

# Comparative Study of Laparoscopic Versus Open Incisional Hernia Repair

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## Abstract

**Introduction:** Incisional hernia is a frequent complication of abdominal operations. The object of this study is to compare laparoscopic repair to open repair of incisional hernia regarding hospital stay and complications. **Material and Methods:** This study compares total 22 cases of incisional hernia repairs performed during December 2011 and May 2013, of which 10 were laparoscopic and 12 were open surgeries. Composite mesh (polypropylene, cellulose ORC) was used for laparoscopic intraperitoneal placement. **Observations and Results:** Both the groups were comparable regarding age. Mean operative time was 163.2 minutes for laparoscopic group (LG), 125.6 minutes for open group (OG). Mean hernia diameter was 6.1cm for laparoscopic group, 6.4cm for open group. Mean length of stay was 3.6 days for laparoscopic group, 7.33 days for open group. Mean follow up was 11.2 months for laparoscopic group, 12.1 months for open group. Complications occurred in 10% of laparoscopic and 41.66% open group. There was no recurrence and mortality in both groups. **Conclusion:** Results for laparoscopic incisional hernia repair seem to be superior to results for open repair in terms of shorter hospital stay, lower infection rate, earlier return to work and comparable recurrence rate and better cosmetic results.

**Keywords:** Composite mesh, Incisional hernia, Laparoscopy.

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## INTRODUCTION

With the evolution of modern surgery and rapid increase in the number of abdominal operations performed, the frequency of incisional hernia has increased. The incidence of incisional hernia, as reported in literature is 3% to 20%<sup>1</sup>. It is one of the most frequent long term complications of abdominal surgery and it continues to be a significant problem for patients as well as surgeons. It develops in 11% of patients after surgery

and in 23% of patients who develop a postoperative wound infection.<sup>2</sup> Unfortunately, attempts at repair of these hernias have not been uneventful, with high rates of hernia recurrence, and considerable rates of morbidity and mortality, making many surgeons hesitant to undertake incisional hernia repair. On the other hand, however, delay in repair may have serious clinical consequences. The principle of laparoscopic incisional hernia repair is based on Rives-Stoppa repair, first published in 1985.<sup>3</sup> Original Rives-Stoppa repair involved extensive tissue dissection in a myofascial plane for placement of mesh. LeBlanc and Booth<sup>4</sup> first described laparoscopic repair of incisional hernia in 1993. Since then, many authors have published reports of laparoscopic incisional and ventral hernia repair. This procedure is fast emerging as an alternative to open technique. Various types of mesh repairs are available for incisional hernia repair. This study analyzed results of a single center experience in laparoscopic and open incisional hernia repairs. The aim of the present study was the prospective evaluation of a case series of

laparoscopic incisional hernia repairs, performed at the same institution with broad experience in laparoscopy, compared with a case series of open preperitoneal incisional hernia repairs.

## MATERIALS AND METHODS

Patients admitted in various surgical wards of our Hospital having Incisional Hernia are included in our study by applying the following inclusion & exclusion criteria. The study was conducted during the period from December 2011 to May 2013 total 22 cases were taken for study.

Patient selection for the study has been on random basis.

### Inclusion criteria

1. Wall defect:  $\geq 2\text{cm}$  to  $\leq 10\text{cm}$
2. Post surgical and gynaecological procedure
3. BMI  $< 30 \text{ kg/m}^2$
4. Patient willing for surgery

### Exclusion criteria

1. Complicated hernia
2. BMI  $> 30 \text{ kg/m}^2$
3. Conversion of laparoscopic repair to open repair

All the patients were inquired about the duration of hernia, progression and the main associated symptoms like pain, vomiting, cough, dysuria, reducibility of the swelling, association with pregnancy. Past history pertaining to previous surgery- its nature, duration, type of surgery and closure was recorded. Patients were also asked about the complications associated with previous surgery like infections. Recording about the scar of the previous surgery, the hernia defect – its position, size, shape, cough impulse, reducibility and the overlying skin over the defect were made.

Data was collected from a specially designed case recording performa pertaining to patient's particulars, proper history, clinical examinations, investigations, diagnosis & surgical procedures, infection following surgery, length of stay in the hospital.

## OPEN PREPERITONEAL METHOD

Patient preparation for the open technique consists of giving a first-generation cephalosporin. The hernia sac was identified and dissected. Sac was opened and if adhesions were present between the bowel/omentum and the sac, it was released. The content of the sac was reduced after adhesiolysis. The redundant sac wall was excised. A plane was created between the peritoneum and the posterior rectus sheath. Hemostasis was achieved in the layer. The peritoneum along with the sac was closed with Polyglycolic acid No. 2.0. Polypropylene mesh (larger than the size of defect) was

placed over the closed peritoneum, under the posterior rectus and secured to the musculo-aponeurotic layer by with Polypropylene No. 2.0 with minimum 4 cm margin from defect on each side with interrupted sutures. A negative suction drain (Romovac) was kept over the mesh and was brought outside through a stab incision in the anterior abdominal wall. Closure of the rectus was done with Polypropylene No. 1 in interrupted fashion. Another negative suction drain was kept over this layer, and brought outside through a stab incision. Excess redundant subcutaneous layer was excised. The subcutaneous layer was closed with Polyglycolic acid No. 2.0 in intermittent manner. The surgical site was painted with Povidone iodine solution (5% strength). Closure of skin was done with Polyamide No 2.0 intermittently. The drainage tubes were secured with sutures. All the patients were kept NPO for up to 6 hours after surgery, following which oral feed was allowed according to bowel handling during surgery and return of bowel sounds.

