



## A STUDY OF LAPAROSCOPIC REPAIR OF ABDOMINAL INCISIONAL HERNIAS.

## General Surgery

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## KEYWORDS

Incisional hernia, Laparoscopic repair, Mesh fixation, Post-operative complication

## Introduction:

An incisional hernia is defined as any abdominal wall gap with or without bulge in area of postoperative scar perceptible or palpable by clinical examination or imaging. Before the introduction of general anaesthesia by Morton in 1846, incisional hernias were rare. As survival after abdominal surgery became more common so did the incidence of incisional hernias. It occurs in about 3 to 20 percent of patients undergoing laparotomy, with the incidence being less after laparoscopic surgery<sup>[1]</sup>. The true incidence of incisional hernia is often underestimated because majority of cases are asymptomatic. The probability of an abdominal incisional hernia occurring is significantly higher for longitudinal incisions than transverse incisions. Appropriate treatments are recommended (non-surgical/surgical treatments) because incisional abdominal wall hernias will not heal spontaneously<sup>[2-4]</sup>.

Several hernia repair methods have been described but some require dissection of wide areas of soft tissue for mesh placement which contributes to an increased incidence of wound infections and wound related complications. These problems have stimulated a continuing search for new techniques for incisional hernia repair. The laparoscopic repair of incisional hernias is rapidly evolving since its first description by Le Blank et al<sup>[5]</sup>. The technique is based on the principle of open, preperitoneal repair described by Stoppa and Rives<sup>[6,7]</sup>. The placement of a large mesh in the preperitoneal location allows for an even distribution of forces along the surface area of the mesh, which may account for the strength of the repair and the decreased recurrence rates associated with it. The feasibility of laparoscopic incisional hernia repair has been clearly established with large series of patients and good long-term follow-up. The merits of the minimally invasive approach have been demonstrated with improved rates of recurrence, reduced risks of wound complications, and applicability of the technique for difficult patient populations<sup>[8]</sup>.

The present research was undertaken to study various etiological factors of incisional hernia and use of laparoscopic approach to repair it, to study different ways in which incisional hernia can be repaired laparoscopically, to study influence of laparoscopic approach on hospital stay and various complications associated with the procedure

## Aims and Objectives:

1. To Study etiological factors of incisional hernia
2. To study various techniques of laparoscopic repair of incisional hernia
3. To study its influence on hospital stay
4. To study its complications with morbidity and mortality
5. To study its influence on recurrence rates

## METHODS

The present hospital based prospective study was conducted on 40 cases in our tertiary care hospital for a period of three year on patients who presented in the out patient department with clinical features and diagnosis of incisional hernia.

## Inclusion criteria:

- Patients presenting with incisional hernia giving valid informed consent for surgery
- Patients who have diagnosis of incisional hernia with defect size 9-225 Sq.cm in size.
- Patients who have negative pregnancy test

## Exclusion criteria

- Extremely obese patients (Body Mass index > 40)
- Contraindications to general anaesthesia
- Presence of local or systemic infection
- Presence of bowel obstruction, strangulation, peritonitis or perforation
- Hernias with defect size less than 9 Sq. cm or hernias with defect size greater than 225 Sq. cm
- Non consenting patients

All of the patients were admitted in different surgical units. A general proforma was prepared for studying each case in detail.

- 1) A detailed enquiry was made regarding history of previous operations, its nature, post-operative period, onset and progress of the present hernia to find out any possible etiological factors for development of incisional hernia like history of post-operative wound infection (discharge of pus from wound), wound dehiscence (gaping of the wound) and respiratory complications.
- 2) Thorough general examination was done to know the general condition of health and associated diseases if any.
- 3) Local examination was done to know the size of the abdominal wall defect in atleast two dimensions, reducibility and tone of abdominal wall muscles.
- 4) Preoperative detailed investigations were done for associated factors like obesity, anemia and disease like diabetes mellitus based on fasting and post meal sugar values.
- 5) Urine pregnancy test of female patients was done.

Associated conditions, if any like bronchitis, hypertension, and ischemic heart disease were properly controlled. Smoking was completely stopped to prevent post-operative cough.

## PREOPERATIVE PREPARATION

- Written informed consent
- Nil by mouth
- Preparation of parts
- A proper clean soap bath on the operative day in the morning was advised.
- Antibiotic prophylaxis: 1 gram cefotaxime was given i/v during induction of anaesthesia
- Foley's catheter insertion: This is particularly important in case of infraumbilical incisional hernia repair as distended bladder interferes with dissection & also risk of injury is there.

## EQUIPMENTS REQUIRED

A part from routine laparoscopic instruments following instruments are required.

