



“A COMPARATIVE STUDY OF SINGLE LAYER CLOSURE AND CONVENTIONAL LAYERED CLOSURE OF LAPROTOMY WOUNDS IN OUR INSTITUTE.”

Surgery

Dr Mahendrasinh Dabhi

3rd Year Surgery Resident, C.U.Shah Medical College and hospital, Surendranagar

Dr Parthrajsinh Vadher

Assistant Professor, C.U.Shah Medical College and hospital, Surendranagar

Dr Mitesh Chavda

2nd Year Surgery Resident, C.U.Shah Medical College and hospital, Surendranagar

Dr Jitesh Rathod

2nd Year Surgery Resident, C.U.Shah Medical College and hospital, Surendranagar

Dr. Salil Kharod

Professor, C.U.Shah Medical College and hospital, Surendranagar

ABSTRACT

Background: Many of the operations performed by the general surgeons take place within the abdomen and consequently incision and suturing of the abdominal layers are the commonest exercises in operative surgery. Abdominal closure is very important as regards to incision, technique of repair and use of newer suture material, and has created a great interest to surgeons. Recent data suggests that technical factors are crucial and can be manipulated by the surgeon. Different suture techniques are used for closure of laparotomy wounds and each has its strong proponents. But the ideal method of abdominal wound closure is modified frequently. Commonly followed methods of abdominal closure are conventional layered closure and single layer closure. Since 1973, different workers have carried out comparative studies of these two methods with encouraging results and single layer closure was found to have definite advantages over conventional closure as regards to operating time, cost, feasibility, ease and postoperative morbidity. The present study is taken up to evaluate the advantages of single layer closure in comparison with the conventional layered closure on the basis of operative time, healing time and postoperative morbidity such as wound infection, burst abdomen and incisional hernia. **Objective:** To compare the techniques of single layer closure and conventional layered closure of laparotomy wounds on the basis of operative time and post-operative complications. **Methods:** Prospective study of 100 patients who underwent laparotomy in CU Shah Medical College and Hospital, Surendranagar, for abdominal surgical problems needing either emergency or elective surgery was carried out after taking approval from ethical committee. Out of these 100 patients, 50 patients underwent laparotomy wound closure by single layer closure technique and the rest 50 patients by conventional layered closure technique. Time taken for closure of laparotomy wound was noted and patients were followed up post-operatively for any wound complications like seroma, wound infection, wound gaping, burst abdomen and incisional hernia. **Results:** The mean time taken for closure of laparotomy wounds by single layer closure technique was 19 minutes and by conventional layered closure technique was 27 minutes. There was a difference of 8 minutes which was statistically significant ($p=0.001$). In the postoperative period, in patients who underwent single layer closure, totally 9 patients (18%) had post operative complications. In those 3 patients (6%) had seroma, 3 patients (6%) had wound infection, 2 patients (4%) had wound gaping, 1 patient (2%) had burst abdomen and none had incisional hernia. In patients who underwent conventional layered closure, totally 15 patients (30%) had post operative complications. In those 5 patients (10%) had seroma, 4 patients (8%) had wound infection, 3 patients (6%) had wound gaping, 2 patients (4%) had burst abdomen and 1 patient (2%) had incisional hernia. **Conclusion:** Laparotomy wound closure with single layer closure technique is better than the conventional layered closure technique in terms of decreased operative time and also decreased postoperative complications.

KEYWORDS

Laparotomy wound; Single layer closure; Conventional layered closure; Seroma; Wound infection; Wound gaping; Burst abdomen; Incisional hernia.

MATERIAL AND METHODS

Material

This study includes 100 patients who were admitted in the Department of Surgery, CU Shah medical college and Hospital, Surendranagar, during the period of May 2020 to July 2021, for abdominal surgical problems needing either elective or emergency surgery. The patients were chosen randomly, irrespective of their age, sex and nature of disease.

