



Study of pre-operative and post-operative variables for incisional hernia repair by open and laparoscopic technique

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Abstract

Background: Incisional hernia is protrusion of part or whole of abdominal viscus through the weakness in layers of anterior wall in the scar of previous operation. The major predisposing factors being post operative wound infection or hematoma. This incidence increases in the presence of adverse factors (local and systemic) such as wound infection, obesity, hypoproteinemia. In all suture repair techniques the tissues are under tension and this increase the risk of ischemia, suture cut out and repair failure. The studies showed that the complication seen in open incisional hernia repair is seroma, hematoma, wound infection, stitch sinus, and recurrence. To overcome this complications and recurrent rates of open incisional hernia repair the Laparoscopic repair of incisional hernia was introduced in the 1990s, which reports (Olmi study) have showed more improvement in recovery time, hospital stay and complication rate.

Objective: The purpose of this study was to compare the difference of incidence of post-operative complications, operative time, length of hospital stay, duration of return to work and recurrence of patients undergoing laparoscopic or open repair of their ventral/incisional hernia a meta-analytic technique for observational studies.

Material and methods: The present study was a prospective study which had been carried out, during the period of July 2010 to September 2012 at a tertiary care centre. A total number of 50 cases were studied and were followed up for a period of 6 months. All patients were operated on by the same surgical team, adapting the type of surgical technique depending on the type of hernia. In the selection process of the technique patients were randomly allowed to opt for any of the two



modalities after analyzing the biological status of the patient but also the associated his/her comorbidities. Patient selection criteria were as below. **Inclusion criteria:** Wall defect: >3 cm to <8 cm, Post-surgical and gynecological procedure, BMI < 30 kg/m², Patient willing for surgery. **Exclusion criteria:** Complicated hernia, BMI >30 kg/m², Conversion of laparoscopic repair to open repair. **Results:** Incidence of incisional hernia was maximum in the age group of 31-50 years (66%) with female preponderance (74%). 25 patients had risk factors like chronic cough (5), hypertension (13), diabetes mellitus (5) and difficulty in micturition (2). 27 had previous emergency surgery while 23 had undergone planned surgery. 60% of patients had undergone gynecological procedures, among which LSCS was the most common operation followed by hysterectomy. 60% of patients had wound complications in previous surgical procedure. Mean operative time for laparoscopic incisional hernia repair was 2 hour 45 minutes and for open hernia it was 2 hour 05 minutes. 46% of patients had duration of return to work (6-10 days) in laparoscopic surgery, 40% of patients had duration of return to work (11-15 days) in open surgery (mean 16), 4% in laparoscopic surgery (mean 10.24 days), 10% of patients had duration of Return to work (16-20 days) in open surgery. **Conclusion:** An optimal technique for mesh placement has not yet been determined and is still a subject of debate among surgeons. Laparoscopic techniques seem to have many benefits, including decreased length of hospital stay, decreased postoperative pain, and reduce the time to return to work and normal activities, but require long learning curve and are still not very accessible to all surgeons, especially in our country.

Key words

Incisional hernia, Exploratory laparotomy, Laparoscopic repair.

Introduction

Incisional hernia is protrusion of part or whole of abdominal viscus through the weakness in layers of anterior wall in the scar of previous operation. Incisional hernia complication occurs in 5-11% of abdominal wound. Bucknall in 1981 and Ellis in 1983 shown 10% incidence of incisional hernia [1]. The major predisposing factors being post-operative wound infection or hematoma [2]. This incidence increases in the presence of adverse factors (local and systemic) such as wound infection, obesity, hypoproteinemia [3, 4]. Before the introduction of knitted polypropylene mesh in the early 1960, most incisional hernia repaired by direct suture techniques. Modified Mayo technique with overlap of fascial edge [5], 'Keel' procedure using relaxing incisions in the lateral aspect of

