ORIGINAL RESEARCH PAPER INTERNATIONAL JOURNAL OF PURE MEDICAL RESEARCH

Surgery

KEYWORDS: Incisional hernia, laparoscopic repair, comparative, open repair, morbidity, complications, pain, cost effectiveness.

COMPARATIVE STUDY OF OPEN AND LAPAROSCOPIC INCISIONAL HERNIA REPAIR WITH RESPECT TO PERI-OPERATIVE COMPLICATIONS AND POST – OPERATIVE MORBIDITY.

Volume - 5, Issue - 2, February - 2020 ISSN (O): 2618-0774 | ISSN (P): 2618-0766

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INTERNATIONAL JOURNAL OF PURE MEDICAL RESEARCH

INTRODUCTION:
Incisional hernia, a failure of the abdominal wall fascia to heal, is a common postoperative complication following abdominal surgery with an incidence varying between 2% and 50%.Incisional hernia entails significant morbidity and discomfort resulting in disturbances in day to day activities.In spite of various available techniques available to surgeon, these hernias recur leading the surgeon to search for an ideal procedure of their repair with preferably zero or universally acceptable minimal recurrence rate. Laparoscopic incisional hernia repair, controversy has endured despite of numerous studies and data suggesting success of laparoscopic incisional hernia repair. However, there is relative lack of evidence to support adoption of laparoscopic repair as standard technique in regard to post operative morbidity and cost effectiveness.

AIMS AND OBJECTIVE:
To compare open and laparoscopic incisional hernia repair technique with respect to the post-operative complications and perioperative morbidity.

MATERIAL AND METHODS:
This is prospective, observational, comparative study, comparing patients who underwent laparoscopicincisional hernia and open incisional hernia repair during study period of November 2015 to August 2017 in Department of General Surgery, J.L.N. Hospital and Research centre, Bhilai.

STATISTICAL METHOD:
Data is analyse using percentages , mean and standard deviation. Continuous variable analysed by Unpaired T-test. Categorical data analyzed using chi square test or Fisher exact test.

CONCLUSION:
In our study laproscopicincisinal hernia repair has more favourable outcome in terms of less hospital stay, shorter duration of surgery, less post-operative pain, early to resume daily activity and lesser wound related complications.

1.INTRODUCTION:

Incisional hernia entails significant morbidity and discomfort resulting in disturbances in day to day activities. Patients with incisional hernia presents with symptoms such as pain, discomfort, cosmetic complaints, skin problems, functional disability, and pulmonary dysfunction. However, up to one third of patients are not always aware of having an incisional hernia, especially when older or the hernia is small. About half of these have no symptoms[1,2].

Incisional hernia repair technique has improved in recent 20 years but it is still associated with significant morbidity and recurrence. Simple anatomical closure of defect under tension is associated with higher recurrence rate. This prompted the development of open repair technique using prosthesis. Introduction of the prosthetic mesh to ensure abdominal wall strength without tension has decreased the recurrence rate [3, 4]. In comparative studies, mesh repair was proven superior to primary repair with recurrence of 11-21% compared to 25-52% for simple closure [5].

In recent years, laparoscopic surgery has gained paramount importance due to its minimally invasive technique, reduced hospital stay and decreased morbidity. The trend towards minimal access surgery has prompted general surgeon to submit all operations to laparoscopic technique. There is continued debate as to the role of laparoscopy in incisional hernia. Although laparoscopic repair has become increasingly popular, its outcome needs further evaluation.

2.MATERIALS AND METHODS:

We prospectively compared 36 unselected, non randomised patients who underwent laparoscopic incisional hernia repair during November 2015 to November 2018 in our department with consecutive 36 patients unselected patients who undergone open incisional hernia repair. Patients with age between 18-75 years with hernial defect <10cm posted for elective incisional hernia repair in our institute included in this study. Patients with incisionalhernial defect >10 cm and complicated incisional hernia were excluded.

