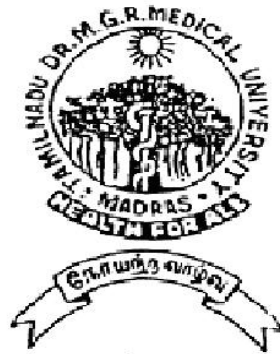


**STUDY OF COMPARISON BETWEEN  
OPEN REPAIR VERSUS LAPROSCOPIC REPAIRS  
FOR VENTRAL HERNIAS**

**DISSERTATION SUBMITTED FOR THE DEGREE OF**

**M.S. DEGREE  
BRANCH – I (GENERAL SUGERY)**

**MARCH - 2008**



**THE TAMILNADU  
DR. M.G.R. MEDICAL UNIVERSITY  
CHENNAI, TAMILNADU**

## **BONAFIDE CERTIFICATE**

This is to certify that the dissertation entitled “**STUDY OF COMPARISON BETWEEN OPEN REPAIR VERSUS LAPROSCOPIC REPAIRS FOR VENTRAL HERNIAS**” is bonafide record work done by **Dr. R. ILANGO MAHESWARAN** under my direct supervision and guidance, submitted to the Tamil Nadu Dr. M.G.R. Medical University in partial fulfillment of University regulation for M.S. Degree, Branch-I, General Surgery.

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I **Dr. ILANGO MAHESWARAN** solemnly declare that the dissertation titled “**STUDY OF COMPARISON BETWEEN OPEN REPAIR VERSUS LAPROSCOPIC REPAIRS FOR VENTRAL HERNIAS**” has been prepared by me. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any other University board either in India or abroad.

This is submitted to The Tamilnadu Dr. M. G. R. Medical University, Chennai in partial fulfillment of the rules and regulation for the award of M.S. Degree, Branch – I General Surgery to be held in March 2008.

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**Date :**

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## INTRODUCTION

Ventral hernias present a challenge even for the experienced surgeon, because of the high incidence of morbidity and recurrence. Wound infection, malnutrition, morbid obesity, chronic cough, prostatism and larger incisions are considered as risk factors for developing incisional hernia. Even though many repairs have been described, search is still continuing for an ideal technique which is patient and surgeon friendly with lesser morbidity and recurrence.

Traditional repairs require laparotomy with suture approximation of the strong fascial tissues on either side. But the recurrence rate was very high (20-52%) on long term follow up. The reason for the underlying problem was that in all sutured repairs, the repair is under tension and this increases the risk of ischemia, suture cut through and failure. From sutured repairs, the concept has slowly moved towards prosthesis with much reduced recurrence rate of 12-24%. Unfortunately, positioning of the mesh makes it necessary to perform an extensive surgical dissection of soft tissues. This is associated with increased incidence of postoperative pain, seromas, hematomas and wound infection.

Along with the world wide acceptance of various laproscopic surgeries, its use in ventral hernia was first reported by LeBlanc in 1993. Following this various reports have been published on laproscopic ventral hernia repair using various techniques and prosthetic materials. Patients undergoing laproscopic treatment of ventral hernias have shorter postoperative stay, fewer analgesic requirements and fewer wound complications. With the introduction of inert prosthetic materials such as PTFE and dual sided meshes the laproscopic repair of ventral hernias have gained more momentum.

## **HISTORICAL REVIEW**

The general surgeon will commonly see and be required to repair the epigastric, umbilical and incisional hernias in adults.

The plethora of techniques for open repair & the different meshes used with high recurrence rates.

The laproscopic repair was developed 14 years back. First prosthetic materials used for repair of ventral hernias were made up of stainless steel and tantlum and were associated with terrible problems and they were discarded quickly.

In 1958 Usher. Reported on the use of a mesh made up of poly ethylene (marlex) while it was strong and relatively inert, it could not be readily sterilized.

In 1962 a polypropylene version that could be autoclaved was developed. This was the most commonly used prosthetic mesh over past 45 years.



Over the past 5 years there has been many different type of synthetic meshes and recently different biological meshes have been introduced.

Welty, Klinge and Schumpelick have been at the forefront of research with respect to evaluating meshes for ventral hernia repair done from 1991 to 1999.

They have placed heavy weight, 'marlex', heavy weight 'atrium' mesh and heavy weight PPM combined with Vicryl mesh to make it light weight mesh.

Expanded PTFE (ePTFE) was first used as a vascular graft in 1972. Dual mesh was introduced by W.L. Gore in 1994.

Rives and Stoppa have used polyester meshes like mersilene and Dacran for thousands of patients with good outcome.

Newer type of polyester mesh is introduced with in camed as parietex and pareitex composite mesh. The latter has a collagen membrane on one side that acts as an antiadhesion barrier and thus it can be placed intraperitoneally.

Over the past 5 years, number of biologic meshes available for repair of ventral hernias.

SURGISIS is made up of porcine gut submucosa

ALLODERM is made from cadaver dermis

PERMACOL is a new mesh from porcine dermis.

## **AIM OF STUDY**

To study the outcome of open repair and laproscopic repair for ventral hernias - a comparison study.

## **REVIEW OF LITERATURE**

### **Randomised controlled trials of ventral hernia repair**

#### **(Laparoscopic Vs Open)**

**Ramshaw et al** has done 174 open repairs and 79 laproscopic repairs. Mean operating time for open repair is 82 minutes and for lap. Repair is 58 minutes. Length of the stay for open repair is 2.8 days and for lap. Repair is 1.7 days. Post op. complication rate is 26% in open repair and 15% in lap. repair. Post operative infection rate is 3% in open repair and 0% in lap. repair. All cases were followed upto 21 months. Recurrence rate is 21% in open repair and 3% in lap. repair.

**Holzman et al** has done 16 open repair and 20 lap. repairs. Mean operating time is 98 minutes for open repair and 128 minutes for lap. repair. Length of stay for open repair is 5 days and for lap. repair 1.6 days post operative complication rate is 31% in open repair and 23% in lap. Repair. Post operative infection rate is 6% for open repair & 5% for lap. repair. No seroma formation in open repair. But in lap. reappear 3% of seroma formation have been reported. All

patients were followed upto 19 months in open repair and 10 months in lap. Repair. Recurrence rate is 13% in open and 10% in lap. repair.

