DOI: https://doi.org/10.3329/medtoday.v36i1.72891

ORIGINAL ARTICLE OPEN ACCESS

Comparative Study of Paramedian and Midline Incision in Laparotomy for Peritonitis due to Non-traumatic Gastro-intestinal Tract Perforation

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Abstract

Introduction: *A prospective observational study was conducted to compare the paramedian incision with midline incision in gastro-intestinal tract perforation.* ***Objectives:*** *To identify better or superior incision which may reduce post operative mortality and morbidity after laparotomy.* ***Materials and Methods:*** *A prospective observational Hospital based study was conducted from January 2009 to June 2009 at department surgery of Shaheed Ziaur Medical College Hospital, Bogura. A total 100 patients of peritonitis due to non-traumatic gastro-intestinal tract perforation were taken for study. Sample were collected by Convenience (purposive) sampling method. Midline incision and Para median incisions were performed as per standard technique. The details of operations, post-operative complications and follow up to be recorded and analyzed.* ***Results:*** *Opening time and closing time in midline incision is significantly less than paramedian (P <0.001). Incidence of wound infection and incidence of wound dehiscence in our study in midline group was less compared to paramedian group buy it is not significant. All forms of dehiscence ranging from superficial dehiscence to burst abdomen were included. Incidence of incisional hernia was significantly higher in midline incision (P<0.05). Healing time was significantly lower in midline compared to Paramedian group (P<0.05).* ***Conclusion:*** *It is concluded that midline incision is preferred compared to paramedian incision. Incidence of wound dehiscence and wound infection is less in midline incision.*

Keywords: *Paramedian, Midline incision, Laparotomy.*

Number of Tables: 05; Number of Figures: 05; Number of References: 14; Number of Correspondences: 04.

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Introduction:

Non traumatic gastro intestinal tract perforation is one of the most common surgical emergencies. Non-traumatic perforation of the small bowel is a serious complication associated with high morbidity and mortality. Diseases that cause small bowel perforation vary in different areas of the world[1]. The most common cause of non-traumatic perforation of small intestine was typhoid (46.4%), followed by non-specific inflammation (39.2%), tuberculosis (12.8%) and malignant neoplasm (1.6%). Primary repair was the most frequent procedure (44.0%), followed by ileostomy (25.5%) and resection-anastomosis (19.3%)[2]. Insight into the management of non-traumatic perforation of the small intestine[3]. Gastrointestinal perforations constitute one of the commonest surgical emergencies encountered by surgeons[4]. In spite of advances in perioperative care, antimicrobial therapy, and intensive care support, perforation peritonitis still has high morbidity and mortality[5]. The spectrum of etiology of perforation in tropical countries is different from its western counterpart. In contrast to western countries where lower gastro-intestinal tract perforations predominate, upper gastro intestinal tract perforations constitute the majority of cases in India[6]. Common causes of non-traumatic gastro intestinal tract perforations in our country are perforation of gastric ulcer, perforation of duodenal ulcer, perforation of vermiform appendix, typhoid ulcer, tubercular ulcer and malignant ulcer perforation etc. A large number of patients are

