Asian Pac. J. Health Sci., 2015; 2(4): 105-113 e-ISSN: 2349-0659, p-ISSN: 2350-0964

A Comparative Study of Incision Hernia: Open Repair and Laparoscopic Repair

Oruganti Shankar*[1], Awais Ghori[2], P.Niranjan[3]

[1]Associate Professor, Department of General Surgery, Government Medical College, Nizamabad, India
[2] Assistant Professor, Department of General Surgery, Government Medical College, Nizamabad, India
[3]Senior Resident: Department of General Surgery, Government Medical College, Nizamabad, India

ABSTRACT

Aim: A comparative non-randomized and prospective study of open repair and laparoscopic repair of incisional hernia. **Materials and methods**: In our study of 38 patients with incisional hernia, operated in open repair group and laparoscopic repair group are compared with regard to the different variables like Operative time, Postoperative pain, Wound infection, Duration of hospital stay and Recurrence. **Results:** A significant reduction in post-operative wound infections, duration of hospital stay , decrease in the post-operative pain as well as recurrence rates of hernia are noted in Laparoscopic repair group compared to open repair group. **Conclusion:** Laparoscopic approach has shown promising results and is being widely accepted.

Keywords: Hernia, Laparoscopic repair, wound infection

Introduction

Hernias are abnormal bulges created by a weakness or hole, usually in the abdominal wall. The main types of hernia are inguinal, femoral, umbilical, diaphragmatic and incisional. Hernias often produce no troublesome symptoms, but some abdominal complaints may be a serious problem. They are usually straight forward to diagnose, simply by feeling and looking for the bulge. Treatment is a choice between watchful waiting and corrective surgery, either via an open or laparoscopic operation. Congenital diaphragmatic hernia is an uncommon, due to a defect involving a newborn's diaphragm. It can be diagnosed before birth of child by scan and needs medical attention. Inguinal hernia surgery is more common in childhood and also in old age, while the likelihood of femoral hernia increases throughout life. Hernia occurs through a weak area or hole in the fascio-muscular abdominal wall. In most cases, there is no obvious reason for hernia to occur, with the exception, an incisional hernia may develop following abdominal surgery. The risk of hernia increases with age and hernia occurs more commonly in men than in women. An hernia can be a congenital - present at birth or develop in children who have a weak in men than in women. An hernia can be a congenital - present at birth or develop in children who have a weak area in their abdominal wall.[1] Physical activities and certain medical problems which increase intra abdominal pressure may lead to hernia. In many cases, hernia is no more than a painless swelling that remains asymptomatic and need no immediate medical attention.[2] Hernia may, however, be the cause of discomfort and pain, with symptoms often becoming worse when standing, straining, or lifting heavy weights. The persons, who notice increasing in size of swelling or soreness, consult a doctor for treatment. In some cases, hernia necessitates immediate surgery, when it becomes obstructed or strangulated. Immediate medical attention should be sought if an inguinal hernia produces acute abdominal complaints such as pain, nausea, vomiting, distension and constipation. The swelling in such case is typically firm more tender and cannot be reduced back into the abdomen. Hiatus hernia can produce symptoms of acid reflux, such as heartburn, water brash. An incisional hernia is a defect in the fascio-muscular layer of the abdominal wall following any incision. [3]Clinically, an incisional hernia presents as a bulge or protrusion at or near the area of long abdominal incisions such as for intestinal or vascular surgery and small incisions such as for appendix removal or abdominal tubectomy. They tend to occur more commonly along mid line incision on anterior abdominal wall and are more complex in this

