ABDOMINAL WOUND CLOSURE WITH PERITONEAL SUTURING VIS A VIS WITHOUT PERITONEAL SUTURING- A COMPARATIVE STUDY

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ABSTRACT

BACKGROUND

The objective of this study was to determine by a prospective randomized clinical trial whether omission of peritoneal suture has any effect on postoperative wound pain, wound sepsis, wound dehiscence, wound hernia etc.

MATERIALS AND METHODS

Materials for this study consisted of 200 cases, both emergency as well as routine admitted to The Department of General Surgery, MKCG Medical College and Hospital, Berhampur during the year 2016 to 2018. Altogether 200 patients were included in this series. 100 patients were included in group A where peritoneum was included and closed in layers and 100 patients in group B where peritoneum was left unsutured. Out of 100 patients, 50 cases were routine cases and 50 cases were emergency cases in each group. A comparative study was done.

RESULTS

5% of patients developed wound dehiscence, 10% of patients developed wound infection in each group. 10% developed wound hernia in group A and 5% in group B. Peritoneal suturing provides little wound strength and omission makes no differences but peritoneum closure was associated with slightly increased incidence of wound hernia.

CONCLUSION

The present series comprised of 200 laparotomies (100 Emergency and 100 Routine), out of which in 50 emergency laparotomies and 50 routine cases, peritoneal suturing was done and in the rest half peritoneal suturing was omitted.

5% of patients developed wound dehiscence in both groups. 10% of patients developed wound infection in each group. 10% developed wound hernia in the group where peritoneum was sutured and 5% in the group where peritoneum was left unsutured. Peritoneal suturing provides little wound strength and omission makes no difference.

KEYWORDS

Peritoneum Closure, Wound Dehiscence, Laparotomy.

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BACKGROUND

Even in current surgical practice, traditional method of abdominal wound closure after laparotomy is suturing of different layers of abdominal wall (including peritoneum) separately. Traditional teaching also advocates that after laparotomy peritoneal layer should be carefully and separately sutured during abdominal wall closure. Although the rational basis for this step is difficult to determine. Taboo behind this is that peritoneal suturing discourages wound dehiscence, contributes to wound strength and preventing leakage of intraperitoneal contents which might induce wound sepsis. But on the basis of works carried out by many eminent surgeons, it has been proved that if peritoneum is not included in abdominal wound closure, this makes no difference and post-operative results are equally good.[1]

Whatever be the method of abdominal wound closure, it should be simple, free from complications like burst abdomen incision hernia etc. and should give less postoperative problem to the patient and early mobilization as well.

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

(i) From intact mesothelium surrounding the wound.
(ii) From mesothelial cells detached from peritoneum and implanted on the wounds as free graft.
(iii) By metaplasia of cells in the connective tissue underlying the wound.
(iv) By a combination of these mechanism.

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Several investigators (Ellis H.[2] Br. J. Surg. 50: 1962) have demonstrated that ischaemic tissue, such as that produced by suture or patching of the peritoneum is the strongest stimulus to the formation of peritoneal adhesion, whereas raw peritoneal defects heal without adhesion formation. Best example of this is that after re-exploration omentum or bowel commonly found adherent to the parietal peritoneum involved in the previous peritoneal closure, whereas the rest of the peritoneal cavity may be free of intraperitoneal adhesions.[3] So all this suggests that omission of peritoneal suture may possibly be beneficial because of reduced adhesion to the posterior aspect of wound.[4] In addition, the parietal peritoneum is richly innervated by somatic pain fibres and is acutely sensitive to mechanical stimulation. Therefore, suture of this layer may contribute significantly to post-operative wound pain.[5,6]

MATERIALS AND METHODS:

Materials for this study consisted of 200 cases, both emergency as well as routine admitted to The Department of Surgery, MKCG Medical College and Hospital, Berhampur during the year 2016 to 2018. Altogether 200 patients were included in this series. 100 patients were included in group A where peritoneum was included and closed in layers and 100 patients in group B where peritoneum was left unsutured. Out of 100 patients in each group 50 cases were routine case and 50 cases were emergency cases. A comparative study was done.

Closure of the Abdominal Incision:

Group A

In this group after laparotomy the closure was done in layers i.e.: -

- Peritoneum.
- Rectus sheath.
- Skin, separately.

Group B

In this group after laparotomy, during closure, peritoneum is left as such i.e. unsutured and rectus sheath is repaired properly preferably by Prolene No. 1 or Prolene 1-0 (i.e. nonabsorbable sutures) and then skin by interrupted sutures with polyamide.