- Atraumatic graspers
- Vere's needle / blunt trocar
- Suture passers
- Epidural needle
- 12mm/15mm port (for introduction of mesh)
- Mesh: polypropylenewith ORC coated mesh (15x15 cm) or polypropylene+polyglicaprone composite mesh (15x15 cm) or polypropylene mesh (15 x 15 cm)
- Tackers (non absorbable)
- Needle holder

### OPERATIVE TECHNIQUE:

#### INTRAPERITONEAL ONLY MESH REPAIR (IPOM)

- Under general anaesthesia patient was positioned in supine position.
- Vere's needle was inserted in left hypochondria, at palmer's point in left para rectal & subcostal region. After creation of pneumoperitoneum with Vere's needle, 10 mm camera port was inserted laterally as far away from hernial site as possible. Other working ports were inserted besides camera port depending upon the case.
- Or Hasson's open technique was used in which port is inserted as far away from hernial site as possible.
- Or for Upper abdominal hernia: Lateral & inferior ports were used.
- For Lower abdominal hernia: Lateral & superior ports were used.
- 30 degree scope provides better view for release of adhesions & hernia.
- After gaining intraperitoneal access, adhesiolysis was done, which is important to look for any additional defects & also for gaining space for mesh placement with adequate overlap.
- For hernias which are in supraumbilical position division of falciparum ligament may be necessary for proper adhesiolysis & getting adequate overlap.
- For hernias which are infraumbilical in position separation of bladder may be necessary from anterior abdominal wall for adequate mesh overlap.
- After adhesiolysis hernial contents were reduced.
- Any old mesh put during previous incisional hernia repair was removed.
- Removal of peritoneal lining of hernia sac: this helps in preventing post-operative seroma formation.
- Mesh was irrigated with diluted gentamicin & folded in following 2 ways:
- Double barrel
- Cigar shaped

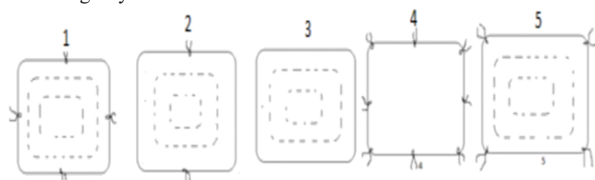
Edge of the defect was identified by either pushing the intraabdominal instrument against the palpating finger & marking the edge of the defect or by passing the needle through abdominal wall & confirming the position of defect in relation to needle.

Mesh was positioned such that it extends 5 cm from edge of the defect on all sides.

Mesh was first unfolded on one half and transfascial sutures applied on that half side then other half of mesh was unfolded & transfascial sutures are applied on that half.

In between the transfascial sutures mesh was tacked on each side with tackers at approximately 3 cm distance.

Mesh was anchored with prolene sutures (prolene 2-0 R/B) in following ways:



1. Transfascial prolene sutures tied subcutaneously at all four edges of mesh with two rows of tackers.
2. Transfascial sutures along linea alba with two rows of tackers
3. Tackers only without transfascial sutures
4. Only transfascial sutures without tackers

5. With transfascial sutures at four corners along with two rows of tackers.

### TYPES OF MESH USED

#### POLYPROPELENE MESH WITH ORC COATING:

Oxidised regenerated cellulose coating is present on visceral side and polypropylene encapsulated by polydioxane is present on parietal side. Polypropylene side promotes tissues ingrowth on parietal side & ORC coating prevents adhesions of bowel with mesh.

#### POLYPROPELENE WITH POLYGECAPRONE COMPOSITE MESH:

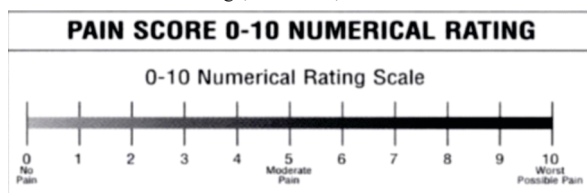
Composite mesh consisting of polyglicaprone & polypropylene.

#### PROPENE MESH:

Consists of polypropylene.

### POSTOPERATIVE CARE

- Patient positioned in propped up position with i/v analgesics given for 1<sup>st</sup> 24 hours followed by oral analgesics.
- Monitoring was done for pulse, BP, fever, tachycardia.
- Patient was given abdominal belt postoperatively.
- Patient was mobilised on the same day of surgery.
- Postoperative total blood counts were checked on day 1.
- Appearance of bowel sounds was checked for.
- Patients pain score was calculated using numerical pain scale as follows:
- At the time of discharge, at 2 weeks, 6 weeks and 3 months.



- No pain: 0
- Mild pain: 1-3
- Moderate pain: 4-6
- Severe pain: 6-10

### OBSERVATIONS AND RESULTS

The study of laparoscopic repair of incisional hernia was carried out in our tertiary care hospital. In this study 40 patients were studied. These patients were followed prospectively over the period of two years.

Following parameters were studied.

