

## ORIGINAL ARTICLE

LAPAROTOMY FOR PERITONITIS: PRIMARY OR DELAYED  
PRIMARY CLOSURE?

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**Background:** Although literature does not provide a level-1 evidence to support either method of closure, various studies have shown a reduced frequency of superficial surgical site infection with delayed primary closure (DPC) as opposed to primary closure (PC). Nevertheless, PC is still preferred by most surgeons to avoid a second procedure. This study was conducted with the objective to compare the frequency of wound infection and duration of hospitalization among patients undergoing primary and delayed primary closure of the skin wound following laparotomy for peritonitis. **Methods:** A randomized controlled trial comprising 70 patients: Thirty-five patients underwent PC (Group-A) and 35 DPC (Group-B). Frequency of wound infection during follow up period and duration of hospital stay was noted in both groups. **Results:** In group-A, 18 (51.43%) patients showed wound infection while in group-B, it was 9 (25.71%) with  $p=0.027$ . Mean hospital stay recorded in group-A was 7.03 days $\pm$ 1.81, and for group-B, it was 6.34 days $\pm$ 4.14 ( $p=0.372$ ). **Conclusion:** DPC for surgical wounds is better than PC technique as it decreases the frequency of wound infection during follow-up period without any significant increase in duration of hospital stay.

**Keywords:** Peritonitis, primary closure, delayed primary closure, surgical site infection

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## INTRODUCTION

Peritonitis, a common surgical emergency, is a term used to describe inflamed serosal membranes including the visceral and parietal peritoneum. In the literature, it is sometimes referred to as intra-abdominal sepsis. Three types have been described depending on its pathogenesis namely: primary, secondary and tertiary peritonitis. Primary peritonitis refers to spontaneous bacterial invasion of the peritoneal cavity. Secondary peritonitis is an infection caused by a breach in the lining of the serosal membranes due to trauma or bowel perforation. Tertiary peritonitis is a condition characterized by recurrent infections in immune-compromised patients caused by organisms that are otherwise not virulent.<sup>1</sup>

Principles of treatment of peritonitis include controlling the source of infection, eliminating bacteria and toxins, maintaining organ system function, and controlling the systemic inflammatory process.<sup>2</sup> Surgery remains a cornerstone of treating peritonitis.

Despite adequate surgery, superficial surgical site infections can still occur and cause considerable morbidity. Abdominal incisions for peritonitis are classified as dirty wounds and lead to high chances of surgical site infection, wound dehiscence and incisional hernia.<sup>3</sup> While operating on patients with generalized peritonitis, a midline incision is preferred because it provides an easy access to all areas of peritoneal cavity. The optimal method of wound closure remains controversial.<sup>4,5</sup>

The two methods of wound closure are primary and delayed primary closure. Despite many studies advocating delayed primary closure, there is no level-1 evidence to conclusively recommend this method.<sup>6</sup> This study compares primary closure with delayed primary closure of wound in patients undergoing laparotomy for peritonitis, to find out the best technique of skin closure. This will help in decreasing wound infection and length of hospital stay.

## MATERIAL AND METHODS

This randomized controlled trial (RCT) was carried out in the department of General Surgery, Fauji Foundation Hospital, Rawalpindi from 15-10-2013 to 15-04-2014. A total of 70 patients above 14 years of age were included selected consecutively and randomized into two groups by blocked randomization. Patients with uncontrolled diabetes mellitus (fasting blood sugar level >200 mg/dl) and those who needed ventilatory support because of their comorbidities, were excluded from the study.

Group-A comprised 35 patients who underwent surgery with primary closure while group-B having 35 patients underwent surgery with delayed primary closure. Informed consent was taken from all patients. The surgery was carried out by one or more of three qualified surgeons of Surgical Unit II. In group-B, the initial dressing was changed on third postoperative day. Subsequent dressings were done daily or as frequently as needed. Subsequently the wound was assessed daily until discharge from hospital. After that, wound assessment was done on weekly basis. Delayed closure was done on fifth day,

or later, when wound was clean. Study variables included age, gender, duration of hospital stay, and wound infection.