**Correspondence*
Dr.Oruganti Shankar
Associate Professor, Department of General Surgery, Government Medical College, Nizamabad, India.
E Mail: osr1963@gmail.com

region and have a high rate of recurrence if repaired with a simple suture technique under tension. For this reason, it especially advised a tension free repair technique using a synthetic mesh. Laparoscopic repair of incisional hernia is a new method of surgery for this condition. The operation is performed using surgical microscopes and specialized instruments. [4]The surgical mesh is placed into the abdomen underneath the abdominal muscles through small incisions to the side of the hernia sac. In this manner, the weakened tissue of the original hernia is never re-incised to perform the repair, and minimizes the wound complications such as infections.[5] In addition, performance of the operation through smaller key holes make less painful and speedy recovery. Laparoscopic repair has been demonstrated to be safe and a more resilient repair than open repair for incisional hernia

Materials and Methods

This study was a comparative, non-randomized and prospective study with 2 group series i.e .open repair group and laparoscopic repair group for incisional hernia. This study was done on patients who gave consent for incisional hernia surgery. Current study involved 38 patients during the period of April 2013 to March 2015 at Government Medical College & hospital, were subjected to mesh repair either by laparoscopy method or by open method.

Inclusion Criteria

- Patients presented to our hospital with incisional hernia.
- Age 20 yrs and above giving written valid consent
- ASA grade 1 and 2
- Medically fit patients to undergo the procedure.

Exclusion Criteria

- Patients age <20 yrs and > 60 yrs
- ASA grade >3
- Hernia defect size < 1.3 cm and > 10 cm
- Patients with acute or sub acute intestinal obstruction.

Preoperative evaluation and preparation

All the patients were evaluated by proper history, detailed physical examination and underwent relevant hematology, biochemistry investigations. Ultrasound of abdomen was performed for all the patients to know the size of the defect, number of defects, contents and to detect other abdominal pathology if any. Patients were on liquid diet the day before and nil orally for 6 to 8 hours before surgery. All patients received antibiotic prophylaxis half an hour before surgery. All the patients were operated under general anaesthesia. Nasogastric tube and Foleys catheter in urinary bladder were placed in all cases. During post-operative period all patients were given parenteral antibiotics and analgesic once in 12 hours on first day and there after orally. The pain experienced by the patients in the post-operative period has been measured according to the number of days on parenteral analgesics.All the patients were ambulated after 24 hrs of surgery and are encouraged for oral feeds. Nasogastris tube and urinary catheter were removed after 24 hrs. Initially the feeds were sips of liquids followed by normal diet in a gradual manner after the recovery of postoperative ileus In those patients with persistent ileus, were kept nil orally and whenever required a nasogastric tube kept in place till recovery from the ileus. The wounds were inspected for any seroma, hematoma or any infection. In open group drains were removed when the collection was less than 10 ml for 2 consecutive days. Patients were discharged after complete ambulation and tolerating normal diet. All the patients were given abdominal support for one month.After discharge, patients were encouraged to take normal diet and return to their normal activities as early as possible but warned to avoid straining and lifting weights .The patients were followed up at 1 week, 1 month, 3 months and 6 months intervals. In the initial follow up, the patients were examined for short term complications like hematoma, seroma, wound infection and wound dehiscence and in subsequent visits, details about pain at the operation site, return to normal activity and recurrence were recorded. The end points measured in both the groups are duration of surgery, duration of post-operative pain, post-operative local complications, duration of hospital stay, return to normal activity, recurrence rates and cosmoses.

Results

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ±SD (Min-Max). Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. This study is a comparative study non-randomized and prospective with 2 group series i.e. opens repair and laparoscopic repair of incisional hernia. Total 38 patients were in the study, in open group 19 members and in laparoscopic group 19 members.

Table 1: Demographic Distribution of Patients

Age	Open Group		Laparoscopic Group	
	Number	Percentage	Number	Percentage
20-30yrs	2	10.52%	1	05.26%
31-40yrs	3	15.79%	8	42.11%
41-50yrs	5	26.32%	6	31.58%
51-60yrs	9	47.37%	4	21.05%
Gender				
Male	4	21.05%	3	15.79%
Female	15	78.95%	16	84.21%
Total	19	100%	19	100%

The mean age for laparoscopic group was 40.4 years and for open group was 49.5years. The difference is not statistically significant among two groups .The study shows that the majority of the patients are in the age around 50 years in open group and 40 years in laparoscopic group .Out of the 19 patients in open group 4 were male (21.05%) and 15 were females (78.095%) ,where as in out of the 19 patients in laparoscopy group 3 were males (15.79%) and 16 were females (84.21%). Most of the patients in the study 81.58% were females and 18.42% were males.

