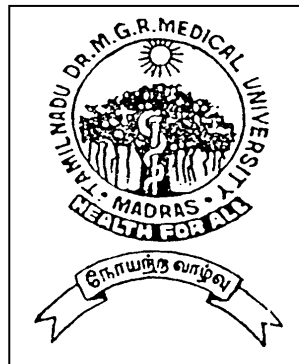


A COMPARATIVE STUDY OF UMBILICAL HERNIA REPAIR BY OPEN AND LAPAROSCOPIC METHOD

DISSERTATION SUBMITTED FOR
M.S. DEGREE BRANCH I (GENERAL SURGERY)

MARCH – 2010



THE TAMILNADU
DR.M.G.R. MEDICAL UNIVERSITY
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**DEPARTMENT OF GENERAL SURGERY
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MADURAI**

CERTIFICATE

This is to certify that this dissertation entitled “**A COMPARATIVE STUDY OF UMBILICAL HERNIA REPAIR BY OPEN AND LAPAROSCOPIC METHOD**” has been done by **DR.G.SUSEELA** under my guidance in the department of surgery, Madurai Medical College, Madurai.

I certify regarding the authenticity of the work done to prepare this dissertation.

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DECLARATION

I, DR.G.SUSEELA solemnly declare that the dissertation titled “**A COMPARATIVE STUDY OF UMBILICAL HERNIA REPAIR BY OPEN AND LAPAROSCOPIC METHOD**” has been prepared by me.

This is submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the requirement for the award of master of General Surgery, Branch I degree Examination to be held in March 2010.

Place : Madurai

Date :

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INTRODUCTION

EMBRYOLOGY AND ANATOMY OF THE UMBILICUS

Embryologically, the fascial margins of the umbilical defect are formed by the third week of foetal life when the four folds of the somatopleurae tend to fold inward. An umbilical cord is produced in the fifth week. By the tenth week of embryonic life, abdominal contents return from their location outside the coelom into the developing abdominal cavity. The vitelline duct and the allantois regress by the fifteenth to sixteenth week. If any of these processes are defective, umbilical malformations occur.

At birth, the umbilical arteries and the umbilical vein are thrombosed, and the vitelline duct and the allantois have already been obliterated. The umbilical ring then scars and contracts. The obliterated umbilical vein (round ligament) is usually attached to the inferior border of the umbilical ring along with remnants of the urachus and the two obliterated umbilical arteries. The round ligament, by crossing and partially covering the umbilical ring, may protect against herniation. In

instances where the ligament divides and inserts in the upper part of the umbilical ring without crossing it, a potential weakness is present.

The umbilical Richet's fascia also reinforces the umbilical ring. If Richet's fascia is absent, located outside the limits of the umbilical ring, (or) only partially covers the ring, the area appears much weaker.

INCIDENCE AND DEMOGRAPHICS:

An umbilical Hernia can occur in both men and women.

It can occur at any age although it is often present at birth.

Umbilical hernias are found in about 20% of new borns, especially premature infants.

Umbilical hernias are more common in male than in female infants; with regard to race, they are eight times more common in African Americans than in Caucasians (or) Hispanics.

In adults the female to male ratio is 3:1

PATHOPHYSIOLOGY OF UMBILICAL HERNIA.

The pathophysiology of umbilical hernia in adults is disputed. It is generally believed that these hernias do not represent persistence from

childhood but arise de novo in adult life. A retrospective review of adults with umbilical hernias found that only 10.9% recalled having hernias from childhood. In a separate series of 71 women and 82 men, it was noted that only two women had recurrence of their infantile umbilical hernias and this occurred during pregnancy. In both cases, the hernia resolved completely after delivery. None of the men followed developed a recurrence.

While the infantile umbilical hernia is a direct hernia, umbilical hernias in adults are indirect herniations through an umbilical canal that is bordered by umbilical fascia posteriorly, the linea alba anteriorly, and the medial edges of the two rectus sheaths on each side. therefore, these hernias tend to incarcerate and strangulate, and do not resolve spontaneously. Askar suggests that they are really paraumbilical hernias that occur just above and laterally to the umbilicus. Their clinical behavior is certainly more akin to paraumbilical hernias. The incidence of incarceration of umbilical hernias in adults is 14 times than in children. In addition there is a high associated morbidity and mortality. There is a large sex difference with over 90% occurring in women, and almost all are obese and multiparous. In this patient population, umbilical hernias

incarcerate half as often as inguinal hernias and three times more often than femoral hernias.

Clinical Presentation and Diagnosis.

Umbilical hernias in adults occur more in pregnant women and obese persons with weak abdominal musculature.

They may develop gradually without producing any discomfort, but patient may see a bulge in the umbilical region. The patient should be examined in standing and lying down position, lift the head and cough.

The diagnosis of umbilical hernia in adults is usually obvious. In large hernias, reduction is often impossible because omentum becomes adherent to the sac. In addition, if the hernia is long – standing, there are often multiple fascial defects. As the hernia enlarges, it becomes oval and has tendency to drag downward. These hernias are very symptomatic. Patients complain of a local dragging pain, due to the weight of the lesion; gastrointestinal symptoms, probably due to traction on the stomach or transverse colon; and intermittent colicky pain, due to partial intestinal obstruction.

PARAUMBILICAL HERNIA

Paraumbilical hernias occur in all age groups, but are more common after age 35 years and are five times more common in women than in men. These lesions are the result of defects in the linea alba and the umbilical fascia, the latter being a direct extension of the transversalis fascia. The most common site is in the supraumbilical linea alba, but defects can also occur below the umbilicus. They may occur in association with umbilical hernias and can be multiple, especially when associated with diastasis recti.

Paraumbilical hernias do not resolve spontaneously. The most common presenting symptom is pain (possibly caused by dragging on the omentum and peritoneum of the falciform ligament), with or without a lump being present. The incidence of complications, such as incarceration, inflammation and gangrene, is much higher than umbilical hernias.

Diagnosis

Due the difference in natural history, these hernias must be distinguished from umbilical hernias. In the supraumbilical hernia, about half of the fundus of the sac is covered by the umbilicus, and the skin of

the abdomen immediately above the umbilicus covers the remainder. This is in contrast to the umbilical hernia, in which the protrusion is directly under the umbilicus with a circumferentially symmetric bulge. In addition, paraumbilical hernias have no collar of fibrous tissue at the neck. If the hernia is small, the diagnosis may be aided by erect posture and tracing the line of the linea alba with the pulp of one finger. The paraumbilical hernia may be felt as a small, palpable defect, often tender, just above or below the umbilicus.

Complications:

Incarceration , Inflammation, Gangrene

The repair used depends on the size of the hernia. The repair presents challenge even for the experienced surgeon because of high incidence of morbidity and recurrence.

Laparoscopic umbilical hernia repair has grown in popularity since it was first reported in the early 1990s.

Low recurrence, fewer complications and shorter hospital stay have led to believe that it sets the new standard for umbilical hernia repair.

With the introduction of inert prosthetic material such as PTFE and dual sided meshes the laparoscopic repair of ventral hernias have gained more momentum.

HISTORICAL REVIEW

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 the use of mesh made 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 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 including umbilical hernia 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 thousand of patients with good outcome.

Newer type of polyester mesh is introduced which is named 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

PERMACO is a new mesh from porcine dermis.