Out of these 100 patients, 50 were randomized to have the abdominal wall closed by single layer closure technique and remaining 50 by conventional layered closure and they were grouped as Group 1 and Group 2 respectively.

Inclusion Criteria:

- Patients aged 15-75 years.
- Patients posted for laparotomy, either elective or emergency.
- Patients who underwent surgery with midline, paramedian and subcostal incisions.

Exclusion Criteria:

- Patients with co-morbid conditions like diabetes mellitus, immunocompromised patients, patients on cancer chemotherapy, immunotherapy and on long term steroids.
- Patients who died within 7 days after surgery.
- Patients who underwent surgery by Grid-iron and Transverse abdominal incisions.
- Patients who underwent second laparotomy or relaparotomy.

RESULTS AND ANALYSIS

The results of this study of 100 patients who underwent laparotomy for

abdominal surgical problems at Cu shah medical college and Hospital, Surendranagar, areas follows Male : Female ratio in our study undergoing laparotomy was 3: 1

In our study, 30 patients underwent elective surgery and 20 patients underwent emergency surgery in group 1 and in group 2, 27 patients underwent elective surgery and 23 patients underwent emergency surgery.

In our study, 64% of patients had midline abdominal incision and 33% had right paramedian incision. 84% of patients in single layer closure technique had midline incision and 12% had right paramedian. Whereas only 44% of patients had midline incision and 54% had right paramedian incision in conventional layered closure group.

Post Operative Complication In The Study Group:

In our study, in single layer closure group, totally 9 patients (18%) and in conventional layered closure group, 15 patients (30%) had post operative complication like seroma, wound infection, wound gaping, burst abdomen and incisional hernia. There is increased risk of SSI in open surgeries.^[13]

1) Seroma:

In group 1, all the 3 patients who had seroma were anaemic. In group 2, out of 5 patients who had seroma, only one had anaemia, and 4 out of 5 patients underwent emergency surgery.

2) Wound infection:

In group I, all the 3 patients who had wound infection underwent emergency surgery. In that one patient was anaemic and one patient

had uraemia. In group 2, out of 4 patients who had wound infection one underwent emergency surgery and 2 patients had anaemia.

3) Wound gaping:

In group 1, both the patients who had wound gaping underwent emergency surgery and both had chest infection with cough. One patient was anaemic and the other was hypertensive. In group 2, out of 3 patients who developed wound gaping, 2 patients underwent emergency surgery. One patient was anaemic and one patient was hypertensive in this group.

4) Burst abdomen:

In group 1, burst abdomen occurred in one patient on 6th post operative day. This patient had ileal perforation and peritonitis with chest infection and cough and was anaemic. This patient underwent emergency surgery.



Figure -1 Clinical Photograph of wound gaping in a post operative patient.

In group 2 burst abdomen occurred in 2 patients, both operated on an emergency basis. First patient had colonic perforation and peritonitis secondary to carcinoma sigmoid colon and was anaemic. Burst abdomen occurred in 7th post operative day. The second patient had gastric ulcer perforation and peritonitis. He also had chest infection with cough and hypoproteinaemia. In this patient burst abdomen occurred on 8th postoperative day.

5) Incisional hernia:

None of the patient in group 1 had incisional hernia. In group 2, one patient had incisional hernia 4 months after the surgery. This patient underwent emergency surgery for intestinal obstruction with gangrenous jejunal segment. He also had uraemia and chest infection and had developed wound infection and gaping in the immediate postoperative period. In our study, the mean postoperative follow up of patients in the single layer closure group was 3.74 months and in the conventional layered closure group was 5 months.

DISCUSSION

Summary Of Findings :

Single layer closure technique is preferred for midline incisions and conventional layered closure, preferred for paramedian incisions.

Single layer closure had reduced operative time than conventional layered closure, and hence, prevents anaesthetic hazards, reduces cost of anesthetic agents and saves time of the surgeon.