the anterior rectus sheath [6], the Nuttall procedure involving transposition of rectus abdominis and its enveloping fascia, using layered steel wire [7]. In all suture repair techniques the tissues are under tension and this increase the risk of ischemia, suture cut out and repair failure. Usher [8] introduced knitted monofilament polypropylene mesh. Other two types of mesh most commonly used polypropylene and expanded polytetrafluoroethylene. The studies showed that the complication seen in open incisional hernia repair is seroma, hematoma, wound infection, stitch sinus, and recurrence. To overcome this complications and recurrent rates of open incisional hernia repair the Laparoscopic repair of incisional hernia was introduced in the 1990s, which reports (Olmi [9] study) have showed more improvement in recovery time, hospital stay and complication rate. The purpose of this



study was to compare the difference of incidence of post-operative complications, operative time, length of hospital stay, duration of return to work and recurrence of patients undergoing laparoscopic or open repair of their ventral/incisional hernia a meta-analytic technique for observational studies.

Material and methods

The present study was a prospective study which had been carried out, during the period of July 2010 to September 2012 at a tertiary care centre. A total number of 50 cases were studied and were followed up for a period of 6 months. All patients were operated on by the same surgical team, adapting the type of surgical technique depending on the type of hernia. In the selection process of the technique patients were randomly allowed to opt for any of the two modalities after analyzing the biological status of the patient but also the associated his/her comorbidities. Patient selection criteria were as below.

Inclusion criteria

- Wall defect: >3 cm to <8 cm
- Post surgical and gynecological procedure
- BMI < 30 kg/m²
- Patient willing for surgery

Exclusion criteria

- Complicated hernia
- BMI >30 kg/m²
- Conversion of laparoscopic repair to open repair

Preoperative orders

A written informed consent for operation after explaining type of surgery (Open repair or laparoscopy repair), anesthesia and pneumo-peritoneum and conversion to open repair if needed was obtained. Preparation of local parts

was done including shaving prior night. Patients were nil by mouth from previous night (10 pm). All patients were given 1 gm ceftriaxone intravenous at induction of anesthesia. Diabetic and anti-hypertensive precautions were taken as per physician advice. Nasogastric tube and urinary bladder catheterization was done in the morning of surgery.

Operative technique

Anesthesia: General/ spinal anesthesia were employed.

Position of the patient: Supine position.

Skin preparation: Skin of the lower abdomen, external genitalia and thigh was prepared with betadine solution.

Open incisional hernia repair procedure: The initial step was to reopen the old incision, mobilize the hernial sac, reduce its contents, excise any redundant peritoneum and close the sac. Thinned out and redundant scar and fascia should be excised back to healthy strong facial margins. Dissection in the proportional and posterior rectus sheath was done to create adequate space for mesh placement. The peritoneum was closed after reduction of the viscera. Polypropylene mesh was now to fit as a retrorectus space, mesh fix with prolene (2-0) interrupted suture, polyethylene suction drain tubes were placed over the surface of the mesh and brought out through separate stab incision. Anterior sheath was closed with vicryl (1-0) continues locking sutured. Hemostasis was achieved. The subcutaneous tissue and skin was closed.

Laparoscopy incisional hernia repair procedure:

The evolution of incisional hernia repair has advanced from open mesh repair to the application of mesh (ultrapro, prolene soft or paritex) repair to the laparoscopic approach. In this technique, the defect was repaired posteriorly and no dissection within the scarred layer of anterior fascia was required. Position of the surgical team and camera varies with site of

the hernia. One of the challenging aspects of laparoscopic repair was port access into a peritoneal cavity that had been previously operated upon. In general, access was obtained for needle insufflation.

- Via the left upper quadrant, placing the port along the anterior axillary line to avoid injury to the more laterally positioned spleen.
- Above the previous scar involving the hernia.
- Open placement of trocar.

