

A Comparative Study Between Continous & Interrupted X-Suture In Emergency Midline Wound Closure

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Abstract: Wound dehiscence or burst abdomen is a very serious post operative complication, associated with high morbidity & mortality. It has significant impact on the healthcare cost. While it is recorded to be 1–3% in most centres, whereas some centres in India recorded incidence of burst abdomen as high as 10–30 %. Among the cases operated in our study, cases of perforative peritonitis constituted 63.1%. Most cases follow emergency laparotomy for peritonitis. Among the total 90 patients who were closed with continuous suture, 9 patients developed burst abdomen. 9 out of the 10 patients of burst abdomen had post operative abdominal distention, signifying high probability of relationship. We came to a conclusion that Interrupted X suture is a better option than continuous suture in emergency cases of midline laparotomies, particularly in patients of hypoproteinemia. Presence of peritonitis found intra operatively, discharge from wound post operatively increases the chances of burst abdomen. Abdominal distension & cough in the post operative period promotes wound disruption. Presence of sepsis, jaundice, anaemia, controlled diabetes, uremia, malignancy, steroid intake & occurrence of hypoxia during operation could not establish any definite relationship with occurrence of burst abdomen.

Keywords – Laparotomies, Serosanguinous, Hypoproteinemia, Burst Abdomen.

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I. Introduction

Wound dehiscence or burst abdomen is a very serious post operative complication, associated with high morbidity & mortality. It has significant impact on the healthcare cost, both for the patient & the hospital. In the Indian scenario, most patients have a low nutritional status & the presentation of peritonitis is often delayed in the emergency. This makes the problem of wound dehiscence more common & graver than the West.

The incidence of burst abdomen depends on host factors (malnutrition, anaemia, hypoproteinemia, peritonitis, hyper bilirubinemia, malignancy, presence of cough, etc.), suture material (absorbable, slowly absorbable, and non-absorbable) & suturing technique (continuous or interrupted)^[1-4]. The incidence of wound dehiscence varies from one centre to another worldwide. While it is recorded to be 1–3% in most centres^[5,6], whereas some centres in India recorded incidence of burst abdomen as high as 10–30 %^[5,6]. Numerous studies have been conducted evaluating a bewildering variety of closure techniques & suture materials^[7,8,9]. The current opinion in the West centers around some form of running mass closure of the abdomen in both emergency & elective settings, as there is no significant difference reported between the two in most cases^[10-18]. While the choice may not be so important in elective patients, who are nutritionally adequate, have little risk factors for wound dehiscence & are well prepared for surgery; however it may prove crucial in emergency patients who often have multiple risk factors for developing dehiscence^[19]. A new ‘interrupted X-suture’ was developed in the Department of General Surgery, AIIMS to circumvent the problem of cutting out effect of a continuous suture^[1].

II. Aims & Objectives

The present study is to compare between the techniques of midline wound closures in patients who were operated through emergency midline laparotomy for any cause.

III. Materials & Methods

1. **Study Area** :Department of General Surgery, Calcutta National Medical College and Hospital, Kolkata