**Carbajo et al** had done 30 cases of open repair and 30 cases of lap. Repairs. Mean operating time for open repair is 112 minutes and 87 minutes for lap. Repair. Patients stayed for 9.1 days for open repair and 2.2 days for lap. Repair post operative complication rate is 50% in open repair and 20% in lap. repair. Post operative infection rate is 3% for open repair and 0% for lap. repair. Seroma formation rate is 67% in open repair and 13% in lap.repair. All patients were followed upto 27 months. Repair. Recurrence rate is 7% in open repair and 0% in lap. Repair.

**Park et al** had done 49 open repair and 56 lap.repair. Mean operating time is 78 minutes for open repair and 95 minutes for lap. repair. Patients stayed 6.5 days for open repair and 3.4 days for lap.repair. Post op. complication rate is 37 % in open repair and 18% in lap.repair, post op infection rate is 2% and 0% in lap repair.

Seroma rate is 2% in open and 4% in lap repair. All patients were followed upto 54 months in open repair & 11% lap. repair.

**De maria et al** had done 18 cases of open repair and 21 cases of lap. repair. He had not mentioned about mean operating time length of stay in hospital is 4.4 days for open repair and 0.8 days for lap.repair. Post operative complications rate is 72% in open repair and 57% in lap.repair post operative infection rate is 33% in open repair and 10% in lap. repair. Seroma rate is 50% in open repair and 19% in lap. repair. All patients were followed upto 24 months. Recurrence rate is 0% in open repair and 6% in lap. repair.

**Chari et al** had done 14 cases as open repair and 14 cases as lap.repair. Mean operating time for open repair is 78 minutes and 124 minutes for lap.repair. Patients stayed 5.5 days for open repair and 5 days for lap. Repair. Post operative complications rate is 14% open repair and 14% in lap. repair. Post operative infection rate is 0% in open repair and 7% in lap.repair.

## **Studies on Laproscopic ventral hernia repair:**

**Dr. Palanivelu** has done laproscopic ventral hernia repair for 786 patients. He had taken 95 minutes time as mean operating time for surgery. Patients stayed in hospital for 3 days. As a post operative complication Seroma is 7.71% and infection rate is 0%. All the patients were followed for 36 months. Recurrence rate is 0.89%.

**Dr. Herniford** has done laproscopic ventral hernia repair for 850 patients. He had taken 120 minutes time as mean operating time. Patients stayed in hospital for 2.3 days. Mean estimated blood loss was 49 ml. There were 128 complications 112 patient s (13.2%). The most common complications were Ileus (3%) and prolonged stroma (2.6%). During mean follow up time of 20.2 months, the hernia recurrence rate was 4.7%.

**Chari & colleagues** found no statistically significant difference between the two groups (Open and laproscopic ventral hernia repair studies ) in terms of hospital stay or complication rate and concluded that there was no demonstrate advantage of laproscopic over open repair. (Although no demonstrable

disadvantage either) while the other authors suggested that laproscopic repair was better in terms of complications and duration of hospital stay.

**Carbajo et al** in their only published prospective randomized study comparing Lap ventral hernia repair and open repair provided evidence for the existence of many of the advantages mentioned in the reports of noncomparative investigations. This study assigned 60 patients to undergo either Laproscopic repair or open surgery. The two groups did not differ significantly in age, sex distribution, incisional hernia type or size of defect. Both operating times and hospital stays were significantly shorter in lap group with lesser complications and less recurrence rates during a mean following period of 27 months.



## **METHODS AND MATERIALS**

This is a prospective type of comparison study conducted from May 2005 to September 2007 at Government Rajaji Hospital, Madurai includes 50 patients who underwent various methods of ventral hernia repairs.

The patients included in this study were randomly selected from those who underwent various surgical procedures including Elective and emergency procedures for complications.

The relevant data of patients included in the study were collected recorded as follows. Name, age, sex occupation, Nutritional status, previous surgery history, post operative period of previous surgery with complications like, wound infections, wound gaping, wound dehiscence and adverse scars and present history, site of hernia, with or without complications, size of defect, co morbid factors were observed for and recorded in the proforma.

Post operative period and complications were noted. Patients general conditions were improved by whole blood, packed cells transfusion & FFP transfusion.

Adhesive plasters were applied over we wound area in post operative period.

**Materials Used:**

**Open repair :**

Anatomical repair - '1' prolene

'1' ethilon

Mesh repair - poly propylene mesh

**Laposcopic repair:**

Anatomical repair - '1' prolene

'1' ethilon

Mesh repair - ePTFE mesh

(e poly tetra fluoro ethylene mesh )

Poly propylene mesh

**Incidence :**

Highest with midline and transverse well documented paramedian, subcostal, gridiron, pfannensteil.

**Complications:**

- Incarceration
- Strangulation of visera
- Atrophy of subcutaneous tissue
- Thinning of skin
- Ulceration of skin
- Loss of domain of visera
- Cosmetic

Although incisional hernias are usually asymptomatic except for protrusion of the abdominal wall, with time it enlarge and becomes symptomatic. These patients often have pain with movement, straining or cough and it interferes with their routine work vomiting, obstipation and severe pain indicates incarceration or strangulation of internal structures.

Ultrasound, UT scan and barium meal series may be used to diagnose the presence of incisional hernia in obese individuals. Laparoscopy may be used as diagnostic as well as therapeutic tool. Multiple defects and associated adhesions can be detected by laparoscopy.

**CASE SELECTION :**

Type of repair	Defect Size
Laprosopic repair	< 3 cm & 3cm
Open repair	> 3 cm

**Types of repair of Ventral Hernia**

**Conventional Repairs**

**LAPROSCOPIC repairs**

**Primary closure**

**Primary closure**

**Prosthetic mesh repairs**

**Prosthetic mesh repairs**

Onlay mesh repairs

Intraperitoneal onlay mesh repair

(Rive's stoppa Wantz)  
Retro rectus mesh repairs

Intraperitoneal onlay mesh with  
Primary closure

Inlay mesh repairs  
(Intra peritoneal Rives type repair)

Retro rectus mesh repairs

## **CONVENTIONAL REPAIRS**

Primary closure is a simple technique which involves closure of the fascial defect with continuous nonabsorbable suture after thorough delineation of the defect. Defects less than 3 cm with strong fascial edge can be treated by this method. The recurrence rates are high in this method.