AIM OF THE STUDY

To study the outcome of

1. Open repair and Laproscopic repair for umbilical hernias – a comparative study.
2. Primary closure versus mesh repair

REVIEW OF LITERATURE

Randomised controlled trials of ventral hernia repair including umbilical hernia (Laparoscopic vs open)

Ramshaw et al has done 174 open repairs and 79 laparoscopic 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 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 2 days post operative complication rate is 31% in open repair and 23% in lap. repair. Post operative infection rate is 6% for open repair and 5% for lap. repair. No seroma formation in lap repair. But in open repairs 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 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. Postoperative 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 days for open repair and 3 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 and 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 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 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.

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 patients (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 complicate 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.

MATERIALS AND METHODS

This is a prospective type of comparative study conducted from December 2007 to November 2009 at Government Rajaji Hospital, Madurai includes 50 patients who underwent open anatomical and mesh repair and laproscopic anatomical and mesh repair methods of umbilical Hernia repair.

The patients included in this study were randomly selected from those who underwent open anatomical and mesh repair and laproscopic anatomical and mesh repair 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, present histor, size of defect, complications, collected were observed for and recorded in the proforma.

Post operative period and complications were noted.

Materials used

Open Repair

Anatomical repair : No '1' prolane
No "1" Ethilon
Mesh Repair : Poly propylene mesh

Lapauoscopic Repair

Anatomical repair - No "1" Prolene
No "1" Ethilon
Mesh Repair - ePTEE mesh
Poly tetra fluoro ethylene mesh

Case Selection

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

Types of umbilical Hernia Repair

Conventional Repairs

Mayo's Repair

Laprosopic repairs

Primary closure
[Shoe lace technique]

Prosthetic mesh Repair

Onlay mesh Repairs

Underlay mesh Repairs

(River's stoppa wahtz)

Inlay mesh repairs

(Intraperitoneal river type repair)

Prosthetic mesh repairs

Intraperitoneal onlay mesh repair

with defect closure

OPEN REPAIRS

Anatomical Repair :

Mayo Technique

In smaller hernias, a subumbilical incision can be used, but large hernias and incarcerated hernias, often required a large incision that may be either transverse (or) ventral.

Dissection is carried around the hernia sac through the subcutaneous tissue down to the aponeurotic layer above, below and on the sides of the sac.

The entire mass of skin, fat and hernia is elevated while the neck of the sac is incised because adhesions of contents are more at the fundus.

After contents are reduced, excess sac excised peritoneum closed with absorbable sutures.

The hernial ring is closed by a row of mattress sutures are so placed that the lower flap is drawn under the upper flap.

In only a mesh repairs, polypropylene mesh at least 3cm larger than the circumference of the neck is sutured over the anterior rectus sheath after primary closure of the fascial defect.

After complete haemostasis the deep surface of the umbilicus is anchored to the midportion of the repair with single absorbable suture.

Tube drain inserted, subcutaneous tissue closed with absorbable suture and skin with staples. A cotton ball kept in umbilicus to allow the restoration of its shape and a sterile dressing applied.

After 72 hrs the dressing, cotton ball removed. Drain removed after 5 days and sutures removed on 8th day.

Open Mesh Repair:

1. Onlay Mesh Repair:

We use a curved infraumbilical incision, making an effort to preserve the umbilicus unless the skin is necrotic. The subcutaneous tissue is separated from the sac, and dissection continues until the neck is reached. The maneuver is facilitated by elevating the skin with Allis clamps. The fascia around the neck of the sac is cleared of fat for at least 3cm in every direction. The sac is opened; if the contents are found to be viable, they can be replaced in the peritoneal cavity. If there is omentum adherent to the sac, it can be divided between ligatures or dissected free and replaced. If bowel is present and compromised, a resection with

anastomosis may have to be performed after adequate enlargement of the ring.

Excess sac is excised, and the resulting peritoneal defect is closed with a running suture. A polypropylene mesh measuring at least 3cm larger than the circumference of the neck is fixed over the anterior rectus sheath. Throughout the procedure the wound is thoroughly irrigated with normal saline solution, which is also used to soak the laprotomy pads utilized during the procedure.

The Underlay Mesh Repair :

Alternatively, mesh can be sutured to the under surface of the posterior rectus sheath and the linea alba above the peritoneal closure.

Post operative Management:

- Compression dressing applied.
- Oral fluids started on next day.
- Normal diet started on second day afternoon
- Parenteral antibiotics for 4 days.
- Drains removed on 3rd / 5th day.

COMPLICATIONS RELATED TO PRIMARY HERNIA REPAIR

Primary hernia repair (the repair of the ventral hernia without the use of a prosthetic material) can be associated with several complications, such as bleeding, infection, and ileus, that plague every aspect of abdominal surgery. There are also complications that are specifically related to ventral hernia repair itself, including pulmonary complications and hernia recurrence.

Haematoma

The repair of ventral hernias can be expected to be associated with bleeding complications as the repair of these hernias often necessitates much more extensive dissection than we would encounter in a standard midline incision. Prevention of this complication should be proactive, with meticulous hemostasis as the mainstay of prevention. The placement of subcutaneous drains has been used frequently to deal with this problem, but while they may allow identification of a problem, they do not prevent it. White et al. have shown that the use of drains does not appreciably decrease the rate of hematoma formation, and may in fact increase the rate of wound infection. Other measures are helpful in preventing bleeding. A careful history looking for any signs of bleeding in the past, a family

history of bleeding disorders, or diseases that may predispose the patient to coagulopathies, is mandatory. The preoperative cessation of anticoagulants such as aspirin, coumadin, and heparin is also helpful if possible.

Seromas

Seromas are also a problem in this type of procedure. These are defined as a collection of serous fluid, not blood, in the subcutaneous space. The extensive dissection that is sometimes necessary to delineate the fascial edges of a hernia defect is a significant predisposing factor in this complication as well. White again showed that drains did not significantly decrease the rate of seroma formation, although the judicious use of closed suction drains for short periods of time (2 to 4 days) is still advocated by many surgeons. Careful obliteration of dead space with subcutaneous sutures and compressive dressings or binders may help in the prevention of this complication. Aspiration may become necessary if a seroma persists, but most will resolve over time if the surgeon and the patient can exercise prudence and patience. If aspiration is performed, it should employ strict aseptic technique.

Both of these complications can predispose to the development of a more devastating complication, that of wound infection. Wound infections are the major cause of ventral hernia recurrence. Bucknall et al. demonstrated that a wound that is infected has a fivefold increase in the risk of developing a ventral hernia, and that infection in a surgical wound can prolong inflammation, delay collagen deposition, and cause extrusion of suture material, all of which cause weakening of the wound tensile strength. The edema that occurs with infection causes the tissues to become weakened and allows the sutures to more easily pull through the tissues.

Wound infection

In the field of umbilical hernia repair, prophylactic antibiotic use is warranted. The risk of repair failure increases with infection. The difficulty of every repair cannot be anticipated prior to the operation, so one cannot predict the length of the procedure or the risk of enterotomy. It is also not always possible to predict the need for a prosthetic repair, for which prophylactic antibiotics are indicated.

The rate of wound infection can be decreased by careful attention to meticulous surgical technique. This may be quite challenging during the extensive dissection that often occurs during a large umbilical hernia repair. The use of gentle tissue handling, sharp dissection, small tissue bites during ligature, and avoidance of tissue dehydration minimizes the trauma to tissue, resulting in less necrotic tissue. The use of fine suture decreases the amount of foreign material in the wound. Irrigation of the wound at closure decreases the amount of foreign and necrotic debris in the wound. Detailed hemostasis and the obliteration of dead space decrease the rate of formation of hematomas and seromas, which can predispose the wound to infection. However, this must be done judiciously, as improperly placed sutures may cause tissue necrosis, increasing the risk of infection.