Suture Material

Group A

1. Peritoneum-Absorbable suture, (chromic 1/1-0) Continuous.
2. Rectus- Monofilament (or Prolene) No. 1/1-0.
3. Skin- polyamide.

Group B

1. Peritoneum Left unsutured.
2. Rectus- Monofilament (or Prolene) No. 1/1-0.
3. Skin- polyamide.

Inclusion Criteria

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

Exclusion Criteria

(i) Those needing wide paramedian incision.
(ii) Jaundiced patient.
(iii) Patients on steroids.
(iv) Patients on cytotoxic drugs.
(v) Uraemic patients:
(vi) Patients who are having oedema due to -
- Anaemia
- Malnutrition
- Hypoproteinaemia.

(vii) Those having widespread sepsis
(viii) Those having widespread malignancies
(ix) Uncontrolled diabetes.

RESULTS

200 cases were operated upon and included in this study. Out of these 200 cases 100 were routine cases. Out of these 200 cases, 100 cases consist of the control group i.e. Group A and 100 cases consist the study group i.e. Group B.

In control group, after laparotomy abdominal wound closure is done in layers i.e. - Peritoneum, Rectus sheath, Skin separately sutured.

In study group after laparotomy wound closure is done without peritoneal suturing.

The cases were selected from Out-patient Department and Emergency Department of MKCG Medical College and Hospital and studied operatively and post-operatively and followed up to 1 year.

Age Group	Routine Case		Emergency Case	
	Group A	Group B	Group A	Group B
0-10	-	-	05	05
11-20	05	15	-	05
21-30	10	15	15	25
31-40	15	10	10	05
41-50	10	-	15	05
51-60	05	05	-	-
61-70	05	05	-	-

Table 1. Incidence of Cases in Different Age Groups

Age Group (in years)	Male	Percentage	Female	Percentage
0-10	05	5.0	05	5.0
11-20	05	5.0	20	20.0
21-30	35	35.0	30	30.0
31-40	10	10.0	30	30.0
41-50	25	25.0	05	5.0
51-60	10	10.0	10	10.0
61-70	10	10.0	0	0

Table 2. Incidence of Cases Sex wise

1.	Cholelithiasis	10	10.0
2.	Gastric Outlet Obstruction	10	10.0
3.	Lump Abdomen	10	10.0
4.	Appendicitis	20	20.0
5.	Meckel's Diverticulum	10	10.0
6.	Chronic Intestinal Obstruction	20	20.0
7.	Obstructive Jaundice	10	10.0

Table 3. Incidence of Cases Disease Wise (Routine)

	Disease	Number	Percentage
1.	D.U. Perforation	25	25.0
2.	Stab Injury	10	10.0
3.	Fire Arm Injury	15	15.0
4.	Blunt Abd. Trauma	05	5.0
5.	Enteric Perforation	15	15.0
6.	Large Gut Volvulus	15	15.0
7.	Small Gut Volvulus	10	10.0
8.	Intussusception	05	5.0

Table 4. Incidence of Cases Disease Wise (Emergency Cases)

Incision	Routine		Emergency	
	Group A	Group B	Group A	Group B
Upper Right Paramedian	05	10	15	05
Lower Right Paramedian	30	25	05	20
Lower Left Paramedian	05	05	05	05
Midline	0	05	10	10
Upper Midline	05	05	05	05
Lower Midline	05	0	05	05
Upper Left Paramedian	0	0	05	0

Table 5. Type of Incision Used in Performing Various Operations

	Complication	Group A	%	Group B	%
1.	Wound Infection	10	10.0	10	10.0
2.	Wound Dehiscence	05	5.0	05	5.0
3.	Wound Hernia	10	10.0	05	5.0
4.	Chest (Pulmo.) Infection	10	10.0	05	5.0
5.	Faecal Fistula	0	0	05	5.0
6.	Ileus	0	0	0	0