PRE-OPERATIVE EVALUATION:
All the patients were evaluated by proper history and detailed clinical examination and investigations including biochemical and imaging modalities like- Routine laboratory studies (Complete blood count, Renal and Liver function test, serum proteins and serum electrolytes), ECG, chest x-ray, Ultrasonography abdominal wall (defect size). Prophylactic short-term antibiotic therapy using first-generation cephalosporin and antithrombotic prophylaxis with anti-embolic stockings were used routinely. Naso-gastric suction and bladder catheterization were used during surgery.

SURGICAL TECHNIQUES:
OPEN SURGICAL APPROACH:
All the patients were subjected to surgery under appropriate anaesthesia. Foley's indwellng urinary catheter was inserted for patient with lower abdominal incisional hernia repair and naso-gastric tube for upper abdominal hernia repair. Single dose of prophylactic antibiotic was given at the time of induction of anaesthesia.

Under all aseptic precautions, painting and draping of abdomen was done and appropriate skin incision was made according to site and size of defect. Subcutaneous flaps were raised 3-5 cm beyond the defect-margin. The hernia sac was identified and contents were reduced back. Then rectus muscle and posterior rectus sheath was dissected followed by dissection between rectus muscle and peritoneum in lower abdomen. The defect in the peritoneum and posterior rectus sheath was closed primarily with 2:0 Vicryl (Polygalactin) suture,followed by placement of polypropylene mesh of suitable size with minimum of 3-5 cm overlap beyond margin of hernia defect was placed over posterior rectus sheath.

Transfascial sutures with 2:0 polypropylene in four corners were used to fix mesh. Anterior rectus sheath was closed over the mesh with a loop of polypropylene or nylon without tension, then skin was closed over the drain/drains depending upon size and extension of the wound.

Drains were placed in subcutaneous plane if required.

LAPAROSCOPIC SURGICAL APPROACH:

All the patients were operated under general anesthesia. Naso-gastric tube was placed for upper abdominal hernia and a Foley's catheter for lower abdominal hernias. Both were removed on completion of the procedure.

Patients were placed in supine position without any tilt. However if hernia is located in flank, lumbar or other area the patient was required to positioned on their side to some extent. Arms of patients wereplaced by side of patient.

All hernias were approached laterally and the side of the abdomen away from the hernia defect was used for placement of the ports. Pneumoperitoneum was established with Veress needle at 'Palmer's point'. Three trocars were sufficient for most procedures with additional ports inserted if needed. A 10- mm zero degree telescopewas used with 10-mm trocar. The camera port was inserted as laterally as possible. Under direct vision, two additional 5-mm trocars were placed laterally and used as working ports. All abdominal wall adhesions were divided. Abdomen was desufflated before measurement of hernia defect. Multiple orifices were measured as one, so that a single piece of mesh can be used to cover all the defects. A double-layer polypropylene expanded composite mesh was used allowing at least 3-5 cm overlap on all sides. Four transfascial sutures were used at the four corners. The mesh was then inserted into the peritoneal cavity via the 10-mm port or directly through the port site. Four previously placed sutures were brought out to the abdominal wall with the aid of a suture passer. The edges of the mesh were secured with absorbable tackers at 1- to 2-cm intervals. Hemostasis was achieved and ports were removed. Drain was not placed.

A compression dressing was placed in the area of defect to reduce the incidence of post-operative seroma.

POST OPERATTIVE:

Postoperative instructions were the same for both groups, including standard iv fluids, iv antibiotics (INJ. CEFUROXIME 750mg /8 hr) and analgesia (INJ. TRAMADOL 50mg IV/ 8h or equivalent dosage for 48 hours post-operatively). Patients resumed normal activities as tolerated. Patient wore abdominal binder for 4 weeks.

All the patients were ambulated within 12 hrs of surgery and encouraged for oral feeds. Initially the feeds were sips of liquids escalated gradually to normal diet after the resolution of post-operative ileus (indicated by passing of flatus and normal bowel sounds on auscultation and return of appetite). Patients with persistent ileus were be kept NPO and whenever required a nasogastric tube passed only to be removed on the resolution of ileus. Surgical site were inspected for any seroma, hematoma or any infection. In open group drains will be removed when collection reduces to less than 30 ml for 2 consecutive days. Patients were discharged after complete ambulation and tolerating normal diet.

