

# COMPARATIVE STUDY OF EFFICACY OF CONTINUOUS VERSUS PARTIAL INTERRUPTED METHOD OF MIDLINE LAPAROTOMY WOUND CLOSURE FOR CONTAMINATED CASES OF TYPHOID PERFORATION

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## ABSTRACT

**Background:** The controversy exists in the literature about the best method of midline suturing in contaminated cases like typhoid, tuberculosis and old traumatic intestinal perforations. **Objective:** To compare the laparotomy wound closure techniques in contaminated cases of typhoid perforation regarding burst abdomen and wound dehiscence. **Methodology:** This was randomized control type of study in which all the patients fulfilling inclusion criteria were included. This study was conducted in surgical ward of Bahawal Victoria Hospital Bahawal Pur. The cases with minimal peritoneal contamination, planned laparotomies for benign abdominal lesions/ tumours and simple, non contaminated laparotomies were excluded from this study. All the cases were initially received in the general surgical emergency department and later referred for surgical consultation. A detailed history and clinical examination was conducted by two general surgeons. All the included patients had an acute presentation and required immediate intervention. The data was noted on a proforma. All included patients were divided in two groups; A and B. Patients of both groups were equal in number i.e fifty patients in each group. Patients of group A underwent continuous method of closure and patients of group B underwent interrupted closure. Outcome parameters included were time required for closure and postoperative wound dehiscence. **Results:** Regarding the results of study the difference in wound dehiscence was significant ( $p < 0.05$ ) between the two groups, group A, 22% and group B, 4%. Results about time required for closure found less than 30 minutes 92% in group A and 62% in group B, the difference was statistically insignificant ( $p > 0.05$ ). **Conclusion:** Continuous method has advantage of being faster and time saving but in regarding the wound dehiscence in contaminated cases it was found that more patients, with continuous closure has dehiscence.

**Keywords:** Contaminated, Continuous, Interrupted, Midline laparotomy, Wound dehiscence.

## INTRODUCTION

There are many causes of laparotomy. It may be an elective or emergency procedure.<sup>1</sup> There are different causes of intestinal perforation leading to extent of contamination like typhoid, tuberculosis, yersinia infection or old traumatic perforation.<sup>2</sup> There are multiple incisions to open the abdomen but midline incision is commonly used access route for emergency laparotomy as it is simple, quick, bloodless, has best extensibility and provides excellent exposure.<sup>1,2</sup> But its drawbacks are comparatively increased incidence of postoperative wound dehiscence and an incisional hernia compared to other incisions.<sup>3</sup> Many factors influence wound complications like wound sepsis and dehiscence. Some of the patient related factors are their nutritional status, hypoalbuminaemia, anaemia, immune suppressed states, renal failure, uncontrolled diabetes, malignancies, steroid therapy and obesity.<sup>4</sup> Other set of factors which influence the strength of repair and healing are related to the technique of suturing.<sup>5</sup> Some of them are the size and type of suture material used (monofilament versus polyfilament, absorbable vs. non-absorbable, natural versus synthetic) and

also the technique of suturing layered versus mass closure, interrupted and continuous.<sup>4</sup> Wound dehiscence is associated with high mortality.<sup>5,6,7</sup> Anemia is a risk factor that is related to increased perioperative stress, blood transfusions, and decreased tissue oxygenation, all of which can affect the immune system and the wound healing process.<sup>8</sup> Despite advances in perioperative care and suture materials, incidence and mortality rates in regard to abdominal wound dehiscence have not significantly changed over the past decades. Several mainly retrospective studies have been performed to identify risk factors for this complication, often presenting conflicting results. Unfortunately, multivariate analysis has only been performed in a minority of studies and in general on small numbers of patients.<sup>9</sup> Patients who undergo emergency surgery are generally in worse condition and nutritional state, and the chance of contamination of the surgical field is higher than in elective surgery. Moreover, the performance of the surgeon might be affected at night, which could lead to suboptimal closure of the abdomen at the end of the operation. Old age is another independent risk factor for abdominal wound dehiscence. Age has also been reported as a risk

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factor in other studies.<sup>10,11</sup> The explanation for this might lie in deterioration of the tissue repair mechanism in the elderly. Especially during the first few days of the wound healing process, the immune system plays a key role. Functional changes adversely affect the influx of cells and compounds that are essential for tissue repair.<sup>12</sup>

The objective of this study was to determine the outcome of laparotomy wound closure technique among contaminated cases of typhoid perforation.