In onlay repairs, a mesh (usually polypropylene) is sutured over the anterior rectus sheath after primary closure of the fascial defect. The mesh is separated from the abdominal contents by the muscles and fascia. Seroma formation, wound infection are the common complications following this type of repair.

Inlay mesh repair is a surgical technique in which the mesh is placed in the intra-abdominal aspect, after excision of the sac. Fixation of the mesh to the abdominal wall is done by partial or full ideal for these types of repair , though there are reports of prolene mesh being used as inlay graft.

Stoppa's repair of ventral hernia ia a type of repair suited for lower abdominal defects associated with thin musculature. A space

is created under rectus sheath which is extended into the retro pubic space. The mesh is placed in the dissected space and anchored to Cooper's ligament on either sides.

## Techniques for IH Repair – Conventional Repairs

### 1. River Stoppa Wantz

- Retro rectus repair – On lay Mesh Repair
- Old incision used and excess thinned out skin can be excised
- Sac entered and all adhesions are completely taken down from the sac and from peritoneal surface in all directions.
- Upto posterior rectus sheath incised
- Posterior rectus sheath is then closed to keep the mesh away from viscera. If that is not enough posterior rectus sheath, omentum can be interposed.
- Polyester mesh is better than heavy weight ppm.
- 12 or more 'u' stiches (Transfixing) through then & then up the abdominal wall using the Reverdin needle sutures placed in a circular fashion
- Then, rectus muscles and fascia are closed in the midline to cover the prosthesis
- Drain placed

## **Intra peritoneal Rives – type repair – INLAY MESH ;**

Now, several meshes can be safely placed in contact with viscera and this now allows an intra peritoneal placement of mesh.

Incision made

Hernia sac is entered and adhesiolysis is done.

Skin and subcutaneous flaps are developed on both sides back into good fascia and far enough laterally so that rectus muscles and fascia can be approximated to cover the mesh after it has been implanted.

Proper size of mesh is determined by bringing the two mobilized rectus muscles to the midline with Kocher clamps.

Then, measure 6 to 8 cm laterally onto good fascia. On either side to determine the width needed and similar overlap into good fascia superiorly and inferiorly.

One or more disposable visceral retraction (fish) are wrapped in a moist laparotomy sponge and placed in the abdominal cavity over the intestines.

The mesh is then placed in the abdominal cavity and 1 '0' or 2 '0' prolene on a large needle that is 60 cm long is placed at 6

'o'clock position as 'U' stich through the mesh & through the fascia back the previously determined point and the suture is tied. A similar separate suture is placed at the 12 'o' clock position and tied.

Then continuous series of 'U' stiches going through the mesh and strong fascia in clockwise fashion sutures are tied. There is now a large piece of mesh behind the defect with broad overlap into good fascia.

Rectus muscles and fascia are brought to the midline and sutured to cover the mesh to protect it from wound problems and to provide a functional and cosmetic result.

Advantage of intraperitoneal approach over classing reverse method

Quicker to do

Less dissection

More cosmetic, because of no skin punctures

Suture pain and seroma formation equal in both methods.



## LAPROSCOPIC REPAIRS

There are various methods of laproscopic repair of ventral hernias, simple closure of the defect and closure with reinforcement by prosthesis either in the intraperitoneal aspect or the extraperitoneal aspect are the main types of Laproscopic repairs.

## INDICATIONS

LAPROSCOPIC ventral hernia repair (L VHR) can be accomplished in almost all patients with excellent results. The size of the hernia is a determining factor in the selection of type of repair. Defects less than 3cm are better done by conventional approach and laparoscopy is reserved for patients with larger defects. In obesity and recurrent incisional hernias laparoscopy is indicated even in smaller sized defects. The “Swiss cheese” type of hernias (multiple smaller defects) is ideally managed by laparoscopy as the defects are more clearly delineated when compared to open repair.

## CONTRAINDICATIONS:

The presence of infection and peritonitis are absolute contraindications for laproscopic ventral hernia repairs. Cases of acute and subacute obstruction merits surutiny on case to basis.

In case of acute obstruction, laparoscopy can be performed to relieve the obstruction and further placement of mesh depends on the viability of the bowel. In the absence of contamination, mesh reinforcement can be accomplished during the same surgery. If the viability is in doubt, the procedure should be limited to suture approximation of the defect. Placement of a prosthetic material can be done at later date. Previous use of prolene mesh induces extensive intraabdominal adhesions. Laproscopic repair of these cases should be attempted only by experienced surgeons as it is not possible to predict the severity of adhesions. The threshold for conversion to open method should be very low in order to prevent major fatalities like unrecognized bowel injuries and delayed perforations due to adhesiolysis. Other conditions like ascites, portal hypertension are relative contraindications. A large pendulous

abdomen with major abdominal defect will benefit more from conventional abdominoplasty rather than laproscopic in terms of cosmesis. The routine contraindications to general anesthesia also apply to the laproscopic ventral hernia repair.

### **Absolute Contraindication**

- Infection
- Strangulation
- Koch's or any infective pathology
- Peritonitis

### **Relative contraindications**

- Morbid obesity
- Extensive adhesions due to prior mesh
- Very large ventral hernia
- Severe cardiomyopathy
- Pulmonary disease
- Portal hypertension

## LAPROSCOPIC INTRAPERITONEAL ONLAY MESH WITH PRIMARY CLOSURE(IPOM)

The majority of the ventral hernias are located in the midline. In case of lower abdominal hernias, the surgeon stands near the left shoulder with the monitor at the foot end. The patient is in supine position with 10-15 degree Trendelenburg tilt to allow the bowel loops to fall away from the pelvis. In upper abdominal defects, the patient is placed in modified lithotomy position with 10-15 degrees head up tilt. The surgeon stands between the legs of the patient with the monitor near the head end, while the camera assistant stands on the right side of the patient. Operations on lateral defects of the abdominal wall, such as those in subcostal or flank areas will need semi or full decubitus position.

### **Instrumentation**

For laproscopic ventral hernia repair a good camera with an optimum light source is essential to prevent inadvertent enterotomies during adhesiolysis. We use the latest 3 CCD digital cameras with Xenon light source for all our laproscopic surgeries. 10mm, 30 degrees scopes are routinely used as they provide excellent view of

anterior abdominal wall compared to 0 degree scope. The camera port is usually 10 mm and the working ports are 5 mm. The camera port is also utilized for introduction of the mesh and suture materials.

