

A Prospective Study to Evaluate the Post-Operative Wound Dehiscence Rate after Midline Laparotomy for Emergency or Elective Surgery: An Hospital Based Study

Vinod Kumar Jeengar¹, Rita Verma^{2*}

¹Associate Professor, ²Professor, Department of General Surgery, RVRS Medical College & Associate Groups of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

ABSTRACT

Background: The present study was undertaken to assess the proportion of Burst abdomen in post midline laparotomy patients, using Interrupted X suture versus Continuous suture technique in sheath closure.

Materials & Methods: A comparative prospective hospital based study done on 50 patients reporting to the Surgery dept., RVRS Medical College and attached groups of Mahatma Gandhi Hospital, Bhilwara, Rajasthan. After taking written informed consent and were equally divided into all cases each in the study group (interrupted X suture) and control group (continuous suture). All the patients scheduled to undergo a midline laparotomy for emergency or elective reasons. Patients younger than 18 years of age, patients who had undergone a previous laparotomy for any condition (or had a incisional hernia or burst abdomen at presentation) and patients who required a re – exploration in post op course were excluded from the present study.

Results: Our study showed that the mean age of patients was 45 years in both groups. Male to female ratio was 2.5:1 in interrupted X-suture group and 1.5:1 in continuous suture group. The 40% dirty wound was found in interrupted X-suture group and 32% continuous suture group. Because interrupted suture use more in dirty wound during patients selection. The

wound infection, dehiscence and incisional hernia were mostly occurred in continuous suture group as compared to interrupted X-suture group.

Conclusion: We concluded that the wound infection, dehiscence and incisional hernia were mostly occurred in continuous suture group as compared to interrupted X-suture group in our study.

Keywords: Laparotomy, Wound Dehiscence, Suture, Incisional Hernia.

*Correspondence to:

Dr. Rita Verma,
Professor,
Department of General Surgery,
RVRS Medical College & Associate Groups of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

Article History:

Received: 28-11-2019, **Revised:** 24-12-2019, **Accepted:** 20-01-2020

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2020.6.1.041	

INTRODUCTION

In recent times, due to the progress made in the chemical industries, numerous kinds of synthetic prostheses have rapidly appeared on the market and, while some of them have been short-lived, others have become progressively well-established.

This succession has included nylon, dacron, teflon, ivalon, velourlined silicone and, above all, polytetrafluoroethylene (PTFE), the latter reducing the formation of adherences.¹

Ventral hernias are an important long-term morbidity of conventional surgery (Cassar and Munro 2002², DeMaria 2000³), as they usually develop within the first five years after laparotomy. Risk factors for incisional ventral hernia include: wound infection, abdominal distension, pulmonary complications, male gender, age, obesity, emergency procedures, early reoperation, jaundice, underlying disease process, type of closure, suture material used in closure and choice of original incision (Millikan 2003).⁴

They can also be a result of too much tension with the initial closure of the abdominal incision, which creates poor healing, swelling and wound separation (Luijendijk et al. 2000).⁵ Hernia sizes vary from very small to very large and complex. A hernia left untreated may enlarge with time and become progressively symptomatic. Surgery is the preferred treatment (Cassar and Munro 2002)² with a choice of two methods – open repair and laparoscopic repair.

Theoretical arguments have been supporting the value of a closure employing non-absorbable sutures that include all layers of the abdominal wall, apart from skin, and that also incorporate wide bites of tissue on either side of the line of incision.⁶

In a study it was observed that wound may lengthen by 30% if distension occurs. An adequate reserve of suture length in the wound is necessary to allow this lengthening to occur and to

ensure a minimal resulting rise in tension between the sutures and the tissues. Deep wound disruption is associated with the use of an SL: WL ratio of 2:1 or less—the lower the ratio, the greater is the risk of a burst wound. Wound disruption because of cutting out of sutures can be prevented by the use of non-absorbable continuous sutures at 1 cm intervals and an SL: WL ratio of 4:1 or more.⁷

Laparotomy is a major surgical procedure, whether elective or emergency always remains the bread and butter of a general surgeon. The choice of surgical incision to open the abdominal cavity can be based on patient, surgeon, or health care system criteria.⁸ Surgeon main interests, aside from the quick and optimal exposure of the operative field, are time to open and close the abdomen, and frequency of burst abdomen, wound infection, postoperative pulmonary complications, and incisional hernias. For health economy, parameters such as duration of operation, length of hospital stay, and full physical and mental activity are relevant.⁹

Wound dehiscence is multifactorial in etiology, conditioned by local and systemic, as well as pre-, intra-, and post-operative factors.¹⁰ Post-operative complete wound dehiscence being an unfortunate and also a serious complication, is associated with high morbidity and mortality rate¹¹, despite the most sophisticated intensive care these patient receive today.

