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Original Research Article

Comparison of efficacy of large tissue bites versus small tissue bites for midline abdominal wound closure

Tappa Mahammad Mustaqrasool[1], Bharat Dikshit[1], Deepak Phalgune[2]*

[1]Department of Surgery, [2]Department of Research, Poona Hospital and Research Centre, Pune, Maharashtra, India

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***Correspondence:**
Dr. Deepak Phalgune,
E-mail: dphalgune@gmail.com

ABSTRACT

Background: Incisional hernia is common complication after median laparotomy, with reported incidence varying between 2% and 20%. For prevention of incisional hernia, many clinical trials and meta-analyses have demonstrated that mass closure technique with simple running suture is good option to close midline incision. An attempt was made in this study to compare efficacy of large tissue bites vs small tissue bites for midline abdominal wound closure.
Methods: Three hundred thirty patients admitted for midline laparotomy were randomized into Group A, and Group B. Group A, and Group B patients underwent abdominal closure by small bites technique, and large bites technique respectively. Patients were followed at 7th postoperative day, 1 month, 6 months, and 12 months. Primary outcome measures were incidence of incisional hernia, incidence of postoperative complications like post-operative pain, surgical site infections, wound dehiscence whereas, secondary outcome measure was fascial closure time. Inter-group comparison of categorical, and continuous variables was done using Chi-square test/Fisher's exact test and unpaired 't' test respectively.
Results: Incidence of incisional hernia was significantly higher in large bites suture technique compared to small bites suture technique at 12 months follow up. Mean time required for fascial closure time was significantly higher in small bite group compared to large bite group. There was no statistically significant difference in postoperative pain, surgical site infections, and wound dehiscence among the two groups.
Conclusions: The rate of incisional hernia was lower in small bites technique compared with large bites technique in midline abdominal incisions.

Keywords: Incisional hernia, Large bites technique, Midline laparotomy**,** Small bites technique, Surgical site infections, Wound dehiscence

INTRODUCTION

The midline laparotomy is frequently used by abdominal surgeons to gain rapid and wide access to the abdominal cavity with minimal damage to nerves, vascular structures and muscles of the abdominal wall. Incisional hernia is a common complication after median laparotomy, with reported incidence varying between 2% and 20%.[1] Higher incidence (30%-35%) have been reported in overweight and obese patients.[2,3] Midline laparotomies and incisional hernias have been subject of investigation for a long period of time. For prevention of incisional hernia, many clinical trials and meta-analyses have demonstrated that a mass closure technique with a simple running suture is good option to close a midline incision. A mass closure technique with a running suture is also easier and quicker to perform than layered techniques with interrupted sutures.[4]

The quality of the suture technique has a significant effect on the risk of incisional hernia. Incisions should be closed with a running suture and with a suture length

(SL) to wound length (WL) ratio of at least 4. When the SL to WL ratio is less than 4, the risk of herniation is 3 times higher.[5] Studies regarding normal weight patients and non-absorbable sutures with this suture technique have not been reported. Hence, an attempt was made in this study to compare the efficacy of large tissue bites vs small tissue bites for midline abdominal wound closure.

METHODS

Patients between aged >18 years and both sexes admitted in Poona Hospital and Research Centre who underwent midline laparotomy between July 2017 and October 2018 were included. The patients were explained about potential advantages, and risks. Permission was obtained from ethics committee (Letter No: RECH/EC/2017-18/334) and scientific advisory committee (Letter no: RECH/SAC/2017-18/170) of the institution for this single blind randomized controlled study. Written informed consent was obtained from all the patients.

Exclusion criteria

Patients who had previous incisional hernia or fascial dehiscence with secondary healing after a midline incision, patients having body mass index (BMI) ≥25 Kg/m^2, patients having collagen disorders, and pregnant women were excluded from the study.

Based on a previous study, setting an alpha error at 0.05, and power at 80%, sample size of 115 patients for each group was calculated by a formula.[3,6] Patients were divided into two groups, Group A and Group B by using block randomization (Figure 1). Randomization of patients into groups was done on the day of surgery. The surgeon and the resident performing the surgery were aware of type of closure technique. Patients were not aware of this type of closure technique.

Group A patients underwent abdominal closure by small bites technique with bite width of 5 mm and inter suture spacing of 5 mm using a no.1 ethilon, whereas Group B patients underwent abdominal closure by conventional large bites technique with bite width of 1 cm and inter suture spacing of 1 cm using a no.1 ethilon. In small bite technique twice as many stitches were placed per sutured centimeter as compared to large bite technique.

Only rectus sheath was approximated during abdominal closure. Wound length was measured in both the groups before closing the rectus sheath. Closure of rectus sheath was done with no.1 ethilon in continuous single layer. Length of remaining suture material was measured, and a suture length of 2 cm was taken as a standard for all patients to be used up in the knot. Thus, the suture length used was calculated (initial suture length - remaining suture length and 2 cm (knot length). A ratio of suture length: wound length was calculated and was aimed to maintain a minimum of 4:1.