The instruments required for ventral hernia repair are very few. Automatic graspers for holding the bowel, sharp scissors and curved dissection forceps for adhesiolysis and Ethicon endo needle holder for intracorporal suturing are the main instruments. We use a specially designed suture passer for fixing the mesh to the fascial layers. He fixation devices such as staplers, anchors and tickers can be used as per the comfort level of the surgeons. ePTFE or composite mesh (Parietex) are ideal. Monopolar or bipolar diathermy should be used with caution. Harmonic scalpel is ideal of adhesions.

### **TECHNIQUE:**

Pneumoperitoneum is created by open technique by HASSAN'S CANULA or veress needle technique at an alternative site as the umbilicus is almost always included in the previous incision. We used to do open technique in supra umbilical technique. Pneumoperitoneum was created through this port. We initially use a 3mm trocar with 3mm telescope to visualize the

abdominal cavity for adhesions of the bowel loops. The 10 mm port is created under vision and the scope is changed to 10mm. Subsequently all ports are created, open laparoscopy is hardly working ports in the left and right hypochondrium. The camera port is placed far enough from the defect so that there is no difficulty in visualizing the proximal area of the defect during fixation of mesh. The upper abdominal hernias which are usually rare are performed by placing similar ports in the lower abdomen. Trocars are placed on the lateral abdominal wall on the opposite side of the defect.

#### ADHESIOLYSIS:

The important and vital part of the surgery is the adhesiolysis. Usually structures like the bowel and omentum are adherent to the defect and the portional sac. The release of the adhesion should be done carefully with sharp scissors, dissecting off the omentum and small bowel from the peritoneal wall. In case of extensive adhesions it might be a better option to leave some parts of the peritoneum and mesh on the bowel, rather risking injury during complete separation. The presence of the adhesions should not deter the surgeon from proceeding with the laproscopic surgery, provided

he has adequate experience. But the threshold for conversion should be low in these cases. If enterotomies are recognized during the surgery it can be closed either by intracorporeal suturing or after exteriorizing the bowel through a minilaparotomy (2-3 cm). The monopolar or bipolar cautery should be used as minimum as possible during adhesiolysis.

#### ASSESSMENT OF DEFECT:

Once adhesiolysis is complete and anterior abdominal wall is cleared off the fat, nature and extent of defect is assessed thoroughly. This assessment is more crucial than the preoperative assessment, as newer defects might be found during this stage. In case of defects where reduction of the contents is not possible, minimal enlargement of the defect on the lateral side will help in easy reproduction.

The defect is clearly delineated after releasing the pneumoperitoneum and the site of the defect and the area of proposed placement of the mesh is marked on the skin. The measurement of the defect is taken on the external surface of the abdominal wall rather than on the intraperitoneal side of the fascial defect. The

entire circumference of the defect should be identified to ascertain its maximum dimensions. Then an adequate sized mesh that covers the entire defect and extending up to 3-5 cm from the edges of the defects is selected. The placement of the mesh over the entire area will prevent further development of hernias in the potentially weak areas.

To improve function of the muscle and quality of repair, we approximate the defective edges using intracorporeal continuous suturing with non absorbable sutures (1 ethilon loop). We have adopted the needle through a 2 mm stab incision below the hernial defect. The length of the suture adequate enough to approximate the defect is pulled inside by holding with Ethicon Needle holder, while the tail end remains outside. The defects is closed by continuous suturing in 2 layers completing in the same area where it was started. The needle is cut from the thread and removed through the 5 mm port. The suture passer (thread grasper) is inserted through the previous stab incision, the suture material grasped and pulled out of the abdomen and tied extracorporeally. No attempt is made to dissect the sac.



## **CHOICE OF MESH:**

Absorbable meshes have limited role in ventral hernia repair. It is mainly used in cases where mesh infection is a significant factor and primary closure is not possible. Polyester mesh has been associated with significantly higher enterocutaneous fistula formation and mesh infection and hernia formation, hence it should not to be used as intraperitoneal onlay graft. Polypropylene meshes prevents recurrence, unfortunately intestinal fistulization has been reported in many series. Expanded polytetrafluethylene (ePTFE) has very few bowel complications. Even if adhesions develop, it can be separated because of smooth surface of the adhesions that are formed.

Recently prostheses have been developed with both characteristics; tissue in growth on one side and nonadhesive surface on the other side. Composite, bilayer polypropylene (parietex) and sepra mesh are examples of these types of meshes. In a study of the various complications following the use of polypropylene, polyester and PTFE mesh, the multifilamented polyester mesh had a significantly higher mean number of complications per patient and

higher incidence of fistula formation, infections, and the additional mean length of stay to treat complications.

### **INTRODUCTION OF MESH:**

The selected mesh (Parietex) is taken and the four corners are tagged with 1-0 polypropylene sutures leaving 2 long threads in each side for fixation. The mesh is folded and reverse loaded on to a 10-5 mm reducer and then placed into the abdominal cavity through the 10 mm port after removing the camera. When reverse loading is not possible (when the mesh is larger in size) a second method is applied. Here the 5 mm needle holder from the right hypochondrium is rail roaded into the camera port under vision while the telescope is slowly withdrawn. When the needle holder exists out of the port the top assembly (which holds the flap valve) is removed and mesh is grasped and pulled into the abdominal cavity. The scope is reintroduced and the remaining mesh is pushed into the abdominal cavity. With this method we are able to introduce all sizes of the mesh without the need to pull the mesh through the skin as recommended by some authors. This method is associated with potential risk of contamination of the mesh by microorganisms.

## **TRANFASCIAL SUTURING:**

Once the mesh is inside the abdominal cavity, we orient the mesh in proper direction and surface (hydrophilic coating should face the bowel and the polyester layer should face the peritoneum). Small skin incisions (2 mm ) are made on the areas where transfixing sutures are planned. Subcutaneous fat is bluntly dissected with hemostats up to the fascia. The suture passer (thread grasper ) is passed through incision obliquely; the suture material is grasped and brought out. The thread grasper is again passed through the same incision few mm away from the previous track (in a different axis) and the other end of the suture material is brought out separately.

The two threads are tied on the outer aspect. Since both the ends of the suture material are brought through the same wound, the knot lies on the fascia and is covered by the skin and subcutaneous fascia. The four corners of the mesh are sutured to the fascia in a similar manner. At this stage we deflate the pneumoperitoneum to check whether the placement of the mesh has been accomplished without any wrinkling or whether the mesh is too taut due to fixation beyond the edges of the mesh.