Incidence of postoperative complications like seroma, wound infection, wound gaping, burst abdomen and incisional hernia are comparatively less in single layer closure technique.

Detection of seroma and its management in postoperative period prevents the occurrence of wound infection.

Use of newer antibiotics and better suture materials have reduced the rate of wound infection.

Peritonitis, emergency surgery, anaemia, hypertension, hypoproteinaemia, uraemia, hyperbilirubinaemia and chest infection with cough, are contributing factors for development of wound gaping and

burst abdomen.

The present study aimed at comparing the techniques of laparotomy wound closure. The technique of laparotomy wound closure is one of the important factor in preventing post-operative complications like wound infection, burst abdomen and incisional hernia. Prevention of herniation of abdominal contents through the incisional wound, resulting in burst abdomen or herniation through a weak scar resulting in incisional hernia are the main aims of a surgeon closing laparotomy wounds.

Though different closure techniques exist for closure of laparotomy wounds, the ideal method of closure is yet to be finalized. Hence the present study was taken up by us at CU Shah medical college and Hospital, Surendranagar, to compare the single layer closure and the conventional layered closure of laparotomy wounds on the basis of operative time and postoperative complications.

In our study the mean age of patients taken up for study was 49.9 yrs in single layer closure group and 47.6 yrs in conventional layered closure group, showing no significant difference between the two groups.

In our study, 64% of patients had midline abdominal incision and 33% had right paramedian abdominal incision, for the approach into the abdomen. 65.63% of midline incisions were closed by single layer technique and 82% of paramedian incisions were closed by conventional layered technique, showing that single layer technique was used significantly more in midline incisions and significantly less in paramedian incisions and preferring conventional layered closure for paramedian incisions. This was due to the fact that we found in paramedian incisions, closing the peritoneum separately and then suturing the anterior rectus sheath only was more technically easier than taking a single bite through the peritoneum, posterior rectus sheath, rectus muscle and anterior rectus sheath, which was bulkier and had high chance of injuring the bowel at the end of the closure.

Many larger earlier studies and Weiland et al study, advocated the use of monofilament nonabsorbable suture material for closure of laparotomy wounds. Weiland et al, from their meta analysis study suggested that continuous closure with non-absorbable suture should be used to close most abdominal wounds ; but however, if infection or distension is anticipated, interrupted absorbable sutures are preferred. Rucinski et al in their metaanalysis of optimal technique for closure of abdominal midline fascia compared absorbable and nonabsorbable sutures. They found no statistically significant difference between nonabsorbable and monofilament absorbable sutures with regard to postoperative wound infection, dehiscence and incisional hernia. There was, however, a higher incidence of wound infection and incisional hernia formation when braided absorbable suture material was used. There was a higher incidence of incision area pain and suture sinus formation when nonabsorbable suture material was used. They advocated a continuous mass closure with absorbable monofilament suture material for laparotomy wounds.

But results of larger studies showing the advantages of absorbable sutures over non absorbable sutures are still awaited. Hence in our study, we used monofilament, non absorbable continuous interlocking sutures (Prolene No.1) for closure of laparotomy wounds.

The incidence of postoperative seroma formation in our study was 6% in single layer closure group and 10% in conventional layered closure group, showing higher incidence in conventional layered closure group.

In our study, the incidence of wound gaping was 4% in single layer closure and 6% in conventional layered closure, again showing only slightly higher incidence in conventional layered closure group.

In our study, incidence of burst abdomen was 2% in single layer closure and 4% in conventional layered closure, showing doubling of burst abdomen incidence in conventional layered closure group. Peritonitis requiring emergency surgery leading to wound infection and gaping, along with associated factors like chest infection with cough, anaemia and hypoproteinaemia were the contributing factors for the occurrence of burst abdomen in our study.

In our study no incisional hernia occurred in single layer closure

group and in conventional layered closure group the incidence of incisional hernia was 2%. Our study was in consistent with the studies of Shukla et al and Singh et al showing higher chance of occurrence of incisional hernia in Conventional layered closure technique.

