Comparison of Laparotomy Wound Dehiscence (LWD) Rate Using Interrupted X-Suture Technique vs Continuous Suture Technique in Rectus Sheath in Emergency Laparotomy

Fazli Akbar, Muhammad Khan, Nisar Ahmad, Shah Abbas, Nadeem Khan

ABSTRACT

Background: Emergency laparotomy is one of the most commonly performed surgeries in emergency situations of general surgery department. This can be performed for multiple causes. Wound closure is one of the main component of outcomes of this surgery. Some surgeons prefer continuous closure of the linea Alba while other prefer interrupted closure technique.

Objective: To compare the frequency of laparotomy wound dehiscence (LWD) using continuous suture technique with interrupted X-suture technique in rectus sheath for emergency laparotomy wound closure.

Materials & Methods: This randomized controlled trial was conducted on adult patients who were planned for emergency midline laparotomy in the department of general surgery of Saidu Group of Teaching Hospitals, Swat. The study was conducted from January 2019 to November 2019. We included 200 patients and divided them into two equal groups. ***Group I;*** In these patients, abdominal incision was closed using continuous suture technique. ***Group II;*** in these patients, interrupted X-suture technique was used for closure of abdominal wound incision. Patients were evaluated daily for 7 days and after that, at 15th day, to diagnose the wound dehiscence on clinical evaluation.

Results: Mean age was 43.8 ± 8.7 years in group I and 42.6 ± 10.9 years in group II (p-value 0.39). There were 77% male patients in group I and 74% in group II (p-value 0.74). Peritonitis due to gut perforation was the commonest etiology, with 63% proportion in group I versus 68% in group II (p-value 0.55). Laparotomy wound dehiscence was diagnosed in 15% patients in group I versus 3.0% patients in group II (p-value 0.006).

Conclusion: Interrupted X-suture technique is better than continuous suture technique for abdominal wall closure after emergency midline laparotomy. Interrupted X-suture technique has significantly lowered the frequency of wound dehiscence.

Keywords: Acute abdomen, emergency midline laparotomy, laparotomy wound dehiscence.

This article may be cited as: Akbar F, Khan M, Ahmad N, Abbas S, Khan N. Comparison of Laparotomy Wound Dehiscence (LWD) Rate Using Interrupted X-Suture technique vs Continuous Suture Technique in rectus sheath in Emergency Laparotomy. J Saidu Med Coll Swat 2021;11(3):133-6.doi.org/10.52206/jsmc.2021.11.3.646

INTRODUCTION

Laparotomy is one of the major general surgery procedures. Opening of the abdomen through midline is a bloodless and very quick approach and is used as a preferred approach especially in emergency laparotomy procedures.[1]

Closure of abdomen after laparotomy is a major concern and is associated with some complications. Laparotomy wound dehiscence (LWD) or burst abdomen is a devastating complication after closure of the abdomen. Laparotomy wound dehiscence is defined as separation of muscle layers or aponeurotic layer of laparotomy wound before healing. Wound dehiscence occurs when wound closure provides insufficient strength to the wound to bear the stress forces. So, when these forces become stronger than the wound strength, it results in wound dehiscence.[2]

Major risk factors of wound dehiscence are surgical site infections, patient co-morbidities (systemic illnesses) and wound closure Technique. In emergency laparotomy, it is impossible to control patient related factors such As age, gender, BMI, smoking or alcohol abuse or systemic illnesses.[3] So, the ultimate preventive strategy is optimal closure technique that is under surgeon's control.[4]

Since last decade, efforts were started to decide the gold standard technique of wound closure.[5] To develop this, a number of suturing materials (such as monofilament v/s braided materials, slowly or rapidly absorbable v/s non-absorbable) and suturing techniques (continuous v/s interrupted) were studied.[6]

Thus in 2010, Diener et al. published a meta-analysis for elective abdominal closure technique including five systematic reviews, 14 original trials, including a total of 7711 patients. The authors concluded that continuous suture technique using monofilament, slowly absorbable sutures with 4:1 of suture to wound length ratio is the best technique of wound closure in elective laparotomy patients.[7] Later on, Fortelny et al. in a systematic review concluded that continuous technique using smaller bites is associated with lower number of complications after laparotomy wound closure.[8] On the other hand, a large meta-analysis by Zuker et al. emphasized that there is a need to conduct more uniform studies to search