Received: 31 October 2023 *Accepted revised version:* 15 February 2024

admitted in our hospital almost every day with non-traumatic gastro intestinal tract perforations and almost all of them need surgical intervention. Laparotomies of these patients are done by midline incision and sometimes by paramedian incision especially for duodenal ulcer perforation and other non-traumatic gastro intestinal tract perforation. Shaheed Ziaur Rahman Medical College Hospital, Bogura is the tertiary level hospital. It is the affordable modern hospital for the large number of poor people in this region. A large number of patients are admitted every day in different general surgical wards. Many patients admit with non-traumatic gastro intestinal tract perforations in different surgical units almost every day. Most of them are treated with emergency laparotomy either by midline or paramedian incision. Some surgeons here always do laparotomy for peritonitis by midline incision but some go through paramedian incision commonly for perforation of duodenal ulcer and other non-traumatic gastro intestinal tract perforation. Among these two incisions, we observed difference in opening and closing time, arbitrary amount of bleeding, surgeon's compliance, wound infection wound dehiscence, healing time, scar strength and incisional hernia. In general observation, midline incision bleeds less, less time consuming to open and close and can be readily enlarged when necessary. As less tissue planes are opened, so incidence of wound infection and subsequent wound dehiscence and other complications are also less. Although comfortable to open and close and to enlarge but approach to lesion is difficult to some extent especially in perforation of duodenal ulcer and other non-traumatic gastro intestinal tract perforation. Someone also complains for formation of weaker scar in midline incision and increased chance of subsequent incisional hernia. By comparison, paramedian incision bleeds more, more time consuming to open and close and less comfortable to enlarge when necessary. As more tissue planes are opened incidence of wound infection and subsequent wound dehiscence and other complications are also more. Of course, approach to lesion is more comfortable in perforation of duodenal ulcer and other non-traumatic gastro intestinal tract perforation. Due to stronger scar and multiple layers of tissue support, incidence of incisional hernia also less. Subsequently patient's mortality and morbidity rate also vary. So better or superior incision in laparotomy for peritonitis due to non-traumatic intestinal perforation should be identified. This study is a prospective study of 100 cases between January 2009 to June 2009 in department of General Surgery of Shaheed Ziaur Rahman Medical College Hospital, Bogura. Cases will be selected randomly form patients of 15 to 50 years of age group, admitted with non-traumatic gastro-intestinal tract perforation and undergone laparotomy. All patients will be properly resuscitated preoperatively and will be provided with same antibiotic. Thorough peritoneal toileting will be done with normal saline and povidone iodine solution and drain will be given in all patients. Same suture material will be used for repair of perforation and wound closure. Post operative physiotherapy will be given to all patients. In this study we will compare midline incision and paramedian incision in laparotomy for peritonitis due to non-traumatic gastro-intestinal tract perforation in context of opening and closure time, arbitrary amount of bleeding, surgeon's compliance, healing time, rate of wound infection, incidence of incisional hernia and incidence of chest complications. So, overall better or superior incision will be identified which may reduce post operative mortality and morbidity after laparotomy for peritonitis due to non-traumatic gastro-intestinal tract perforation.

Materials and Methods:

This prospective observational study was conducted from January 2009 to June 2009 at department surgery of Shaheed Ziaur Medical College Hospital, Bogura. Sample were collected by Convenience (purposive) sampling method. Total 100 Patients of peritonitis due to non-traumatic gastro-intestinal tract perforation who has under gone laparotomy in Shaheed Ziaur Rahman Medical College Hospital, Bogura between 15 to 50 years of age were selected for the study. Exclusion criteria were – patients with comorbid diseases and patients with traumatic perforation. Data was collected in pre-organized data collection sheet from patients fulfilling inclusion exclusion criteria with informed written consent. All findings will be recorded in prescribed data collection sheet including clinical history, physical examination and pre operative findings. Patient is prepared with all investigations for anesthesia and operation. With informed written consent for operation, patient is operated under general anesthesia. Operation notes including indication, procedure per operative and, preoperative findings are recorded. All findings including post operative follow up and outcome recorded in predesigned data collection shit. All cases will be numbered chronologically. Statistical analyses were carried out by using the Statistical Package for Social Sciences version 23.0 for Windows. The mean values were calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. Clearance was taken from ethical clearance committee of CuMCH prior to the study. Confidentiality of the data was strictly maintained.