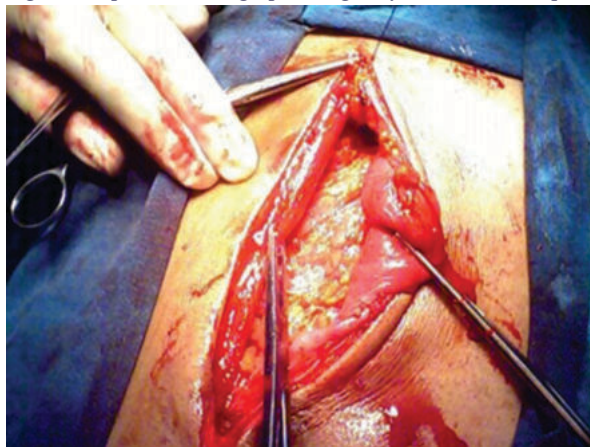
Strength of this study is that on follow up of patient who underwent single layered closure were at reduced risk of incisional hernia as compared to the patients who underwent conventional layered closure, also single layered closure was cost effective as compared to the conventional layered closure and limitation of this study was the length of wound and technique of suturing was not considered.

CONCLUSION

In our study, single layer closure of laparotomy wounds took less operative time than conventional layered closure. Also the incidence of postoperative complications like seroma, wound infection, wound gaping, burst abdomen and incisional hernia were less in single layer closure. Hence, we conclude that single layer closure technique is better than conventional layered closure of laparotomy wounds in terms of operative time and post operative complications.



Figure–2 Operative Photograph of single layer closure technique



Figure–3 Operative Photograph of single layer closure technique

REFERENCES

1. Jones TE, Newell ET Jr, Brubaker RE. The use of alloy steel wire in the closure of abdominal wounds. *Surg Gynecol Obstet* 1941; 72 : 1056–59.
2. Dudley HAF. Layered and mass closure of the abdominal wall : A theoretical and experimental analysis. *Br J Surg* 1970; 57: 664–667.
3. Kirk RM. Effect of method of opening and closing the abdomen on incidence of wound bursting. *Lancet* 1972; 19: 352–3.
4. Goligher JC. Visceral and parietal sutures in abdominal surgery. *Am J Surg* 1976 ; 131(2): 130–140.
5. Martyak SN, Curtis LE. Abdominal incision and closure – A systems approach. *Am J Surg* 1976; 131(4): 476–80.
6. Ellis H, Heddle R. Does the peritoneum need to be closed at laparotomy? *Br J Surg* 1977; 64(10): 733–6.
7. Gilbert JM, Ellis H, Fowleraker S. Peritoneal closure after lateral paramedian incision. *Br J Surg* 1987; 74(2): 113–5.
8. Hugh TB, Nankivell C, Meagher AP, LiB. Is closure of the peritoneal layer necessary in the repair of midline surgical abdominal wounds? *World J Surg* 1990; 14(2): 231–4.
9. Poole GV Jr, Meredith JW, Kon ND, Martin MB, Kawamoto EH, Myers RT. Suture technique and wound bursting strength. *Am Surg* 1984; 50(10): 569–72.
10. Nayman J, Mc Dermott FT. Wound dehiscence in acute renal failure. Clinical and experimental studies. *Med Res* 1965; 1: 180–85.
11. Fisher J, Turner FW. Abdominal incisional hernias – a ten year review. *Can J Surg* 1974 ; 17: 202–4.
12. Amarjit Singh, Surjit Singh, Dhaliwal US, Sukhdev Singh. Technique of abdominal

wall closure. *Ind J Sur* 1981; 11 : 785 – 89.

13. Sudhir K Navadiya, Yagneshkumar L Vaghani, Harish D Chauhan. Comparative study of laparoscopic surgery and open surgery in regards to surgical site infections, *Int J Med Sci Public Health*. 2013; 2(1): 125-128.