#### TABLE NO. 1: AGE DISTRIBUTION OF PATIENTS

Most common age group having incisional hernia was 31-40 yrs. (57.5%) while there were less number of patients having incisional hernia in 21-30 yrs. age group (4%)

| AGE (YRS) | NO OF PATIENTS | PERCENTAGE |
|-----------|----------------|------------|
| 21-30     | 4              | 10         |
| 31-40     | 23             | 57.5       |
| 41-50     | 13             | 32.5       |
| Total     | 40             | 100        |

#### TABLE NO. 2: SEX DISTRIBUTION OF PATIENTS

Incisional hernia was observed most commonly in females in this study (80%)

| SEX    | NO OF PATIENTS | PERCENTAGE |
|--------|----------------|------------|
| Male   | 8              | 20         |
| Female | 32             | 80         |
| Total  | 40             | 100        |

#### TABLE NO. 3: DISTRIBUTION ACCORDING TO BODY MASS INDEX

Most no. of patients belonged to the obesity category 1 that is BMI 30-35\*

| BODY MASS INDEX | NO OF PATIENTS | PERCENTAGE |
|-----------------|----------------|------------|
| 18-25           | 3              | 7.5        |
| 25-30           | 15             | 37.5       |
| 30-35           | 22             | 55         |
| Total           | 40             | 100        |

BODY MASS INDEX (Kg/m<sup>2</sup>): 18-25: NORMAL, 25-30:

PREOBESE, 30-35: OBESITY CATEGORY 1  
35-40: OBESITY CATEGORY 2, >40: OBESITY CATEGORY 3.

**TABLE NO 4: RISK FACTORS**

Most commonly observed risk factor was postoperative wound related complications followed by obesity. Most of the patients had multiple had multiple risk factors.

| RISK FACTORS                         | NO OF PATIENTS |
|--------------------------------------|----------------|
| POST OP WOUND RELATED COMPLICATIONS* | 28             |
| OBESITY                              | 22             |
| MALNUTRITION#                        | 10             |
| MULTIPLE SURGERIES                   | 12             |
| POST OP RESPIRATORY COMPLICATION     | 7              |
| DIABETES                             | 6              |

\*Post-operative wound related complications include wound infection, gaping or burst abdomen.

#Malnutrition includes: anaemia and hypoproteinaemia which delays wound healing.

12 patients had history had history of multiple surgeries amongst them 8 had history of multiple lower segment Caesarean sections. It included 2 patients of recurrent incisional hernias following open repair.

2 Patients had history of LSCS and hysterectomy. Amongst these 1 patient had incisional hernia recurrence twice after open repair.

1 Patient had history of perforation peritonitis and subsequent laparotomy for post-operative adhesive intestinal obstruction.

1 patient was operated for chronic duodenal ulcer with highly selective vagotomy done and subsequent laparotomy for gastric outlet obstruction for which gastrojejunostomy was done. This patient had incisional hernia following second laparotomy which was operated laparoscopically. This patient presented with recurrence of laparoscopically repaired hernia.

**TABLE NO 7: LAPAROSCOPIC REPAIR IN RECURRENT INCISIONAL HERNIA**

In our study total of 4 patients were operated who had recurrence of previously repaired incisional hernia. Amongst these patients, 3 patients had recurrence following open repair.

-Amongst these 3 patients:

1. Patient had recurrence twice after previous open repair of incisional hernia.
1. Patients had recurrence following laparoscopic onlay placement of mesh.

All of these 4 patients of recurrent incisional hernia had history of multiple surgeries through same incision

| PREVIOUS METHOD OF INCISIONAL HERNIA REPAIR    | NUMBERS OF RECURRENCES | NUMBERS OF PATIENTS |
|------------------------------------------------|------------------------|---------------------|
| OPEN REPAIR OF INCISIONAL HERNIA               | ONCE                   | 2                   |
|                                                | TWICE                  | 1                   |
| LAPAROSCOPIC INTRAPERITONEAL ONLAY MESH REPAIR | ONE                    | 1                   |

**TABLE NO 8: SIZE OF HERNIAL DEFECT**

| SIZE OF DEFECT         | NO OF PATIENTS | PERCENTAGE |
|------------------------|----------------|------------|
| 9 Sq.cm-25 Sq. cm      | 23             | 57.5       |
| 25 Sq. cm - 100 Sq.cm  | 14             | 35         |
| 100 Sq. cm -225 Sq. cm | 3              | 7.5        |
| TOTAL                  | 40             | 100        |

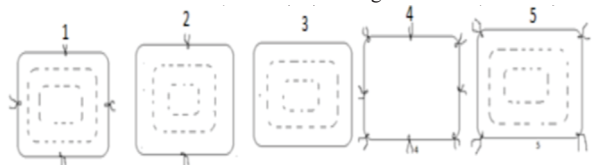
**TABLE NO 9: PROCEDURAL DETAILS**

In most of the patients only intraperitoneal only placement of mesh without anatomical closure of the defect was done. Two of the patients had multiple (two) defects, in them intraperitoneal onlay placement of mesh was done so as to achieve adequate overlap of defects. Anatomical closure of defects was not done.

