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Research Article

A COMPARATIVE STUDY BETWEEN CLOSURE VERSUS NON-CLOSURE OF PARIETAL PERITONEUM AFTER NON-OBSTETRIC LAPAROTOMY SURGERY

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ABSTRACT

Background: The debate on closure versus non closure of parietal peritoneum after laparotomy has been going on since ages, 1st dating back to the 1930's. The aim of this present study is to compare the results of closure versus non closure of parietal peritoneum after laparotomy surgery in terms of post-operative complications.

Methods: A total of 100 patients irrespective of sex, were included in this study, who attended the out-patient department of general surgery or casualty of Krishna institute of medical sciences, Karad, from June 2017 to May 2019, requiring laparotomy surgery either on routine basis or as emergency basis. 50 patients were placed in group A, who underwent conventional peritoneal suturing after laparotomy surgery, whereas the other 50 cases were placed in group B, where peritoneum was left unsutured.

Results: 2% patients in each group developed wound dehiscence. Incidence of surgical site infection was 4% in group A and 2% in group B. Incidence of post-operative ileus was comparable in both groups. There was no incidence of faecal fistula in the present study. Incidence of incisional hernia was 2% in each group.

Interpretation and Conclusion: Owing to its tremendous regenerative capacity, and the fact that tensile strength of rectus sheath is far greater than that of the parietal peritoneum, purposeful omission of peritoneal suturing has hardly any drastic consequence on surgical success and results are comparable to that of conventional peritoneal suturing, as demonstrated in this present study.

INTRODUCTION

Proper closure of wound influences the success of surgery by healing[1-2]. Conventional teaching has taught us to close laparotomy wounds in layers i.e. parietal peritoneum followed by rectus sheath and finally skin. However since decades, many pioneering surgeons have put this practice to the test. After umpteen number of studies, they concluded that purposeful omission of parietal peritoneum suturing after laparotomy surgery makes no to the outcome of surgical success[3].

Healing of peritoneal defect is different from the healing of epithelial surfaces. Reconstruction of mesothelial defects have been considered to take place as follows:

1. From intact mesothelium surrounding the wound.
2. From mesothelialcells detached from peritoneum and implanted on the wounds as free graft.
3. By metaplasia of cells in the connective tissue underlying the wound.
4. By a combination of these mechanism.

Research has shown that peritoneal suturing leads to tissue ischemia which subsequently makes this site more prone to develop adhesions with omentum/ bowel[4]. In contrast, raw, unsutured peritoneum heals without adhesion formation. This has been put to the test with studies doing follow-up laparoscopy after laparotomy surgery. They found that adhesions between omentum/ bowel is mainly at the incision site where parietal peritoneum was sutured and the rest of the peritoneum was free of adhesions[5]. This suggests that patients might be benefited from non-closure of peritoneum after laparotomy as chances of developing adhesions can be reduced[6]. In addition the parietal peritoneum is pain sensitive owing to its rich nervous supply. Involving peritoneum in closure of laparotomy incisions might increase post-operative pain of the patients[7,8].

AIM AND OBJECTIVES

Aim

To do a comparative study between closure versus non-closure of parietal peritoneum after non-obstetric laparotomy surgery.

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Objectives

To compare the outcome of closure versus non-closure of parietal peritoneum after non-obstetric laparotomy surgery with respect to post-operative complications like

- Surgical site infection
- Wound dehiscence
- Burst abdomen
- Ileus
- Fecal fistula
- Incisional hernia (after a 1 year follow-up period)

MATERIAL AND METHODS

The present study was carried out at Krishna Institute of Medical Sciences, Karad, where 100 patients, irrespective of sex were included in the study. 50 patients were allotted group A where peritoneum was included in their laparotomy closure, and, the other 50 patients were allotted group B, in whom peritoneum was left unsutured. In each group 25 patients were operated on routine basis and 25 were operated on emergency basis.

Method of closure of laparotomy incision in each group was done as follows-

Group A-control group-closure was carried out as follows

1. Parietal peritoneum-sutured with vicryl 2-0 suture in continuous interlocking fashion
2. Rectus sheath-sutured by prolene 1-0 suture in continuous interlocking fashion
3. Skin-sutured by polyamide 2-0 suture by interrupted mattress sutures.

Group B-control group-closure was carried out as follows

1. Parietal peritoneum-LEFT UNSUTURED
2. Rectus sheath-sutured by prolene 1-0 suture in continuous interlocking fashion
3. Skin-sutured by polyamide 2-0 suture by interrupted mattress sutures.

Inclusion Criteria

Patients needing laparotomy of all age groups in emergency as well as elective cases.