Closing the wound under tension or allowing the abdomen to become distended after surgery will increase the pressure on the sutures, thus increasing the damage to the tissue incorporated within these sutures, subsequently increasing the amount of necrotic tissue in the wound. Given the fact that a wound infection may well defeat the purpose of a hernia repair, it should be understood that a hernia repair should not be

undertaken in the presence of cellulitis, wound sinuses, or infected foreign material. These situations must be remedied before repair can be safely effected. Scarred or atrophic skin should be excised as this type of skin is prone to ischemia and subsequent infection, and old sutures should be removed completely ii at all possible as they may harbor bacteria that could result in wound infection.

Recurrence

The risk of recurrence for those hernias repaired without prostheses can be quite significant-as high as 50% in some reported series. Many factors contribute to the recurrence of a hernia. The rate of recurrence is felt to be higher in those patients who have infections in their wounds. Recurrence has also been related to the presence of obesity. Incisions in the obese abdomen result in significantly more traumatized tissue, predisposing the patient to wound infection. The obese patient also has a high intraabdominal pressure, which increases the tension on the suture line. Stress on the suture line caused by straining under light anesthesia, vomiting, coughing, or gaseous distention of the abdomen can increase the tension on the suture line, resulting in pressure necrosis or tearing of the tissues. Preoperative pulmonary toilet, cessation of smoking, good

anesthetic technique, and gastric decompression will help alleviate these problems. The size of the hernia was felt to be important hernias less than 4 cm had a significantly lower risk of recurrence than those greater than 4cm (25% versus 41%). Surgical technique is important in the prevention of recurrence of hernias. It is mandatory to use meticulous technique to decrease the rate of hematomas, seromas, and wound infections. It is also very important to use surgical skill and judgment to close these wounds without undue tension, as this tension allows for disruption of the wound. Several techniques have been described to minimize the tension on the wound, including undermining the fascia, counterincisions, the use of internal retention sutures, the use of a suture-to-wound length ratio of 4:1 to 5:1, and the use of prosthetic material.

LAPROSCOPIC REPAIRS

There are various methods of Laproscopic repair of umbilical hernias, simple closure 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 can be accomplished in almost all patients with excellent results.

In obesity and recurrent hernias laparoscopy is indicated procedure.

The “Swiss Cheese” type of hernias (multiple small defects eg umbilical and supra & infra umbilical) 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 Laparoscopic umbilical hernia repairs.

Cases of acute and subacute obstruction merits scrutiny on case to case 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 viability is in doubt, the procedure should be limited to suture approximation of the defect. Placement of prosthetic material can be done at late date. Laproscopic repair should be attempted by experienced surgeons.

The threshold for conversion to open method should be very low in order to prevent major fatalities like unrecognized bowel injuries and delayed perforation due to adhesiolysis. Other conditions like ascities, portal hypertension are relative contraindications.

A large pendulous abdomen with major abdominal defect will benefit more from conventional abdominoplasty rather than laproscopic method in terms of cosmesis. The routine contraindication to general anaesthesia also apply to laproscopic repair.

Absolute Contraindication :

- Infection
- Strangulation
- Peritoneal dialysis
- Peritonitis

Relative contraindications:

- Morbid obesity.
- Extensive adhesions due to prior mesh.
- Cardiac diseases.
- Pulmonary diseases
- Portal hypertension.

Primary Closure:**(Shoe lace technique)**

Small umbilical hernias less than 2.5cm in diameter are often successfully closed with primary tissue repairs.

Larger defects need mesh reinforcement.

Preoperative Preparations:

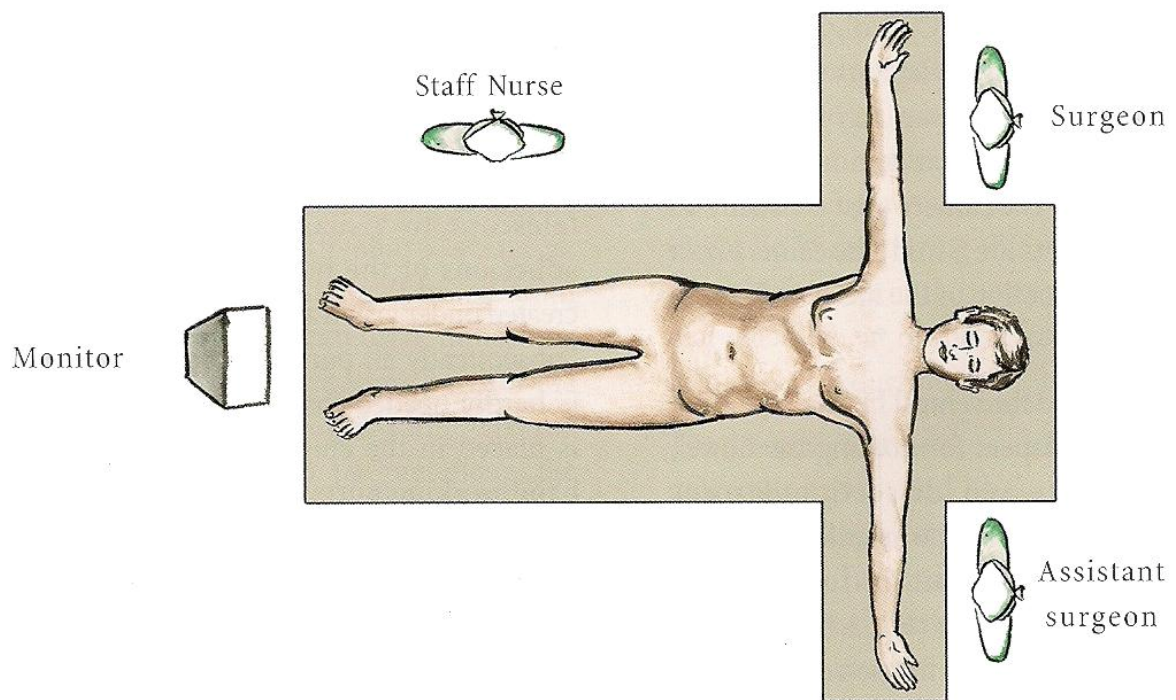
Patients is freed of infection especially skin.

Respiratory function is optimized by appropriate pulmonary function evaluation. Bowel preparation with a liquid diet and cathartics for 1 (or) 2 days prior to surgery.

Anaesthesia : General Anaesthesia with an endo tracheal tube is required.

Position

Patient is supine position.



Team setup for midline and lower abdominal hernias

Operative preparation

- Patient is given antibiotics
- Nasogastric tube inserted for decompression of stomach
- A foley catheter is placed.
- The skin prepared with povidone iodine and spirit.

Instrumentation

A good camera with an optimum light source is essential to prevent inadvertent enterotomies during adhesiolysis.

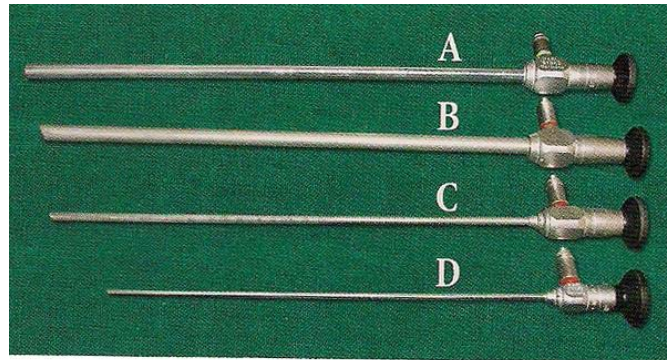
Latest 3CCD digital cameras with xenon light source.