2. **Study Population:** Patients who are being operated on an emergency basis through midline abdominal incision for any intra-abdominal pathology, in the Department of General Surgery, Calcutta National Medical College and Hospital, Kolkata.
3. **Study period:** March 2012 to February 2013 [1 year]
4. **Sample size & design:** All patients who are operated by midline laparotomies during the study period (except those who fall in the exclusion criteria) were selected.
5. **Study Design:** Descriptive type of observational study, which is longitudinal in design.
6. **Parameters to be studied:**
 - a) *Incidence of burst abdomen.*
 - b) *Presence of serosanguinous discharge post operatively from wound*
 - c) *Duration of operation*
 - d) *Presence of peritonitis*
 - e) *Presence of sepsis (W.B.C. count >10,000/dl]*
 - f) *Hypoproteinemia (albumin < 3gm%)*
 - g) *Presence of Cough*
 - h) *Hyperbilirubinaemia (bilirubin > 2mg/dl]*
 - i) *Anaemia (Hb % < 10gm/dl]*
 - j) *Presence of abdominal distension*
 - k) *Diabetes (FBS>140mg/dl, PPBS>200mg/dl]*
 - l) *Steroid intake*
 - m) *Uremia (urea >50mg/dl]*
 - n) *Hypoxia (spO₂<90% during operation]*
 - o) *Presence of malignancy*
7. **Study tools:**
 - a) *History*
 - b) *Clinical assessment*
 - c) *Investigations*
8. **STUDY TECHNIQUE:**
 - a) *Inclusion criteria- Patients being operated on emergency basis through midline laparotomy for any pathology during the study period.*
 - b) *Exclusion criteria*
 - i. *Patients less than 18 year old.*
 - ii. *Patients who had undergone a previous midline laparotomy.*
 - iii. *Patients who developed an anastomotic leak (in whom resection & anastomosis was done].*
9. **CASE DISTRIBUTION:** Out of the 157 cases of midline laparotomies, 67 cases were closed by interrupted X-suture & rest 90 cases by continuous suture.
10. **FOLLOW-UP:** The cases were observed for four weeks for any sign of wound dehiscence.
11. **ANALYSIS OF DATA:** Categorical variables are expressed as Number of patients and percentage of patients and compared across the groups using Pearson's Chi Square test for Independence of Attributes. Continuous variables like age and Duration of operation also categorized and are expressed as Number of patients and percentage of patients and compared across the groups using Pearson's Chi Square test for Independence of Attributes. An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

IV. Results Analysis & Discussion

In our study age distribution of the laparotomies performed showed majority of the cases in the age group of 31 to 50 years, with a median age 38years. A total of 93 patients in this age group (among the total 157) patients were operated. Singh A, Singh S, Dhaliwal et al^[13] also found majority of cases in the age 25 – 50 years. Srivastav A, Roy S, Sahay KB et al^[11] found average age of the emergency group to be 38.06 with a median age of 32 years & a SD of 15.209. Male patients constituted the majority (73.9%). In almost all the studies^[14,15] there is male predominance. In the study by Srivastav A, Roy S, Sahay KB et al^[11], there were 25% females & 75% males This is probably due to the increased outdoor activity of the male population. Among the causes found intra operatively, peptic perforations (gastric & duodenal) were the majority of cases (30.6%). M Tariq et al noted this to be 42% of the total cases. The population group of 31 to 50 years, who were the majority, also showed peptic perforation as the principal cause. Among the cases operated, cases of perforative peritonitis constituted 63.1%. Most cases follow emergency laparotomy for peritonitis^[4]. Among the total 90 patients who were closed with continuous suture, 9 patients developed burst abdomen. 1 among 67 patients of the interrupted arm developed burst abdomen. P value 0.031 shows advantage of interrupted X suture over continuous suture in prevention of burst abdomen. In the study by Srivastav A, Roy S, Sahay KB et al^[11], in the