Table 6. Incidence of Post-Operative Complications Following Abd. Closure

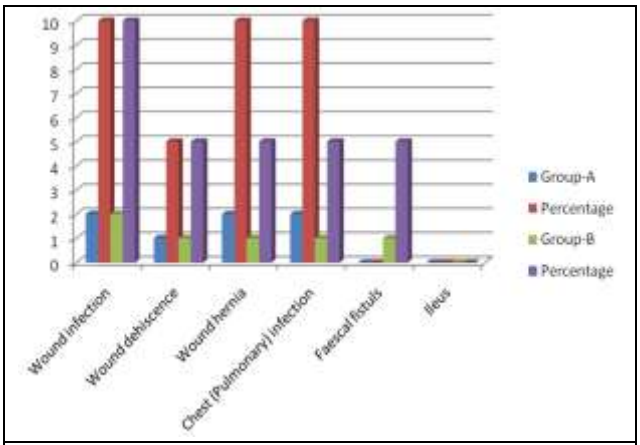

Chart 1. Incidence of Post-Operative Complication Following Abd. Closure. Y Axis 1 Unit= 5 Patients in Groups

Total Cases	Group A	%	Group B	%
200	100	50.0	100	50.0
Wound Dehiscence	05	5.0	05	5.0
200	100	50.0	100	50.0
Wound Dehiscence	05	5.0	05	5.0
Wound Hernia	10	10.0	05	5.0

Table 7. Complication During Follow-Up Period

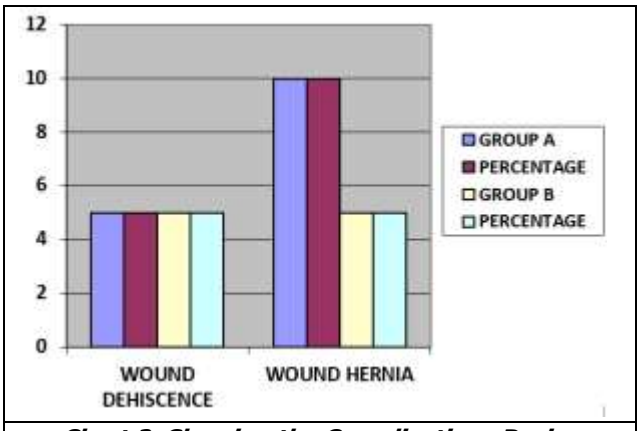

Chart 2. Showing the Complications During Follow-Up Period

Wound dehiscence was noticed in ten emergency cases. Five were in group A operated for D.U. perforation with feature of severe peritonitis and shock. They developed feature of dehiscence on fifth, seventh and ninth day of operation. Another five patients of large gut volvulus, blunt trauma abdomen were in group B. They developed feature of dehiscence on 10th and 11th day after operation.

Among fifteen patients who had developed wound hernia ten were in group A who developed incisional hernia after four months and another five were in group B who developed incisional hernia at six months follow up.

DISCUSSION

The age-old method for suturing abdominal wound is suturing of different layer of abdomen (peritoneum, rectus sheath and skin) separately i.e. one must suture the peritoneum. But there are many situations in which in spite of all care, closure of peritoneum perfectly not become possible e.g. obese person, too much distended abdomen, debilitated person with poor anaesthesia etc. But in that case, we experienced not any marked deleterious effects later on.

There exist situations when due to factors like-

- Location of incision.
- Body built of the patient.
- Depth of anaesthesia.

Closure of peritoneum becomes awkward and add considerable time to closure of the wound. Sometimes it may also interfere with juxtaposition of the edges of the fascia. It has already been reported by several authors that routine, purposeful omission of closure of peritoneum did not have adverse effects on healing of peritoneum.

Available literature on the subject has been studied and the present work has evaluated them.

In the present study we have tested the relevance of peritoneal closure in the healing of abdominal incisions from the point of view of wound strength, adhesions, hernia, infections, wound dehiscence and other complications.

Since this study is carried upon on 100 cases in each group, the result may be far from the standard. We got slightly more percentage of post-operative complications in both groups than complications observed by other author. Definitely it may be result of less number of cases that has been studied, poor hospital environment and poor socio-economic condition of the patients admitted here, who cannot afford desired proper drugs as well as his/her low physical condition.

Routine cases as well as emergency cases are included in this study and vertical abdominal incisions are used. The study of 100 cases with peritoneal suturing and 100 cases without peritoneal suturing is compared in the perspective of wound strength, post-operative complications and adhesion. One year follow up of the cases done.

Incidence

Patients regardless of any discretion of age and sex were taken into two groups viz-group "A" and group "B". In group "A" peritoneal suturing was done and in group "B" peritoneal suturing was omitted.

In routine cases 50% of- cases were in age group 21-40 years while in emergency cases 40% of cases were in younger age group i.e. (21 - 30 years).

The maximum number of cases in group "A" were from (21-30 years, 31-40 years and 41-50 years) 25 cases in each group and maximum number of cases in group "B" were from (21-30 years) age group. It includes 40 cases out of 100 cases.

