

## Original Research Article

# 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

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### ABSTRACT

**Background:** The best method of wound closure would be one that provides adequate tensile strength to the incision until the wound heals and approximates the tissue in a way that normal healing mechanism can occur under optimal circumstance. The suture should remain secure even in the presence of local or systemic infection. The continuous suture has the advantage of an evenly distributed tension across the suture line and being more expedient. It also has the advantage of having a single suture line holding the fascia together. The interrupted suturing technique has the disadvantage of being time consuming.

**Methods:** All the patients of peritonitis were taken up for emergency laparotomy fulfilling the inclusion criteria will be included in the study. They were divided into two groups A and B by randomization technique. Each group contained 30 patients each. Patients included in group A underwent continuous method of abdominal fascia closure post laparotomy. Patients included in group B underwent interrupted method of abdominal fascia closure post laparotomy.

**Results:** In the present study, 60 cases of peritonitis were taken up, out of these mean age in the two groups were 34.03 years and 35.03 years respectively, majority of the patients were male 50 (83.3%); Most common diagnosis was of duodenal perforation peritonitis with 22 patient (36.7%), with Ileal perforation peritonitis 15 patients (25.0%), Kochs perforation peritonitis 13 patient (21.7%); Mean time taken for closure in continuous group was 13.10 minutes as compared to 16.00 minutes in interrupted group, This difference was statistically significant. Wound infection rate in two group were 26.7% and 33.3% respectively, wound infection was present in 30% of total patient. Burst abdomen was present in 20% in both the group.

**Conclusions:** Continuous suturing with polypropylene is comparable to interrupted suturing in terms of wound infection, frequency of burst abdomen. Although continuous suturing is better than interrupted suturing as it is faster, take less time in closure than interrupted closure. Continuous polypropylene thus becomes the preferred material and method of closure for abdominal fascia for acute peritonitis.

**Keywords:** Continuous suturing, Emergency laparotomy, Polypropylene

### INTRODUCTION

Midline laparotomy is the most common technique of abdominal incisions in both emergency and elective settings because it is simple, provides adequate exposure

to all four quadrants, affords quick exposure with minimal blood loss.<sup>1</sup> One of the most common and major complication associated with the closure of midline laparotomy is wound dehiscence which is a major cause of postoperative morbidity.

Wound dehiscence is related to several factors pertaining to patient besides suture material and method of closure.<sup>2</sup> Numerous studies and meta-analysis have been conducted comparing all kinds of closure techniques and suture materials. The current opinion in west focuses on running mass closure of the abdomen in both emergency and elective settings as no significant difference has been reported in the above settings between the two methods of closure in terms of wound dehiscence and incisional hernia in most studies.<sup>3</sup>

The type of closure may not be so important in elective patients who are nutritionally adequate, do not have risk factors for dehiscence and are well prepared for surgery. However, it may prove crucial in emergency patients with peritonitis who often have multiple risk factors for developing dehiscence.<sup>2</sup>

**METHODS**

The aim of this study was to compare post-operative complications of closure of laparotomy wound by interrupted mass closure and continuous mass closure with non- absorbable suture in the setting of acute peritonitis in terms of wound Infection, burst abdomen and mean closure time in different technique.

The proposed study was conducted in the department of Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi. A total of 60 patients were taken in the study. All the patients of peritonitis were taken up for emergency laparotomy fulfilling the inclusion criteria will be included in the study. They were divided into two groups A and B by randomization technique. Each group contained 30 patients each. Patients included in group A underwent continuous method of abdominal fascia closure post laparotomy.

Patients included in group B underwent interrupted method of abdominal fascia closure post laparotomy.

**Inclusion criteria**

- All patients presenting to emergency surgery department with acute peritonitis.

**Exclusion criteria**

- Patients under the age of 13 years
- Patients with previous abdominal surgery with midline incision scar
- Patients with co-morbid condition, like renal failure, malignancy, Patient on radio or chemo therapy, and collagen vascular disease.

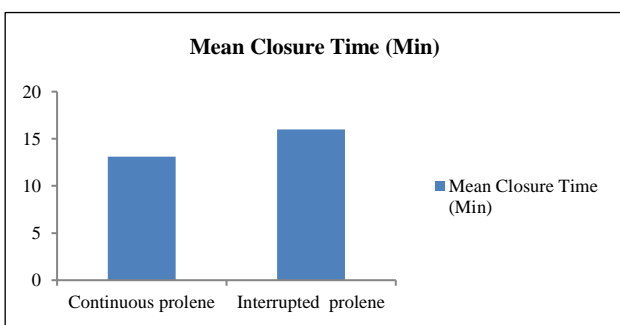
Informed consent was taken from all the patients, Demographic data, name, age, sex, MRD no, address were recorded, Patients were diagnosed to have peritonitis on the basis of history, clinical examination and relevant investigations according to the proforma.