emergency laparotomy group, burst abdomen occurred in 2.17% in the interrupted group & 14.8% in the continuous group. Presence of serosanguinous discharge from the midline laparotomy wound is a known precursor of burst abdomen. In our study among the 10 patients presenting with burst abdomen, 9 had presence of discharge. P value <0.001. So our study once again proved it to be related with burst abdomen. Most of the operations(22.9%] took 90 – 104 minutes to complete. It showed no relationship with incidence of burst abdomen. Perforative peritonitis was the major cause of laparotomy & among the 10 cases with burst abdomen, all had peritonitis. P value 0.012. Riou JPA, Cohen JR, Johnson H et al^[48] & Makela JT, Kiviniemi H, Juvonen T, Laitinen S et al^[49] found peritonitis to be associated with most of the cases. Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] found relative risk for burst with peritonitis as exposure was 1.86 (95% CI; 1.36 to 2.55). The attributable fraction is 46.3% (95% CI ; 26.3 to 60.8%; p value = 0.031). Wagar SH, Malik ZI, Razzaq A, Abdulah MT, Shaima A, Zahid MA found hypoproteinemia to be a risk factor for burst abdomen. But in our study hypoproteinemia (serum albumin <3gm%) showed no relation with burst. P = 0.376. But when the patients who had hypoproteinemia are compared with the two different types of suture, all the 6 patients who developed burst were closed with continuous suturing method. Analysis indicates interrupted X suture may have prevented burst abdomen in these patients (p=0.028). Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] found- a total of 65.65% had no coughing, 2.02% had atelectasis, 17.17% had chronic obstructive airway disease (COAD), 12.12% had asthma and 3.03% had bronchopneumonia. 5.88% of patients with COAD, 8.33% of patients with asthma and 33.33% of patients with bronchopneumonia developed dehiscence thus showing that postoperative bronchopneumonia could be a significant factor in predicting a high risk of burst. In our study presence of cough in the post operative period was found to be associated with increased risk of wound dehiscence. (p=0.022). Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] found no association of burst abdomen with hyperbilirubinaemia. But Armstrong CP^[5] et al found jaundice to be associated with poor wound healing & burst abdomen. In our study, hyperbilirubinaemia is not found to be associated with burst. (p=0.246) Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] noted- Out of 39 anaemic patients, 6 developed burst, and 1 for interrupted method. Whereas among 60 patients without anaemia, only 3 experienced burst. The RR for burst= 1.82 (95% CI, 1.0 to 3.11; P = 0.148). This suggested anaemia to be a risk factor for burst abdomen. Protein deficiency anaemia is also a risk factor for burst abdomen^[4]. But in our study (p= 0.669), anaemia is not found to be a risk factor. All the cases of burst abdomen in the study conducted by AIIMS, New Delhi^[1] had post operative abdominal distention.

In our study 9 out of the 10 patients of burst abdomen had post operative abdominal distention, signifying high probability of relationship (p<0.001). Wagar SH, Malik ZI, Razzaq A, Abdulah MT, Shaima A, Zahid MA.^[51] also found co-relation of abdominal distension with incidence of burst. ‘Recent evidence based studies show no significant effect in patients, with controlled diabetes mellitus, on the risk of burst abdomen’^[4] Our study also showed no relationship of diabetes with burst abdomen (p=0.394). Corticosteroids use interferes with healing due to suppressed macrophage function, capillary proliferation & fibroplasias.^[4] In our study none of the 10 patients who had a history of steroid intake experienced burst abdomen. P value 0.394 signified no relation between the two. However none of the studies indicated significance of the duration of steroid intake. There is scope of further studies in this aspect. Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] noted no significant relation between presence of uremia & burst abdomen. In the present study p value is found to be 0.772 & so no co-relation is found. Occurrence of hypoxia anytime during the operation had no significant relationship with the incidence of burst abdomen (p=0.122).

Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] also found no co-relation between hypoxia & burst. Presence of malignancy found intra operatively or pre operatively had no significant correlation with burst in the present study(p=0.597). It was also corroborated by Srivastav A, Roy S, Sahay KB, Seenu V, Kumar A, Chumber S, Bal S, Mehta S^[1] in their study.(p=0.44)

V. Conclusion

Interrupted X suture is a better option than continuous suture in emergency cases of midline laparotomies, particularly in patients of hypoproteinemia. Presence of peritonitis found intra operatively, serosanguinous discharge from wound post operatively increases the chances of burst abdomen. Abdominal distension & cough in the post operative period promotes wound disruption. Presence of sepsis, jaundice, anaemia, controlled diabetes, uremia, malignancy, steroid intake & occurrence of hypoxia during operation could not establish any definite relationship with occurrence of burst abdomen. Average time for closure of the abdomen by interrupted X suture was 32 minutes & that of continuous suture was 12 minutes. However this difference could not establish any relationship with increased incidence of burst abdomen.

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