While the choice may not be so important in elective patients who are nutritionally adequate, do not have any risk factor for dehiscence and are well prepared for surgery, however it may prove crucial in emergency patients who often have multiple risk factors for developing dehiscence¹¹ and the strangulation of the sheath is the proverbial last straw in precipitating wound failure. The present study was undertaken to assess the proportion of Burst abdomen in post midline laparotomy patients, using Interrupted X suture versus Continuous suture technique in sheath closure.

MATERIALS & METHODS

A comparative prospective hospital based study done on 50 patients reporting to the Surgery dept., RVRS Medical College and attached groups of Mahatma Gandhi Hospital, Bhilwara, Rajasthan.

Inclusion Criteria: All patients scheduled to undergo a midline laparotomy for emergency or elective reasons were included in the study.

Exclusion Criteria:

1. Patients younger than 18 years of age.
2. Patients who had undergone a previous laparotomy for any condition (or had an incisional hernia or burst abdomen at presentation).

Procedure and Technique

1. Continuous Closure: Continuous closure was performed using no. 1 vicryl suture, care being taken to place each bite 1.5 to 2 cm from the linea alba edge with successive bites being placed 1 cm from each other. The edges of linea alba was gently approximated without strangulation with an attempt to keep a suture to wound length ratio of 4:1 as shown in figure 1.

2. Interrupted Closure: Interrupted closure was performed using no. 1 vicryl suture, as shown in Figure 2. A large bite was taken outside – in 2cm from the cut edge of linea alba. The needle emerged on the other side from inside out diagonally 2 cm from

the edge and 4 cm above or below the first bite. This strand was subsequently crossed or looped around the free end of suture (Figure 2) and continued outside – in, diagonally at 90° to the first diagonal. The two end tied just tight enough to approximate the edges of linea alba taking care not to include bowel or omentum between the edges. This created two X like crosses-one on the surface and another deep to linea alba. The next X suture was placed 1 cm away from the previous one. Henceforth, in a 14 cm long wound, 3 X-sutures were applied.

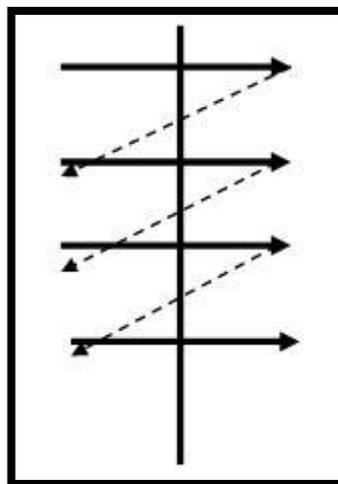


Fig 1: Continuous Closure

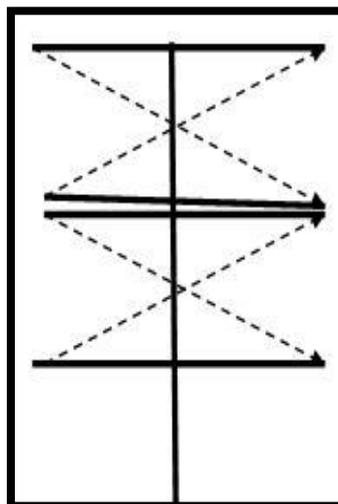


Fig 2: Interrupted Closure

Follow up

All patients of study groups were follow up in 1 year for nature of dehiscence and incisional hernia and follow up patients during discharge, after 6 months and 1 years.

RESULTS

Our study showed that the mean age of patients was 45 years in both groups. Male to female ratio was 2.5:1 in interrupted X-suture group and 1.5:1 in continuous suture group (table 1). The 40% dirty wound was found in interrupted X-suture group and 32% continuous suture group. Because interrupted suture use more in dirty wound during patients selection (table 2). The wound infection, dehiscence and incisional hernia were mostly occurred in continuous suture group as compared to interrupted X-suture group (table 3).