## **INTRACORPOREAL SUTURING:**

We fix the edges of mesh to the abdominal wall by intracorporeal suturing using vicryl. We find the use of conventional sutures for this purpose are more cost effective when compared to devices such as staplers, anchors and tackers. However these devices are important as they fix the mesh effectively, especially for surgeons who are not well versed in endosuturing techniques. The sutures are placed 2-3cm apart in all the four sides of the mesh. Once the suturing is completed, the pneumoperitoneum is deflated and the ports closed.

## **TRANSABDOMINAL EXTRAPERITONEAL REPAIR :**

In this method polypropylene mesh is placed in the preperitoneal space between the peritoneum and the muscular layer to prevent adhesions. This is mainly used in ventral hernial defects in the lower abdomen, where the properitoneal fascia is loose. In this area placement of an onlay mesh is not ideal.

Principle of access to abdomen is the same as the previous technique. The peritoneum is incised along the edge of the defect and the peritoneal flap is raised as much as possible up to the lateral

border of the rectus sheath. If possible, the sac is excised from the hernia by blunt dissection. The edges of the hernial defect are approximated with polypropylene interrupted mattress or continuous stitches. The subperitoneal dissection can be extended into the space of Retzius and a large size mesh can be placed. The polypropylene mesh of adequate size is placed over the defect extending for about 3 cm on all aspects. The mesh is anchored either by intracorporeal suturing or external mattress sutures with suture passer (thread grasper). Finally, the peritoneum is sutured over the mesh. The separation of the sac from the abdominal wall will be extremely difficult in some situations. If the peritoneum is lacerated to a large extent then it is advisable to convert the technique to intraperitoneal onlay mesh technique with PTFE or parietex meshes. We prefer this technique for small defects in the lower abdomen. This technique for small defects in the lower abdomen. This technique is not well suited for larger defects. In certain cases of ventral hernia a combination of intraperitoneal and extraperitoneal mesh repair may be ideal.

## UMBILICAL HERNIA REPAIR:

Umbilical hernia defects are common in adults and these are usually smaller defects which can be repaired either by open technique or by laproscopic method. For defects more than 2 cm mesh repair is usually necessary. High incidence of recurrence and potentially increased risk of infection (if mesh is used ) due to the incision in and around the umbilical crease are the problems involved in umbilical hernia repair. High bacterial flora counts in this area are thought to contribute to the increased incidence of wound infections when compared to other areas. Open technique (Mayo) has shown high recurrence.

In one third of patients, although the defect is small, the adjoining rectus sheath is defective or very thin. This cannot be assessed by open approach and might lead to recurrence. Several small series and case reports have demonstrated the reasibility of LAPROSCOPIC umbilical hernia as a potential means of avoiding these problems.

Laparoscopic approach enables to visualize the entire rectus sheath. If the defect is small and rectus sheath is well developed, excision of the sac and closure of the defect with prolene sutures is indicated.

Umbilical hernia repairs are performed in the same manner as ventral hernia repairs. The camera port is placed in the epigastric region and the two working ports on the lateral aspects in the pararectal area. The contents if any, are reduced with the help of external compression and simultaneous traction from inside. The defect is delineated and is closed with non absorbable sutures. If the defect is more than 2 cm, the defect is reinforced with a ePTFE or a Parietex mesh. The mesh is anchored to the abdominal wall either by intracorporeal suturing or by transfascial suturing as described in the ventral hernia repair. Laparoscopic umbilical hernia repair with mesh is a better alternative to conventional repair in terms of reduced recurrence and infections around the umbilical area.

## POSTOPERATIVE MANAGEMENT FOR LAP SURGERY

We apply compression dressing in the area of the hernial defect to prevent seroma collection. The patient is advised to wear abdominal binder for 2 weeks. They are allowed to take fluids 4-6 hrs after the surgery. In cases of extensive adhesions the fluids are started after the movement of the bowel. The patient is encouraged to perform routine work without restrictions. Usually the patients are discharged on the third to sixth post operative day.

Post operative Management for open repairs:

- Compression dressing applied
- Oral fluids started on next day
- Normal diet started on second day afternoon
- Antibiotics IV given
- Drains removed on 3<sup>rd</sup> to 5<sup>th</sup> day



## **COMPLICATIONS OF LAPROSCOPIC VENTRAL**

### **HERNIA REPAIR**

The incidence of complications following laproscopic repair are much less when compared to open repair. Bowel injuries, seromas and mesh infection are the important complications.

### **BOWEL INJURIES**

Bowel injuries are the made important complications in laproscopic ventral hernia repair with an overall reported incidence around 5% and occasionally around 15%. This can occur either during the initial trocar entry or during adhesiolysis. The adhesiolysis is considered as the most crucial part of the LAPROSCOPIC ventral hernia repair. Avoidance of cautery, sharp dissection with scissors history of peritonitis and previous mesh repair the incidence of dense adhesions is more and in these cases dissection should proceed with caution.

In case of bowel injury, it can be repaired either by laparoscopy. The mesh reinforcement should not be performed in these conditions and it should be deferred to a later date. The there should for conversion in suspected bowel injuries and for

deciding on relook laparotomy in patients who are not improving following dense adhesiolysis should be extremely low.

## SEROMAS

The fluid accumulation in the retained hernial sac after laproscopic approach is common and usually self limiting. Most of these fluid collections resolve with conservative management. Aspiration of the seroma can be performed if it is continuously enlarging in size. This should be done under strict aseptic precautions, to avoid introduction of infection. Some patients have pain in the area of full thickness sutures. The usually subsides with conservative management like NSAIDs and injection of local anesthetics.

## MESH INFECTION

The incidence of mesh infection is very low (about 1% ) when compared to 10-15% incidence in conventional ventral hernia surgeries. All aseptic precautions should be taken to avoid this complication as managing this complication is very difficult. The infected meshes usually need removal for effective healing of the wound.