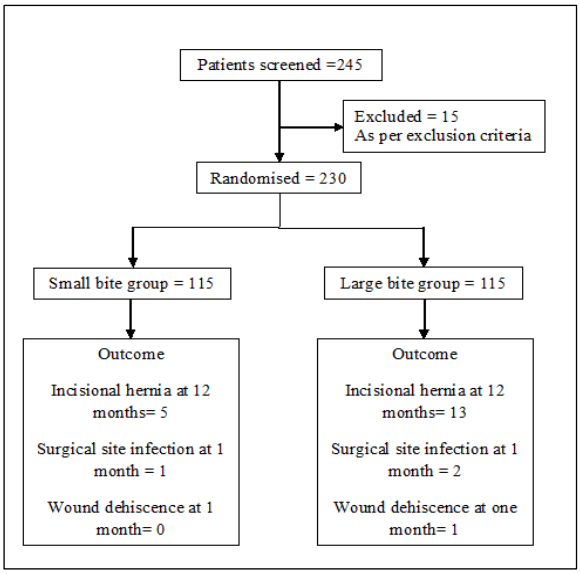

Figure 1: CONSORT diagram.

In this study, authors evaluated the incidence of incisional hernias Patients were examined clinically in supine position with a relaxed and a tensed abdominal wall while lifting both legs extended and then standing with relaxed and tensed abdominal wall while straining. Postoperative wound pain was measured using visual analogue scale (VAS) score, where patients were asked to mark a number reflecting pain (scale 0-10).

Rectus sheath closure time was defined as a time period between taking first bite for midline wound closure and completion of tying of the knot. Time was calculated by using stopwatch. Patients were followed at 7th postoperative day, 1 month, 6 months and 12 months. Primary outcome measures were incidence of incisional hernia, incidence of postoperative complications like post-operative pain, surgical site infections, wound dehiscence whereas, secondary outcome measure was fascial closure time.

Statistical analysis

Data collected were entered in Excel 2007 and analysis of data was done using Statistical Package for Social Sciences for Windows, Version 20.0. IBM Corporation Armonk, NY, USA. Data on categorical variables are shown as n (% of cases) and the data on continuous variables is presented as mean and standard deviation (SD).

The inter-group comparison of categorical variables was done using Chi-square test or Fisher's exact test. The statistical significance of inter-group difference of means of continuous variables was tested using unpaired 't' test. The underlying normality assumption was tested before statistical analysis. p-values less than 0.05 were considered to be statistically significant.

RESULTS

A total of 230 patients were included in the study and allocated to small bite group (115 patients) and large bite group (115 patients) randomly. Incidence of incisional hernia was compared between two groups at 6th month and 12th month follow up. Comparison of pain was done by using VAS score between two groups at 7th post-operative day. Incidence of surgical site infections, wound dehiscence was compared between two groups at 7th post-operative day and 1 month follow up. Fascial closure time by using stopwatch was compared between two groups.

There was no statistically significant difference in mean age and gender between large bites suture technique compared to small bites suture technique (Table 1). Incidence of incisional hernia was significantly higher in large bites suture technique compared to small bites suture technique at 12 months follow up.

Mean time required for the fascial closure was significantly higher in small bite group compared to large bite group. There was no statistically significant difference in postoperative pain, surgical site infections and wound dehiscence among the two groups (Table 1).

Table 1: Comparison of small bites and large bites suture technique.

Characteristics		Small bite	Large bite	P value
Age in years (mean±SD)		37.5±8.9	36.2±8.8	0.27*
Gender N (%)	Male	63 (54.8)	62 (53.9)	0.895**
	Female	52 (45.2)	53 (46.1)	
Incidence of incisional hernia at 6 months N (%)	Yes	0 (0.0)	1 (0.9)	0.316***
	No	115 (100.0)	114 (99.1)	
Incidence of incisional hernia at 12 months N (%)	Yes	5 (4.3)	13 (11.3)	0.0495***
	No	110 (95.7)	102 (88.7)	
Mean visual analogue scale at 7th day (mean±SD)		4.7±1.7	4.9±1.7	0.491*
Surgical site infection at 7th day N (%)	Yes	3 (2.6)	8 (7.0)	0.122***
	No	112 (97.8)	107 (93.0)	
Surgical site infection at 1 month N (%)	Yes	1 (0.9)	2 (1.7)	0.561***
	No	114 (99.1)	113 (98.3)	
Wound dehiscence at 7th day N (%)	Yes	0 (0.0)	1 (0.9)	0.316***
	No	115 (100.0)	114 (99.1	
Wound dehiscence at 1 month N (%)	Yes	0 (0.0)	1 (0.9)	0.316***
	No	115 (100.0)	114 (99.1)	
Mean fascial closure time in minutes (mean±SD)		20.4±1.4	13.1±1.4	0.0001*

*Unpaired 't' test was used; **Chi-square test was used; ***Fisher's exact test was used.