POST-OPERATIVE FOLLOW UP:

Regular follow ups were done in the immediate postoperative period at 2 weeks, 1 month, 3 months. Each patient was followed up for minimum of 3 months post-operatively.

Data on these patients was collected with use of a standard proforma in which age, sex, previous surgery, preoperative evaluation, hernia size and location, previous hernia repairs, operating time, intra-operative and post-operative complications, postoperative hospital stay, date of last follow-up evaluation, and whether there had been a hernia recurrence will be recorded. Data was compared for open and laparoscopic incisional hernia repair and outcome following surgery on basis of

- Incidence of intra-operative complications including bowel injury
- Duration of surgery
- Post-operative pain by Visual analogue scale (VAS).Wound infection rate
- Seroma or haematoma formation
- Hospital stay(days)
- Cost-effectiveness
- Recurrence

Post-operative pain was recorded at POD-1, POD-3, POD-7 using Visual Analogue Scale (VAS) from 0 to 10 with 0 being no pain and 10 being maximum (worst pain ever in their life).

STATISTICAL METHODS IN MAIN STUDY:

Continuous variable will be analyzed by Mean, SD and test of significance by t test Categorical data will be analyzed using chi square test or fisher exact test.

RESULTS:

This study was carried out in Jawaharlal Nehru Hospital and Research Centre, Bhilai during study period of November 2015 to August 2017(including 3 months follow up) in the Department of General Surgery. Patients who met inclusion criteria were included in the study aftertaking proper consent.Out of 72 patients, 36 patients underwent Laparoscopic repair and 36 patients underwent open repair. Prospectively data collected from 72 patients with minimum follow up of 3 months. Results obtained are as follows

	Open repair (OR) Group (n = 36)	**Laparoscopic repair (LR) Group (n = 36)**
Age (Mean)	53.19(±13.83)	51.64(±11.3)
Sex Distribution		
Male	4	6
Female	32	30
Body Mass Index (BMI) (kg/m^2)	31.82 (±4.43)	28.97 (±3.95)
Mean Defect Size (cm)		
USG	4.97(±1.56)	4.39(±1.40)
Intra-operative	5.22(±1.64)	4.47(±1.58)
Duration of surgery (In Minutes)	116.11(±34.08)	106.81(±26.16)
Hospital Stay (In days)	10.19(±5.16)	5.28(±2.49)
Mean Visual analogue Scale (VAS)		
POD 1	5.81(±1.31)	4.58(±1.36)
POD3	3.64(±1.2)	2.58(±0.87)
POD7	2.19(±0.75)	1.25(±0.97)
Resumption of daily activities (in days)	3.25(±1.75)	2.31(±0.89)
Complications (Total N = 72)	13(36.11%)	7(19.44%)
SSI	2(5.56%)	0
Seroma	2(5.56%)	4(11.11%)

Seroma,SSI	1(2.78%)	(0%)
Ileus	2(5.56%)	3(8.33%)
Seroma,Cuticular Necrosis	1(2.78%)	(0%)
Cuticular Necrosis	3(8.33%)	(0%)
Bowel injury	1(2.78%)	(0%)
Mesh infection	1(2.78%)	(0%)
Cost (In Rupees)	39564.06(±8306.45)	67802.97(±4249.16)
Recurrence (Min follow up 3 months)	1	0

DISCUSSION:

Incisional hernia is a common problem encountered in day to day surgical practice. Many methods of repair of incisional hernia have been described in the literature. With the advances in minimal access surgery, laparoscopic incisional hernia repair is emerging as better option compared to the conventional open repair techniques. Even after nearly two decades of experience with laparoscopic incisional hernia repair there is a surprising paucity of good data clearly proving the benefits of this technique over the standard open surgery. In developing countries like India, treatment options vary from place to place. Treatment option mainly depends upon socioeconomic status of patient and surgical expertise of the hospital. Therefore laparoscopic incisional hernia repair technique needs to be further evaluated.