Table 2: Previous Operations

Previous Operation	Open Group		Laparoscopic Group	
Caesarian operation	5	26.32%	12	63.15%
Laparotomy for Peritonitis	8	42.10%	2	10.53%
Open Hysterectomy	3	15.79%	2	10.53%
Mini-Lap Tubectomy	3	15.79%	0	0%
Laparotomy for Intestinal Obstruction	0	0%	1	05.26%
Recurrent Hernia	0	0%	2	10.53%
Total	19	100%	19	100%

From the above data it is found that, in our study most of incisional hernias occurred below the umbilicus in the midline.Laparotomy was the most common operation followed by Caesarian operation (26.32%) in open group and (63.15%) in laparoscopic group followed by Laparotomy for Peritonitis and Open Hysterectomy.According to the study all 38 patients presented with swelling i.e.100% and 16 patients presented with pain i.e. 42.11% in addition to swelling. (Table – 4)

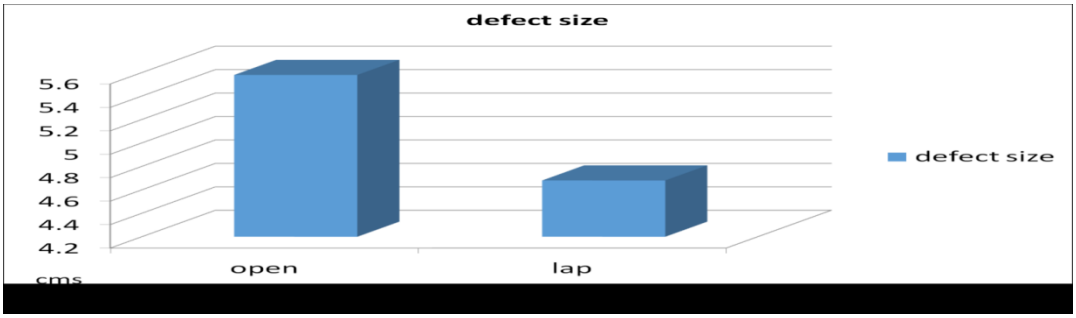

Figure 1: Distribution of Incisional Hernia Defect Size

Defect size assessed by USG abdomen. In open group mean defect size was 5.38 cm. and In laparoscopic group mean defect size is 4.68 cm.P value is 0.219 not significant statistically.

Table 3: Operating time and Post operative stay in hospital in present study

Operating Time(Min)	Open Group		Laparoscopic Group	
	Number	Percentage	Number	Percentage
<60	1	05.26%	0	0%
61-100	3	15.79%	2	10.53%
101-120	5	26.32%	11	57.90%
121-140	2	10.53%	1	05.26%
141-160	4	21.05%	4	21.05%
161-180	4	21.05%	1	05.26%
Total	19	100%	19	100%
Mean Operating Time	128.5min		125.6min	
P-Value	0.79			
Post OP Stay In Days				
1-2	0	00.00%	6	31.58%
1-5	2	10.53%	10	52.63%
6-10	9	47.37%	3	15.79%
11-15	4	21.05%	0	00.00%
16-20	1	05.26%	0	00.00%
21-25	0	00.00%	0	00.00%
26-30	3	15.79 %	0	00.00%
Total	19	100%	19	100%
Mean	12.11days		2.88days	
P-Value	0.000151			

In this study the mean operating time in open group was 128.5 min and in laparoscopic group was 125.6 min and there was no significant statistical difference between them. p-value 0.78. All the patients in laparoscopic group had good post-operative period, had early ambulation and early return to their normal activities and with short hospital stay i.e. mean 2.88 days.