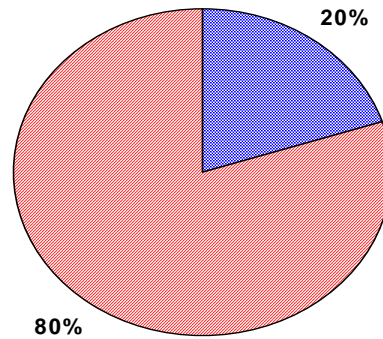
# RESULTS

**Table : 1**

## **Sex Distribution of the cases**

Gender	No.of patients	Percentage
Male	10	20%
Female	40	80%

SEX DISTRIBUTION OF THE PATIENTS



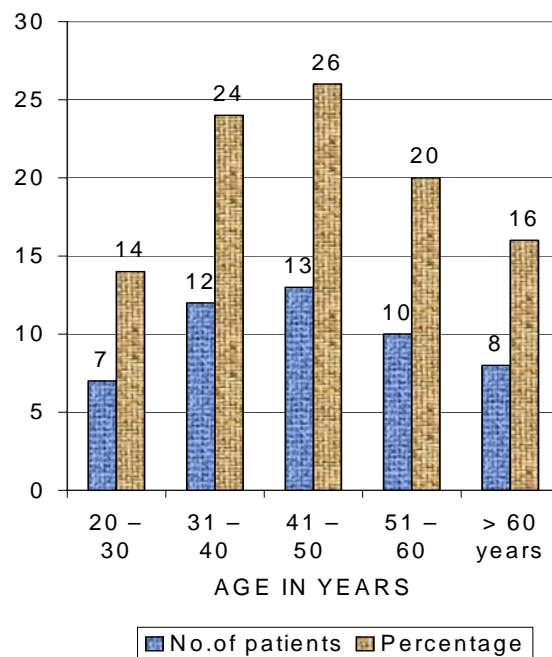
Male Female

**Table : 2**

**Age wise Distribution of the cases**

Age in years	No.of patients	Percentage
20 – 30	7	14
31 – 40	12	24
41 – 50	13	26
51 – 60	10	20
> 60 years	8	16
Total	50	100

AGE DISTRIBUTION OF THE PATIENTS



**Table – 3**

**Types of ventral hernias among 50 patients**

	Types of Hernia	No.of patients
I	Incisional Hernias	37
	Through RPM Scar	7
	Upper midline	3
	Lower midline	25
	Kocher's	1
	Parietal wall hernia (Traumatic)	1
II	Umbilical Hernia	10
III	Para umbilical hernia	2
IV	Epigastric Hernia	1
	Total	50

Table - 4

**Post Operative Complications**

Complications	Open	Laprosopic
Wound Infection	More	Less
Seroma formation	More	Less
Pain	More	Less
Wound gaping	More	Less
Wound deliscence	More	Less
Recurrence	More	Less

Table - 5

	Open repair	Lap. Repair
Availability of facilities and expertise	More number	Less number
Effectivity	Equal	Equal
Feasible	Equal	Equal
Safe	Equal	Equal
No.of hospital stay days	More	Less
Post. Op. complications	More 20%	Less 10%
Recurrence rate	More Suture repair 45-50% Mesh repair 2-30%	Less < 10 % < 3%
Cosmetic and functional results	Better, closure of rectus muscles to midline	No

Post operative complications in GRH among 50 patients

Post op. complication rate	Incidence	
Open Repair (29 patients)		
Anatomical repair (6 patients)	2	(1 seroma, 1 wound inf)
Mesh repair (23 patients)	9	1 seroma, 5 wound inf)
Lap. Repair		
Anatomical repair (19 patients)	3	(1 seroma, 2 wound inf)
Mesh repair (2 patients)	Nil	

Post operative complications Rate in GRH among 50 patients

Post op. complication rate	Incidence	Recurrence
Open Repair		
Anatomical repair	33%	4
Mesh repair	39%	Nil
Lap. Repair		
Anatomical repair	16%	Nil
Mesh repair	Nil	Nil



## Incisional Hernia:

Incisional Hernias - 2% after laparotomy

Predisposing Factors
Poor surgical techniques
Rough handling of tissues
Use of Absorbable suture materials
Closure of abdomen under tension
Infection of wound
Obesity
Cigarette Smoking
Pulmonary disease
Hypo albuminemia
Chemotherapy
Steroids

## **DISCUSSION**

The Laproscopic repairs have shown to be safe and effective in the management of ventral hernia. Most of the Laproscopic approaches have shown a decrease in complications like infection, seroma and wound dehiscence. The shorter hospital stay reported constantly in these studies is one of the important advantage of these repairs. This is mainly due to decreased pain, fewer complications, early mobility and faster return of bowel movements. The cost comparison between laproscopic and open ventral hernia has been found to be less in one study, when the costs involved in treating the complications were taken into account.

In one of the largest series of laproscopic hernia repairs, Heniford et al has reported a low rate of conversion, shorter hospital stay and low risk for recurrence. In an analysis of 850 patients who under went laproscopic ventral hernia repair over 9 years, the following results were published. Mean operating time was 120 min, mean estimated blood loss was 49 ml and hospital stay averaged 2.3 days. There were 128 complications in 112 patients (13.2%).

The most common complications were ileus (3%) and prolonged scroma (2.6%). During a mean follow-up time of 20.2 months, the hernia recurrence rate was 4.7%. comparing patients who had a hernia recurrence with those who did not, the authors found significant associations between recurrence and larger hernias, longer operating times, previous hernia repairs and higher complication rates. Patients who were morbidly obese (BMI>40) were also more likely to have recurrence as compared with those of more normal weight.

A series of comparative trials have shown persistent benefits in terms of shorter hospital stay, decreased infection and recurrence rates compared to open repairs.

In a review of comparison of lap and open ventral hernia studies reported higher complication rates and longer hospital stay in the open group. The conclusion from these studies was that laproscopic incisional hernia is at least as effective and as safe as open mesh repair. Chari and colleagues found no statistically significant difference between the two groups in terms of hospital

stay or demonstrably advantage of laproscopic over open repair (although no demonstrated disadvantage either), while the other authors suggested that laproscopic repair was better in terms of complications and duration of hospital stay.

Patients in the LVHR group had fewer complications and a significant lower hernia recurrence rate during a mean follow-up period of 27 months. These results again show that Laproscopic repair is more safe and reliable operation in terms of recurrence and complications.

### **Causes of recurrence (Earlier studies)**

- Transfascial sutures not employed
- Use of smaller sized meshes.
- Scar tissue reaction and encapsulation
- Ineffective anchoring of the mesh
- Steep learning curve

## **RECURRENCE**

Size of the defect, obesity, diabetes mellitus, lower midline incision and wound infection are considered as the risk factors for recurrence. In a study by Hesselink et al hernias smaller than 4 centimeters, had a significantly lower recurrence rate (25percent) than larger hernias (41percent).