**RESULTS**

In the present study, 60 cases of peritonitis were taken up, out of these mean ages in the two groups were 34.03 yrs and 35.03 years respectively, majority of the patients were male 50 (83.3%); Most common diagnosis was of duodenal perforation peritonitis with 22 patients (36.7%), with Ileal perforation peritonitis 15 patients (25.0%), tubercular perforation peritonitis 13 patient (21.7%), mean time taken for closure in continuous group was 13.10 minutes as compared to 16.00 minutes in interrupted group. The difference was statistically significant.

**Table 1: The distribution of mean and S.D. of closure time in two groups.**

Closure Time	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Continuous prolene	30	13.10	2.998	0.547	10	19
Interrupted prolene	30	16.00	2.150	0.392	12	20



**Figure 1: The mean closure time in two groups.**

The mean of closure time in continuous Prolene and Interrupted Prolene groups are 13.10 and 16.0 minutes respectively. Patients have 10- 20 minutes closure time in the study. The statistically significant difference between the mean closure time was found in the two groups (p=0.000) (Table 1, Figure 1).

Wound infection rate in two group were 26.7% and 33.3% respectively, wound infection was present in 30% of total patient. There is no significant association between the presence of wound infection in two groups.

Burst abdomen was present in 20% in both the group. The difference was not statistically significant ( $p>0.05$ ).

## DISCUSSION

The specific technique used in closure of the abdominal fascia for the individual is frequently based on nonscientific factors. Because of difficulties arising from differently tailored study designs, the surgical literature has not clearly demonstrated an optimal technique to close abdominal fascia, especially in emergency settings.

The most common diagnosis of the patients was of duodenal perforation peritonitis with 22 patients along with tubercular perforation peritonitis in 13 patients followed by enteric perforation peritonitis in 15 patients.

Diagnosis of tubercular perforation peritonitis was made only after confirmation from histo-pathological examination and enteric perforations were diagnosed only after positive widal test, positive typhidot test or positive blood culture for salmonella. All the two groups were comparable in terms of diagnosis of patients in each group. 20 patients of gastric perforations including duodenal ulcer perforations and 19 cases of colorectal perforations were included by Iwase et al.<sup>4</sup>

Mean time taken for closure of rectus sheath in groups A&B was  $13.10\pm 2.998$ , and  $16.00\pm 2.15$ , minutes respectively. The difference being statistically highly significant ( $p<0.001$ ). The difference in time can be attributed to running closure in continuous suturing without having to tie multiple knots.

Overall, anesthesia and operating time were prolonged by 11 and 10 minutes respectively by use of an interrupted suture. The difference was statistically significant ( $p=0.02$ ). In a prospective, randomized comparison by McNeil et al continuous closure was accomplished in significantly less time ( $21\pm 8$  minutes) than interrupted closure ( $43\pm 19$ ) minutes but this also included the time taken for closure.<sup>5</sup>

Wound infection rates in the two groups A and B were 26.6%, and 33.3% respectively which was statistically non-significant. The total wound infection rate was 30%. Wound infection rate has been found to be present in 3-10% patients undergoing clean elective surgeries. Similarly, higher incidence of infection (14%) was also present in a study by Gislason et al which also included high proportion of emergency operations (32%).<sup>6</sup> Cruse and Foord found in a retrospective survey a wound infection rate of (40%) among 2,093 dirty wounds but they did not specify how skin closure was performed.<sup>7</sup> Stone et al also reported a similar incidence of wound infection (14%) in emergency laparotomy in retrospective study whereas the same was reduced to 2% and 11% in trauma patients with negative and positive laparotomy in the prospective study.<sup>8</sup> No significant difference was observed in the wound infection rate between the

continuous and interrupted closure by Sahlin et al (10% in continuous and 11% in interrupted).<sup>9</sup>

The wound infection was not found to be statistically affected by the technique employed. No statistically significant difference in wound infection rates was observed with either technique between non-absorbable suture material.<sup>3,10-12</sup> There is lack of data about the persistence of wound infection while comparing the above two techniques and sutures. Wound infection rate was found to be considerably higher than in other studies because our study included patients undergoing clean-contaminated or contaminated surgeries.

Burst abdomen noted in the two groups were 20% in each, which was statistically insignificant. Indian authors have reported burst abdomen to occur in 10-30% of emergency cases.<sup>13-15</sup> High percentage of wound dehiscence could be attributed to higher wound infection rate and malnourishment. Consistent with our results, all the five recent meta-analysis trials have shown that there is no significant difference in terms of wound dehiscence while comparing the technique of closure.