Table 4: Distribution of post-operative pain

No of Days of Analgesic use	Open group		Laparoscopic group	
	Number	Percentage	Number	Percentage
1-4	12	63.16%	17	89.48%
5-7	4	21.06%	2	10.52%
8-10	2	10.52%	0	0%
11-13	1	05.26%	0	0%
Total	19	100%	19	100%
Mean	5.66days		2.22days	
P-Value	0.003			

The pain experienced by the patients in the post-operative period has been measured according to number of day's requiring parenteral analgesics. In this study mean number of days requiring parental analgesics is 5.66 days in open group and 2.22 days in laparoscopic group.

Table 5: Distribution Post Operative Wound Infection

Wound Infection	Open Group	Laparoscopic Group
Yes	6 (31.58%)	0 (00.00%)
No	13 (68.42%)	19 (100.00%)
Total	19(100%)	19 (100%)
P-Value	0.007	

6 out of 19 cases i.e. (31.58%) were infected in the open group and none in the laparoscopic group, p-value 0.007.

Recurrence: All the cases were followed up periodically for 6 months by clinical and sonological methods. Out of 19 cases one case of recurrent hernia was reported in open group and none in laparoscopic group.

Table 6: Distribution of cosmoses

Satisfaction/ /Cosmoses	Open Group	Laparoscopic Group	Total
Satisfied	7	19	26
Not satisfied	12	0	12
Total	19	19	38
P-Value	<0.0001		

In this study 7 out of 19 patients in open group were satisfied by the procedure and 12 patients are not satisfied. All the 19 patients were satisfied cosmetically in laparoscopic group.

Fig 1:Adhesiolysis of sac and sac dissection

Fig 2: Closure of hernia defect and raise of flaps

Fig 3:Laparoscopic adhesiolysis

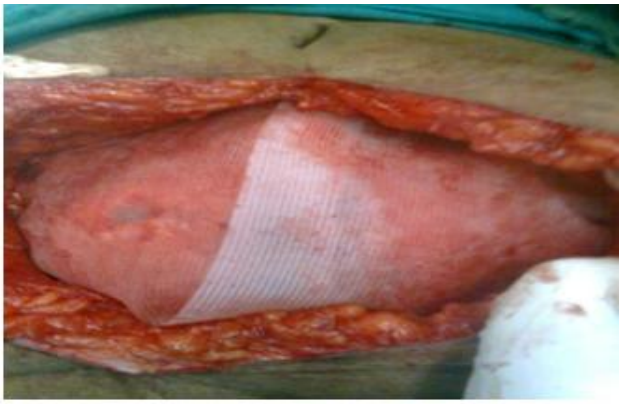

Fig 4:Fixation of mesh larger than the defect size

Discussion

Incisional hernia is one of the most common long term complication of abdominal operations, with an incidence of 3-20%[6].Before the introduction of mesh prosthesis for repair of incision hernia, only open suture repairs were practiced, but with a recurrence rate more than 50%[7].With the introduction of mesh prosthesis recurrence rate has been brought down, but the wound related complications increased the morbidity of the procedure. Laparoscopic surgery is surgical technical advancement enabled the surgeon to provide more valuable surgical management of incisional hernia. The controversy that currently exists over the potential benefits of laparoscopic repair of incisional hernia motivated us to analyze our experience with this procedure.Laparoscopic repair of incisional hernia eliminates the main complications of open mesh repair like wound related complications, recurrence of hernia, This laparoscopic repair has decreased wound infection rate, less pain, minimum use of analgesics, accelerated recovery, short hospital stay and early return to daily activities and work.In the present study which consists of 38 patients, in open repair group 19 patients and in the laparoscopic repair group 19 patients. The overall majority of the patients were females of which in the laparoscopic repair group 42.11%patients were in the age group of 31-40 years against 47.37% of the patients were in the age group of 50-60 years in the open repair group.