Exclusion Criteria

1. Those needing wide paramedianincision.
2. Patients on cytotoxicdrugs.
3. Patients who are having edema due to-

- Anemia
- Malnutrition
- Hypoproteinaemia.

a. Those having widespreadsepsis
b. Those having widespreadmalignancies
c. Chronic debilitating diseases which are a constant threat to life.

RESULTS

Table 1 Distribution of routine and emergency cases

GROUP	ROUTINE		EMERGENCY	
	Group A	Group B	Group A	Group B
	23	27	27	23
TOTAL	50		50	

In the present study, 50 cases were operated on routine basis and 50 on emergency basis. In group A, 23 cases were operated on routine basis and 27 cases were operated in emergency. In group B, 27 patients were operated on routine basis and 23 were operated in emergency.

Table 2 Age-wise distribution of cases

Age Group	Routine Case		Emergency Case	
	Group A	Group B	Group A	Group B
0-10	-	-	1	2
11-20	4	1	1	4
21-30	6	7	6	3
31-40	7	10	11	7
41-50	4	6	5	3
51-60	2	1	-	3
61-70	-	2	3	1
TOTAL	50		50	

In the present study, maximum cases were operated between the ages of 21-50 years.

Table 3 distribution of cases according to sex and age

Age Group (in years)	Male	Female
0-10	3	-
11-20	4	6
21-30	13	9
31-40	17	18
41-50	9	9
51-60	4	2
61-70	1	5
TOTAL	51	49

In the present study, 51 cases were males and 49 cases were females. Among males and females, maximum number of cases were between 21-50 years.

Table 4 (A) Distribution of cases operated in routine basis.

Sr. no.	Diagnosis	No. of cases
1.	Cholelithiasis	13
2.	Gastric Outlet Obstruction	6
3.	Lump Abdomen	14
4.	Meckel's Diverticulum	2
5.	Chronic Intestinal Obstruction	11
6.	Obstructive Jaundice	4
	TOTAL	50

In the present study, of the 50 cases operated in routine basis, maximum number of cases were cholelithiasis, abdominal lump and chronic intestinal obstruction.

Table 4 (B) Distribution of cases operated on emergency basis

Sr. no.	Diagnosis	No. of cases
1.	D.U. Perforation	15
2.	Stab Injury	2
3.	Blunt Abdominal Trauma	8
4.	Enteric Perforation	17
5.	Large Gut Volvulus	1
6.	Small Gut Volvulus	4
7.	Intussusception	3
	TOTAL	50

In the present study, of the 50 cases operated on emergency basis, maximum number of cases were of hollow viscous perforation.

Table 5 List of various incisions used

Incision	Routine		Emergency	
	Group A	Group B	Group A	Group B
UpperRight Para-median	-	-	7	8
Midline	12	16	20	17
Upper Midline	3	1	4	2
Lower Midline	1	1	6	2
TOTAL		**100**		

Para-median incision was used in 15 cases of which in 7 cases, peritoneum was closed and in the remaining 8, peritoneum was left unsutured. Midline incision was used in 85 cases of which 46 cases were sutured and 39 cases were left unsutured.

Table 6 list of post-operative complications

	Complication	Group A	Percentage	Group B	Percentage
1.	Surgical site infection	2	4 %	1	2 %
2.	Wound dehiscence	1	2 %	1	2 %
3.	Burst abdomen	0	0 %	0	0 %
4.	Ileus	2	4 %	2	4 %
5.	Fecal fistula	0	0 %	0	0 %
6.	Incisional hernia (after 1 year follow-up)	1	2 %	1	2 %

In the current study, incidence of wound dehiscence and incisional hernia was 2% in both groups. Incidence of surgical site infection was 4% in group A and 2% in group B. incidence of post-operative paralytic ileus was 4% in each group. None of the cases presented with burst abdomen and fecal fistula. Overall complication rate was 12 % in group A and 10% in group B.

Of importance

1. Analgesia was provided in the form of non-steroidal anti-inflammatory drugs via intravenous route in equal doses and frequency to both groups and post-operative pain was assessed using visual analogue scale. Readings of pain on the visual analogue scale were comparable in both groups.
2. Depending upon the length of the laparotomy incision, closure time of laparotomy incision was 3-8 minutes lengthier in group A as compared to group B.

DISCUSSION

Traditional dictum states that closure of laparotomy incision should first commence with closure of peritoneum, followed by rectus sheath and finally by skin. However this school of thought has been challenged by many surgeons.

The peritoneum is one continuous sheet, forming two layers and a potential space between them: the peritoneal cavity. The outer layer, the parietal peritoneum, is attached to the abdominal wall and the pelvic walls. The peritoneum unlike other body tissues has tremendous capacity of regeneration. However, what it makes up for in healing, it lags behind in tensile strength.