Observations & Results:

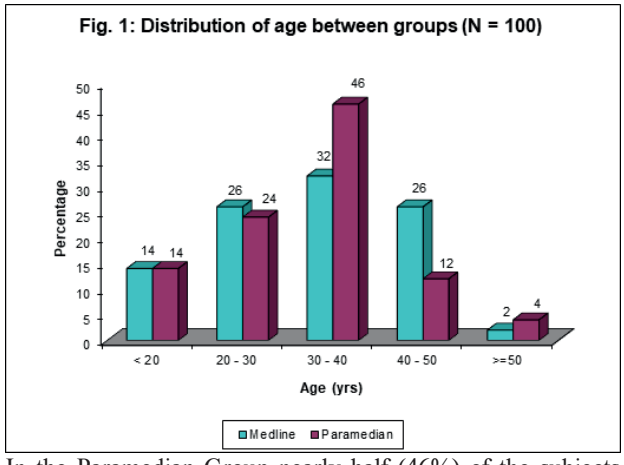
All the data were collected by a structured protocol. Result is summarized and analyzed by appropriate statistical methods. The result is then compared and discussed with the similar standard study in home and abroad. Finally, the study was concluded with specific findings, ideas and highlights. Out of total 100 patients selected for study, 50 were in Midline Group and 50 in Paramedian Group. The findings derived from data analysis are furnished below:

Table- I: Comparison of age between groups:

Age (years)	Group	
	Midline (n= 50)	Paramedian (n=50)
<20	7 (14.0) *	7 (14.0)
20-30	13 (26.0)	12 (24.0)
30-40	16 (32.0)	23 (46.0)
40-50	13 (26.0)	6 (12.0)
≥ 50	1 (2.0)	2 (4.0)
Mean ± SD	**32.38 ± 1.44**	**31.32 ± 1.41**
Range	15 - 50	15 - 50

* Values in the parentheses denote corresponding%

Table-I and Fig. I demonstrates that about one-third (32%) of the subjects in the Midline Group was between 30-40 years followed by 26% between 20-30 years, another 26% in the range 40-50 years and 14% below 20 years of age.



In the Paramedian Group nearly half (46%) of the subjects were in the 3rd decades of life, 26% were between 40 – 50 years, 24% between 20 – 30 years and 14% below 20 years of age. Very few subjects in both the groups were of 50 years and above. The lowest and highest ages in both Midline and Paramedian Groups were 15 and 50 years respectively. The mean ages of Midline and Paramedian Groups were 32.38 ± 1.44 and 30.56 ± 1.27 years respectively.

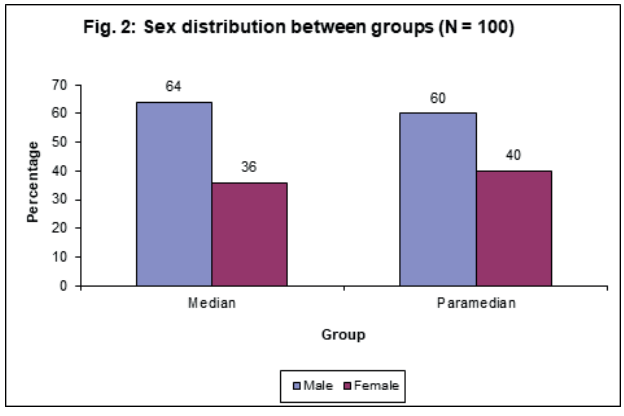


Table-II & Fig. 2 compare the distribution of sex between groups. In Midline Group 64% were males and in Paramedian Group 60% were males giving a male female ratio of roughly 3:2. The groups were almost identical with respect to sex.

Table- II: Showing comparison sex distribution between groups

Sex	Group	
	Midline (n= 50)	Paramedian (n=50)
Male	32(64.0)*	30(60.0)
Female	18(36.0)	20(40.0)

* Values in the parentheses denote corresponding %.

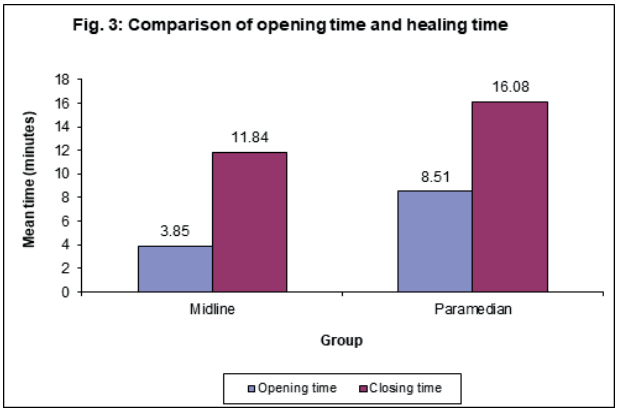


Table III demonstrates that both opening and closing time were significantly less in Midline Group compared to those in Paramedian Group (3.81 ± 1.01 vs. 8.51 ± 3.67 minutes, p < 0.001 and 11.84 ± 3.50 vs. 16.08 ± 3.37 minutes, p < 0.001 respectively).