KARL STORZ image 1 Digital camera

10mm, 30 degree telescopes and 0degree telescopes are routinely used.

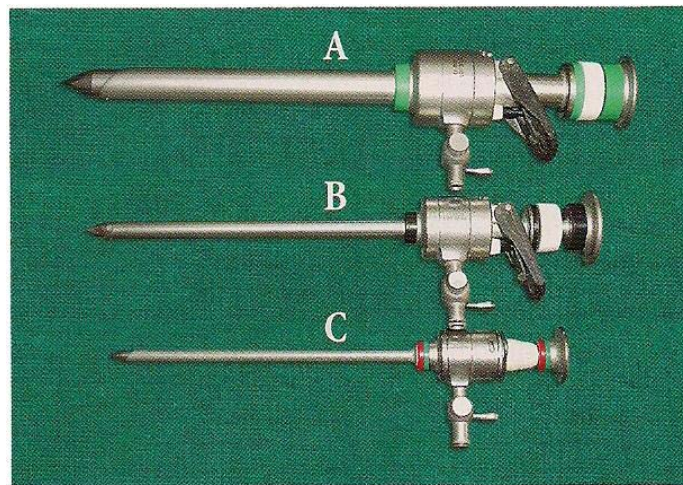
30 degree scope provide excellent view of anterior abdominal wall.



Scopes

- A - 0° 10 mm
- B - 30° 10 mm
- C - 30° 5 mm
- D - 30° 3 mm

Working port is 5mm port.



Reusable trocars with pyrimidal tip

- A - 10 mm trocar
- B - 5 mm trocar
- C - 3 mm trocar

Bipolar meryland and Bipolar scissor.

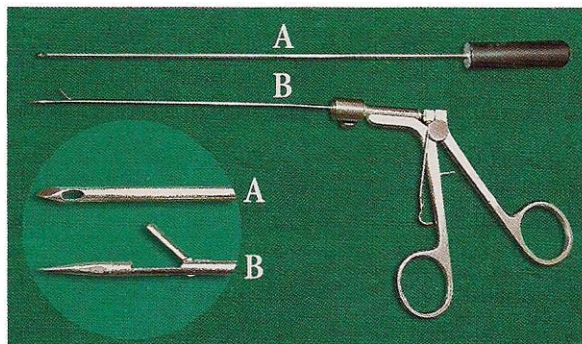


Electrocautery - Maestro Plus
(Ethicon)

Mery land dissecting forceps for holding tissues,

Endo needle holder for intracorporeal suturing are main instruments.

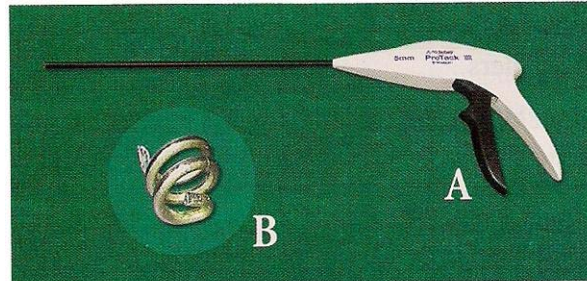
We use a specially designed suture passer needle for fixing the mesh to the fascial layers.



Suture passing devices

- A - Thread introducer
- B - Thread grasper

- Transfacial stitches
- Tackers are used for fixation



Tacker - Auto suture

A - Device
B - Tack

- ePTFE mesh was used.
- Minopolar / bipolar diathermy should be used with caution.
- Harmonic scalpel is ideal of adhesiolysis.
- Skie needle
- Suture passing needle.

Technique

Preoperative defect has to be measured. From the outer edge 5cm on all sides of the defect marked. So trocar placement should be well away from this to cover the mesh area.

Trocars are placed for laterally to avoid interference with mesh and mesh fixation.

Access to abdomen is gained by Hasson's technique (or) veress needle approach.

We used hasson's technique in the left hypochondriac region at Palmer's point.

This is a muscle splitting approach.

Pneumoperitoneum created with Co2 with flow rate of 2.5 litres/min upto 13mm of Hg.



CO₂ insufflator

30° telescope used for visualization and operation.

Operating 5mm port in the left lumbar region.

Adhesiolysis is performed with tissue holding forceps and scissors while applying counter pressure on the umbilicus with nondominant hand.

After adhesiolysis, next step is to determine the borders of the fascial defect a long (venflon needle) was passed during surgery through the abdominal wall at the borders of the defect.

This is done in each direction.

The shoelace repair

For the shoelace suture, a 6m length of No: 0 (or) 1 monofilament polyamide is used.

Doubled to form a loop 3m long.

Alternatively commercially available loops can be used (Loop ethilon).

Small nick with 11 blade is made at the site of needle marks around the defect externally in the skin.

The loop is introduced in the abdominal cavity using suture passing needle and one end retrieved by skie needle passed through the corresponding opposite incision. The other end is retrieved through subcutaneous plane using the same skie needle. After reducing the pressure, the thread is tied with a knot. The edges of the rectus sheaths come together with this suture line, the new liner alba created to restore the normal anatomy of the umbilicus.

Pneumoperitoneum undone, port sites closed using no:00vicryl.

Pad kept over the umbilicus compression dressing made which remained after 24 hrs, to prevent seroma formation.

Complications

- Small haematomas
- Ecchymoses
- Seromas
- Wound infection very uncommon
- Recurrence
- Trocar cellulitis
- Trocar site hernia
 - Intestinal injury
 - Nerve entrapment

Laposcopic intraperitoneal onlay mesh with primary closure (IPOM)

Absorbable meshes have limited role in umbilical 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 due to mesh erosion, mesh infection and hernia formation, hence it should not be used as intraperitoneal onlay graft.

Polypropylene mesh prevents recurrence, unfortunately intestinal fistulation has been reported in many series.

Expanded polytetrafluoroethylene (ePTFE) has very few bowel complications. It was developed in 1983.

It is a solid version with two distinctly different sides that is intended for intraabdominal use.

Intrabdominal side is smooth and microporons, resist tissue in growth and as such the opposite side is rough with wide pores that allow intense tissue incorporation. This material conforms well to the abdominal wall and has minimal shrinkage and good long term compliance. We used composite mesh from ethicon company the “proceed mesh”.

After making the defect size measurements from outside as mentioned early, the prosthetic mesh that will overlap all margins of the defect by approximately 4cm is selected.

No 0 monofilament sutures are placed at the midpoint of each side.

Reverse loading technique

The mesh is rolled like a scroll from the superior and inferior ends and pushed into the peritoneal cavity through 10mm port site. The mesh is unfurled within the abdomen. The sutures are individually pulled through the abdominal wall with a suture passer at the previously marked positions.

The individual strands of each suture are brought out through separate fascial punctures but through same skin incisions so that full thickness abdominal wall bites are taken to fix the mesh in position. The sutures are individually tied with the knots left buried in subcutaneous tissue when the abdomen is deflated.

The perimeter of the mesh is then secured with spiral tacks placed 1cm apart.

The tacks ensure that bowel will not herniate between the sutures.

Post operative management for laproscopic surgery

We apply compression dressing in the area of the hernial defect to prevent seroma collection.

The patient is advised to wear abdominal belt.

Fluids are allowed 4-6 hrs after surgery. Patients are discharged on 3rd day and encouraged to do routine works.

Complications

1. Bowel injuries (ie) accidental enterotomies.
2. Seromas
3. Mesh infection
4. Thermal injuries [diathermy]

Bowel injuries

These are important complications with overall reported incidence around 5%.

This can occur either during the initial trocar entry (or) during adhesiolysis.