| Procedure                                                                       | NO OF PATIENTS | PERCENTAGE |
|---------------------------------------------------------------------------------|----------------|------------|
| Single Defect With Anatomical Closure With intraperitoneal Onlay Mesh Placement | 10             | 25         |
| Single Defect Without Anatomical Closure And intraperitoneal Onlay Mesh Repair  | 28             | 70         |
| Multiple Defects With Intraperitoneal onlay Mesh Placements Without Anatomical  | 2              | 5          |
| TOTAL                                                                           | 40             | 100        |

**TABLE NO 10: METHODS OF MESH FIXATION**

1. Transfascial prolene sutures at sides tied subcutaneously with two rows of tackers
2. Transfascial sutures at linea alba with tackers
3. with tackers only without transfascial sutures
4. Only transfascial sutures without tackers
5. with transfascial sutures at corners along with two rows of tackers



| METHOD OF MESH FIXATION | NO OF PATIENTS | PERCENTAGE |
|-------------------------|----------------|------------|
| 1                       | 10             | 25         |
| 2                       | 12             | 30         |
| 3                       | 7              | 17.5       |
| 4                       | 5              | 12.5       |
| 5                       | 6              | 15         |
| TOTAL                   | 40             | 100        |

**TABLE NO. 11: TYPES OF MESHES USED**

Most of the patients (17) were operated with intraperitoneal onlay placement of composite polypropylene plus polyglecaprone mesh and polypropylene with oxidised cellulose coated mesh was used in 15 patients

| TYPES OF MESH USED                                           | NO. OF PATIENTS | PERCENTAGE |
|--------------------------------------------------------------|-----------------|------------|
| POLYPROPELEN WITH OXIDISED REGENERATED CELLULOSE COATED MESH | 15              | 37.5       |
| POLYPROPELENE WITH POLYGLECAPRONE MESH                       | 17              | 42.5       |
| POLYPROPELENE MESH                                           | 8               | 20         |
| TOTAL                                                        | 40              | 100        |

**TABLE NO. 12: OPERATIVE TIME**

| OPERATIVE TIME IN MINUTES | NO OF PATIENTS |
|---------------------------|----------------|
| <90 MINS                  | 10             |
| 90-120                    | 28             |
| >120                      | 2              |
| TOTAL                     | 40             |

In maximum no of patients operative time was within 90 to 120 minutes. Two patients required more than 120 mins in both of them anatomical closure of defect with intraperitoneal onlay mesh placement was done. Mean operative time was 98.25 minutes. More operative time was required in patients in whom anatomical closure with onlay placement of mesh was done and in patients who had history of multiple previous surgeries.

**TABLE NO. 13: COMPLICATION**

| COMPLICATIONS            | No. OF PATIENTS | PERCENTAGE |
|--------------------------|-----------------|------------|
| Seroma                   | 3               | 7.5        |
| Trocar Site infection    | 4               | 10         |
| Fever                    | 5               | 12.5       |
| Early Postoperative pain | 8               | 20         |
| Prolonged pain           | 3               | 7.5        |
| Prolonged ileus          | 7               | 17.5       |

Three patients had seroma which was confirmed on ultrasound.

Patients responded to conservative management and did not required any aspiration of seroma.

- Four patients had trocar site infection. They also had postoperative fever and responded to i/v antibiotics and local cleaning and dressing.
- Five patients had postoperative fever. Of them 4 had trocar site infection and 1 patient had urinary tract infection.
- Seven patients had prolonged ileus, they were investigated and mechanical cause of obstruction was ruled out. All were managed conservatively.
- Eight patients had early postoperative pain. They were kept on oral analgesics. They were followed after 2 weeks postoperatively.
- Out of them only 3 patients complained of prolonged pain beyond 2 weeks. Two of these patients responded to local injection of bupivacaine and did not complain of pain on subsequent visits. One patient required local injection of bupivacaine at 6 weeks visit and responded to it and did not complain of pain on subsequent visits. Postoperative pain was found more in patients who had history of multiple surgeries and patients in whom transfascial sutures for mesh fixation were used.

**TABLE NO. 14: POST OPERATIVE PAIN WITH DIFFERENT TYPES OF MESH FIXATION METHODS**

| NO OF PATIENTS           | METHOD OF MESH FIXATION |   |   |   |   |
|--------------------------|-------------------------|---|---|---|---|
|                          | 1                       | 2 | 3 | 4 | 5 |
| EARLY POSTOPERATIVE PAIN | 2                       | 1 | - | 3 | 2 |
| PROLONGED PAIN           | -                       | - | - | 2 | 1 |
| CHRONIC PAIN             | -                       | - | - | - | - |

According to type of mesh fixation method early postoperative pain was observed in all types of mesh fixation methods involving transfascial prolene sutures, except in fixation with tackers. None of the patients studied had chronic postoperative pain.