Insufflation was done by veress needle and 1st port of 10 mm inserted and camera introduced and abdomen visualized. 2nd port of 5 mm introduced through which dissecting forceps introduced. 3rd port of 5 mm introduced taking care of the working angle and grasper introduced. Other ports were introduced when required. The next challenge was the extensive laparoscopic lists of adhesions to gain exposure to the entire hernia defect and provide a 3 to 4 cm circumferential area of overlap for the mesh patch beyond the edge of the hernia defect. The sac was retracted and excised from within the hernia. The mesh was then cut to fit this defect with a margin of 3-4 cm on each side to provide adequate coverage and to minimize tension. (Sometimes, non-absorbable sutures were placed around the circumference of the mesh and tied, but not cut). Once inside the abdominal cavity, the mesh was unrolled, positioned and fixed using straight needle or a transfacial suture passer. The ends were tied at the skin level at 4-6 points around the repair and buried with the subcutaneous tissue in the stab incision. After all sutures had been tied and cut, laparoscopically-placed tacks or staples were used to further fasten the mesh to the anterior abdominal wall. Rest of the abdomen was evaluated and hemostasis confirmed. Pneumoperitoneum was released. Fascial closure of ports more than 10 mm was done.

Post-operative care

Patients were kept nil orally for a day and oxygen by mask was given for first few hours. Ryle's tube was removed but urinary catheter was retained for a day. Diabetics, hypertensive and ischemic heart disease (IHD) patients were given their treatment.

Laparoscopy repair: Diclofenac was satisfactory for most patients and few require analgesia after 48 hours. Injectable antibiotics (Inj. Ceftriaxone 1 g intravenous for 12 hourly) were given for two days. Patients vary in the speed with which they return to normal activities but most had done so within 1-3 weeks. The early mobilisation, which had been described to the patient preoperatively, was started as soon as possible after his/her return to the ward, progressively increasing the distance walked.

Open repair: Broad spectrum antibiotics were continued till the removal of suction drain. Suction drain was kept till the drainage became less than 25 cc in 24 hours. Dressings were done every alternate day with elastoplast and abdominal binder was given. Skin sutures were removed on 12th- 15th post-operative day. Following discharge, patient was advised to restrict heavy work for 6 months and in child bearing age, females were advised to avoid pregnancy for 1 year.

Discharge

Patients were discharged after stool passed, taken full diet, less post-operative pain and removing negative drain. All patients were given oral cefixime 200 mg BD for 7 days and oral diclofenac 50 mg BD for 5 days and then as per required. Stool softeners were given for a week. All patients were advised and counseled regarding avoiding straining, exercise, weight lifting, bicycling for 3 months. Patients were advised to take medical help if develops any cough, constipation or dysuria, to reduce weight if obese and quit smoking.



Follow Up

All the patients were followed up on 2nd, 7th, 15th postoperative day and then at 6 months.

Results

All 50 Patients tolerated the procedure well, without intraoperative complications. No myocardial infarction or major bleeding was recorded. From the study, incidence of incisional hernia was maximum in the age group of 31-50 years (66%) with female preponderance (74%). The youngest patient was 24 years and the oldest was 76 years (mean age 42.38). In view of hernia defects, total 15 patients had incisional hernia with defect size 3-4 cm of which 12 undergone laparoscopic repair and 3 open repair. 8 (16%) and 7 (14%) patients incisional hernia defect size was 5-6 cm (total 15), 5 (10%) and 15 (30%) patients incisional hernia defect size was 7-8 cm (total 20), in Laparoscopic and open incisional hernia repair respectively. Study indicated that 26 (52%) patients presented with median swelling, 13 (26%), 4 (8%), 4 (8%), 3 (6%) patients with para-median, lateral, infra umbilical and supraumbilical swelling. 25 patient had risk factors like chronic cough (5), hypertension (13), diabetes mellitus (5) and difficulty in micturition (2). 27 had previous emergency surgery while 23 had undergone planned surgery. 60% of patients had undergone gynecological procedures, among which lower section cesarean section (LSCS) was the most common operation followed by hysterectomy. 60% of patients had wound complications in previous surgical procedure. 15 and 4 patients had 2.31-3.00 hour duration of surgery for laparoscopic and open repair respectively. Mean operative time for laparoscopic incisional hernia repair was 2 hour 45 minutes and for open hernia it was 2 hour 05 minutes. 46% of patients were able to ambulate on the 1st day of laparoscopic surgery, 40% and 4% patients had ambulation on 2nd day of open and laparoscopic

