



Original Article

## Comparison of suture technique (interrupted vs. continuous) with respect to wound dehiscence

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Received : 22 March 2020  
Accepted : 07 April 2020  
Published : 31 December 2020

DOI  
10.25259/IJMS\_21\_2020

Quick Response Code:



### ABSTRACT

**Objectives:** Post-operative complete wound dehiscence, being an unfortunate and also a very serious complication, is associated with a high morbidity and mortality rate despite the most sophisticated intensive care these patients receive today. The quest for the best closure technique for abdominal incisions continues. To achieve this goal, several modifications in opening the abdomen and closing the wound have been tried. There are many studies in the literature comparing various methods of wound closure, with conflicting results. The aim of the present study was to assess the proportion of wound infection and wound dehiscence in the post-midline laparotomy patients, using interrupted X suture versus continuous suture technique in sheath closure.

**Material and Methods:** A total of 80 patients undergoing vertical midline emergency laparotomy at one of the gynecology units were recruited randomly after taking written informed consent and were equally divided into 40 cases each group (interrupted X suture) and (continuous suture) they were randomized into two groups depending on whether the patient registration number was odd or even.

**Results:** The age of the patients varied from 16 years to 82 years. In Group A, the mean age was  $36.75 \pm 13.78$  years, and in Group B, the mean age of the patients was  $38.37 \pm 12.56$  years. In Group A, 8 (20%) patients had comorbidity, whereas, in Group B, 10 (25%) patients had comorbidity. In Group A, 12 patients had wound infection, while in Group B, ten patients had wound infection ( $P = 0.001$  [statistically significant]). In Group A, two patients had wound dehiscence, while none of the patients in Group B had wound dehiscence ( $P = 0.001$  [statistically significant]). There was no incisional hernia in both the groups.

**Conclusion:** Emergency laparotomy is associated with a higher rate of burst abdomen as compared to elective laparotomy, but using interrupted X suture technique in sheath closure, wound dehiscence can be prevented up to some extent.

**Keywords:** Wound dehiscence, Emergency laparotomy, Interrupted X suture, Continuous suture

### INTRODUCTION

Laparotomy is a major surgical procedure, whether elective or emergency.<sup>[1]</sup>

A midline incision is frequently used in abdominal and gynecological surgeries. It provides a relatively quick and wide access to the abdominal and pelvic cavity which can be made with minimal damage to muscles, nerves, and blood supply as these structures do not cross the midline.<sup>[2-6]</sup> The ideal wound closure provides strength and a barrier to infections. To achieve that goal, the closure should be fast, efficient, without tension/ischemia, comfortable to the patient, technically easier to the surgeon, and esthetic. Hence, one should follow the principles of wound closure.<sup>[6]</sup>

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Wound dehiscence is parting of the layers of a surgical wound. Either the surface layers separate or the whole wound splits open. It presents as mechanical failure of wound healing of the surgical incision. Wound dehiscence, also known as burst abdomen or wound disruption, carries a substantial morbidity rate, and in addition, there is an increase in the cost of care, both in terms of increased hospital stay, nursing, and workforce cost in managing cases of burst abdomen. Incidence of post-laparotomy wound dehiscence/burst abdomen varies from center to center. While the incidence of wound dehiscence has been reported as 1–3% in most centers across the world,<sup>[7,8]</sup> some centers in India have recorded an incidence rate of burst abdomen as high as 10–30%.<sup>[9,10]</sup> Wound dehiscence is multifactorial in etiology, conditioned by local and systemic, as well as pre-, intra-, and post-operative factors.<sup>[8-10]</sup> Post-operative complete wound dehiscence, being an unfortunate and also a serious complication, is associated with high morbidity and mortality rate<sup>[11,12]</sup> despite the most sophisticated intensive care these patients receive today.

Wound dehiscence is related to the technique of closure of the abdomen and the suture used.<sup>[13]</sup> While the choice may not be so important in an elective patient who is nutritionally adequate, do not have any risk factor for dehiscence, and are well prepared for surgery; however, it may prove crucial in the emergency patient who often has multiple risk factors for developing dehiscence.<sup>[14]</sup>

The present study was undertaken to assess the proportion of wound infection, pain, and wound dehiscence in the post-midline laparotomy patients, using interrupted X suture versus continuous suture technique in sheath closure.

## MATERIAL AND METHODS

This prospective study was conducted in the postgraduate Department of Obstetrics and Gynaecology, Government Medical College, for 1 year with effect from July 1, 2016, to June 30, 2017. A total of 80 patients undergoing vertical midline laparotomy at one of the gynecology units were recruited randomly after taking written informed consent and were equally divided into 40 cases each group interrupted X suture and continuous suture. They were randomized into two groups depending on whether the patient registration number was odd or even. All the patients scheduled to undergo a vertical midline laparotomy for emergency reasons were included in the present study. Patients younger than 16 years of age, patients who had undergone the previous laparotomy for any condition or had an incisional hernia, or burst abdomen at presentation and patients who required a re-exploration in post-operative course were excluded from the present study. Sheath closure was done by the same observer in all the cases, with similar suture material and similar tension in the suture, with a similar technique of knot tying.

