Original Research Paper

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General Surgery

MULTILAYERED CLOSURE TECHNIQUE VS SINGLE LAYERED CLOSURE FOR ABDOMINAL INCISIONS

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ABSTRACT

OBJECTIVE: To compare the techniques of single layered mass closure vs multilayered closure with regard to operative time vs post-operative complications.

METHODS: A study was done on 100 cases undergoing major abdominal surgery in NRI GENERAL HOSPITAL, CHINNAKAKANI, both emergency or elective surgeries. Amongst these 100 patients, 50 patients underwent closure by conventional layered closure and 50 patients by single layered closure. Time taken for closure of wound were noted and patients were followed post operatively for wound complications like seroma, wound infection, gaping and burst abdomen. Incisional hernia if any was noted.

RESULTS: The mean time taken for closure of incision by single layered closure was 19 minutes and by conventional layered closure was 27 minutes. There was a difference of 8 minutes which was statistically significant (p value 0.001). in the post operative period in patients who underwent single layered closure 18% had post operative complications. In multilayered closure 30% developed complications.

CONCLUSIONS: 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 :

INTRODUCTION

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. 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.

AIM:

To compare the techniques of single layer closure and conventional layered closure of laparotomy wounds.

OBJECTIVES:

1. To compare the operative time and healing time for single layer closure and conventional layered closure of laparotomy wounds.
2. To compare the post-operative complications after performing single layer closure and conventional layered closure of lapar otomy wounds, like seroma, wound infection, wound gaping, burst abdomen and incisional hernia.

CLOSURE OF ABDOMINAL WALL CAN BE DONE BY –

I) LAYERED CLOSURE OF ABDOMINAL WALL:

Consists of suturing of peritoneum, layers of rectus sheath separately by using absorbable or non absorbable suture material with the sutures close to the margin of the incision. The disadvantage of this method is that the suture can cut out, especially if the tissues are poor.

II) MASS CLOSURE :

Jones et al1 first reported the use of interrupted mass near and far suture technique in 1941. This technique incorporates all the layers of abdominal wall except skin.

Wide bites must be taken, a minimum of 1cm from the wound edge, and placed at intervals of 1cm or less. The suture length should measure atleast four times the wound length, when suture is placed on tension as may occur during abdominal distention. For the midline incision, all layers of abdominal wall except skin and subcutaneous fat are incorporated and then the skin is closed. A similar technique is used for the paramedian incision by picking up the anterior and posterior rectal sheaths. The transrectus incision will incorporate the medial sliver of rectus muscle in suture loop.

Transverse and sub-costal Kocher's incisions also can be closed with this technique.

Mass closure is impossible only with the lateral paramedian incision. For this incision, the posterior rectus sheath with the peritoneum and the anterior rectus sheath, are closed separately.

III) DOUBLE LOOP CLOSURE (CONTINUOUS OR INTER RUPTED):

Jones and colleagues, Abel and Hunt have reported series showing satisfactory healing of vertical incisions when the double loop concept was used.

The double loop closure forms an inner and an outer loop. It passes through all layers of abdominal wall at a distance from wound edges and again through anterior fascia, muscle and posterior fascia, this time close to the wound edges.

A feature of double loop closure was that when tensile forces on the wound are increased, the outer loop which contained more tissue than the inner loop, pulled the inner loop tight. This resulted in perfect opposition instead of divergence. Burleson asserted that this mechanism is responsible for observation that patients experience less wound pain when coughing, if laparotomy is closed with a double loop. Reduced wound pain lowers risk of pulmonary complications.

But laparotomies closed with this technique could not withstand an increased intra abdominal pressure.

IV) DOUBLE NEAR AND FAR PROLENE SUTURE FOR LAPA ROSTOMY WOUNDS :

Laparostomy, leaving the peritoneal cavity open to heal by granulation is increasingly considered to be safe and effective technique for the management of intra abdominal sepsis. The large cavity produced by laparostomy heals by granulation from omentum and viscera, often leaving a abdominal defect.

The technique of double near and far prolene suture closure should be considered in patients undergoing reconstruction of the abdominal wall laparostomy defect.

MATERIAL

This study includes 100 patients who were admitted in the Department of Surgery, NRI GENERAL HOSPITAL, CHINNAKAKANI, during the period of November 2018 to October 2019, for abdominal surgical problems needing either elective or emergency surgery.

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.

METHODS

HISTORY

History taking was followed as a routine in all cases admitted to the wards. History was taken regarding diseases like diabetes mellitus, hypertension, jaundice, tuberculosis and other chest infections and also the time of onset of the disease. History of smoking, prolonged use of steroids was also taken into account.

INVESTIGATIONS

As a routine, the following investigations were done for all cases
- Blood : Hb%, TC, DC, ESR, BT, CT, Blood grouping and Rh typing.FBS, PPBS
- LFT for protein values and level of bilirubin.
- Blood urea, serum creatinine
- Urine : for albumin, sugar, microscopy
- ECG and chest X-ray PA view were done routinely in all cases preoperatively to know the cardiac and pulmonary status.