Table 7: Various studies in comparison with present study

Study	Year	Open repair	Laparoscopic
Gender distribution : Female /Male			
Erturk *et al*[8]	2013	14/6	13/7
S.J.F.Qadri *et al*[9]	2013	30/10	28/12
Present study	2015	15/4	16/3
Mean defect size :(cm)			
Erturk *et al*[8]	2013	6.43	5.6
S.J.F.Qadri *et al*[9]	2013	8.30	8.89
Present study	2015	5.38	4.68
Mean ASA			
Erturk *et al*[8]	2013	2.25	1.73
Present Study	2015	1.44	1.22
Duration of surgery :(min)			
Chari *et al*[13]	2000	124	78
Holzman *et al*[12]	1997	128	98

S.J.F.Qadri *et al*[9]	2013	75.1	90.3
Erturk *et al*[8]	2013	101	106
Present study	2015	128.5	125.6
Wound infection			
Holzman[12]	1997	6%	5%
Carboza *et al*[16]	1999	18%	0%
Erturk *et al*	2013	2.5%	0%
S.J.F.Qadri *et al*	2013	25%	5%
Present study	2015	31.58%	0%
Recurrence			
Erturk *et al*[8]	2013	1(5%)	1(5%)
S.J.F.Qadri *et al*[9]	2013	1(2.5%)	1(2.5%)
Present study	2015	1(5.26%)	0(0%)

Most (66.6%) of the incisional hernias were located in the lower abdomen. This reflects the caesarean section and other gynecological operations are the prime cause of incisional hernias in Indian population, in contrast to the published English literature where in the majority are following procedures like aortic surgery, gastric surgery, and colonic surgery[10,11]All of them are presented with swelling over the abdomen and 44.4% of the patients with pain it. Size of defect is one of the important factors to determine the outcome. In the present study mean defect size is 5.38 cm in open group and 4.68 cm in laparoscopic group which is comparable to other studies.In open repair, the defect is closed and an on- lay mesh repair is done. Laparoscopic repair usually does not include closure of the hernia orifice therefore it relies on the strength of the mesh and its fixation. Further studies are needed in this important aspect.Park *et al* reported cardiopulmonary complication rates as 1.7% laparoscopic repair group and 10.2% in open repair group respectively[10].We observed cardiopulmonary complication in laparoscopic repair group 1 patient(5.26%) developed postoperative atelectasis, was recovered un-eventfully.We observed that the difference between two surgery groups in terms of cardiopulmonary complication depend up on preoperative ASA score which was significantly greater in open repair group. Mean ASA in open group was 1.44 and in laparoscopic group was 1.22.Although longer or similar operation duration with laparoscopic technique compared to the open method was reported earlier by different studies[11,12]recent literature supports shorter operation duration due to technological advancements with laparoscopic method[13,14,15]'Carbajo *et al* reported that operation duration was reduced by 50% with the help of external knotting technique in this laparoscopic method[16] However, duration of operation in laparoscopic repair group was not significantly decreased compared with the open repair group in our study. Mean operation duration was 125.6 min (range 45 - 180 min) and 128.5 min (range 45 - 180 min) in laparoscopic group and open group, respectively.Although operation duration was the longest (165min) initially with laparoscopic technique, it was shortened gradually, as abdominal wall dissection is not needed in laparoscopic group In laparoscopic repair group blood loss was significantly less as compared to open repair group and this is an important as most of our female patients are anemic.With regard to intra operative complications in open repair group there were no significant complications but in laparoscopic repair group there was one major complication, inadvertent enterotomy (ileal perforation)while releasing bowel adhesions which was managed by open- suturing of the perforation and in 2 cases of laparoscopic group were converted into open method as dense adhesions of bowel to the abdominal wall, hard to be released by sharp dissection in laparoscopic method. The role of surgical expertise in this context cannot be denied. Tissue dissection is more in open repair group, wound related infections complications are higher. More over the infection during the previous surgery puts them at a higher risk probably due to some bacteria lying dormant as shown by Davis and Houck[17,18]In present study, wound infections are significantly higher in open repair group 31.58%as compared to zero in laparoscopic group. Control of mesh infection may be problematic though it has been documented that infection of polypropylene mesh can be controlled without removal of mesh. But one case in open repair group had severe prolonged mesh infection, responded poorly to antibiotics, local wound toilet techniques and was managed by removal of mesh. This patient had recurrence of hernia. Seroma formation is one of the