Avoidance of cautery, sharp dissection with scissors are advised. Cautious approach with previous history of peritonitis and previous mesh repair will avoid this. In our study no incidence of bowel injury occurred.

Seromas

The fluid accumulation in the retained hernial sac after laproscopic approach is common and self limiting. If it is continuously enlarging aspiration of seroma can be performed under strict aseptic precaution.

Mesh Infection

The incidence is very low 1%. All septic precautions should be taken to avoid this complication as managing this complication is very difficult. The infected meshed usually need removal for effective healing of the wound.

RESULTS

Table -1

Sex distribution of the cases

Gender	No. of patients	Percentage
Male	16	32%
Female	34	68%

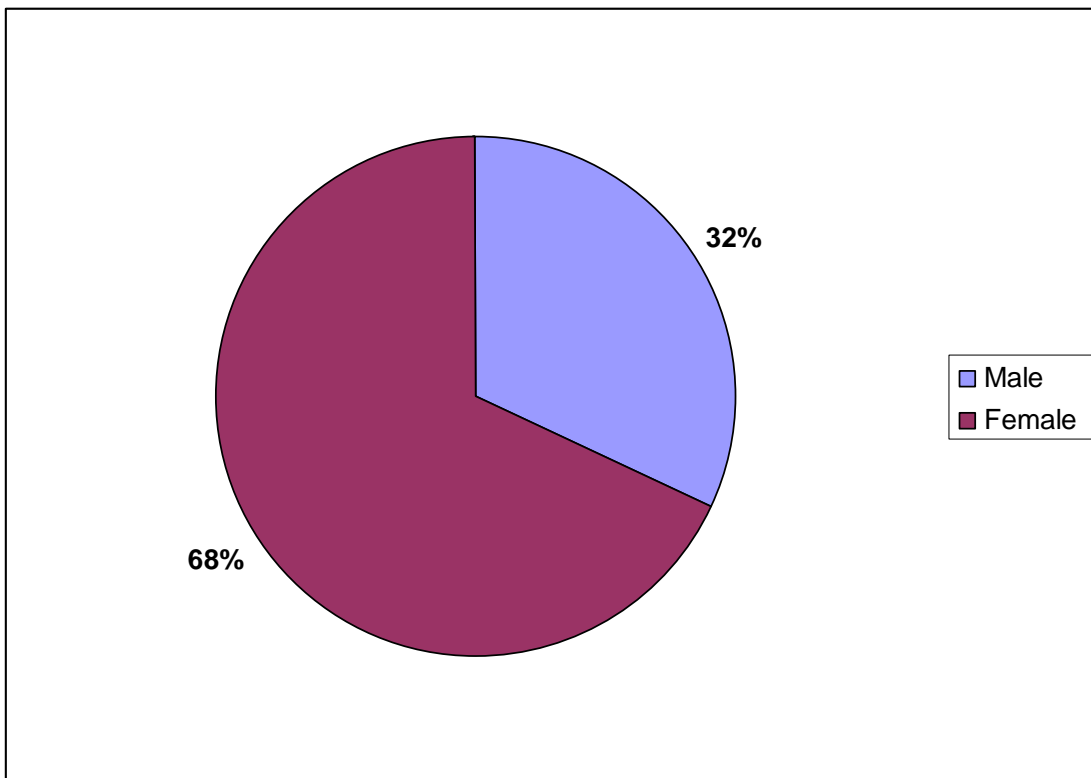


Table -2

Age wise distribution of the cases

Age in years	No. of patients	Percentage
13-20	1	2%
21-30	13	26%
31-40	9	18%
41-50	9	18%
51-60	9	18%
>60 yrs	9	18%
Total	50	100

Age distribution of the patients

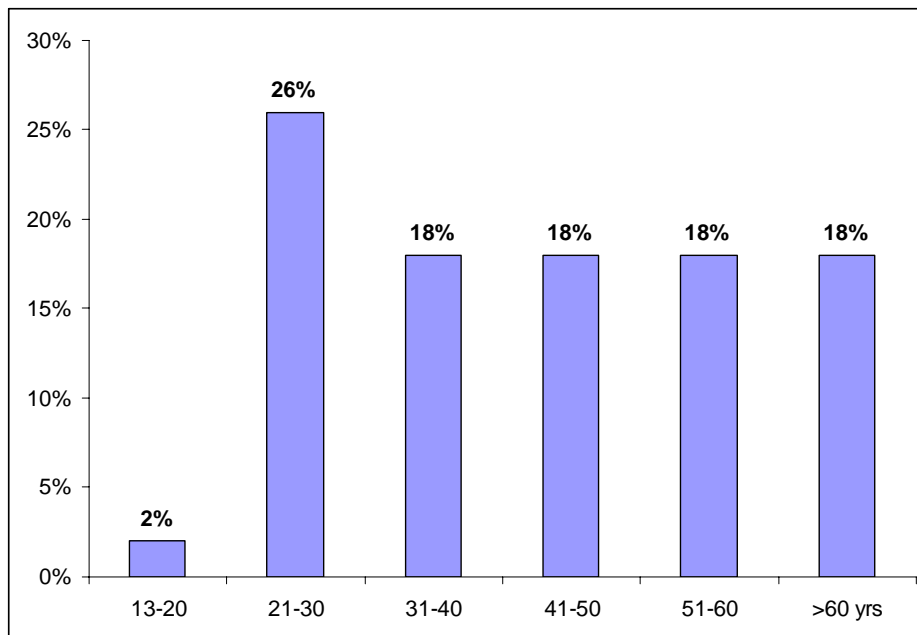


Table -3
Type of hernia among patients

Umbilical	14
Paraumbilical	
Supraumbilical	29
Infraumbilical	07
Total	50

Type of hernia among the patients

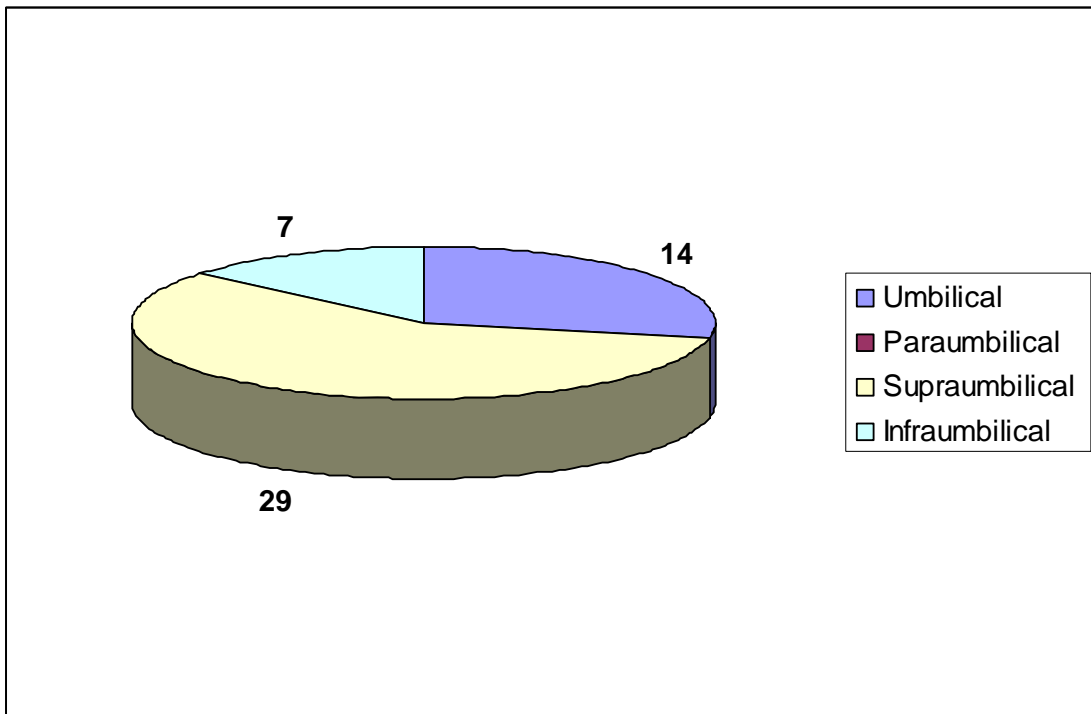


Table -4

Post operative complications

Complications	Open repair		Laprosopic repair	
	Anatomical	Mesh	Anatomical	Mesh
Wound infection	1	5	Nil	Nil
Seroma formation	1	1	1	Nil
Pain	1	2	Nil	Nil
Recurrence	2	Nil	1	Nil

Post operative complication rate in GRH among 50 pts.