Table 1: Demographic profile of both groups

Demographic profile	Interrupted X-suture (group I)	Continuous Suture (group II)	P-value
Age (yrs)			
Mean±SD	43.56±11.41	44.00±15.60	>0.05
Gender			
Male	18	15	>0.05
Female	7	10	
Total	25	25	

Table 2: Type of contamination in surgical site in both groups

Contamination	Interrupted X-suture (group I)	Continuous Suture (group II)
Clean	15	17
Dirty	10	8
Total	25	25

Table 3: Wound in surgical site in both groups

Wound	Interrupted X-suture (group I)	Continuous Suture (group II)	P-value
Wound infection	5	7	>0.05
Wound dehiscence	1	6	<0.05
Incisional Hernia	0	12	<0.05

DISCUSSION

Suture repair techniques have prominent repairing of ventral and incisional hernia over a century. Since the dawn of the history of surgery many different varieties of suture materials and techniques have been tried and advocated at different times. No one suture material or method has given a total satisfactory result as far as vertical abdominal incisions are concerned.

While the choice may not be so important in elective patients who are nutritionally adequate, do not have any risk factor for dehiscence and are well prepared for surgery, however it may prove crucial in emergency patients who often have multiple risk factors for developing dehiscence¹¹ and the strangulation of the sheath is the proverbial last straw in precipitating wound failure.

Our study showed that the mean age of patients was 45 years in both groups. Male to female ratio was 2.5:1 in interrupted X-suture group and 1.5:1 in continuous suture group. Similar our results with Ashraf F. Al-Faouri et al (2017)¹² found range of age was 20-94 years.

Anurag Srivastava et al (2004)¹³ found that the average age of the patients in the continuous arm was 36.37 years and in the interrupted arm it was 40.09 years, slightly decreased our results.

Elderly patients are more likely to have surgical wound ruptures and delayed healing, compared with younger patients. With aging, collagen undergoes qualitative and quantitative changes and also, there is a decrease in response to hypoxia. Slightly increased with our results by Anurag Srivastava et al (2004)¹³ found male to female ratio was 3:1. Ashraf F. Al-Faouri et al (2017)¹² found 1.25:1.

The 40% dirty wound was found in interrupted X-suture group and 32% continuous suture group. Because interrupted suture use

more in dirty wound during patients selection. Richards PC, Balch CM, Aldrete JS (1983)¹⁴ found type of wound had no influence on the dehiscence rate. Anurag Srivastava et al (2004)¹³ found Sepsis, cough, anaemia, malnutrition and abdominal distension are significant risk factors for burst.

The wound infection, dehiscence and incisional hernia were mostly occurred in continuous suture group as compared to interrupted X-suture group.

Richards PC, Balch CM, Aldrete JS (1983)¹⁴ found in mid-line incisions, the dehiscence rate was 2.0% for the continuous group versus 0.9% for the interrupted group.

Conflict our results with Nicole C. F. Hodgson et al 2000¹⁵ found there were no differences in the incidence of wound dehiscence or wound infection with respect to suture material or method of closure.

van 't Riet M et al (2002)¹⁶ found that closure by continuous suture was followed by significantly more incisional hernias than closure by interrupted suture (P < 0.009).

Gupta H et al (2008)¹⁷ found that the interrupted method of closure was associated with significantly less dehiscence as compared with the continuous method.

Navneet Kumar et al (2015)¹⁸ found interrupted X suture technique is better than continuous suture technique in prevention of burst abdomen in both emergency as well as elective laparotomy.

Theoretically two factor may be concerned in the causation of burst abdomen, either the intra-abdominal pressure is too great or the wound is too weak .However the intra-abdominal pressure is frequently not within surgeons control but wound must be made sufficiently strong to withstand this pressure.

CONCLUSION

We concluded that intraperitoneal sepsis, cough, uremia, wound infection, and necrosis of linea alba are significant predictors of burst.

In presence of these symptoms, the risk of abdominal wound dehiscence can be reduced to less than one-third by using interrupted sutures. Jaundice, anemia, malnutrition, and intra-abdominal malignancy do not increase the risk of burst.

