volvulus in 2. The difference was significant (P< 0.05).

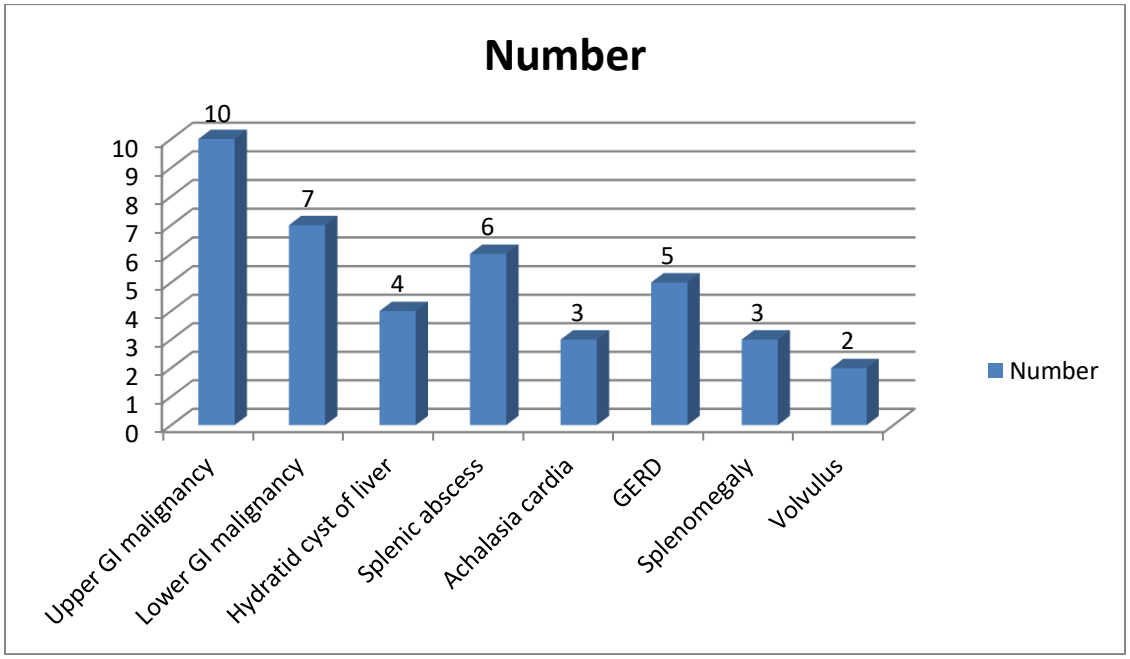

Fig 3: Assessment of intra-abdominal pathologies

Table 3: Comparison of post- operative complications

Post- operative complications	Group I	Group II	P value
Wound infection	1	0	0.12
Seroma	0	1	
Hematoma	2	1	
Incisional hernia	0	1	
Button hole hernia	1	1	

Table 3, Fig 4shows that common post- operative complications was wound infection seen in 1 in group I, seroma 1 in group II, hematoma 2 in group I, incisional hernia 1 in group II and button hole hernia 1 each in group I and II. The difference was non- significant (P> 0.05).

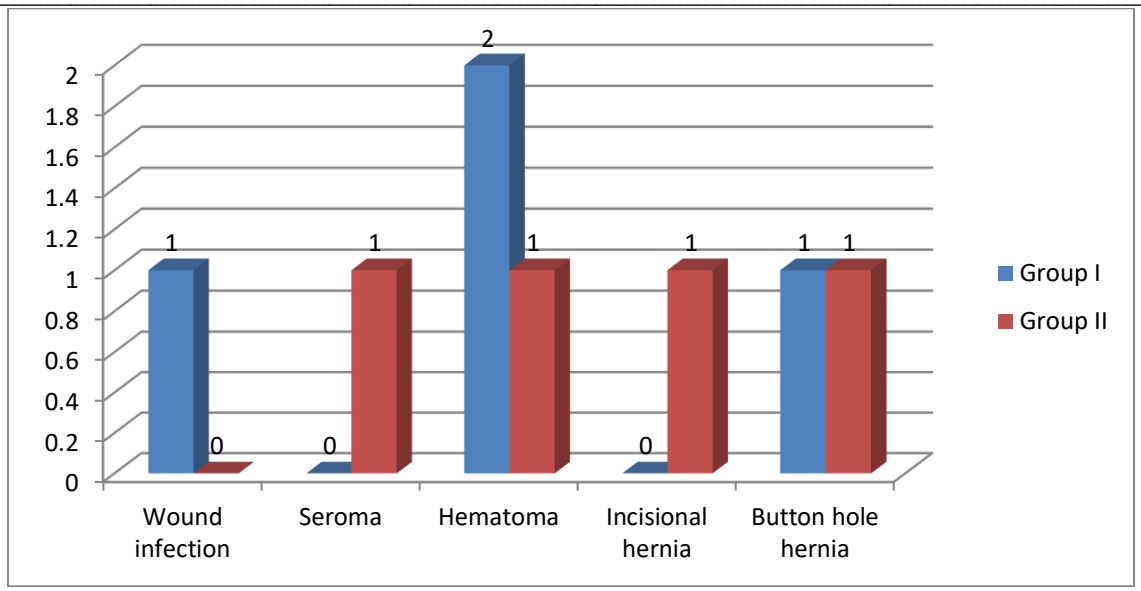

Fig 2: Comparison of post- operative complications

Discussion

The surgeon's aim is to restore the structural integrity of incised or injured tissues to as near normal as possible. The importance of the role played by sutures in this cannot be exaggerated; however, the suture technique has been found out to be equally important in surgery[7]. In spite of perfect asepsis, improved surgical skills, antibiotics, etc. wound complications comprise nearly 50% of all post-operative complications[8]. Hence, there is a constant search for a suture technique which would minimize the wound failure rate. Many trials carried out for determination of ideal technique for abdominal fascial closure, lacked sufficient power to show significant treatment differences also the results were conflicting and had left many surgeons uncertain about it[9]. The best abdominal closure technique should be fast, easy, and cost effective while preventing both early and late complications[10].The present study was conducted to mass closure versus layered closure of midline laparotomy incisions.