Department of Surgery Saidu Group of Teaching Hospital, Swat

Correspondence: Dr. Fazli Akbar
Assistant Professor Department of Surgery, Saidu Group of Teaching Hospital Swat
Email: dr.fazliakbar2001@gmail.cm

Received: July 9th, 2020 Accepted: August 27th, 2020

for an ideal technique of wound closure after laparotomy procedures because from available material, it is not possible to decide the best technique of wound closure to reduce the incidence of wound dehiscence.[9]

However, there is still no gold standard technique defined so far for wound closure in emergency laparotomy. Interrupted X-sutures and continuous suture techniques are commonly used for wound closure in emergency laparotomy. So, the present study is conducted to compare the frequency of laparotomy wound dehiscence using continuous suture technique with interrupted X-suture technique.

MATERIALS AND METHODS

This randomized controlled trial was conducted on adult patients who were planned for emergency midline laparotomy in the General Surgery department of Saidu Group of Teaching Hospitals, Swat from January 2019 to November 2019. Patients who underwent previous major abdominal procedures, having abdominal malignancy and uncontrolled diabetes mellitus were excluded. Written consent from each patient or guardians was taken before inclusion in study. Approval from hospital ethical review board was also taken.

We included 200 patients and divided them into equal groups. *Group I;* in these patients abdominal incision was closed using continuous suture technique. The suture bites were taken at a maximum of 1 cm distance and sutures were placed in a continuous manner starting from proximal to distal edge. *Group II;* in these patients, interrupted X-suture technique was used for abdominal wound closure. Non-absorbable polypropylene sutures were used in both groups. The needle was passed outside in of one side of the wound and then was moved inside out of the opposite edge and then in an X manner from outside in to inside out manner.

After laparotomy, patients were followed for 15 days to determine outcomes of study. Patients were evaluated daily for 7 days and after that, at 15th day to determine the outcome.

We used SPSS v23 computer software for data compilation and analysis. Chi-square test was applied to compare frequency of laparotomy wound dehiscence and other qualitative variables between the groups taking p-value =0.05 as significant.

RESULTS

Mean age of patients, gender and etiology were similar between the groups; mean age was 43.8 ± 8.7 years in group I and 42.6 ± 10.9 years in group II (p-value 0.39). There were 77% male patients in group I and 74% in group II (P-value 0.74). Peritonitis due to gut perforation was the commonest etiology, with 63% proportion in group I versus 68% in group II (p-value 0.55) (Table 1).

Laparotomy wound dehiscence was diagnosed in 15% patients in group I versus 3.0% patients in group II (p-value 0.006) (Fig. 1).

Table 1. Baseline Study Characteristics.

	Group I (Continuous)	Group II (Interrupted X-suture)	p-Value
Age (mean ± S.D.)	43.8 ± 8.7	42.6 ± 10.9	0.39
Female gender (%)	23.0 %	26.0%	0.74
BMI (Kg/m2)	24.81±2.45	24.61±2.86	0.61
Etiology (%)			
Perforated Peritonitis	63	68	0.55
Fire Arm Injury	37	32	