Data was analysed using SPSS-10.0. Chi-square test was used to compare both groups for frequency of surgical site infection (SSI) and Student's *t*-test to compare the difference between mean duration of hospital stay.

**RESULTS**

Seventy patients were included in this study. Demographic profile of patients under study is shown in table-1. In group-A, 18 (51.43%) patients showed wound infection while in group-B, it was 9 (25.71%) with *p*=0.027. Mean hospital stay recorded in group-A was 7.03 days±1.81, and for group B, it was 6.34 days±4.14 (*p*=0.372).

**Table-1: Demographics of study subjects**

	Group A (PC)	Mean Age±SD	Group B (DPC)	Mean Age±SD
Male	27 (77.14%)	31.37±12.93	30 (85.71%)	35.17±16.24
Female	8 (22.86%)	29.13±13.83	5 (14.29%)	29.6±16.68
Total	35 (100%)	24.76±7.48	35 (100%)	32.61±14.66

**DISCUSSION**

Delayed primary closure of contaminated wounds has long been practiced in war time surgery. Its use in laparotomy wounds after peritonitis has been a subject of debate.<sup>6</sup> Although available literature is skewed in favour of delayed primary closure<sup>7-10</sup>, a large proportion of surgeons still prefer primary closure.

This study clearly shows that the frequency of wound infection during the follow up period was significantly lower (*p*=0.027) with delayed primary closure technique (Group-B), than with primary closure technique (Group-A). Patients who undergo surgery for peritonitis have a significantly increased risk for SSI leading to failure of wound-healing. The incidence of SSI increases with the degree of contamination and may occur even after thorough peritoneal and wound lavage. Leaving open these wounds prevent infection as repeated dressing change accomplishes adequate drainage. This is the possible explanation of why there is significantly reduced frequency of infection in group-B patients.

Duration of hospital stay was also noted after both the closure techniques in each group. Although mean hospital stay for group-A was longer than for group-B, the difference was not statistically significant (*p*=0.372).

A systematic review and meta-analysis, conducted by Bhangu *et al*, included eight randomized controlled trials to assess the benefits of DPC over PC.<sup>6</sup> They concluded that though

DPC appeared to offer an advantage in terms of wound healing, there is no definitive evidence to prove that DPC lowers the rate of surgical site infection. They attributed this conclusion to the poor trial design followed by those studies. Another study conducted by Siribumrungwong *et al*, concluded that primary closure is superior to delayed primary closure in terms of prevention of superficial SSI.<sup>5</sup>

On the other hand, a similar study carried out by Ahmad *et al*, corroborates our findings.<sup>11</sup> Another study by Duttaroy D *et al* also recommends DPC as a preferred closure technique as it affords decreased rate of surgical site infection and wound dehiscence, in addition to decreased hospital stay.<sup>3</sup> A study by Usang *et al*, to assess outcome of patients with typhoid perforation, documented significant complications including SSI in patients who had a primary closure of their wound.<sup>12</sup> Bender JS<sup>13</sup> studied 181 patients presenting to a single surgeon with Class IV abdominal wounds. He concluded that DPC is a safer technique that can be effectively applied in the large majority of patients with dirty abdominal wounds in order to reduce SSI. Cohn SM and Giannotti G<sup>14</sup>, in a prospective randomized trial conducted to compare two wound management strategies for dirty abdominal wounds, concluded that DPC produced a decreased SSI rate compared with PC if carried out for dirty wounds 4 days after surgery. They also established that there was no increase in the length of hospital stay or cost of treatment.

Our study strengthens the point of view that DPC is a better closure technique as it reduces the SSI rate significantly, hence reducing morbidity and length of hospital stay. Its strength is that patients that had any confounding variables that could affect wound healing were excluded from the study. The weakness of this study is its relatively small sample size. A larger, well-designed, preferably multicentre trial is required to lay the debate to rest conclusively.

**CONCLUSION**

Delayed primary technique for surgical wound closure is better than primary technique as it decreases the frequency of wound infection during follow up period without any significant increase in duration of hospital stay.

**AUTHOR'S CONTRIBUTION**

One or more of the authors were the operating surgeons in each case under study in this RCT. GN: compiled the data. EB, IS: performed the literature search, SIS: wrote the manuscript that was reviewed by the other two authors.

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