DISCUSSION

A midline incision is the most commonly used route of access to the abdominal cavity.[7] The midline incision provides a relatively quick and wide access to the abdominal cavity and is therefore often used in major surgery and for emergency procedures.[8] There are many wound complications after closure of midline abdominal incisions like surgical site infections, wound dehiscence, incisional hernia etc.

Deerenberg et al reported that there was less fascial closure time in large bite technique. Millbourn and Deerenberg et al, reported that patients who underwent small bite suture technique had low incidence of incisional hernia.[3,9] There are multiple factors apart from the suture technique that affect postoperative complications like postoperative pain, surgical site infections and incisional hernia. There are no reported studies regarding normal weight patients and non-absorbable sutures comparing small and large tissue bite closure.

Mean age of subjects included in this study was 37.5 years and 36.2 years in small bite group and large bite group respectively. This was comparable with previously undertaken studies.[3,9]

The definition of incisional hernia suggested by the European Hernia Society is any abdominal wall defect, with or without a bulge, in the area of a postoperative scar perceptible or palpable by clinical examination.[10] Incidence of incisional hernia was significantly higher in large bites suture technique compared to small bites suture technique at 12 months follow up in the present study. A large bite might include subcuticular fat and sometimes muscles also, thus when exposed to tension aponeurotic edges might separate giving rise to weak closure. Separation of wound edges leads to hernia formation. These findings are in concordance with Deerenberg et al and Millbourn who reported a

significant reduction in the incisional hernia rate by small bite suture technique.[3,9] Fortelny et al reported twice the rate of incisional hernia in small bite group.[11]

In the present study, there was no statistically significant difference in post-operative surgical site infection between the two groups which is in concordance with Deerenberg et al whereas Israelsson et al reported a higher rate of wound infection in large stitches.[9,12]

In this study, there was no statistically significant difference in incidence of wound dehiscence between the two groups. These results are similar to those reported by Deerenberg et al Wound dehiscence occurs either due to breakage of suture or slippage of anchor knot or tearing through the tissues.[9]

Limitations of the study was time duration was comparatively short. Hence, authors cannot comment on long term follow up. The sample size of this study was small. Hence, further research in multiple centers with larger sample size and longer follow up should be undertaken to substantiate these findings.

CONCLUSION

Incidence of incisional hernia was significantly higher in large bites suture technique compared to small bites suture technique at 12 months follow up. Mean time required for the fascial closure was significantly higher in small bite group compared to large bite group. There was no statistically significant difference in postoperative pain, surgical site infections and wound dehiscence among the two groups.

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REFERENCES

1. Anthony T, Bergen PC, Kim LT, Henderson M, Fahey T, Rege RV, et al. Factors affecting recurrence following incisional herniorrhaphy. World J Surg. 2000;24(1):95-101.
2. Manninen MJ, Lavonius M, Perhoniemi VJ. Results of incisional hernia repair. A retrospective study of 172 unselected hernioplasties. Eur J Surg Acta Chirurgica. 1991;157(1):29-31.
3. Millbourn D. Closure of midline abdominal incisions with small stitches. Studies on Wound Complications and Health Economy Doctoral thesis. Umea, Sweden: Umea University. 2012.
4. Van't Riet M, Steyerberg EW, Nellensteyn J, Bonjer HJ, Jeekel J. Meta-analysis of techniques for closure of midline abdominal incisions. Bri J Surg. 2002;89(11):1350-6.
5. Rahbari NN, Knebel P, Diener MK, Seidlmayer C, Ridwelski K, Stöltzing H, et al. Current practice of abdominal wall closure in elective surgery-Is there any consensus?. BMC Surg. 2009;9(1):8.
6. Motulsky H. Intuitive biostatistics. Chapter 22. Choosing an appropriate sample size. Oxford: Oxford University Press; 1995: 195-204.
7. Ellis H, Bucknall TE, Cox PJ. Abdominal incisions and their closure. Curr Prob Surg. 1985;22(4):4-51.
8. Burger JW, Lange JF, Halm JA, Kleinrensink GJ, Jeekel H. Incisional hernia: early complication of abdominal surgery. World J Surg. 2005;29(12):1608-13.
9. Deerenberg EB, Harlaar JJ, Steyerberg EW, Lont HE, van Doorn HC, Heisterkamp J, et al. Small bites versus large bites for closure of abdominal midline incisions (STITCH): a double-blind, multicentre, randomised controlled trial. Lancet. 2015;386(10000):1254-60.
10. Muysoms F, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E, et al. Classification of primary and incisional abdominal wall hernias. Hernia. 2009;13(4):407-14.
11. Fortelny RH, Baumann P, Thasler WE, Albertsmeier M, Riedl S, Steurer W, Kewer JL, Shamiyeh A. Effect of suture technique on the occurrence of incisional hernia after elective midline abdominal wall closure: study protocol for a randomized controlled trial. Trials. 2015;16(1):52.
12. Israelsson LA, Jonsson T, Knutsson A. Suture technique and wound healing in midline laparotomy incisions. Eur J Surg Acta Chirurgica. 1996;162(8):605-9.

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