## LAPAROSCOPIC METHOD

Intraperitoneal onlay mesh repair was undertaken, pneumoperitoneum is created by open technique by Hassan's technique or veress needle technique at an alternative site (palmer's point) as the umbilicus is almost always included in the previous incision. Pneumoperitoneum was created through this port. We initially use a 10mm trocar with 10mm telescope to visualize the abdominal cavity for adhesions of the bowel loops. Subsequently all ports are created. Usually structures like the bowel and omentum are adherent to the defect and the peritoneal sac. The release of the adhesion should be done carefully with sharp scissors, dissecting off the omentum and small bowel from the peritoneal wall. Once adhesiolysis is completed and anterior abdominal wall is cleared off the fat, nature and extent of defect is assessed thoroughly. This assessment is more crucial than the preoperative assessment, as newer defects might be found during this stage. The defect is clearly delineated after releasing the pneumoperitoneum and the site of the defect and the area of proposed placement of the mesh is marked on the skin. The measurement of the defect is taken on the external surface of the abdominal wall. Then an adequate sized suitable mesh (Composite) that covers the entire defect and extending up to 3-5 cm from the edges of the defect is selected. The selected mesh is taken and the corners and sides are tagged with 1-0 polypropylene sutures leaving 2 long threads in each side for fixation. The mesh is folded and reverse loaded on to a 10-5 mm reducer and then placed into the abdominal cavity through the 10 mm port after removing the camera. Once the mesh is inside the abdominal cavity, we orient the mesh in proper

direction and surface small skin incisions (2 mm ) are made on the areas where transfixing sutures are planned and performed with suture passer needle. The corners and sides of the mesh are sutured to the fascia in a similar manner. At this stage we deflate the pneumoperitoneum to check whether the placement of the mesh has been accomplished without any wrinkling or whether the mesh is too taut due to fixation beyond the edges of the mesh. Once the suturing is completed, trocar sites checked for bleeding and the pneumoperitoneum is deflated, the ports closed.

## COMPOSITE MESH

When placing mesh in intraperitoneal position a composite mesh with one side made to promote tissue ingrowth and the other to resist adhesion formation should be used. Composite meshes have been developed that combine a macroporous mesh with a temporary, absorbable antiadhesive barrier. Basic constructs of these mesh materials include heavyweight or lightweight polypropylene or polyester. Absorbable barriers are typically composed of oxidized regenerated cellulose, omega-3 fatty acids, or collagen hydrogels. We used proceed composite mesh (polypropylene, ORC) for intraperitoneal placement.

## OBSERVATIONS AND RESULTS

Patient characteristics are summarized in **Table 1**. 1. No statistical difference was noted between the 2 groups.

**Table 1:** Patient characteristics

	Laparoscopic group	Open group
Number of patients	10	12
Sex (M/F)	7/3	7/5
Mean age (years)	43.9	42.75

Operative findings are shown in **Table 2**. Mean operative time in the LG was 163.2 minutes. Mean operative time in the OG was 125.6 minutes. The difference was statistically significant. Mean hernia diameter was 6.1 cm (3-10) in the LG and 6.4 cm (2-10) in the OG. No drainage was used in the LG while in the OG it was used in 100% of cases. Mean length of stay was 3.6 days (2-5) in the LG and 7.33 days (3-21) in the OG. The duration of hospital stay is significantly low in laparoscopic group with p value <0.05. We did not have to convert any of the laparoscopic procedures. Complications occurred in 1 patient (10%) in the LG. This patient had trocar site infection which was controlled with antibiotics and dressings. No gastrointestinal problems occurred related to the intraperitoneal mesh. We did not encounter major complications.

**Table 2:** Operative findings

	Laparoscopic group	Open group
Mean operative time (min)	163.2(136-178)	125.6(100-174)
Mean hernia diameter (cm)	6.1(3-10)	6.4(2-10)
Use of drainage	0	12
Mean length of stay (days)	3.6(2-5)	7.33(3-21)
Complications	1(10%)	5(41.66%)
Mean follow up (months)	11.2(6-23)	12.1(8-24)
Recurrence	0	0
Mortality	0	0

Complications occurred in 5 patients (41.66%) in the OG. All five were minor complications (3 wound infections controlled with antibiotics and dressings , no mesh removal required as infection was superficial and mesh was placed preperitoneally; 1 wound seroma and 1 urinary retention requiring catheterization ). No major complication occurred. Median follow-up was 11.2(6-23) months in the LG and 12.1(8-24) months in the OG (**Table 3**). No recurrence was observed in the both groups. There was no mortality in both groups.