Method	Recurrence %	Other complications %
Open repair		
a. anatomical repair [11]	18%	27%
b. mesh repair [18]	Nil	44%
Laprosopic repair		
a. anatomical repair [10]	10%	10%
b. mesh repair [10]	Nil	Nil

Table -5

Availability of facilities and expertise	Open repair	Lap. Repair
	More number	Less number
Effectivity	Equal	Equal
Feasible	Equal	Equal
Safe	Equal	Equal
No. of hospital stay days	More	Less
Postoperative complication	More	Less
Cosmetic & functional results	Good	Less
Cost effectiveness	More	Less

DISCUSSION

In our study we selected 50 patients.30 of them subjected to open repairs. Among them 11 of them underwent anatomical repair and 18 of them underwent open mesh repair.

20 patients were selected for laproscopic repair. 10 of them underwent primary closure. 10 of them underwent primary closure with mesh repair.

The laproscopic approach to umbilical hernia have shown to be safe and effective. The benefits of laparoscopy includes

- Reduction in postoperative pain no cases complained of pain to 3 cases in open repair.
- Shorter length of stay 3 days compared to 9 - 14 days.
- Seroma formation one case compared to 2 cases.
- Wound infection no cases compared to 6 cases.
- Decreased morbidity due to early bowel movements.
- Improvements in recurrence rates 10% as compared to 18% with the open procedure.
- The comesis is good.

Discussion

Voeller et al. recently presented 407 laparoscopic ventral/incision repairs at the October 1999 American College of Surgeons Meeting (12). The patients were large, with a mean body mass index of 32 kg², and 90% had previous abdominal surgery, with 136 of the hernias being recurrent. The average hernia size was 100 cm'. Length of stay was short, with few serious complications and no mortality. The mean follow-up has been approximately 2 years, with a range of up to 5 years. There were six bowel injuries and four mesh infections. The 14 recurrences (3.4%) compares favorably to the 10% to 36% described in the literature for open ventral/incisional hernia repair. The majority of recurrences were from mesh removal due to infection.

Postoperative results

Length of stay		
Average	1.8 days	
Range	0-17 days	
Complications		53(13%)
Mortality		0
Follow-up		
Average	23 months	
Range	1-60 months	

The laparoscopic technique described above has been used to repair lumbar hernias as well as parastomal hernias as described via an incision by Sugarbaker. The high coronary artery bypass graft (“CABG”) epigastric hernia and the low juxtapubic bone hernia can present many challenging aspects laparoscopically. The mesh in the low hernia must be sutured to Cooper’s ligament, and in the high epigastric hernia sutured to any available tissues around the sternum and ribs.

The author has laparoscopically reoperated upon several patients who have had a prior laparoscopic ventral/incisional hernia repair and found any adhesions to be filmy and readily taken down when PTFE mesh, especially the dual-sided mesh from W. L. Gore, is used. There is a “pseudoperitoneum” covering the mesh, and if one dissects between this and the mesh the adhesions are quickly lysed much more readily than the dense adhesions seen with polypropylene mesh. Thus, laparoscopic repair of ventral/incisional hernias now appears to be a very safe technique that can give a very low recurrence rate. It is absolutely essential that suture fixation of the prosthesis be a part of the procedure to continue to yield low recurrence rates. A long-term follow-up will certainly be necessary to further evaluate the procedure.

COMPLICATIONS

	No	Percent
Prolonged ileus	9	2.21
Seroma (>6 wk)	8	1.97
Suture pain (>8 wk)	8	1.97
Intestinal injury	6	1.47
Mesh cellulitis	5	1.23
Haematoma/bleeding	4	0.98
Trocar cellulitis	3	0.75
Urinary retention	3	0.75
Fever of unknown origin	3	0.74
Respiratory distress	2	0.49
Intraabdominal abscess	1	0.25
Trocar site hernia	1	0.25

In one of the largest series of laproscopic hernia repairs, Heinford et al has reported a low rate of conversion, Shorter hospital stay and low risk for recurrence. In an analysis of 850 patients who underwent

laparoscopic ventral including umbilical hernia repairs over 9 years the following results were published: Mean operating time was 120 min, mean estimated blood loss was 49 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 seroma 2.6%.

During a mean follow up time of 20.2 months the hernia recurrence rate was 4.7%.

The recurrence was found in larger hernias, longer operating times, previous hernia repairs and higher complication rates. Patients who were morbidly obese (BMI >40), also had recurrences.

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 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 laparoscopic hernia is as effective and safe as open mesh repair in terms of recurrence.

Causes of recurrence

- Transfascial sutures not employed
- Use of smaller sized meshes
- Ineffective anchoring of mesh
- Steep learning curve
- Size of the defect
- Obesity
- Diabetes mellitus
- Chronic cough
- Multiparity are considered as risk factors for recurrence.

In a study by Hesselink et al hernias smaller than 4 cm, had a significantly lower recurrence rate 25% than larger hernias 41%.

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

CONCLUSION

Laparoscopic mesh repair produce low recurrence rate with less morbidity. The evidence available at present suggests that laparoscopic repair is feasible, safe although experience with the new meshes is still limited and less cost effective.

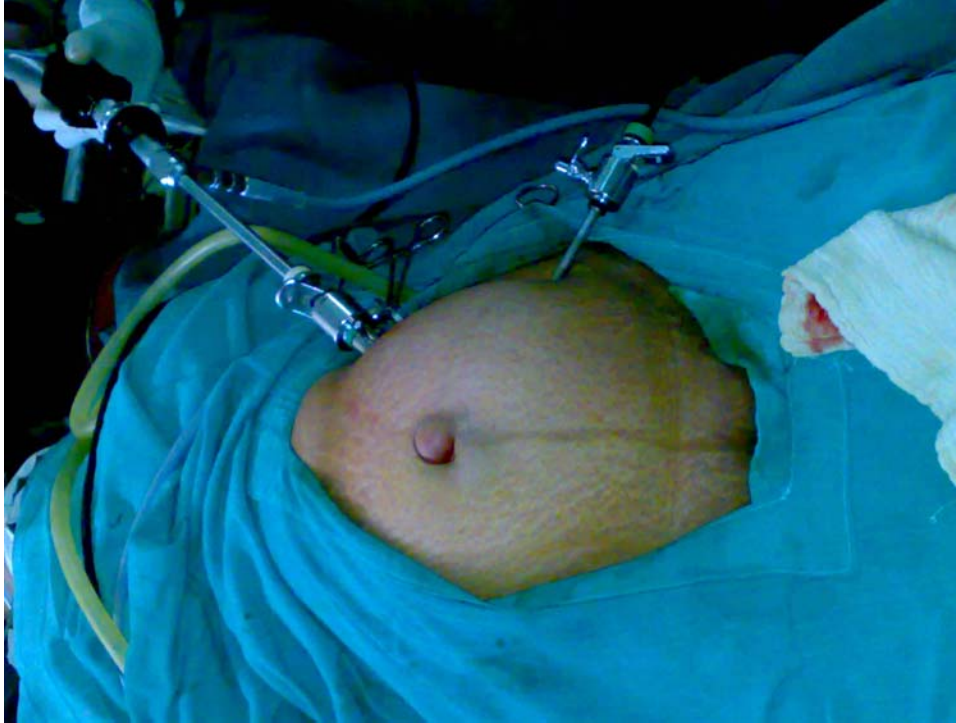
With the existing data, it will be prudent to recommend laparoscopic repair as the first line treatment for umbilical hernia where the facilities and expertise are available, where it is not, open mesh repair remains a suitable alternative. As laparoscopic skills improve, it is likely that laparoscopic repair will be more widely performed in future.