surgery respectively, other 10% of patients were have 3rd day ambulation in open surgery. Mean period of ambulation were 1.08 days and 2.2 days in laparoscopic and open repair respectively. 46% of patients had duration of hospital stay (1-3 days) in laparoscopy surgery, 34% of patients had duration of hospital stay (4-6 days) in open surgery and 4% in laparoscopic surgery, 16% of patients had duration of hospital stay (7-10 days) in open surgery with mean hospital stay of 3.32 days and 6.16 days in laparoscopic and open repair respectively. 46% of patients had duration of return to work (6-10 days) in laparoscopic surgery, 40% of patients had duration of return to work (11-15 days) in open surgery (mean 16 days), 4% in laparoscopic surgery (mean 10.24 days), 10% of patients had duration of return to work (16-20 days) in open surgery. 17 patients had post-operative pain in open surgery, 5 patients in laparoscopic surgery, 9 patients had wound seroma (5 laparoscopic surgeries and 4 open surgeries). 5 patients suture track infection in open surgery, 2 patients port site infection in laparoscopy surgery, wound infection which was treated with antibiotics according to culture and sensitivity reports. Patients of wound dehiscence were taken up for secondary suturing, seroma formation treated by drainage and dressings, and 3, 1 and 1 patients complained of urinary retention, bowel complication and respiratory distress respectively. There was no surgery related mortality and no recurrences yet reported.

Discussion

In our study, Incisional hernia was most common in female (74%). In Carbajo [10] study, 73 % female in (30 patients) laparoscopic repair and 60% female in (30 patients) open repair while in Ramshaw [11] study, 56% female in (79 patients) laparoscopic repair and 55% female in

(174 patients) open repair. Ellis, Gajraj and George [12] in their study noticed a mean age of 49.4 years. Olmi [9] study noted median age was 64.5 years in laparoscopy group and 68 years in open group. The sex incidence was 1: 4 (M: F) approximately showing a female preponderance. This is because of laxity of abdominal muscles due to multiple pregnancies and also an increased incidence of obesity in females. Ellis, Gajraj and George [12] obtained an incidence of 64.6% female population in their study of 383 patients. J.B. Shah [13], Goel and Dubey [14], studies have male to female ratio 1: 1.17 and 1: 1.25 ratios respectively. Olmi [9] studied showed 50 cases in which 26/24 (M/F) in laparoscopy group and 21/29 (M/F) in open group.

52% of the incisional hernia occurred in midline infra umbilical incision because intra abdominal hydrostatic pressure is higher in lower abdomen compared to upper abdomen in erect position i.e., 20 cm of water and 8 cc of water respectively, an absence of posterior rectus sheath below arcuate line and gynaecological surgeries who have poor abdominal wall musculature. This is comparable with A.B. Thakore, et al. [15] studies (67.1%) and Goel and Dubey [14] studies (44.6%). 60 % of cases occurred following gynecological procedures (Hysterectomy, Tubectomy, Cesarean sections). Ponka [16] in his study noted 36% incidence and Goel and Dubey [14] noted 28.76% incidence among gynecological procedures. 12 (24%) and 03 (06%) patients incisional hernia defect size was 3-4 cm, 08 (16%) and 07 (14%) patients incisional hernia defect size was 5-6 cm, 5(10%) and 15(30%) patients incisional hernia defect size was 7-8 cm, in laparoscopic incisional hernia repair and open incisional hernia repair respectively. In Olmi [9] study, mean defect size 10.6 (4-23) cm in laparoscopic group and 10.5 (7-21) cm in open group.