SPECIAL INVESTIGATIONS:
- Plain X-ray abdomen in erect posture was used in acute abdominal cases suspected of hollow viscus perforation or intestinal obstruction.
- Contrast X-rays like barium meal were used wherever necessary.
- Upper GI endoscopy was used in suitable cases for diagnosis.
- Abdominal ultrasound and CT scan were done in necessary cases.
- However in emergency cases, only the investigations necessary for
- supporting the diagnosis were employed.
- Complete workup of the cases was done in all cases who underwent
- elective surgery.

CLOSURE OF ABDOMINAL INCISIONS IN GROUP 1 A. MID LINE INCISION:

Closure was performed by suturing the cut edges of the peritoneum and linea alba together. Bites were taken about 1 cm from the cut edges and interval of about 1cm with continuous locking sutures using Prolene No. 1.

B. PARAMEDIAN INCISION:

The peritoneum, endoabdominal fascia, posterior layer of rectus sheath, the medial fibres of rectus abdominis muscle and anterior layer of rectus sheath were sutured as a single layer. The bites were taken about 1 cm from the cut edges and about 1cm interval. Continuous locking sutures were employed using Prolene No. 1.

C. KOCHER'S INCISION:

The peritoneum and cut edges of anterolateral abdominal wall muscles on the lateral aspect and the peritoneum and rectus abdominis along with its sheath on the medial aspect were sutured as a single layer.

The bites were taken about 1cm from cut edges and about 1cm interval. Continues locking sutures were employed using Prolene No.1.

IN GROUP 2 A. MID LINE INCISION:

The peritoneum was closed with Vicryl or chromic catgut by continuous locking sutures and the linea alba was closed similarly with Prolene No.1.

B. PARAMEDIAN INCISION:

The peritoneum and posterior layer of rectus sheath were closed with Vicryl or chromic catgut by continuous locking sutures. The anterior layer of rectus sheath was closed with No.1 Prolene by continuous locking sutures. Skin was closed with nonabsorbable material like Ethilon using interrupted mattress sutures in both groups of patients. Time taken for closure of abdomen was recorded in all cases. Drains were used wherever necessary, through a separate stab incision.

POST OPERATIVE

All the patients received antibiotics suitable for the case parenterally, usually for 2-3 days and orally for 5-7 days. Antibiotics were continued only whenever indicated after 10 days. Analgesics were given post operatively. Blood transfusions were given wherever indicated.

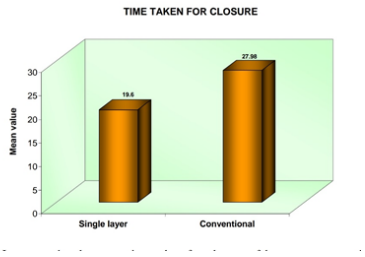
The wound was examined on 3rd, 5th, 7th and 9th or 10th day and the condition of the wound noted. Drains wherever employed were removed on 2nd or 3rd day unless required.

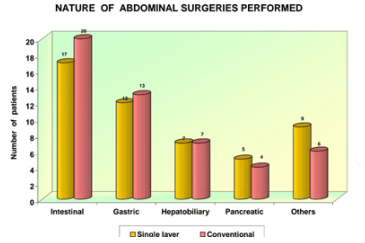
The sutures were removed between 7th to 10th day in both the groups. During the post operative period, the patients were examined for abdominal distension, vomiting, hiccup and chest infection. Seroma and wound infection was also noted. Regular examination of the wounds for signs of wound gaping and burst abdomen was done.

FOLLOW UP:

Regular monthly follow up was done for 3 months, once in 3 months for one year after discharge from the hospital. During the follow up, the patients were examined for scar complications and incisional hernia. The data was analyzed for comparison between single layer closure and conventional layered closure of laparotomy wounds by using incidence rate and unpaired student T test for continuous numerical values, and chi square test for categorical value.

RESULTS:





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.

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.

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.

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.

BURST ABDOMEN:

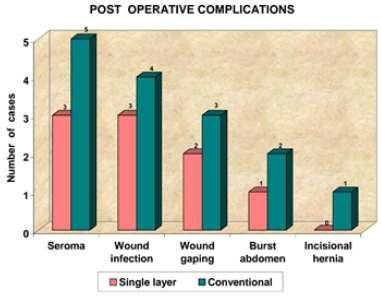
In group 1, burst abdomen occurred in one patient on 6th post operative day. This patient had ileal perforation and peritonitis with chest infection and cough and was anaemic. This patient underwent emergency surgery.

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.

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 immed iate postoperative period.



SUMMARY

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, hypoprotei naemia, uraemia, hyperbilirubinaemia and chest infection with cough, are contributing factors for development of wound gaping and burst abdomen.

Wound infection, wound gaping and burst abdomen increased patient's morbidity, hospital stay and cost. Longer period of follow up is required to know the exact incidence of incisional hernias.

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