## Continuous closure

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

## Interrupted closure

Interrupted closure was performed using no. 1 vicryl suture. A large bite was taken outside – in 2 cm from the cut edge of linea alba. The needle emerged on the other sides 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 the suture and continued outside – in, diagonally at 90° to the first diagonal. The two ends 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 such as crosses-one on the surface and another deep to linea alba. The next X suture was placed 1 cm away from the previous one.

Surgical site infection was diagnosed if any one of the following criteria was fulfilled: Purulent drainage from the incision, organisms isolated from an aseptically obtained culture of fluid, or tissue from the superficial incision, at least one of the following signs or symptoms of infection-pain or tenderness, localized swelling, redness, or heat. Wound dehiscence was suspected when there was serosanguinous discharge and was confirmed when there was a visible gap between the wound edges or abdominal viscera that were lying outside the abdominal cavity in the wound and a new closure was necessary. Incisional hernia was defined clinically as a palpable incisional fascial defect  $\geq 2$  cm in diameter or visible bulge in the laparotomy incision.

## RESULTS

A total of 80 patients undergoing emergency laparotomy by vertical midline incision were included in the study and divided into two groups: Group A and Group B. The age of the patients varied from 16 years to 84 years. In Group A, the mean age was  $36.75 \pm 13.78$  years, and in Group B, the mean age of the patients was  $38.37 \pm 12.56$  years. The majority of patients in both the groups were in second and third decades. The two groups were well matched and there was no statistically significant difference; as far as, the age of the patients was concerned. In Group A, 8 (20%) patients had comorbidity, whereas, in Group B, 10 (25%) patients had comorbidity. Fourteen complications were noted in Group A, while ten complications were noted in Group B. In Group A, 12 patients had wound infection, while in Group B, ten patients had wound infection ( $P = 0.001$

[statistically significant]). In Group A, two patients had wound dehiscence, while none of the patients in Group B had wound dehiscence ( $P = 0.001$  [statistically significant]). There was no incisional hernia in both the groups.

## DISCUSSION

Abdominal wound dehiscence and hernia are the major causes of morbidity following any laparotomy, whether elective or emergency. Theoretically, two factors 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 the wound must be made sufficiently strong to withstand this pressure. During the post-operative period, a wound must depend for its strength on the following things:

1. Cohesion of the healing tissue
2. The bandage and dressing
3. Suture material and technique.

The best method of wound closure would be to provide adequate tensile strength until the wound is healed, approximate the tissue in a way that normal healing mechanisms can occur under optimal circumstances and remain secure even in the presence of local or systemic infection.

A total of 80 patients undergoing emergency laparotomy by vertical midline incision were included in the study and divided into two groups: Group A and Group B. The age of the patients varied from 16 years to 82 years. In Group A, the mean age was  $36.75 \pm 13.78$  years and in Group B, the mean age of the patients was  $38.37 \pm 12.56$  years. The two groups were well matched and there was no statistically significant difference ( $P = 0.521$ ); as far as, the age of the patients was concerned. Sirvastava *et al.*<sup>[15]</sup> showed similar age and gender distribution in their study. The majority of patients in our study belonged to the second and third decades. Osman *et al.*<sup>[16]</sup> showed that the majority of patients belonged to the age group of 20–50 years.

In our study, comorbidity was present in 8(20%) patients in Group A, while 10 (25%) had comorbidity in Group B. Similarly, a study conducted by Altaf *et al.*<sup>[17]</sup> showed that 24.8% of patients had comorbidity in their study.

The incidence of wound infection in our study was 30% in Group A, and it was 25% in Group B. Navneet *et al.*<sup>[18]</sup> in their study reported the incidence of wound infection of 29% in the continuous group and 19% in the interrupted group.

Incidence of wound dehiscence in our study was 5% in Group A and no wound dehiscence was noted in Group B. Osman *et al.*<sup>[16]</sup> in their study, reported similar incidence of wound dehiscence in their study. Similarly, Richards *et al.*<sup>[19]</sup>

reported incidence of 2% in continuous group versus 0.9% for interrupted group. Indian authors have reported burst abdomen to occur in 10–30% of emergency cases (Shukla *et al.*,<sup>[11]</sup> Singh *et al.*<sup>[10]</sup>). This high incidence of wound dehiscence in our study may be because our peripheral hospital setup is not up to mark, due to which patients which need surgery are not operated there and are referred to higher centers when their condition deteriorates.

## CONCLUSION

Emergency laparotomy is associated with a higher rate of burst abdomen as compared to elective laparotomy, but using interrupted X suture technique in the closure of sheath, the rate of wound dehiscence can be prevented to some extent.

## Declaration of patient consent

The authors certify that they have obtained informed consent from all patients.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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**How to cite this article:** Sharma G, Prashar N, Gandotra N. Comparison of suture technique (interrupted vs. continuous) with respect to wound dehiscence. *Indian J Med Sci* 2020;72(3):191-4.