During investigations with cadaver material Seidel *et al*.[9] measured a breaking force of 73.6631.4 N/cm on the anteriorleaf of the rectus sheath in lateral direction and 19.669.8 N/cm incranial-caudal direction. At the posterior leaf of the rectus sheath abreaking force of 66.7629.4 N/cm in lateral and 14.765.9 N/cmin cranial-caudal direction was measured. For the lineaalba a breaking force of 82.4627.5 N/cm in lateral and 32.4614.7 N/cm in cranial-caudal direction was measured. Comparing this to the results of Hollinsky *et al*.[10], a good consistency for the cranial/caudal direction in the linea alba becomes obvious but about twice as high forces in the lateral direction are reported bySeidel[9]. As the experimental setups are comparable, this might be due to the preservation method of the tissue.

This further validates the above statements and clearly demonstrates the superior strength of the rectus sheath and lineaalba over the parietal peritoneum.

The current study was carried out on 100 patients, irrespective of sex in Krishna Institute of Medical Science, Karad. 50 patients underwent peritoneal suturing as part of laparotomy incision closure and in 50 patients peritoneal suturing was omitted.

The current study was not sexually biased and included 51 males and 49 females. Maximum number of patients were lying between ages of 21-50 years among both sexes

Ellis *et al* randomised the closure of verticallaparotomy wounds.Ellisetalintheirstudyselected343patientsoutof these 168 patients were put in group "A" where after laparotomy peritoneum was closed and 175 in group "B" where peritoneum was not sutured after laparotomy. He carried out laparotomies by median incisions (one-layer closure 41%; two-layer closure 39%) and paramedian incisions (one-layer closure 52%, and two-layer closure 57%).

In the present study, 50 cases were operated on routine basis and 50 on emergency basis. In group A, 23 cases were operated on routine basis and 27 cases were operated in emergency. In group B, 27 patients were operated on routine basis and 23 were operated in emergency.

Para-median incision was used in 15 cases of which in 7 cases, peritoneum was closed and in the remaining 8, peritoneum was left unsutured. Midline incision was used in 85 cases of which 46 cases were sutured and 39 cases were leftunsutured.

In the study carried by H. Ellis and R. Heddle (1977), out of the list 11% in group "A" and 7% in group "B" developed post-operative complications.

In our study, overall complication rate was 12 % in group A and 10% in group B.

J.M.Gilbert, H.Ellis and Sharon Fowerakerrandomized 145 patients in two groups. This time they used only paramedian incision. In 75 patients the peritoneum was closedandin70 patients the peritoneum was leftunsutured purposefully and rectus sheath was repaired by monofilament-1-suture and follow up was done during the post-operative period and at 1, 3, 6, 12 months after operation. In the perspective of their studies they noted burst abdomen and wound dehiscence of 0% in group "A" and 0% in group "B"; and 1.3% in group "A" and 0% in group "B" respectively.

In our study the incidence of wound dehiscence was 2% in each group. We did not encounter any case of burst abdomen in our present study.

In their series H. Ellis and R. Heddle noticed incidence of wound hernia up to 2.8%.

In our present study we reported the incidence of incisional hernia as 2% in each group after 1 year follow up period.

When tensiometry was done and observation for adhesion to scars were taken in experimental rabbit study, the findings were statistically significant in the study conducted by Ellis *et al* (1977). But tensiometry was not donein the present study because the study was conducted on human subjects. The adhesion to scar was also not seen but a year follow-up of the patients revealed that none of them neededrelaparotomy.

CONCLUSION

In the present study, peritoneal suturing was carried out for 50% of patients and in the remaining 50%, peritoneal suturing was omitted. Results obtained after comparative study was comparable in both groups. No 1 group produced statistically significant observations over the other.

As mentioned earlier, parietal peritoneum has an efficient and dynamic regenerative capacity, aiding in its quick healing-whether sutured or left unsutured. However since it lacks tensile strength, suturing of parietal peritoneum during laparotomy incision closure provides little if at all no strength to the overall wound. Moreover incorporating parietal peritoneum in the closure of laparotomy incisions has increased predisposition to adhesion formation in the future. Furthermore in difficult closures where exposure is not good, possibility of involving bowel / omentum is high.

Purposeful omission of peritoneal suturing also saves on cost of suture material. On an average, depending on length of incision, closure time is reduced by 3-8 minutes, depending on expertise of surgeon.

Contrary to popular practice, purposeful omission of parietal peritoneal suturing after laparotomy surgery is a safe and effective technique for laparotomy incision closure as elucidated in our study.

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