Among total cases included in this study 50% were emergency procedures and 50% were routine procedure. Out of which 50% emergency procedures and 50% routine procedures were allocated to group "A" and group "B".

Out of list 50% patients were male and 50% were female.

Among all cases in group "A" 10 patients were having obesity; five were having malignancy and five were having chest infections and chronic cough.

In group "B" 15 patients were having obesity and 10 patients were having chest infection. Out of the list, 60 cases were done by midline incisions in which 30 cases were done by peritoneal suturing and 30 cases were done without peritoneal suturing.

40 cases were done by paramedian incision in which 20 cases were done by peritoneal suturing and 20 cases were done without peritoneal suturing.

First work on human being was carried on by H. Ellis & R. Heddle (1977), after thoroughly reviewing the experimental studies.

Ellis et al randomised the closure of vertical laparotomy wounds. Ellis et al in their study selected 343 patients out of 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 our studies we carried out laparotomies on 200 patients, 100 in each group, out of which median incision (one-layer closure 30%, two-layer closure 30%) and paramedian incision (one-layer closure 70%, and two-layer closure 70%) were given.

Ellis et al did emergency operations in which in 8% closure was done in one layer and in 10% closure was done in two layers. In our study 50% emergency and 50% routine operations were performed in each group. In 50% cases closure was done in one layer leaving the peritoneum and in 50% cases peritoneal suturing was done.

In their study the patients with obesity and chest infection were (34% group "A" and 30% group "B") and 15% in group "A" and 19% in group "B" respectively.

In our study obese patients constituted 10% in group "A" and 15% in group "B" and patients with chest infection constituted 5% in group, "A" and 10% in group "B".

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 studies 15% in group "A" and 10% patients in group "B" developed post-operative complications.

In their study, the incidence of dehiscence in group "A" was 4%, incidence of hernia in group "A" was 7% as compared to 5% and 7% in group "B" respectively.

In our studies on 100 patients in each group. We detected an incidence of 5% wound dehiscence and 10% wound hernia in group "A" as compared to 5% wound dehiscence and 5% wound hernia in group "B".

As seen by H. Ellis and R. Heddle (1977) failure rate with median and paramedian incision was 8.7% and 5.9% respectively.

In our studies the failure rate with median incision was 33% and failure rate with paramedian incision was 3.5%.

In their study obesity accounted for 11.7% and chest infection for 18.3% failure.

In our study the failure rate with obesity is 20% and that with chest infection is about 33%.

In the study done by H. Ellis and R. Heddle (1977) failure rate with emergency operation was 12% whereas in our study the failure rate with emergency operation was 20%.

In the present study, only obesity and chest infection has reached the level of statistical significance. The results are better in present series because selection of cases are made where jaundice, widespread malignancy, uremia and uncontrolled diabetes are not included.

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 done in 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 needed relaparotomy.

J. M. Gilbert, H. Ellis and Sharon Foweraker randomized 145 patients in two groups. This time they used only paramedian incision. In 75 patients the peritoneum was closed and in 70 patients the peritoneum was left unsutured 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% group "A": 0% group "B") and 1.3% in group "A" and 0% in group "B" respectively.

In our study we noticed wound hernia of 10% in group "A" and 5% in group "B" while wound dehiscence of 5% in group "A" and 5% in group "B".

Wound infection was noticed in 9.3% in group "A" and 11% in group "B" in the study of Gilbert et al. In our study the incidence of wound infection was 10% in group "A" and 10% in group "B".

Thomas B. Hugh: Charles Nan Kivell et al published their original scientific reports in 1990. They randomized their cases in 2 groups (i.e. cases in which peritoneal repair was done and cases in which peritoneal repair was omitted). They put 87 patients in group "A" and 98 patients in group "B". They used midline incisions.

Finally, they came out with flying results. They detected wound sepsis and wound dehiscence in 2.2% and 0% cases in group "A" and 3% and 1% in group "B". The incidence of incisional hernia in their study was 1.1% in group "A" and 1% in group "B".

In our study using midline incisions in 60 cases the rate of wound sepsis was 0% and wound dehiscence was 8.3%; wound hernia was 16.6% in group "A" and wound sepsis was 0%, wound dehiscence was 8.3% and incisional hernia was 0% in group "B".

Narcotic administration was recorded daily for 5 days in patients with group "A" and group "B". As compared to group "A" who took 10 shots of Narcotics in post-operative period, group "B" patients needed only 5 shots of narcotics in first five post-operative day.