#### Methods Of Mesh Fixation:

1. Transfascial prolene sutures at sides tied subcutaneously with two rows of tackers.
2. Transfascial sutures at linea alba with tackers
3. With tackers only without transfascial sutures
4. Only transfascial sutures without tackers
5. with transfascial sutures at corners along with two rows of tackers

**TABLE NO. 15: POSTOPERATIVE PAIN ASSESSMENT**

Postoperative pain discharge, at 2 weeks, 6 weeks and at 3 months. At the time of discharge 32 patients had pain score between 0-3 and 8 patients had pain score between 4-6. They were included under early postoperative pain category. These patients were followed at 2 weeks and 3 of them had persistent pain and were categorised under prolonged pain category. They were given local injection of bupivacaine and 2 of them responded to it. 1 patient required another injection of local bupivacaine and did not complain of pain on subsequent visits.

| Numerical pain score | Number of patients at follow-up |         |         |          |
|----------------------|---------------------------------|---------|---------|----------|
|                      | Discharge                       | 2 weeks | 6 weeks | 3 months |
| 0-3                  | 32                              | 37      | 39      | 40       |
| 4-6                  | 08                              | 03      | 01      | -        |
| >6                   | -                               | -       | -       | -        |

**TABLE NO. 16: POSTOPERATIVE HOSPITAL STAY**

| Postoperative stay | No. Of patients | Percentage |
|--------------------|-----------------|------------|
| 3 Days             | 06              | 15%        |
| 4 Days             | 25              | 62.5%      |
| 5 Days             | 06              | 15%        |
| >6 Days            | 03              | 7.5%       |

Most no of patients (62.5%) were discharged on 4<sup>th</sup> postoperative day. Four patients had trocar site infection two of them were discharged on 5<sup>th</sup> POD. Seven patients had prolonged ileus. Four of them were discharged on 5<sup>th</sup> POD. And three were discharged on 7<sup>th</sup> POD. Mean hospital stay was 4.22 days.

#### DISCUSSION

- This study was conducted in our tertiary care hospital for a period of three years. It included 40 cases of incisional hernia admitted during this period.

- The study was conducted with aims to study incisional hernia in relation to its various etiological factors, to study different ways in which incisional hernia can be repaired laparoscopically. Others were to study influence of laparoscopic approach on hospital stay and various complications associated with the procedure.
- Maximum number of patients (57.5%) were in the age group of 31-40 years which is comparable to study conducted by **Goel et al (1981)<sup>[9]</sup>** who reported 62.33% of patients in this range. **Shah J B et al<sup>[10]</sup>** reported maximum incidence in Age group 21-40 years.
- In this study out of 40 patients 32 were females and 8 were males (M: F=1:4), showing female preponderance. Similar female preponderance was also observed in studies conducted by **Goel et al (1981)<sup>[9]</sup>**, **Parekh et al (1988)<sup>[13]</sup>** and **Shukla et al<sup>[11]</sup>** who reported male to female ratio of 1:1.25: 1:3.75: and 1:9 respectively. Higher incidence in female population is explained by gynaecological surgeries as a leading cause of incisional hernia.
- In this study maximum number of the patients had body mass index range 30-35 (obesity category 1) followed by body mass index range 25-30 (pre obese category). **Bose et al<sup>[12]</sup>** reported higher incidence of incisional hernias in obese patients (30%).
- In the present study most common risk factor responsible for incisional hernia occurrence was post-operative wound related complications such as wound infection gaping or wound dehiscence (28 patients). **Bose et al<sup>[12]</sup>** studied 110 cases of incisional hernias in which he documented that, upto 23% of those who develop postoperative wound infection had the occurrence of incisional hernia. **Vant RM et al<sup>[14]</sup>** found that incisional hernia develops in majority of patients after wound dehiscence regardless of suture material or technique
- Multiple surgeries as a risk factor was observed in 12 out of 40 patients in our study. **Lemont et al<sup>[16]</sup>** concluded that increased incidence of incisional hernia was present when surgery was performed through same incision and stated that incidence after re incision was 12%.
- Postoperative respiratory complication as a risk factor was present in 7 out of 40 patients in our study. **Parekh et al<sup>[13]</sup>** and **Bose et al<sup>[12]</sup>** reported postoperative respiratory complications as a risk factors in 13.16% and 20.90% patients respectively.
- Diabetes as a risk factor was observed in 6 patients out of 40 in our study. Studies by **Bose et al<sup>[12]</sup>** and **Shah et al<sup>[17]</sup>** reported diabetes as a risk factor in 10% and 8.18% of the patients respectively.
- Smoking as risk factor was observed in 4 male patients. **Carison MA et al (1995)<sup>[18]</sup>** demonstrated that smokers have a 4-fold higher risk factors previously recognized to be associated with incisional hernia. **Lars Tue Sorensen et al (2005)<sup>[19]</sup>** concluded from their study that smoking is a significant risk factor for incisional hernia.
- In our study most common previous incision leading to incisional hernia formation was infraumbilical midline incision (67.5%) followed by supraumbilical midline incision (27.5%) together contributing 95% of incisional hernias. **Read et al<sup>[20]</sup>** reported 74.3% patients of incisional hernias were as a result of midline incisions. **Goel et al<sup>[9]</sup>** reported that 44.52% of hernias were through infraumbilical midline incisions. **Hope et al<sup>[21]</sup>** also reported the 86.67% of incisional hernia were as a result of midline incisions.
- **Bloomstedt et al<sup>[22]</sup>** stated in his study that midline vertical abdominal incisional is the commonest site for occurrence of incisional hernia and this is because:
  1. These operations are usually carried out in emergency or hurriedly.
  2. Linea alba is less vascular.
  3. Forces of action of abdominal wall muscles act transversely therefore they cause stretching effect on wound margins.
- In the present study, maximum number of incisional hernias followed gynaecological surgeries like lower segment caesarean section (45%), hysterectomy (22.5%) and tubectomy (2.5%) comprising together 70%. Higher incidence in most of these procedures is because most of these procedures are carried out in emergencies and infraumbilical midline incision is commonly used which is more vulnerable for incisional hernia formation. **Shukla et al<sup>[11]</sup>** in his study reported 70% of the incisional hernias occur as a result of gynaecological procedures. **Shah J B<sup>[10]</sup>** and **Goel et al<sup>[9]</sup>** reported an incidence rate of 42% and 28.76% incisional hernias as a result of gynaecological procedures.
- In our study total of 4 out of 40 patients were operated who had recurrence of previously repaired incisional hernia. Among these