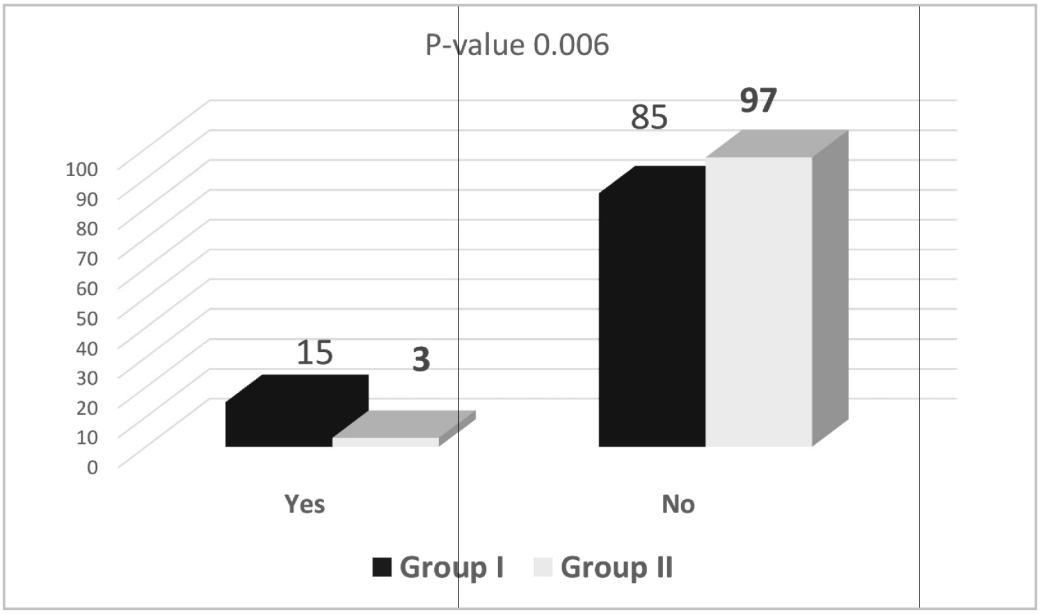


Figure 1. Frequency of Laparotomy Wound Dehiscence (LWD).

DISCUSSION

Acute abdomen is a clinical presentation of intra-abdominal disease that needs surgical intervention. Because acute abdomen is associated with electrolyte imbalances, dehydration and even sepsis, so if not treated urgently, can cause very high morbidity and mortality.[10, 11] Peritonitis due to gut perforation and fire arm injuries are common reasons for laparotomy in emergency departments.[11] Midline laparotomy is a preferred technique for laparotomy in emergency departments.

Closure of abdomen after laparotomy is a major issue. The method of closure should have sufficient tensile strength and good tissue approximation to allow sufficient wound healing and good tolerability.[12] Despite high volume of researches, there is still no optimal technique of abdominal wound closure because of variability in study designs, inclusion criteria of patients and mixed results of published researches.[13] In present study, we evaluated the frequency of laparotomy wound dehiscence after emergency midline laparotomy using continuous suture technique vs interrupted X-suture technique for closure of the linea alba.

In our study, wound dehiscence was diagnosed in 15% patients in continuous suture group versus only 3% patients in interrupted X-suture group, with significant statistical difference. A similar study by Khan et al. compared the outcomes of continuous suture technique with X-suture technique. The authors reported wound dehiscence in 4.0% patients who underwent X-suture and in 16% patients who underwent continuous suture technique for wound closure.[14] Bansiwal et al reported 5.4% wound dehiscence in interrupted X-suture technique while 20.1% in continuous suture technique. Similarly Choudary et al reported about 2.5% wound dehiscence in interrupted technique as compared to 10% in continuous suture technique. Kanju et al almost have similar results with 6.6% wound dehiscence in interrupted technique as compared to 16% in continuous technique. There was one study by Kumar et al who got almost similar results i.e 20% wound dehiscence in both techniques.

Another study by Shashikala et al. reported that x-suture technique is better than continuous. They reported wound dehiscence in 26.67% patients using continuous sutures versus 6.67% patients using interrupted X-suture technique.[15]

However, another study reported wound dehiscence in 5.0% patients in continuous group versus 5.0% in interrupted x-closure technique and reported that both of these techniques are equally effective and provide sufficient wound strength.[16] Sharma et al. also did not found any significant difference in abdominal wound dehiscence; 3.33% in interrupted technique versus 6.66% in continuous technique.[17]

In our hospital, emergency laparotomy is routinely done using midline abdominal incision. Both

continuous and interrupted X-sutures are routinely used for the purpose of wound closure. In present study we found that interrupted X-suture technique is better than continuous technique and is associated with lower frequency of wound dehiscence.

CONCLUSION

Interrupted X-suture technique is better than continuous suture technique for abdominal wall closure after emergency midline laparotomy. Interrupted X-suture technique has significantly lowered the frequency of laparotomy wound dehiscence.