Careful dissection, minimal bowel handling, proper fixation with either sutures or anchors and selection of ideal cases will reduce the recurrence rates considerably.

### **Prevention of Incisional Hernia:**

- Detailed preoperative assessment and treatment before elective surgery giving special attention to control cough diabetes, nutrition and septic foot.
- Use of non absorbable sutures for closures viz polyamide and polypropylene in size 1. Alternatively 1-0 or 1 loop sutures may be used.
- Closer may be 'layer by layer' technique or by 'mass closure' technique.

- Abdomen should be well released during closure and patient should out of anaesthesia without any staining.
- Control of cough, vomiting and distension in the post operative period. Gastro intestinal intubation and chest physiotherapy should be instituted.
- Avoid hypovolemia and hypoxia during surgery for under nourished patients and patients suffering from malignancy, retention sutures should be used.
- Operation performed in emergency and for peritonitis are more likely to develop incisional hernia.
- In highly infected cases superficial part of the wound may be left open initially and followed by delayed primary closure.
- Synthetic absorbable or non absorbable mesh may be used judiciously in selected cases.
- Skin sutures should be removed between 10-15 days.

## **CONCLUSION**

Laparoscopic mesh repair produces low recurrence rate (0-9 percent) with acceptable morbidity. The evidence available at present suggests that laparoscopic repair is feasible, safe and at least as effective as open mesh repair, although experience with the new meshes is still limited. With the existing data, it will be prudent to recommend laparoscopic repair as the first line treatment for incisional hernia where the facilities and expertise are available where it is not, open mesh repair remains a suitable alternative. As laparoscopic skills improve, it is likely that laparoscopic repair will be more widely performed.

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## PROFORMA

Name of the patient : Age :  
Occupation : Sex :

### Complaints :

H/o present illness  
H/o Past Surgery  
    H/o when was the surgery done  
    H/o post operative period  
    H/o cough  
    H/o Burst abdomen  
    H/o Wound Dehiscence  
H/o Personnel History :  
    H/o Diabetes, Hypertension, Obesity,  
    Hard work, Smoking

### General Examination :

Obesity  
Anaemia  
Hypoproteinemia,  
Under nourished

### Local Examination :

Previous incisional scar  
Swelling – size, shape, surface, sinus, site, ulcer,  
    any bowel movement.  
Defect size and site < 3 m or > 3 cm  
Swelling – Reducible, irreducible, obstructed, strangulated,  
    Incarerated, inflamed

### Surgery Planned :

1. Open                      Anatomical closure  
                                    Hernio plasty (mesh repair)
2. Laproscopic            Anatomical closure  
                                    Mesh repair

### Post operative complications :

No.of days stayed in hospital post operatively :

Date of discharge.

### Follow up Period :

Look for Recurrence  
Look for any complications

**INCISIONAL HERNIA – DEFECT MARKED**

**INCISIONAL HERNIA – DEFECT MARKED**

**LAPROSCOPIC VIEW OF DEFECT**

**LAPROSCOPIC VIEW OF DEFECT**



## **LAPROSCOPIC VIEW OF DEFECT**

## **1<sup>ST</sup> STUTURE OF LAP. ANATOMICAL REPAIR**

**SUTURES COMPLETED IN LAP.ANATOMICAL REPAIR**

**SUTURES COMPLETED IN LAP. ANATOMICAL REPAIR**

**EXTERNAL VIEW OF LAP. ANATOMICAL REPAIR**

**EXTERNAL VIEW OF LAP. ANATOMICAL REPAIR**

**LAP. ANATOMICAL REPAIR**

**LAP. ANATOMICAL REPAIR**

**EXTERNAL VIEW OF LAP.ANATOMICAL REPAIR**

**EXTERNAL VIEW OF COMPLETED  
ANATOMICAL REPAIR**

**LAP. VIEW OF REPAIR**

**COMPLETED REPAIR OF INCISION HERNIA  
BY LAPROSCOPY**

**COMPLETED REPAIR OF INCISION HERNIA  
BY LAPROSCOPY**

**COMPLETED REPAIR OF INCISION HERNIA  
BY EXTERNALLY**

## **ePTFE MESH**

## **PLACEMENT OF ePTFE MESH OVER THE DEFECT**



**PLACEMENT OF ePTFE MESH OVER THE DEFECT**

**PLACEMENT OF ePTFE MESH OVER THE DEFECT**

**PLACEMENT OF ePTFE MESH OVER THE DEFECT**

**PLACEMENT OF ePTFE MESH OVER THE DEFECT**

**PLACEMENT OF ePTFE MESH OVER THE DEFECT**

**EXTERNAL ADHESIVE PLASTERING**



## MASTER CHART

S. No.	Name	Age / Sex	IP No.	Previous surgical incision	Site of Hernia	Defect size	Surgery done	Open anatomical repair	Open mesh repair	Lap. Anatomical repair	Lap. Mesh repair	Post operative complications	No.of days stayed post operatively	Follow up period in months	Others
1	Sundarammal	50/F	501664	RPM	Upper ½	5cmx6cm			Yes			Wound gaping	20	15	
2	Manoharan	48/M	798/07	-	UH	5cmx5cm	Mayo	Yes					15	20	
3	Alagammal	55/F	99904	LM	Upper ½	6cmx4cm			Yes			Seroma	18	20	
4	Palanichamy	45/M	14459	LM	UH	5cmx5cm	Mayo	Yes					17	21	
5	Ameena Beevi	62/F	13240	-	UH	6cmx6cm			Yes			Seroma	18	15	
6	Muthiah	68/M	18162	-	UH	5cmx5cm	Mayo	Yes					15	18	
7	Amudavan	38/M	20164	UM	Lower ½	6cmx5cm			Yes			Wound infection	15	19	
8	Sivanayammal	31/F	29542	RPM	UH	5cmx5cm			Yes			Wound infection	15	17	
9	Thileatumnisha	30/F	38480	LM	Upper ½ I.H.	6cmx5cm			Yes				20	15	
10	Muthylakshmi	43/F	45111	LM	Upper ½ I.H.	6cmx4cm			Yes			Wound dehiscence	25	10	
11	Subbuthai	58/F	29758	K	Middle 1/3	7cmx5cm			Yes			-	20	10	
12	Begam	40/F	35768	LM	Middle 1/3	3cmx2.5cm			Yes			-	5	10	
13	Sundaravalli	42/F	40559	LM	Lower ½ I.H.	6cm			Yes			-	18	14	
14	Lingammal	38/F	35214	LM	UH	10cm			Yes			Wound gaping	25	12	
15	Veerakali	68/F	2147	UM	Lower ½ I.H.	6cm			Yes			-	10	16	