In Indian set-up, burst abdomen occurred in 1/46(2.17%) in interrupted group and 8/54(14.8%) in continuous group in a study by Srivastav et al on 100 patients undergoing emergency laparotomy, the difference being statistically significant.<sup>16</sup> Patients were followed up for evidence of burst abdomen till 6 weeks. In a retrospective study by Larsen et al patients were reviewed for burst abdomen and forty-five of 3768 patients had burst their abdomen within 30 days of midline laparotomy. The abdomen bursts after a mean of 8 days. High rates of burst abdomen in our study can be primarily explained by the fact that our study was conducted in patients undergoing emergency surgery for peritonitis which constitutes a major source of sepsis. Richards et al also concluded that statistically significant difference in incidence of burst abdomen is present in infected wounds than in non-infected wounds ( $p<0.02$ ).<sup>17</sup> Protein calorie malnutrition is widely prevalent in the Indian population. The problem gets compounded further with the onset of consuming diseases like tuberculosis, typhoid, cancer etc. many patients undergoing emergency laparotomy suffer from one of the co-morbid conditions detrimental to healing like anaemia, poor nutritional status, post-operative pulmonary complications etc. Often patients are managed on conservative treatment in peripheral health centers as a result of which they often present in hypovolemic or septicemic shock. Haemodynamic instability has been described as a significant risk factor for burst abdomen.<sup>2</sup>

## CONCLUSION

Continuous suturing with prolene is comparable to interrupted suturing in terms of wound infection, although infection was seen more in interrupted closure. Continuous suturing is better than interrupted suturing as it is faster, take less time in closure than interrupted

closure. Continuous suturing is comparable to interrupted suturing in terms of burst abdomen. Continuous polypropylene thus becomes the preferred material and method of closure for abdominal fascia for acute peritonitis.

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## REFERENCES

1. Ellis H. Midline abdominal incision. Br J Obstet Gynecol. 1984;91:1-2.
2. Riou JPA, Cohen JR, Johnson H. Factors influencing wound dehiscence. Am J Surg. 1992;163:324-30.
3. Ceydeli A, Rucinski J, Leslie wise. Finding the best abdominal closure: an evidence based review of the literature. Curr Surg. 2005;62(2):220-5.
4. Iwase K, Higaki J, Tanaka Y, Kondoh H, Yoshikawa M, Kamike W. Running closure of clean and contaminated abdominal wounds using a synthetic monofilament absorbable looped suture. Surg. Today. 1999;29:874-9.
5. McNeill PM, Sugerman HJ. Continuous absorbable versus interrupted non-absorbable fascial closure. Arch Surg. 1986;121:821-3.
6. Gislason H, Gronbech JE, Soreide O. Burst abdomen and incisional hernia after major gastrointestinal operations- comparison of three closure techniques. Eur J Surg. 1995;161:349-54.
7. Cruse PJE, Foord R. The epidemiology of wound infection. A ten year prospective study of 62,939 wounds. Surg Clin North Am. 1980;60:27-40.
8. Stone HH, Hoefling SJ, Strom PR, Dunlop WE, Fabian TC. Abdominal incisions: transverse vs. vertical placement and continuous versus interrupted closure. South Med J. 1983;76:1106-8.
9. Sahlin S, Ahlberg J, Grantstrom L, Ljungstrom KG. Monofilament versus multifilament absorbable sutures for abdominal closure. Br J Surg. 1993;80:322-4.
10. Van't Riet M, Steyerberg EW, Netlensteyn J, Bonjer HJ, for JeeKel J. Metaanalysis of techniques closure of midline abdominal incisions. Br J Surg. 2002;89:1350-6.
11. Rucinski J, Margolis M, Panagopoulos G, Wise L. Closure of the abdominal midline fascia: meta-analysis delineates the optimal technique. Am Surg. 2001;67(5):421-6.
12. Weiland DI, CurtisBay R, DelSonli S. Choosing the best abdominal closure by meta-analysis. Am J Surg. 1998;176:666-70.
13. Jones TE, Newell ET, Brubaker RE. The use of alloy steel wire in the closure of abdominal wounds. Surg Gynecol Obstet. 1941;72:1056-9.
14. Burleson TE. Factors affecting wound healing. Wound healing for surgeons. London: BailliereTindall. 1984;42-75.
15. Choudhary SK, Choudhary SD. Mass closure versus larger closure of abdominal wound: a prospective clinical study. J Indian Med Assos. 1994:229-32.
16. Srivastava A, Roy S, Sahay KB, Vuthaluru S, Kumar A, Chumber S, et al. Prevention of burst abdominal wound by a new technique: a randomized trial comparing continuous versus interrupted X-suture. Indian J Surg. 2004;66(1):220-5.
17. Richards PC, Balch CM, Adrete JS. Abdominal wound closure. A randomized prospective study of 571 patients comparing continuous versus interrupted suture techniques. Ann Surg. 1983;197:238-43.

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