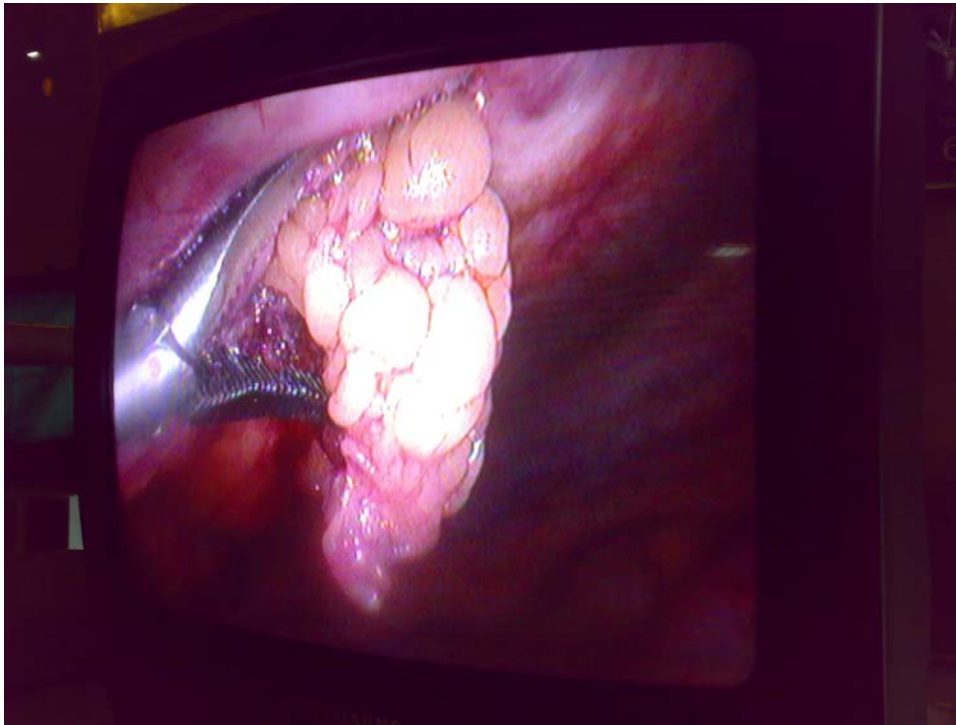
Defects marked preoperatively



10mm port inserted at Palmer's point



5mm port inserted at left iliac fossa



Adhesiolysis



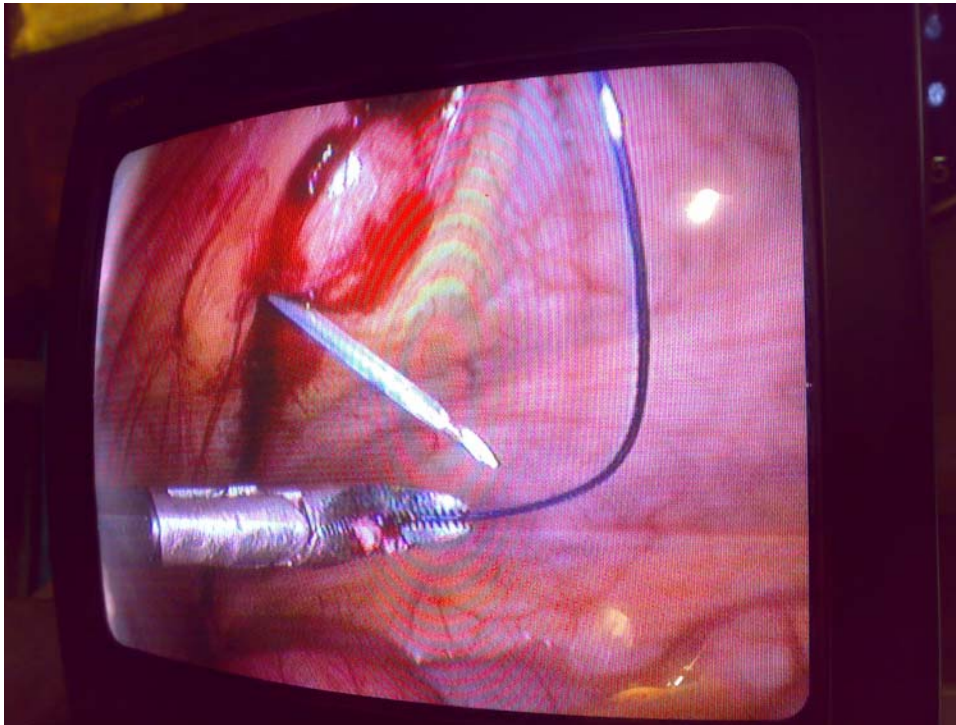
Laparoscopic view of defect



Niks made externally



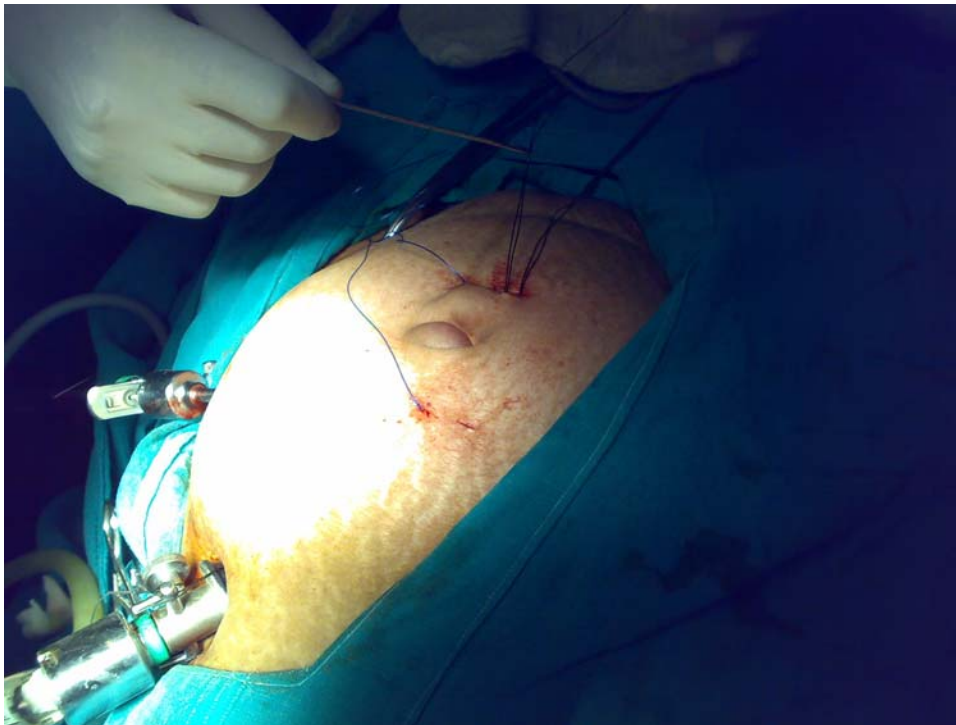
External view of anatomical repair



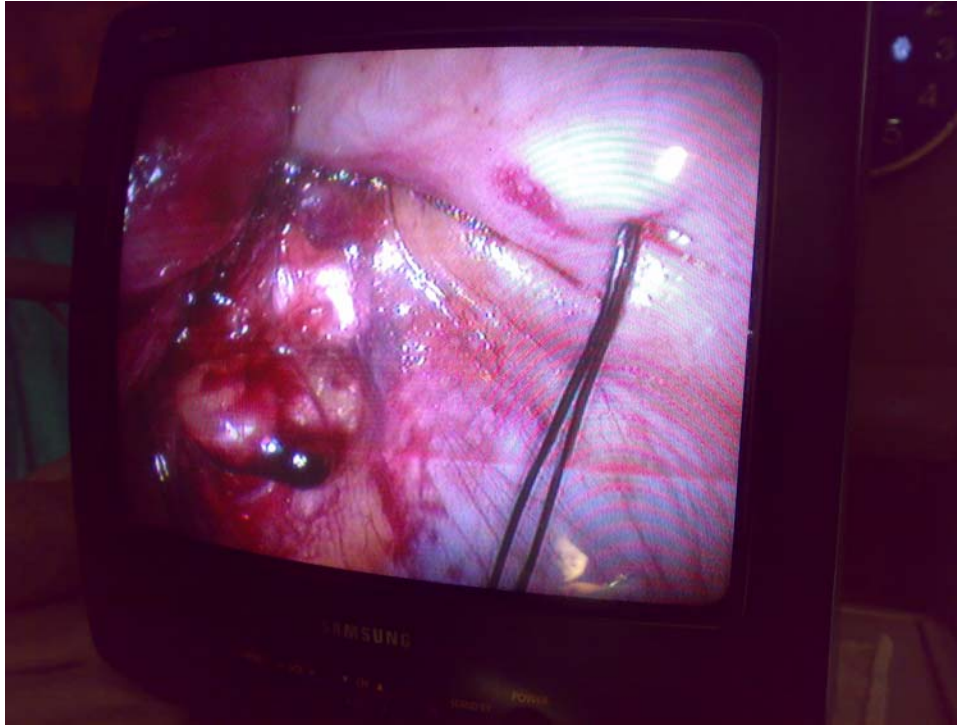
Laparoscopic view of defect closure