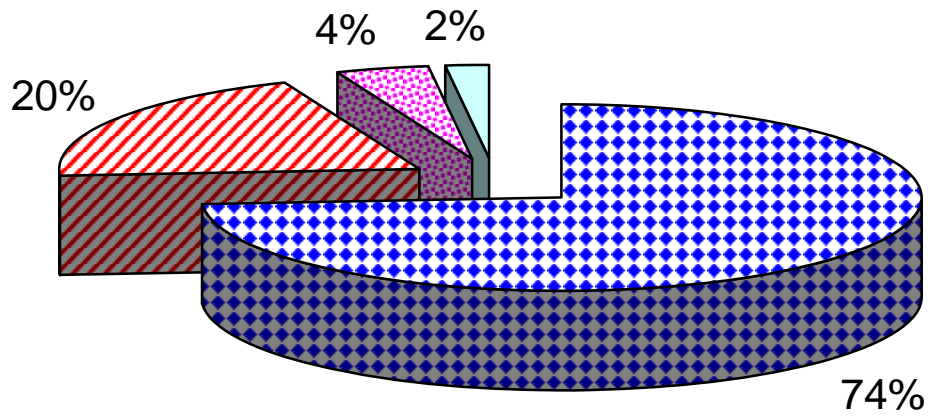
S. No.	Name	Age / Sex	IP No.	Previous surgical incision	Site of Hernia	Defect size	Surgery done	Open anatomical repair	Open mesh repair	Lap. Anatomical repair	Lap. Mesh repair	Post operative complications	No. of days stayed post operatively	Follow up period in months	Others
16	Rajakumari	47/F	276101	LM	Middle 1/3	6 cm			Yes			Seroma	10	18	
17	Chandran	48/M	502521	LM	Middle 1/3	5 cm			Yes			-	15	12	
18	Chandra	24/F	122998	LM	Upper 1/3	2.5 cm		Yes	Yes			-	10	16	
19	Nagamal	22/F	22331	LM	Upper 1/3	2 cm		Yes	Yes				10	14	
20	Veni	41/F	33968	LM	Upper 1/3	5cmx5cm			Yes				12	10	
21	Balasundaram	62/M	44402	LM	Lower 1/3	2cmx4cm		Yes					10	12	
22	Pandiammal	55/F	47934		Upper 1/3	6cmx5cm			Yes				14	18	
23	Chandrakala	26/F	50044	LM	Upper 1/3	6cmx4cm			Yes				12	12	
24	Thavasi	55/M	50473		Lower 1/3	5cmx3cm			Yes				12	16	
25	Rajeshwari	34/F	493191	LM	Upper 1/3	3cmx2cm				Yes			5	15	
26	Ponni	49/F	495810	LM	Upper 1/3	3cmx2cm				Yes			6	14	
27	Julee	35/F	496927	LM	Middle 1/3	2.5cmx2.5c				Yes			6	14	
28	Chellammal	66/F	9925	LM	Middle 1/3	2.5cmx2.5cm				Yes			6	15	
29	Shakareswari	38/F	15343	LM	Lower 1/3	2.5cmx2.5cm				Yes			5	16	
30	Shanthi	45/F	17673	LM	UH	3cmx2.5cm				Yes			5	18	
31	Renganayaki	40/F	19130	LM	Upper 1/3	2.5cmx2.5cm				Yes			6	15	
32	Muneeswari	35/F	24684	RPM	Upper 1/3	4cmx4cm					Yes		4	12	
33	Lakshmi	31/F	26553	RPM	Upper 1/3	3cm x 3 cm				Yes		Seroma	5	15	



S. No.	Name	Age / Sex	IP No.	Previous surgical incision	Site of Hernia	Defect size	Surgery done	Open anatomical repair	Open mesh repair	Lap. Anatomical repair	Lap. Mesh repair	Post operative complications	No. of days stayed post operatively	Follow up period in months	Others
34	Mahalakshmi	23/F	28164	RPM	Upper 1/3	3cm x 2 cm				Yes			5	16	
35	Mehaboob jegabam	23/F	30738	LM	Middle 1/3	3cm x 2 cm				Yes			4	18	
36	Radha	31/F	15129	RPM	Upper 1/3	3cm x 2.5 cm				Yes			5	15	
37	Begam	40/F	35168	RPM	Upper 1/3	3cm x 2 cm				Yes			5	14	
38	Seethalakshmi	25/F	44861	LM	Upper 1/3	5cm x 5 cm					Yes		8	15	
39	Lingammal	25/F	42603		Recu. U.H.	3cm x 3 cm				Yes		Seroma	5	12	
40	Palanichamy	54/M	64715		Parietal wall hernia	3cm x 3 cm				Yes			4	11	
41	Gandhimathi	55/F	50275		Upper 1/3	3cm x 2 cm				Yes			5	10	
42	Asaiponnu	45/F	52160		Para U.H.	3cm x 3 cm				Yes			5	12	
43	Chandra	57/F	5407		Multilevel Hernia	3cm x 2.5 cm				Yes			5	14	
44	Lingammal	38/F	52262		Para U.H.	10cm x 10 cm		Yes				Wound dehiscence	10	15	
45	Malar	30/F	59430		U.H.	3cm x 3 cm							5	16	
46	Palaniyammal	50/F	64607		U.H.	5cm x 3 cm		Yes				Seroma	10	10	
47	Sundarammal	60/F	68197	IH LM	Upper 1/3	3cm x 3 cm				Yes			5	9	
48	Seethalakshmi	28/F	56417	IH	Upper 1/3	3cm x 2.5 cm				Yes			5	8	
49	Meenakshi	58/F	67129	LM		1.5cmx1.5 cm		Yes					28	8	
50	Arumugam	62/M	62344	LM	Epigastrichernia	4cm x 4cm			Yes				10	7	





Type of Hernia among the patients



 Incisional Hernia	 Umbilical Hernia
 Paraumbilical hernia	 Epigastric hernia