In present study, group I had 12 males and 8 females and group II has 11 males and 9 females. Deshmukh et al[11]compared the two methods (Mass closure and Layered closure) of laparotomy wound closure in relation to post-operative complications, time for wound closure and cost effectiveness in both groups and also to decide the most effective method among the two. Patients were followed up for 6 months in post-operative period for detection late complications. Total 60 patients of were studied. Majority of patients were in 61 to 65 age group. Male outnumbered the females. Incidence of early complications like seroma, wound infection is more in layered closure group as compared to mass closure. Mean wound closure time is more in layered closure group. Mass closure technique is more cost effective than layered closure group.We found that common intra-abdominal pathologies were upper GI malignancy in10, lower GI malignancy in 7, hydratid cyst of liver in 4, splenic abscess in 6, achalasiacardia in 3, GERD in 5, splenomegaly in 3 and Volvulus in 2. Singh et al[12] in their study 80 cases were equally divided into two groups of 40. In both groups, vertical midline incision was used. In the first group, abdomen was closed using the single layer closure technique. Continuous suturing with burial of the knots was done in 20 patients and interrupted mass closure was done in another 20 patients. In the other group, the abdomen was closed in layers. The time required for closure was considerably less when continuous suture technique was used. One patient in the mass closure group and four in the layered group developed post-operative wound infections. One patient in the layered closure group developed a stitch sinus. There were two cases of burst abdomen with the layered closure technique.

Two patients in the layered closure group developed incisional hernias 6 months post-operatively.

We observed that common post- operative complications was wound infection seen in 1 in group I, seroma 1 in group II, hematoma 2 in group I, incisional hernia 1 in group II and button hole hernia 1 each in group I and II.Patel et al[13] in their study fifty-five RCTs with a total of 19,174 participants were studied. Results showed that the proportion of participants who developed incisional hernia at one year or more of follow-up, we did not find evidence that suture absorption (absorbable versus non-absorbable sutures, RR 1.07, 95% CI 0.86 to 1.32, moderate-quality evidence; or slow versus fast absorbable sutures, RR 0.81, 95% CI 0.63 to 1.06, moderate-quality evidence), closure method (mass versus layered, RR 1.92, 95% CI 0.58 to 6.35, very low-quality evidence) or closure technique (continuous versus interrupted, RR 1.01, 95% CI 0.76 to 1.35, moderate-quality evidence) resulted in a difference in the risk of incisional hernia.

Conclusion

Authors found that mass closure of midline laparotomy incisions was more effective as compared to layered closure.

References

1. Hodgson NC, Malthaner RA, Ostybe T. The search for an ideal method of abdominal fascial closure: a meta-analysis. Ann Surg. 2000;231:436-42.
2. Wissing J, Van Vroonhoven TJ, Schattenkerk ME. Fascia Closure after midline laparotomy: results of a randomised trial. Br J Surg. 1987;74:738-41.
3. Kendall WH, Brennan G, Guillou J. Suture length ratio and the integrity of midline and lateral paramedian incisions. Br J Surg. 1991;78:705-7.
4. Israelsson LA, Jonsson T. Closure of the midline laparotomy incisions with polydioxanone and nylon: the importance of suture technique. Br J Surg. 1994;81:1606-8.
5. Leaper DJ, Pollock AV, Evans M. Abdominal wound closure: a trial of nylon, polyglycolic acid and steel sutures. Br J Surg. 1977;64:603-6.
6. Khan NA,Shehzad K. Comparison between delayed absorbable polydioxanone and non-absorbable (prolene) suture material in abdominal wound closure. PAFMJ 2009; 59(1):1

7. Bloemen A, Dooren P, Hoofwijk AGM. Randomized clinical trial comparing polypropylene or polydioxanone for midline abdominal wall closure. Br J Surg. 2011; 98:633-9.
8. Murtaza B, Khan NA, Sharif MA. Modofied abdominal wound closure technique in complicated /high risk laparotomies. J coll physicians Surg Pak. 2010;20:37-41.
9. Brolin RE. Prospective randomised evaluation of midline fascial closure in gastric bariatric operations. Am Surg. 1996;172:328-31.
10. Krukowski ZH, Matheson NA. 'Button hole' incisional hernia: a late complication of abdominal wound closure with continuous non-absorbable sutures. Br J Surg. 1987;74:824-5.
11. Deshmukh SN, Maske AN. Mass closure versus layered closure of midline laparotomy incisions: a prospective comparative study. Int Surg J 2018;5:584-7.
12. Singh G, Ahluwalia R. A comparison between mass closure and layered closure of midline abdominal incisions. Med J DY Patil Univ 2012;5:23-6.
13. Patel SV, Paskar DD, Nelson RL, Vedula SS, Steele SR. Closure methods for laparotomy incisions for preventing incisional hernias and other wound complications. Cochrane Database of Systematic Reviews.2017;11:1

Conflict of Interest: Nil
Source of support:Nil