- patients 3 patients had recurrence following open repair, 1 patient had recurrence twice after previous open repair of incisional hernia. And other two had recurrence once following previous incisional hernia repair. 1 patient had recurrence following laparoscopic onlay placement of mesh. That patient had mesh migration into defect which was found intra operatively, All of these 4 patients of recurrent incisional hernia had history of multiple surgeries through same incision. **Verbo et al**<sup>[23]</sup> studied 41 cases of recurrent incisional hernias, all cases were operated with laparoscopic approach. Complications were found in 17% of patients. Recurrence was observed in 2.4% of patients. Most of the patients operated belonged to defect size group 9 cm<sup>2</sup> to 25 cm<sup>2</sup>, Laparoscopic repair has been recommended for incisional hernias greater than 3 cm in diameter.
- In our study amongst 28 patients out of 40, there was a single defect in which onlay intraperitoneal mesh placement was done without anatomical closure.
  - In 10 patients anatomical closure along with onlay intraperitoneal mesh placement was done.
  - Two patients had multiple defects (two in either) in whom onlay intraperitoneal mesh placement was done without anatomical closure.
  - In our study, in 10 patients out of 40 the operative time was <90 minutes. In 28 patients time period was between 90 to 120 minutes. In 2 patients operative time was more than 120 minutes. Mean operative time in our study was 98.25 minutes. Operative time was more in patients in whom anatomical closure with intraperitoneal onlay mesh placement was done. Also more time was required in patients who had history of multiple previous surgeries including recurrent incisional hernias. Longer operating time can be explained with the learning curve in laparoscopy. Furthermore the fixation technique of the mesh can be time consuming especially in large incisional hernia repair.
  - In a study by **Kohler et al**<sup>[25]</sup> mean operative time was 101 minutes. In a similar study carried out by **Heniford et al**<sup>[26]</sup> mean operative time for laparoscopic repair of incisional hernia was 120 minutes.
  - In our study 3 out of 40 patients had seroma as complication. Seroma was confirmed on ultrasound. Spontaneous resolution of seroma was observed by six weeks postoperatively, these patients did not require any aspiration of seroma. Most of the authors consider<sup>[21-26]</sup> conservative management for seromas. **Berger et al**<sup>[28]</sup> reported seroma in 4% of patients in their series. **Mizrahi et al**<sup>[29]</sup> reported seroma occurrence in 4.3% of patients. **Ferrari et al**<sup>[30]</sup> reported seromas in 4% of patients.
  - In our study, 4 out of 40 patients had trocar site infections. All of them responded to local wound dressing. All of them had postoperative fever. Symptomatic improvement was observed after infection was controlled. In laparoscopic incisional hernia repair the incidence of surgical site infection is low. In a meta-analysis of 8 randomized controlled trials **Forbes et al**<sup>[31]</sup> showed a significant reduced risk of surgical site infections in laparoscopic incisional hernia repair. **Heniford et al**<sup>[26]</sup> reported trocar site cellulitis in 5 patients in their study. **Heniford et al** performed diagnostic laparoscopy in patients with unexplained postoperative fever to exclude intraabdominal pathology but had negative results. In all patients with postoperative fever mesh infection was ruled out by ultrasound of abdomen. Mesh infection as a complication was not observed in our study.
  - In our study, appearance of bowel sound was checked postoperatively in all patients. In patients who had prolonged ileus which is described as absence of bowel activity by 72 hours postoperatively, mechanical cause of bowel obstruction was ruled out by ultrasound abdomen and X-ray abdomen erect. In 6 of them bowel sounds appeared on 4<sup>th</sup> postoperative day and in 1 patient it appeared on 5<sup>th</sup> day postoperatively. **Ben -Haim et al**<sup>[32]</sup> have reported prolonged ileus beyond 5 days. **Bageacuet al**<sup>[33]</sup> reported prolonged ileus in 6 patients in their study.
  - Postoperative pain is an important aspect of laparoscopic repair of incisional hernia which leads to readmission increasing morbidity and increasing cost of the procedure. In our study more pain was experienced by patients in whom transfascial sutures were used for mesh fixation. Early postoperative pain is pain felt by patient in early postoperative period. It usually gets resolved in one or two weeks. In our study 8 out of 40 patients had early postoperative pain. Numerical pain score calculated in them at the time of discharge was between 4-6. All patients were kept on oral analgesics and followed postoperatively and assessed for postoperative pain by measurement of numerical pain score and