complications of incisional hernia repair and occurs both in open repair and laparoscopic repair, it varies from 1 to 14%[19,17,20]The literature on wound related complications of open mesh repair has the most compelling argument in favor of laparoscopic repair. In open mesh repair the wound related complications range from3.5%to18% with an average of 8.1% whereas in laparoscopic repair it is overall 2% [19, 17, 20] De-Maria [21] and Raftopoulos [22] in their studies found that patients had less pain following laparoscopic repair. In present study, the post operative pain was definitely less in laparoscopic group as compared to open group. The mean hospital stay was significantly shorter in laparoscopic group (2.88days)as compared to open repair group(12.11days).In many studies of open repair and laparoscopic repair of incisional hernia the recurrence rate was 4% for the laparoscopic method and 16.5% open method[23]. In present study, with follow up for 6 months period, reported no recurrence in the laparoscopic group and one recurrence in open group .The recurrence rate in present study, 0% in laparoscopic group and 5.26% in open group, which is almost same as that published literature. Further studies with larger population and for long time are needed to determine the rate of recurrence in laparoscopic versus open repair of incisional hernia. The cost factor needs to be addressed with regard to laparoscopic incisional hernia repair. The main contributor to the cost of laparoscopic repair is the mesh (composite mesh) and the disposable tacker which is used to fix the mesh in place. The use of tacker can be omitted by using intra corporeal suturing to fix the mesh but this markedly increases technical difficulty of the procedure and the operative time. In present study, the polypropelene mesh used in all cases which is cost effective and covered the visceral surface with collagen sheet in order to prevent adhesions. The difficult step of intra corporeal suturing was avoided and replaced with transfacial fixation with delayed absorbable sutures. The results of present study .encourage the use of polypropylene mesh for laparoscopic incisional hernia repair. In present study, in laparoscopic incisional hernia repair group, during a mean follow up of 6 months, there were no readmission for symptoms of complications like adhesion-obstruction, gut erosion or for any symptom due to intra-peritoneal use of polypropylene mesh. Vrijland Ww[23] in his study has concluded that there is low risk of intestinal complications for intra-peritoneal use of polypropylene mesh.

Conclusion

Laparoscopic repair is associated with less chances of wound infection, the operative time is more or less equal to that of open repair, the degree of post operative pain and its duration is less, the analgesic requirement is less, duration of hospital stay is less and patients can be discharged early from the hospital. Patients of laparoscopic group can resume their work early and the cosmetic advantage in laparoscopic group is obvious. Laparoscopic approach has shown promising results and is being widely accepted.