Table-III: Comparison of opening and closing time between groups

Time	Group		p-value
	Midline (n= 50)	Paramedian (n=50)	
Opening time	3.81 ± 1.01	8.51 ± 3.67	<0.001
Closing time	11.84 ± 3.50	16.08 ± 3.37	<0.001

Data were analyzed using Student's t-test and were presented as mean ± SD.

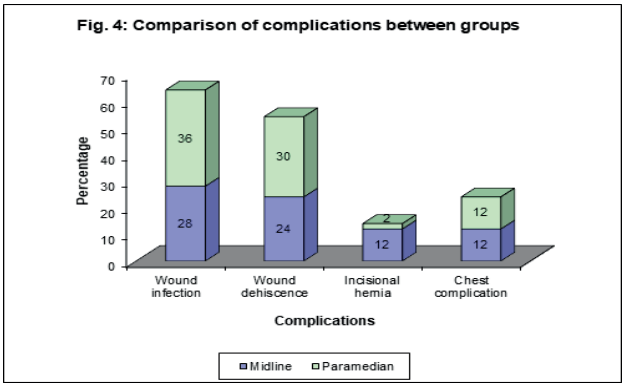


Fig. 4 & Table-IV show that incidence of incisional hernia was significantly higher in Midline Group (12%) than that in Paramedian Group (2%) ($p < 0.05$).

Table-IV: Comparison of complications between groups

Complications#	Group		p-value
	Midline (n= 50)	Paramedian (n=50)	
Wound infection	14(28.0) *	18(36.0)	0.260
Wound dehiscence	12(24.0)	15(30.0)	0.326
Incisional hernia	6(12.0)	1(2.0)	0.040S
Chest complication	6(12.0)	6(12.0)	0.620

* Values in the parentheses denote corresponding %.

All the variables, except incisional hernia, were analyzed using Chi-squared (x^2) Test and data were presented as n (%); the data of incisional hernia were analyzed with the help of Fisher's Exact Test. Level of significance was 0.05 and $p < 0.05$ was considered significant.

Incidence of wound infection and wound dehiscence are more in paramedian group.

Fig. 5 & Table V compares the outcome between groups. The healing time was observed to be significantly less in Midline Group than that in Paramedian Group (14.78 ± 1.10 vs. 18.16 ± 0.95 days, $p < 0.05$).

Fig. 5: Comparison healing time between groups

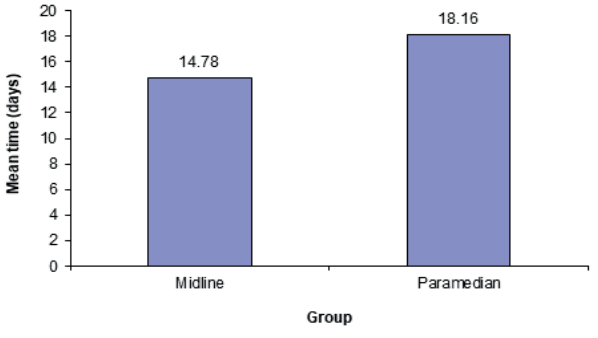


Table-V: Comparison of outcome between groups

Outcome	Group		p-value
	Midline (n= 50)	Paramedian (n=50)	
Healing time (days)	14.78 ± 1.10	18.16 ± 0.95	0.025

Data were analyzed using Student's t-test and were presented as mean ± SD.