We are performing laparoscopic incisional hernia repair regularly at our institution. In this study we attempt to compare laparoscopic and open incisional hernia repair with respect to peri-operative morbidity, post-operative pain, duration of surgery, hospital stay and financial implications.

DEMOGRAPHY:

Most of the patients in the study were between 4-6th decade (Mean age 53.19 in OR and 51.64 in LR) with female preponderance (Female: Male ratio 6:1).Female predominance is may be because of lower abdominal scar is more common in females due gynaecological procedures such as lower segment caesarean section and tubal ligation.

BODY MASS INDEX (BMI):

Most of the patients were from pre-obese and obese category. Mean BMI is 28.97(SD=3.95) is in OR and 31.82(SD=4.43) in LR.Obesity emerges as a risk factor for incisional hernia occurrence as Other studies by **Rao AS et al**[6],**Tsuruta et al**[7], **Misra et al**[8].

Obesity is a risk factor for incisional hernia occurrence, may be because obesity increases tension on suture line. Obesity also increases risk of post-operative complications such as paralytic ileus, atelectasis, pneumonia and deep vein thrombosis that may increase the risk of incisional hernia.

COMPLICATIONS:

The major disadvantage of conventionalincisionalhernia repair has been wound-relatedcomplications.The wound-relatedcomplications include wound hematoma, infection, dehiscence, necrosis, chronic sinus, seroma.

In OR group there were eight wound related complications. In OR there were 3 cases of surgical site infection which treated with skin suture removal, daily dressings and oral antibiotics. Four cases of seroma were treated by compression bandage. There were two cases of ileus which resolved with conservative treatment. One case of bowel injury was managed with primary repair.

In LR there were four cases of seromamanaged with compression dressing. Three cases of paralytic ileus were managed conservatively.Complications in previous studies are as follows.

STUDIES		SSI	SEROMA	ILEUS	BOWEL INJURY	MESH INFECTION	CUTICULAR NECROSIS
Present study	OR	3	4	2	1	1	4
	LR	0	4	3	0	0	0
Vyas et al[9]	OR	3	4	3	2		
	LR	2	1	1	0		
Lomanto et al[10]	OR	3	3	5	1	2	
	LR	2	5	1	1	0	
Bencini et al[11]	OR	6	5	5	1		
	LR	0	6	1	2		
Qadri et al[12]	OR	6	2			1	
	LR	2	0			0	

SSI= surgical site infection

POST OPERATIVE PAIN:

Post operative pain is calculated from Visual Analogue Scale (VAS) on post operative Day 1 Day 3, Day 7. In present study on Day 1, mean VAS score was 5.81(SD=1.31) in OR group and 4.58(SD=1.36) in LR group. Post operative pain decreased significantly in LR on Day 3 and Day 7. On Day 3 mean VAS score was 3.64(SD=1.2) in OR group and 2.58(SD=0.87) in LR group. On Day 7 mean VAS score was 2.19(SD=0.75) in OR group and 1.25(SD=0.97) in LR group.

Post operative pain was less in laparoscopic repair group as observed in other studies by **Misra et al**[8], **Lomanto et al**[10], **RaoAS et al**[6]and **Sayyad et al**[13].

Postoperative pain was significantly lower in LR group compared to OR group on POD1, POD 3 and POD7. In general laparoscopic incisional hernia associated with lower post-operative pain, this is due to less tissue dissection, less operative time smaller skin incisions.

DURATION OF SURGERY:

Mean duration of surgery was 116.11(SD=34.08) min. in OR and 106.81(SD=26.16) min. in LR group. Difference in duration of surgery is not statistically significant (p-value0.02).4444. Studies by **Sayyad et al**[13], **Froylich et al**[14] suggested laparoscopy took more time compared to open repair. Studies by **Rao AS et al**[6], **Tsuruta et al**[7], **Lomanto et al**[10], **Vyas et al**[9] showed less operating time in laparoscopy than open repair.

The operation time has been one of the important determinants in assessing the effectiveness of an operative procedure. It is generally accepted that it takes longer time to perform laparoscopic incisional hernia repair. In the current study, laparoscopic repair could be accomplished in less time than open repair, although the difference was not statistically significant. This was possible because operation time varies with experience of surgeon and the level of expertise.