## METHODOLOGY

One hundred cases of exploratory laparotomy fulfilling the inclusion criteria were selected from surgical emergency of Surgical department Bahawal Victoria Hospital, Bahawalpur from 1<sup>st</sup> January 2015 to 31<sup>st</sup> July 2016. Patients were randomly allocated in two groups; group A for continuous closure and group B for partial interrupted closure. The wound closure for the patients of both groups was done with a suture prolene. The wound of patients in group A was continuously closed but in patients of group B was additionally applied partial interrupted prolene stitches as in modified smead jhonson technique. Patients were kept in ward for 7 days after operation for assessment and evaluation regarding wound dehiscence. The other variable was time consumed during wound closure was already recorded on a predesigned proforma in all patients during operative procedure. Collected information was entered into SPSS version 20 and analyzed. The infection control measures like preoperative surgical site preparation, aseptic techniques and antibiotic prophylaxis used, were similar in both the groups. The outcomes like time required for closure was whether it was >30 minutes or <30 minutes, while wound dehiscence (Present /Not Present) was presented as frequency and percentage. Chi-square test was applied on wound dehiscence for comparison of significance between two groups. All patients underwent preoperative requisite investigations and optimization of physiological abnormalities as per standard protocol. All patients were operated under general anaesthesia. Necessary measures were carried out as per the pathologies encountered. All patients were having only single indication of laparotomy i-e the typhoid perforation leading to contamination in abdomen. All patients were between 20 to 30 years of age. Wound dehiscence was defined as the separation

of the two edges of the laparotomy fascia with visible bowel, omentum, mesentery or other intraperitoneal structures through it with or without fibrin layer cover.

## RESULTS

There were one hundred patients fulfilling the inclusion criteria operated and included in study. There were 38 males and 62 female patients. All included patients were in between 20 to 30 years of age. In results of study, 11 (22%) patients were found with wound dehiscence in group A and 2 (4%) patients in group B. (Table I).

**Table I: Wound dehiscence in both groups**

Group	Total patients	Wound dehiscence present	Not present
Group A	50	11 (22%)	39 (78%)
Group B	50	02 (4%)	48 (96%)

Regarding the consumption of time required for closure there were only 4 (8%) patients of group A in which time consumed was >30 minutes, while there were 19 (38%) patients in group B in which time consumed was >30 minutes. (Table II)

**Table II: Time consumption during wound closure in both groups.**

Group	Total patients	Time consumed >30 minutes	<30 minutes
Group A	50	4 (8%)	46 (92%)
Group B	50	19 (38%)	31 (92%)

## DISCUSSION

The major mechanism of wound rupture is the suture cutting through the fascia, though occasionally it may be due to suture break or slippage of the knot. Continuous suture technique has the benefit of being easier and less time-consuming.<sup>13</sup> It is associated with lesser risk of stitch sinuses and stitch granulomas.<sup>14</sup> However, it places the integrity of the entire wound on a single strand and a cut-through at a single point can slacken the entire suturing.<sup>15</sup> Increased tension across the wound is distributed between the two loops in such a way that the wound remains well approximated without the suture cutting through. Interrupted figure-of-eight suturing technique reduces the cut out force, whereas the continuous suture exerts a "hacksaw effect" at the tissue-suture interface and the to-and fro movements

of the suture strand within the tissues act like a Gigli saw, due to varying tension of different parts of the abdominal wall on breathing and movement, gradually causing the suture to cut through the linea alba.<sup>18</sup>

There is no consensus regarding ideal wound closure after laparotomy.<sup>19</sup> Many randomized trials in the West have reported equal wound complication rates following the use of continuous or interrupted monofilament fascial closure.<sup>18,19</sup> A study found greater dehiscence risk in the interrupted group, though the difference was significant only in the “contaminated wounds” subgroup. However, the details of the interrupted suturing technique were not described.<sup>20</sup> Inflammatory diseases had an extremely high frequency of wound dehiscence. 15.07% and 22.73% respectively, with routine continuous suture closure technique.<sup>17</sup>

The frequency of wound dehiscence after emergency laparotomy was 6.7% as compared to 1.5% in elective cases. In our study 22% of continuous suture and 4% of interrupted has wound dehiscence. Rahman<sup>20</sup> recorded abdominal wound dehiscence in 7 (23.23%) cases, among the 33 patients of spontaneous ileal perforation with acute peritonitis and an incidence of wound infection in 30.3%. This study also had a small number of patients, but all were emergency laparotomies with complicated and high risk cases (intra-abdominal sepsis). Wound dehiscence is associated with a mortality of above 25%.<sup>16</sup>

## CONCLUSION

Partial interrupted closure in laparotomy is better than continuous closure regarding wound dehiscence. However, requirement of long time of surgery make it unpopular among surgeons.

### Conflict of interest

There is no conflict of interest among all authors.

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