REFERENCES

1. Kunju RD, Thakkannavar V, Merta S. A clinical study of continuous and interrupted fascial closure in emergency midline laparotomy at a tertiary care centre. Int Surg J. 2017;4(6):2014-7.
2. Ousey K, Djohan R, Dowsett C. Surgical wound dehiscence: Improving prevention and outcomes. WUWS Consensus document. 2018:1-46.
3. Walming S, Angenete E, Block M. Retrospective review of risk factors for surgical wound dehiscence and incisional hernia. BMC Surg. 2017;17:19-23.
4. Helgeland J, Tomic O, Hansen TM. Post-operative wound dehiscence after laparotomy: a useful healthcare quality indicator? A cohort study based on Norwegian hospital administrative data. BMJ Open. 2019;9(4):e026422-9.
5. Patel SV, Paskar DD, Nelson RL. Closure methods for laparotomy incisions for preventing incisional hernias and other wound complications. Cochrane Database Syst Tev. 2017;11:Cd005661.
6. Huang Q, Li J, Lau W-y. Techniques for abdominal wall closure after damage control laparotomy: from temporary abdominal closure to early/delayed fascial closure, a review. Gastroenterol Res Pract. 2016;2016:2073-260.
7. Diener MK, Voss S, Jensen K. Elective midline laparotomy closure: the inline systematic review and meta-analysis. LWW; 2010.
8. Fortelny RH. Abdominal Wall Closure in Elective Midline Laparotomy: The Current Recommendations. Front Surg. 2018;5:34-42.
9. Zucker BE, Simillis C, Tekkis P. Suture choice to reduce occurrence of surgical site infection, hernia, wound dehiscence and sinus/fistula: a network meta-analysis. Ann R Coll Surg Engl. 2019;101(3):150-61.
10. Sreeharsha H, Sp R, Sreekar H. Efficacy of POSSUM score in predicting the outcome in patients undergoing emergency laparotomy. Pol J Surg. 2014;86(4):159-65.
11. Uranues S, Fingerhut A, Ozkan OV. Laparoscopy: A Diagnostic and Therapeutic Tool for Acute Care Surgery. Acute Care Surgery Handbook: Springer; 2016. p. 27-41.
12. Williams ZF, Hope WW. Abdominal wound closure: current perspectives. Open Access Surg. 2015;8:89.
13. Tamini N, Cereda M, Capelli G. Searching for the safest abdominal closure technique after emergency laparotomy for Hinchey III and IV peritonitis. Int Surg J. 2017;4(8):2534-8.
14. Khan AA, Khan N, Qayyum A. Comparison of continuous versus interrupted x-suturing technique for abdominal wall closure in emergency midline laparotomy wound. J Postgrad Med Inst. 2018;32(4):390-4.
15. Shashikala V, Abhilash S, Abhishek G. A comparative study between continuous and x-interrupted sutures in emergency midline laparotomies. Int Surg J. 2018;5(5):1753-7.
16. Mohsin Khan AJ, Ojha A. A comparative study of single layer interrupted closure versus single layer continuous with intermittent aberdeen's knots closure of laparotomy wounds. Int J Sci Res. 2018;7(6):48-9.
17. Sharma AC, Gupta AK, Singh N. Comparison of continuous versus interrupted abdominal fascia closure using polydioxanone suture in laparotomy. Int Surg J. 2019;6(8):2832-6.
18. Bansiwal RK, Mittal T, Sharma R. Comparative study of abdominal wound dehiscence in continuous versus interrupted fascial closure after emergency midline laparotomy. Int Surg J. 2019;6(3):886-91.
19. Kumar B, Jauhari A. Comparison of continuous versus interrupted method of abdominal fascia closure using non-absorbable suture in the patients of acute peritonitis: our experience of 60 cases. Int J Res Med Sci. 2017;5(8):3299-3302.

DATA SHARING STATEMENT: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

CONFLICT OF INTEREST: Authors declared no conflict of interest.
GRANTED SUPPORT AND FINANCIAL DISCLOSURE: Nil

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Akbar F, Haq **AU:** Concept and design of study, Collection of data, statistical analysis
Khan M, Ahmad **N:** Writing of manuscript, critical review of manuscript
Abbas S, Khan **N:** Analysis and interpretation of data, statistical analysis
Samillah: Data collection, bibliography

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.