In the study of Thomas B. Hugh et al, the narcotic requirement in group "A" was 1.5 mg/kg morphine equivalent as compared to 1.3 mg/kg morphine equivalent in group "B".

An examination of the complicating factors in the post-operative course of these patients with disrupted wounds was made in order to elicit any possible correlation with the incidence of disruption. A post-operative predisruption complicating factor was noted in the records of 200 patients. Pulmonary complications accounted for 33% and obesity 20%. These were not amenable to the use of antibiotics, nasogastric tube decompression. The other two categories haematoma and infection are more easily preventable. The overall infection rate was 10%. Average day of wound dehiscence was found to be 8th to 9th day post-operatively.

Our clinical study has failed to reveal any obvious differences between the healing of laparotomy wounds with the peritoneum sutured or left open layer.

Recent papers on abdominal wound dehiscence published over the past decade, usually give an incidence of' between 1 and 3 percent in vertical abdominal incisions. (Higgins et al 1969; Mandoza et al 1970; Keil et al 1973; Irvin et al 1976).

In our study we noticed a rate of 5% of wound dehiscence in a series of work carried out over 200 patients whether peritoneum is sutured or not sutured.

Blomstedt and Welin Berger (1972) note a 10% incidence of wound hernia following 279 cholecystectomies.

In cholecystectomies in our study the incidence of wound hernia was 0% and altogether of incisional hernia was 7.5%.

In their series H. Ellis and R. Heddle noticed incidence of wound hernia up to 2.8% which is 7.5% in our studies.

Alexander and Prudden (1966) blamed chest complications and infections.

In our study the maximum number of wound failures met with chest infection and then obesity.

Bayer and Ellis (1977) showed that healing of the abdominal incisions was seriously impaired in animals rendered jaundiced by common bile duct ligation. Human studies in this case are lacking.

This study has also supported the findings of Donaldson et al and Guillou et al that lateral paramedian incisions are better. It has great intrinsic strength in the immediate post-operative period to the extent that burst abdomen did not occur.

Out of 200 cases performed in this series we met ten cases of wound hernia with midline incision while we got only five cases of wound hernia with lower right paramedian incision during follow up period.

Follow Up

Follow up was satisfactory in our experiment. Ten patients of group "A" and five patients of group "B" did not turn up during follow up period. Follow up was incomplete at 6 months follow up in only 10 patients in group "A" and 5 patients in group "B". Five patients in group "A" developed wound hernia.

At one year follow up 10 cases each from group "A" and group "B" did not turn up and five case in group "A" and five cases in group "B" developed incisional hernia.

Since this study was carried upon on small number of cases the results may not be standard and to come with a definite conclusion is difficult.

CONCLUSION

The present series comprised of 200 laparotomies (100 Emergency and 100 Routine), out of which in 50 Emergency and 50 routine cases, peritoneal suturing was done and in the rest half peritoneal suturing was omitted.

5% of patients developed wound dehiscence in both groups. 10% of patients developed wound infection in each group. 10% developed wound hernia in the group where peritoneum was sutured and 5% in the group where peritoneum was left unsutured. Peritoneal suturing provides little wound strength and omission makes no differences. Because parietal peritoneum is pain sensitive, after suturing it with multiple bite gives more post-operative pain to the patient and there is more need of narcotics in post-operative period. While when peritoneum is left as such, post-operative pain to the patient is reduced comparatively, so patient needs less narcotics and analgesics post-operatively. There is less chance of taking bite in viscera and repair is amenable under vision. There is less chance of wound adhesion if peritoneal suture line is left as such. It is less time consuming. There is less expenditure on suture materials if peritoneum is left unsutured. Midline as well as paramedian incisions are equally good and makes no difference whether peritoneum is being closed or not. Quick in, quick out surgery is possible in Emergency and also helpful where relaxation is not satisfactory. Cases were followed up for one year and wound hernia was found more in the group where peritoneum was sutured. However, we got slightly higher percentage of post-operative complications in both groups than observed by other authors. Definitely it may be a result of some poor hospital environment, comparatively less perfect operation theatre facility and poor socio-economic condition of patients admitted who cannot afford costly antibiotics and possesses poor physical condition.

Finally, it is inferred that suturing of the parietal peritoneum is not necessary at least in vertical abdominal incisions (Midline + Paramedian). If the rectus sheath closure is done by monofilament or Prolene suture.

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