other complications.

- 3 of those patients had prolonged pain when they were assessed at the time of 2 week follow up, rest got relieved of pain. 2 of these patients responded to local injection of bupivacaine and did not complain of pain on subsequent visits. 1 patient required repeated injection of bupivacaine locally and responded to it. None of patients in this study complained of chronic pain beyond 3 months.
- According to the type of mesh fixation method early postoperative pain was observed in all type of mesh fixation methods involving transfascial prolene sutures except by tacker only method of mesh fixation method. In a study by **Eelco Wassenaar et al**<sup>[34]</sup> 28% of the patients had prolonged postoperative pain and were treated with anti-inflammatory medications and reassurance. There was no statistical difference in the frequency of prolonged postoperative pain between the transabdominal suture techniques and the technique with tacks only.
- **Costanza and colleagues**<sup>[35]</sup> defined chronic pain as pain lasting for more than eight weeks. They reported eight such cases, in all of whom the pain was resolved either with time or injections of local anaesthetics.
- None of patients in our study had recurrence of incisional hernia.
- Average hospital stay in our study was 4.22 days. In a study by **Heniford et al**<sup>[26]</sup> the average hospital stay was 2.3 days.
- In the present study none of the laparoscopic procedure were converted to open surgery. In a study by **Heniford et al**<sup>[26]</sup> the conversion rate of laparoscopy to open surgery was 3.8%.

## CONCLUSIONS

Following conclusions can be drawn from this study.

- Incisional hernia occurrence is common in females in their thirties.
- Postoperative wound related complications like wound infection and wound dehiscence, obesity, malnutrition and respiratory complications are important risk factors. So proper asepsis during primary surgery is important for prevention of incisional hernia. Similarly weight control measures should be adopted and anaemia and hypoproteinaemia should be corrected before surgery. Proper measures should be taken at the prevention of incisional hernia in future.
- Midline incisions are more often associated with incisional hernia occurrence.
- Incisional hernia occurrence is more oftenly seen after gynaecological surgeries.
- Most common defect size in incisional hernia observed was between 9 to 25 Sq. cm in our study.
- Laparoscopic intraperitoneal onlay mesh placement without anatomical closure of defect was found to be adequate method for incisional hernia repair.
- Postoperative pain is an important complication of laparoscopic repair. Type of mesh fixation method has impact on postoperative pain.
- Postoperative pain gets resolved either with time or local anaesthetics.

## REFERENCES:

1. Korenkov M, Paul A, Sauerland S, Neugebauer E, Arndt M, Chevrel JP, et al. Classification and surgical treatment of incisional hernia. *Langenbeck's Arch Surg*. 2001 Feb 1;386(1):65-73.
2. Read RC, Yoder G. Recent trends in management of incisional herniation. *Arch Surg*. 1989;124:485-8.
3. Vorst AL, Kaoutzanis C, Carbonell AM, Franz MG. Evolution and advances in laparoscopic ventral and incisional hernia repair. *World J Gastrointest Surg*. 2015;7:293-305.
4. Al Chalabi H, Larkin J, Mehigan B, McCormick P. A systematic review of laparoscopic versus open abdominal incisional hernia repair, with meta-analysis of randomized controlled trials. *Int J Surg*. 2015;20:65-74.
5. Le Blank K, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafluoroethylene preliminary findings. *SurgLaparoscEndosc*. 1993;3:39-41.
6. Stoppe RE. The treatment of complicated groin and incisional hernias. *World J Surg*. 1989;13:545-54.
7. Rives J, Pire JC, Flament JB, Palot JP, Body C. Treatment of large eventrations. New therapeutic indications apropos of 322 cases. *Chirurgie*. 1985;111:215-25.
8. RK Mishra. *Laparoscopic Repair of ventral hernia* In: *Textbook of Practical Laparoscopic Surgery*. 2nd Edition. Jaypee; 2013;17:233-234.
9. Goel TC, Dubey PC. Abdominal incisional hernia - Anatomical technique of repair. *Indian J Surg*. 1981;43:324-7.
10. Shah JB. Incisional hernia-a study of 50 cases. *Indian J Surg*. 1977;39:353-56.
11. Shukla VK, Gupta A, Singh H, Pandey M, Gautam A. Cardiff repair of incisional hernia: a university hospital experience. *Eur J Surg*. 1998;164:271-4.
12. Bose SM, Lal R, Kalra M, Wig JD, Khanna SK. Ventral hernia: A review of 175 cases. *Indian J Surg*. 1999;61(3):180-4.
13. Parekh JN, Shah DB, Thakore AB. Incisional hernia - A study of 76 cases. *Indian J Surg*. 1988;50:49-53.
14. Vant RM, De Vos Van Steenwijk PJ, Bonjer HJ, Steyerberg EW. Incisional hernia after repair of wound dehiscence: incidence and risk factors. *Am J Sur*. 2004;70(4):281-6.
15. Tweedie FJ, Long RC (1954) Abdominal wound disruption. *SurgGynecolObstet*