**Table 3:** Complications

	Laparoscopic group	Open group
Respiratory distress	0	0
Urinary retention	0	1(8.33%)
Wound seroma	0	1(8.33%)
Wound infection	-	3(25%)
Trocar site infection	1(10%)	-
Recurrence	0	0
Mesh infection	0	0
Bowel complication	0	0

## DISCUSSION

Incisional hernias remain a large problem in general surgery. Despite the introduction of meshes, the recurrence rate has continued to be a major concern. About 13% of patients operated on for incisional hernia undergo one subsequent reoperative repair within 5 years.<sup>5</sup> Mesh repair has proven to be superior to direct suture repair, but recurrence rates remain as high as 24%.<sup>6</sup> Open incisional hernia repair has a high complication rate due to extensive lateral dissection and the need for drainage, which increases infection rates.<sup>7</sup> Moreover, infection is one of the major risk factors in developing recurrent abdominal hernias.<sup>6</sup> 22 cases of incisional hernia admitted in our institute for treatment, between December 2011- May 2013 are presented in this study. This study may not reflect all the aspects of incisional hernia, as the series is small and follow up has been for a short period in most of the cases. In our study Incisional hernia is

most common in female (63.6%). In our study the sex incidence of incisional hernia among the 22 cases studied is 1:2 (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. Laparoscopic incisional hernia repair is thought to be superior because it does not require an extensive dissection of subcutaneous tissue and postoperative drainage. Risk of wound infection should be lower, as should the overall complication rate. Moreover, placement of mesh on the inner layer of the abdominal wall (beneath the peritoneum) is the more physiological method of repair and should allow for a lower recurrence rate.<sup>8</sup> In the almost all literature the operating time of laparoscopic repair was found to be more than that of open repair<sup>9,10</sup>, in considering the operating time, the exact identification of the start of the procedure and its conclusion varies. In general the time should be calculated from the insertion of first trocar to the end of skin suturing. Generally all laparoscopic procedures are time consuming for the following reasons, inherent nature of slow manoeuvre of laparoscopic techniques, time taken by careful slow insufflations, routine diagnostic laparoscopy before starting any laparoscopic procedure. We use sutures rather than tacks as tacks are costlier and patients in our institute cannot afford them. This also makes operative time somewhat longer. We keep the mesh overlap the defect at least 4 cm to 5 cm to lower the risk of recurrence. We feed patients a clear fluid on the first postoperative day and a soft diet on the second. The characteristics of the patients were not different between the 2 groups, that is, the 2 groups can be considered comparable. Mean length of stay was dramatically shorter in LG (3.6 days), which is confirmed by many recent studies.<sup>9, 10, 11, 12</sup> The duration of hospital stay is significantly low in laparoscopic group with p value <0.05. We did not assess postoperative pain or resumption of basic functions, such as oral food intake or bowel movements or return to work, but we can presume that length of stay is an indirect measure of them in favour of laparoscopy. We did not experience problems with the mesh, no cases of intestinal adherence have been documented up to this time. We did not have any cases of trocar-site bleeding. We did not use drains in the LG, as compared with drains placed in 100% of OG. In the present study there is significant reduction in incidence of post operative wound infection/ trocar site infection in laparoscopic group (10%) as compared to open group (25%). A similar study done by others has also shown a significant reduction in wound infection rate.<sup>9, 10, 11, 12, 13,14</sup> Wound infection is lower in laparoscopic hernia repair compared to open, as there is decreased extent of tissue

dissection in the former. Trocar site infection seen in laparoscopic repair resolves with antibiotics. This study demonstrates that laparoscopic incisional hernia repair has advantages over the traditional open approach, namely hospital stay, and a lower wound infection rate. Due to the shorter length of stay, laparoscopic repair compensates for the higher direct cost. On the other hand, some drawbacks must be outlined. The lack of randomization lowers the power of the statistical analysis, and the short follow-up could underestimate the problem of recurrences. We believe that recurrence due to technical error should occur within the first year and during the first cases of the learning curve.<sup>8</sup> We need to further evaluate our patients to rule out a higher recurrence rate. This study also confirms the excellent performance of laparoscopic composite mesh (in our case proceed mesh) in the laparoscopic incisional hernia repair.

## CONCLUSION

Laparoscopic incisional hernia repair seems to be superior to open mesh repair, because of a shorter hospital stay, lower infection rate, earlier return to work and comparable recurrence rate, allows viewing of other smaller defects not evident preoperatively and better cosmetic results. The recurrence rate does not seem to be different, even if follow-up is too short to provide clear evidence of it. We need further study, randomized controlled trials with longer follow up and bigger sample size to provide evidence of this conclusion.

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