Reference

1. Park, E; Roth, JS. "Abdominal Wall Hernia".CurrProbSurg 2006;43 (5): 326–75.
2. Bucknall, TE; Cox, PJ; Ellis, H . "Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies". Br Med J 1982;284 (6320): 931–3.
3. Edwards, C; Geiger, T; Bartow, K; *et al*."Laparoscopic transperitoneal repair of flank hernias: a retrospective review of 27 patients". SurgEndosc 2009;23: 2692–6. .
4. Schumpelick, V; Klinge, U; Junge, K; Stumpf, M "Incisional abdominal hernia: the open mesh repair". Langenbecks Arch Surg 2004;389: 1–5
5. Lyons, M; Mohan, H; Winter, DC; Simms, CK "Biomechanical abdominal wall model applied to hernia repair". Br J Surg 2015;102 (2): 33–9.
6. Read RC, Yoder G. Recent trends in the management of incisional herniation. Arch Surg 1989;124(4):485e8.
7. Hesselink VJ, LuijendijkRW , de W ilt JH, *et al*. An evaluation of risk factors in incisional hernia recurrence. Surg Gynecol Obstet 1993;176(3):228e34.
8. Erturk et al Incisional Hernia Repair: Laparoscopic or Open A Randomized Clinical Trial J Curr Surg • 2013;3(1):29-34
9. Qadri, S.J.F., Khan, M., Wani, S.N., Nazir, S.S., Rather, A. Laparoscopic and open incisional hernia repair using polypropylene mesh-A comparative single centre study. *Int J Surg*. 2010;8:479–483.
10. LeBlanc KA, W hitaker JM, Bellanger DE, Rhynes VK. Laparoscopic incisional and ventral hemioplasty: Lessons learned from 200 patients. Hernia 2003;7(3):118e24.
11. ParkA, BirchDW, LovricsP. Laparoscopic and open incisional hernia repair:a comparison study.Surgery.1998;124(4):816-21.
12. Holzman *et al* , laparoscopic ventral and

incisional hernioplasty. Surg endosc1997;11:32-35.

13. ChariR, ChariV, EisenstatM, ChungR. A case controlled study of laparoscopic incisional hernia repair. SurgEndosc.2000;14:117-119.

14. Ramshaw BJ, Esartia P, Schwab J, Mason EM, W ilson RA, Duncan TD, Miller J, et al. Comparison of laparoscopic and open ventral herniorrhaphy. AmSurg.1999;65(9):827-831

15. Goodney PP, Birkmeyer CM, Birkmeyer JD. Short-term outcomes of laparoscopic and open ventral hernia repair:a meta-analysis.Arch Surg. 2002;137(10):1161-1165.

16. Carbajo MA, Martin del Olmo JC, Blanco JI, de la Cuesta C, Toledano M, Martin F. Laparoscopic treatment vs open surgery in the solution of major incisional and abdominal wall hernias with mesh. SurgEndosc. 1999;13:250–2.

17. Davis JM, W olff B, Cunningham TF. Delayed wound infection. An 1 1-year survey. Arch Surg 1982;117(2):113e7.

18. Houck JP, Rypins EB, Sarfeh IJ, et al. Repair of incisional hernia. Surg Gynecol Obstet 1989;169:397.

19. Heniford BT, park A, Ramshaw BJ, Voeller G, Laproscopic repair of ventral hernias: nine years‟ experience with 850 consecutive hernias. Ann Surg 2003;238:391-9.

20. Franklin Jr ME, Gonzalez Jr JJ, Glass JL, Manjarrez A. Laparoscopic ventral and incisional hernia repair: an II-year experience. Hernia 2004;8(1):23e7. 90

21. De Maria FJ, Moss JM, Sugerman HJ. Laparoscopic intraperitonea polytetrafluoro ethylene (PTFE) prosthetic patch repair of ventral hernia prospective comparison to open prefascial polypropylene mesh repair. Surg Endosc 2000;14:326e9

22. Raftopoul Q I, Vanuno D, Khorsand J, et al. Outcome of laparoscopic ventral hernia repair in correlation with obesity, type of hernia and hernia size. J. Laparoendosc Adv Surg Tech 2002;12(6):425e9.

23. Vrijland WW, Jeekel J, Steyerberg EW , Hoed PT den, Bonjer HJ. Intraperitoneal polypropylene mesh repair of incisional hernia is not associated with enterocutaneous fistula. Br J Surg 2000; 87: 348-52.

Source of Support: Nil
Conflict of Interest: None