- 99:41–47.
16. Lamont PM1, Ellis H. Incisional hernia in re-opened abdominal incisions: an overlooked risk factor. *Br J Surg.* 1988 Apr;75(4):374-6
  17. Amjad Shah, Zia Aftab, Syed Muhammad Ali, Salah Gehani, Khalid Ahmed Fellow, Ahmed Almodaris, Rashad Fouad, Abdulrahman Al-Aal. Incisional Hernia Post Laparotomy-Incidence and Risk Factors. *Journal of Surgery.* Vol. 6, No. 1, 2018, pp. 19-22.
  18. Carlson MA, Ludwig KA, Condon RE. Ventral hernia and other complications of 1,000 midline incisions. *South Med J.* 1995;88:450-3.
  19. Sorensen LT, Friis E, Jorgensen T, et al. Smoking is a risk factor for recurrence of groin hernia. *World J Surg.* 2002;26:397-400
  20. Read RC, Yoder G. Recent trends in management of incisional herniation. *Arch Surg.* 1989;124:485-8.
  21. Hope PG, Carter SS, Kilby JO. The da Silva method of incisional hernia repair. *Br J Surg.* 1985;72:569-70.
  22. Blomstedt B, Welin-Berger T. Incisional hernias: a comparison between midline, oblique and transrectal incisions. *Acta Chir Scand.* 1972;138:275-8.
  23. Verbo A, Petito L, Manno A, Coco C, MFascers CM, Lurati M, et al. . Laparoscopic approach to recurrent incisional hernia repair: a 3-year experience. *J Lap Adv Surg Techn.* (2007) 17:5. 10.1089/lap.2006.0133.
  24. Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies. *Br Med J.* 1982;284:931-3.
  25. Koehler R, Voeller G. Recurrences in laparoscopic incisional hernia repairs: a personal series and review of the literature. *J Soc Laparoendoscop Surg.* 1999;3:293-304.
  26. Henriford BT, Park A, Ramshaw BJ. Laparoscopic ventral and incisional hernia repair in 407 patients. *J Am Coll Surg.* 2000;190:645-50.
  27. Merskey HE. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms. Prepared by the International Association for the Study of Pain, Subcommittee on Taxonomy. *Pain Suppl.* 1986;3:S1-226.
  28. Berger D, Bientzle M, Müller A. Postoperative complications after laparoscopic incisional hernia repair. Incidence and treatment. *Surg Endosc* 2002;16(12):1720–3.
  29. Mizrahi S, Lantsberg L, Kirshtein B, Bayme M, Avinoah E. The experience with a modified technique for laparoscopic ventral hernia repair. *J Laparoendosc Adv Surg Tech A* 2003;13:305-7
  30. Ferrari G, Bertoglio C, Magistro C, Girardi V, Mazzola M, Di Lernia S, et al. . Laparoscopic repair for recurrent incisional hernias: a single institute experience of 10 years. *Hernia.* (2013) 17:573–80. 10.1007/s10029-013-1098-3.
  31. S. S. Forbes, C. Eskicioglu, R. S. McLeod and A. Okrainec. (2009). Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh. *Br J Surg.* Vol. 96, No. 8, pp.851-858.
  32. Ben-Haim M, Kuriansky J, Toy R et al. 2002. Pitfalls and complications with laparoscopic intraperitoneal expanded polytetrafluoroethylene patch repair of postoperative ventral hernia. *Surgical Endoscopy*, 16: 785-788. 00; 10(2): 79-84.
  33. Bageacu S, Blanc P, Breton C, Gonzales M, Porcheron J, Chabert M, et al. Laparoscopic repair of incisional hernia: A retrospective study of 159 patients. *Surg Endosc.* 2002;16:345-8.
  34. Wassenaar EB, Raymakers JT, Rakic S. Removal of transabdominal sutures for chronic pain after laparoscopic ventral and incisional hernia repair. *Surg Laparosc Endosc Percutan Tech.* 2007;17(6):514-6.
  35. Costanza MJ, Heniford BT, Arca MJ, Mayes JT, Gagner M. Laparoscopic repair of recurrent ventral hernias. *Am Surg.* 1998;64:1121-5.