Discussion:

Non traumatic gastro intestinal tract perforation is one of the most common causes of surgical emergency. A good number of patients are admitted almost every day in surgical wards with symptoms of acute abdomen. Almost all of them are treated by laparotomy either by midline or paramedian incision. Significant difference of outcome among these two incisions is observed. In this study, we compared 50 cases of midline group with 50 cases of paramedian group in terms of opening time, closing time, rate of wound infection, wound dehiscence, incisional hernia, chest complication, healing time, arbitrary amount of bleeding and surgeons' compliance. All patient had proper preoperative resuscitation, received same antibiotic (Ciprofloxacin + metronidazole), same suture materials was used in all case and thorough peritoneal toileting was done with normal saline plus Povidone iodine. Drain was given in all cases and all received post operative physiotherapy. Mean time taken for laparotomy or opening time in our study in midline incision was 3.81±1.01 minutes. This was close to findings of Keran SR, canolly EM[7] which was 4.37 minutes (7.5 second/cm^2). Mean opening time in paramedian group is 8.51 ± 3.67 minutes. Opening time in midline incision is significantly less than paramedian ($P < 0.001$). Mean time taken to close laparotomy wound or closing time in midline incision in our study is 11.84 ± 3.50 minutes and paramedian group that is 16.08 ± 3.37 minutes. Closing time were significantly less in midline group compared to paramedian group ($P < 0.001$). Incidence of wound infection in midline group was less (28%) compared to paramedian group 36% with P-0.260. Acta chir Sand[8]: Observed in 1980, 28.8% wound infection in dirty abdominal condition. According to Ann surg[9], rate of wound infection in dirty abdominal condition was 40%. Incidence of wound dehiscence in our study in midline group was 24% which is significantly less compared to paramedian group 30%, P-0.326. All forms of dehiscence ranging from superficial dehiscence to burst abdomen were included. Marwahs and Marwah N[10] observed 28% of incidence of wound dehiscence in midline laparotomy for peritonitis in a randomized clinical study of consecutive 50 cases. Talwars, Laddha BL[11], observed 37% wound dehiscence in paramedian laparotomy for typhoid Ulcer perforation. Incidence of incisional hernia in follow-up from after 2 months of operation to 1 year was 12% in midline group and 2% in paramedian group. Incidence of incisional hernia was significantly higher in midline incision ($P<0.05$). Ballon-Caneiro JM[12], observed 16% incidence of incisional hernia within 1-6 years in midline laparotomy. According to Br. J. surg[13], 0.37% incidence of incisional hernia in Para median laparotomy. According to JR Soc.med[14], Comparative study between midline and paramedian laparotomy reveals incidence of incisional hernia was 2 in midline and 20 in paramedian ($P<0.001$). Incidence of post-operative chest complication was similar in both groups (12%). Arbitrary amount of bleeding was more in paramedian incision than midline incision. Exact measurement of bleeding could not be done due to lac technical support in our hospital. Amount of bleeding was assessed arbitrarily from number of gauzes soaked and degree of soaking which was more in paramedian group than midline group. In observation by kerans SR, canolly EM[7] bleeding in laparotomy was

1.7ml/cm^2. Surgeon's compliance was better in paramedian group where approach to operation site was more comfortable than midline incision according to some surgeon. This difficulty was significantly over come by increasing length of incision for 2-3 cm, adequate muscle relaxation and good retraction. Healing time was assessed by post. Operative hospital stays. Mean post operative hospital stay in midline group was 14.78 ± 1.10 days and in Paramedian group that was 18.10 ± 0.95 days. Healing time was significantly lower in midline compared to Paramedian group (P<0.05). Talwars, Laddha BL[11], observed mean post operative hospital stay 16.8 days in typhoid ulcer perforation which is close to our observation. Increased post operative hospital stay in Paramedian group was due to increased incidence of wound infection and wound dehiscence and for subsequent management.

Conclusion:

It is concluded that midline incision is preferred compared to paramedian incision. Incidence of wound dehiscence and wound infection is less in midline incision. Per operative bleeding is also less. Regarding post operative hospital stay, paramedian incision observed longer hospital stay due to increased incidence of wound infection and wound dehiscence and for subsequent management.

Conflict of Interest: None.

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