HOSPITAL STAY:

Hospital stay is counted from admission (i.e. one day prior to surgery) to the discharge of patient. Mean hospital stay was found to be 5.28(SD=2.49) days in LR (range 2-12 days) and 10.19(SD=5.16) days in OR (range 3-34 days). Difference in hospital stay of both groups is statistically significant with P-value <0.0001. Hospital stay was found to be more in OR group in studies by **Vyas et al**[9], **Misra et al**[8], **Badinger et al**[15]and**Lomanto et al**[10].

Some patients in each group who had complications skewed the mean with extreme values. Hospital stay in OR group was comparatively more because eight cases had wound related complications including 1 case of mesh infection which required hospitalisation for 34 days.

COST OF SURGERY:

In our country cost of surgery is one of the deciding factors in opting for any surgical procedure. In this observational study, approximate cost of surgery is calculated from cost of operative procedure, cost of mesh and mesh fixation devices, cost of hospitalization and consultation charges

Mean cost (in Rupees) found to be 39564.06(SD=8306.45) in OR group and 67802.97(SD=4249.16) in LR group. Laparoscopic repair cost more than open repair with p value of 0.0001. Very few studies are performed to evaluate cost of surgery. A study by**Misra et al**[8] reported laparoscopic repair is costly compared to open repair.

STUDIES	OR(mean cost)	LR(mean cost)	P – value
Present study (in Rupees)	39564(SD=8306.45)	67802.97(SD=4249.16)	<0.0001
Misra et al[8] (in Rupees)	1536(SD=1062)	13786(SD=6792)	0.01
Bencini et al [11] (in Euros)	3936(SD=2131)	3091(SD=1536)	0.017

Financial features of two different surgeries were very different because the cost of composite prosthesis and fixation tackers is much more than conventional PTFE prosthesis and suture material.

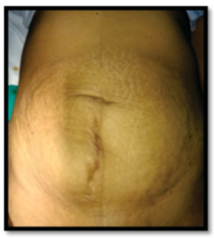

IMAGE 1: INCISIONAL HERNIA (INFRAUMBILICAL MIDLINE)

IMAGE 2 : HERNIAL DEFECT INTRA-OPERATIVELY

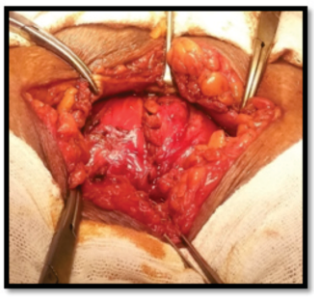

IMAGE 3: TISSUE (PERITONEUM) REPAIR INTR-OPERATIVELY

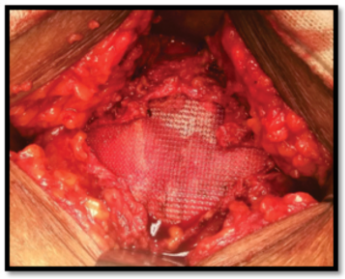

IMAGE 4 : MESH IN SITU

Laparoscopic repair

IMAGE 7 : INSUFFELATED ABDOMEN WITH HERNIA

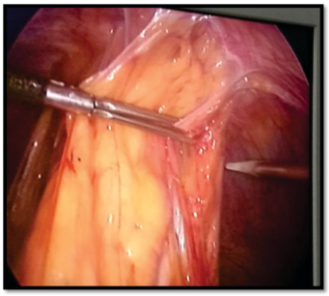

IMAGE 8 : HERNIAL DEFECT WITH ADHESINOLYSIS IN PROGRESS

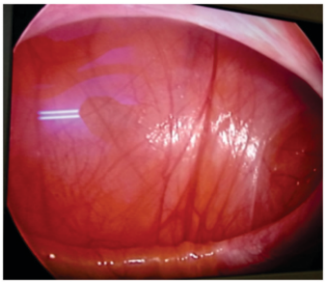

IMAGE 9 : HERNIAL DEFECT AFTER ADHESINOLYSIS

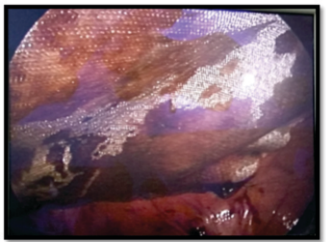

IMAGE 10 : MESH AFTER FIXATION

REFERENCES :