30% of patients had duration of surgery 2.31-3 hours in laparoscopic surgery and 8% had same duration in open surgery, 26% of patients had duration of surgery 2-2.30 hours in open surgery and 16% had same duration in laparoscopic surgery while 16% of patients had duration of surgery 1.30-2 hours in open and 4% had same duration in laparoscopic surgery. Olmi [9] study showed mean operative time 59 (35-120) minutes in laparoscopic group and 164.5 (100-187.3) minutes in open group. The risk factors promoting incisional hernias were wound infection accounted for 34%, chronic cough 7 (14%) and prostatitis/ dysuria 2 (4%). This is comparable with that of Bose, et al. [17] studies in which wound infection (59 out of 110 patients - 53.63%), chronic obstructive pulmonary disease (23/110 - 20.90%) and stricture urethra (10/110 - 9.09%). 3 patients (10%) had undergone more than one operation previously which is also one of the risk factors in our study which can be compared with Ponka [16] series (25%).

Olmi [9] study showed means hospital stay in laparoscopic group 2.1 (1-4) days and open group 8.1 (6-14) days. Carbajo [10] study showed means hospital stay in laparoscopic group 2.23 (1-4) days and open group 9.06 (6-14) days. In our study, 46% of patients had duration of return to work was 6-10 days in laparoscopic surgery and 40% of patients had duration of return to work was 11-15 days in open surgery while 4% in laparoscopic surgery, 10% of patients in open surgery had duration of return to work was 16-20 days) in Pring [18] study . Thus the superiority of laparoscopic repair over open repair can be accounted for.

There was no surgery related mortality in this study. 17 patients had post-operative pain in open surgery, 5 patients in laparoscopic surgery, 9 patients had wound seroma seen in open surgery, 5 patients suture track infection in open

surgery, 2 patients port site infection in laparoscopy surgery, wound infection which was treated with antibiotics according to culture and sensitivity reports. Patients of wound dehiscence were taken up for secondary suturing. Seroma formation which was treated by drainage and dressings, and 3, 1 and 1 patients complained of urinary retention, bowel complication and respiratory distress respectively. The infection rate was 2% in the laparoscopy repair most recent series [19, 20]. Olmi [9] study showed among 8 (16%) patients in the laparoscopic group, 6 were persistent seroma, in 1 patient were infection, 1 patients, mesh infection than requiring removal of the mesh. Complications occurred in 25 (50%) patients in the open group, 7, 5, 8, 1, 1 and 3 patients of wound infection, persistent serous secretions, persistent neuralgia, mesh infection, pulmonary embolism, and small bowel obstruction respectively.

We had no recurrences; however the follow-up period was variable and short to comment upon. Usher [8] reported zero percent recurrence in 48 patients who were treated by polypropylene mesh repair. Jacobus W.A., et al. [21] reported 10 year cumulative rate of recurrence of 63% in anatomical repair and 32% in mesh repair. The recurrence rate thus varies in different studies but all studies favour mesh repair to decrease the recurrence rate. Olmi [9] study showed recurrence among 1 (2%) patients in laparoscopic group and 0 patients in open group while other study of laparoscopic incisional hernia repair showed low recurrence rate [22].

With thorough patient evaluation, pre-operative skin preparation, meticulous surgical technique, use of peri-operative broad spectrum antibiotics, nasogastric aspiration, early ambulation, less hospital stay and chest physiotherapy, complication rates in our study were minimized. With laparoscopic repair early

ambulation, less hospital stay, early return to work, less post-operative complications.

Conclusion

Incisional hernia repair surgical techniques continue to evolve with remarkable progress in terms of prosthetic materials and minimally invasive technology. An optimal technique for mesh placement has not yet been determined and is still a subject of debate among surgeons. Laparoscopic techniques seem to have many benefits, including decreased length of hospital stay, decreased postoperative pain, and reduce the time to return to work and normal activities, but require long learning curve and are still not very accessible to all surgeons, especially in our country.

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