REFERENCES

1. Read RC, Yoder G. Recent trends in the management of incisional herniation. *Arch Surg*. 1989. 124:485-8.
2. Cassar K and Munro A. Surgical treatment of incisional hernia. *British Journal of Surgery*. 2002; 89(5): 534-45.
3. DeMaria EJ, Moss JM, Sugerman HJ. Laparoscopic intraperitoneal polytetrafluoroethylene (PTFE) prosthetic patch repair of ventral hernia. Prospective comparison to open prefascial polypropylene mesh repair. *Surgical Endoscopy*. 2000;14(4):326-9.
4. Millikan KW. Incisional hernia repair. *Surg Clin North Am*. 2003; 83: 1223-34.
5. Luijendijk RW, Hop WC, van den Tol MP, de Lange DC, Braaksma MM, et al. A comparison of suture repair with mesh repair for incisional hernia. *N Engl J Med*. 2000;343: 392-8.
6. Ellis H: Incisions, Closures, and Management of the Wound. In Zinner MJ, Ellis H, Nathanson K (eds): *Maingot's Abdominal Operations*, ed 10. Connecticut, Appleton and Lange, 1997, p 395-426.
7. Jenkins TPN. The burst abdominal wound: a mechanical approach. *Br J Surg* 1976;63:873-6.
8. Idris SA., Ali AQ, Shalayel MH, Idris TA, Alegail IMA; Design of a multi-centre study to evaluate frequency and risk factors for wound dehiscence/burst abdomen: a study of 1683 major midline laparotomies. *Sudan Medical Monitor*, 2010; 5(4): 185-91.
9. Ceydeli A, Rucinski J, Wise L; Finding the best abdominal closure: an evidence-based review of the literature. *Current Surgery*, 2005; 62(2): 220-5.
10. Shukla HS, Kumar S, Misra MC, Naithani YP. Burst abdomen and suture material: a comparison of abdominal wound closure with monofilament nylon and chromic catgut. *Indian J surg*. 1981;43:487 – 91.
11. Niggebrugge AH, Hansen BE, Trimboos JB, Van de Velde CJ, Zwaveling A, Mechanical Factors influencing the incidence of burst abdomen. *Eur J Surg* 1995;161:655 – 61.

12. Ashraf F. Al-Faouri, Alaa A. Alzu'bi et al. Interrupted Braided Sutures versus Running Monofilament Sutures in the Prevention of Abdominal Wound Dehiscence: A Prospective Nonrandomized Case-Control Trial. *JRMS March* 2017; 24(1):31-7
13. Srivastava A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S. Prevention of burst abdominal wound by a new technique: A randomized trial comparing continuous versus interrupted X-suture. *Indian J Surg* 2004;66:19-27.
14. Richards PC, Balch CM, Aldrete JS. Abdominal wound closure. A randomized prospective study of 571 patients comparing continuous vs. interrupted suture techniques. *Ann Surg* 1983;197:238-43.
15. Hodgson NC, Malthaner RA, Ostbye T. The search for an ideal method of abdominal fascial closure: a meta-analysis. *Ann Surg* 2000;231:436-42.
16. Van't Riet M, Steyerberg EW, Nellensteyn J, et al. Meta-analysis of techniques for closure of midline abdominal incisions. *Br J Surg* 2002;89:1350-6.
17. Gupta H, Srivastava A et al. Comparison of interrupted versus continuous closure in abdominal wound repair: a meta-analysis of 23 Trials. *Asian J Surg* 2008 ;31(3):104-1 .
18. Navneet Kumar, Narendra Choudhary, Ram Chandra Sherawat, Irfan Hussain, Shalu Gupta, Prabha Om. A Prospective Study to Compare the Suture Technique (Continuous Versus Interrupted) in Prevention of Burst Abdomen. *IOSR Journal of Dental and Medical Sciences*. 2015;14(11):129-32.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882. This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Vinod Kumar Jeengar, Rita Verma. A Prospective Study to Evaluate the Post-Operative Wound Dehiscence Rate after Midline Laparotomy for Emergency or Elective Surgery: An Hospital Based Study. *Int J Med Res Prof*. 2020 Jan; 6(1):166-69. DOI:10.21276/ijmrp.2020.6.1.041