1. Nieuwenhuizen J, Halm JA, Jeekel J, Lange JF. Natural course of incisional hernia and indications for repair. Scandinavian Journal of Surgery. 2007 Dec;96(4):293-6.
2. Ah-kee EY, Kallachil T, O'Dwyer PJ. Patient awareness and symptoms from an incisional hernia. International surgery. 2014 May;99(3):241-6.
3. Uslu HY, Erkek AB, Cakmak A, Kepenekci I, Sozener U, Kocaay FA, Turkcapar AG, Kuterdem E. Trocar site hernia after laparoscopic cholecystectomy. Journal of Laparoendoscopic& Advanced Surgical Techniques. 2007 Oct 1;17(5):600-3.
4. Burger JW, Halm JA, Wijsmuller AR, ten Raa S, Jeekel J. Evaluation of new prosthetic meshes for ventral hernia repair. Surgical Endoscopy and Other Interventional Techniques. 2006 Aug 1;20(8):1320.
5. Beale EW, Hoxworth RE, Livingston EH, Trussler AP. The role of biologic mesh in abdominal wall reconstruction: a systematic review of the current literature. The American Journal of Surgery. 2012 Oct 31;204(4):510-7
6. Rao AS, Gupta A, Naik D, Gunasekaran G, Bhandari V, Rajput D. A comparative study between laparoscopic intraperitonealonlay mesh hernioplasty and open underlay mesh hernioplasty for ventral hernias. International Surgery Journal. 2016 Dec 13;2(3):352-60.
7. Tsuruta A, Hirai T, Nakamura M. Retrospective comparison of open versus laparoscopic ventral and incisional hernia repair. Asian journal of endoscopic surgery. 2014 Aug 1;7(3):246-50.

8. Misra MC, Bansal VK, Kulkarni MP, Pawar DK. Comparison of laparoscopic and open repair of incisional and primary ventral hernia: results of a prospective randomized study. Surgical Endoscopy And Other Interventional Techniques. 2006 Dec 1;20(12):1839-45.
9. Vyas PH, Joshi AH, Odedra N, Shah KS. Comparison of Open and Laparoscopic Prosthetic Repair of Large Ventral Hernias. National Journal of Community Medicine. 2016;7(3):201-3.
10. Lomanto D, Iyer SG, Shabbir A, Cheah WK. Laparoscopic versus open ventral hernia mesh repair: a prospective study. Surgical Endoscopy and Other Interventional Techniques. 2006 Jul 1;20(7):1030-5.
11. Bencini L, Sanchez LJ, Boffi B, Farsi M, Scatizzi M, Moretti R. Incisional hernia repair. Surgical Endoscopy And Other Interventional Techniques. 2003 Oct 1;17(10):1546-51.
12. Qadri SJ, Khan M, Wani SN, Nazir SS, Rather A. Laparoscopic and open incisional hernia repair using polypropylene mesh-A comparative single centre study. International Journal of Surgery. 2010 Dec 31;8(6):479-83.
13. Sayyad ST, Ilyas M, Satyanarayana G, Yashaswini H. Comparative study in clinical response in open versus laparoscopic ventral hernia repair. International Surgery Journal. 2016 Dec 9;3(3):1206-12.
14. Froylich D, Segal M, Weinstein A, Hatib K, Shiloni E, Hazzan D. Laparoscopic versus open ventral hernia repair in obese patients: a long-term follow-up. Surgical endoscopy. 2016 Feb 1;30(2):670-5.
15. Badiger S, Koppad SN, Kulkarni A, Kodliwadmath H. Comparative analysis of open versus laparoscopic ventral hernia repair. International Surgery Journal. 2016 Dec 9;3(3):1167-72.