External view of anatomical repair



External view of primary closure



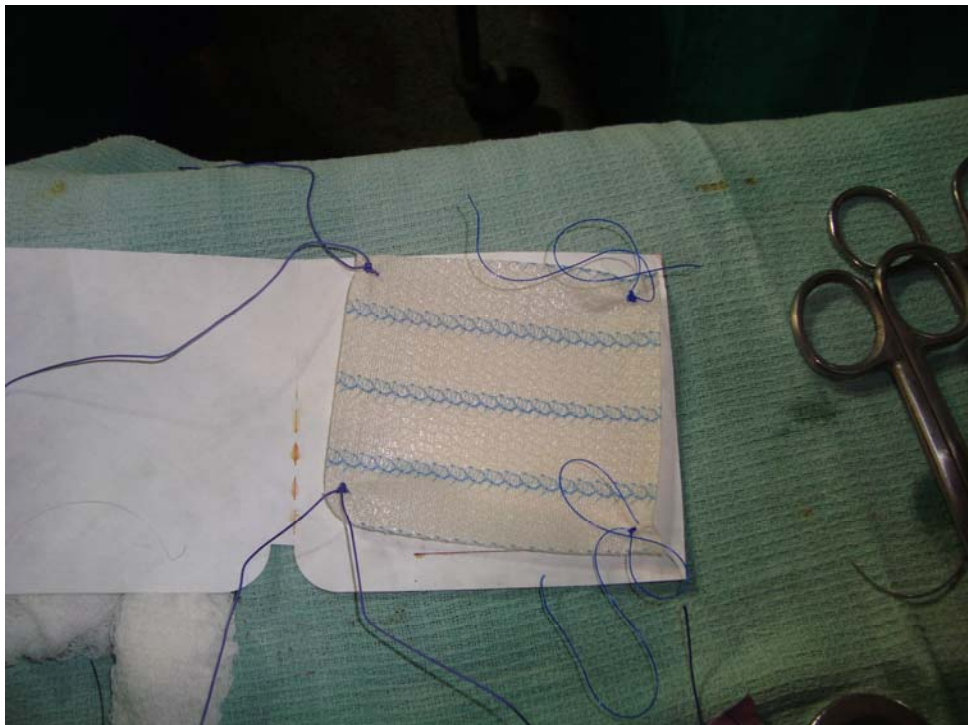
Laparoscopic view of completing the anatomical repair



Completion of defect closure



Corners Tagged With Prolene Sutures



Polyester surface facing abdominal wall



Hydrophilic coating facing the bowel



Reverse loading technique of mesh



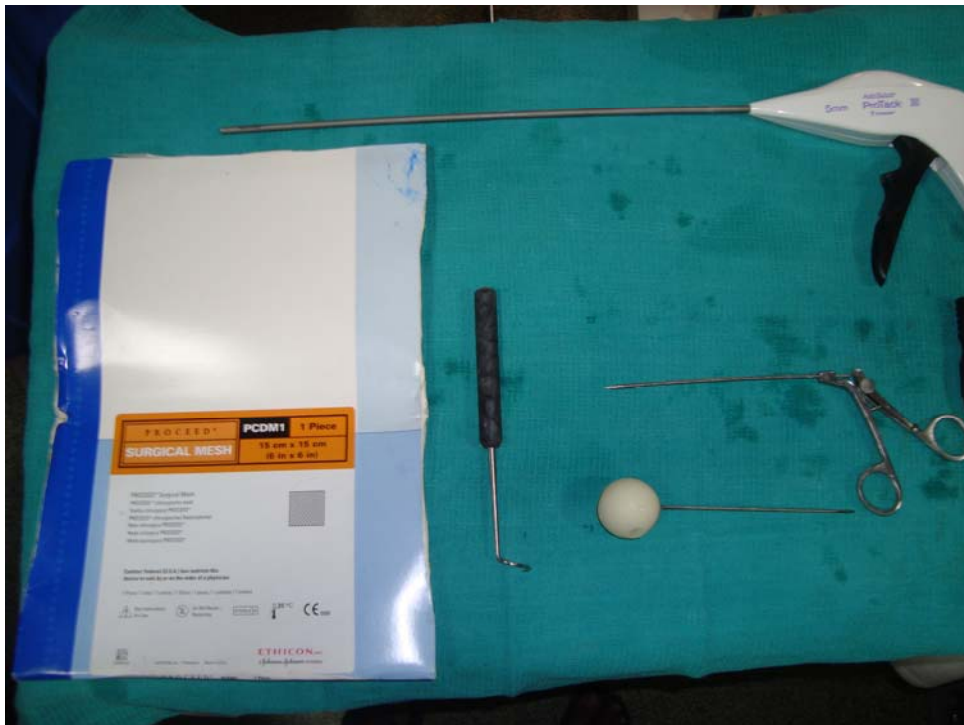
Mesh fixed with tacks



Laparoscopic view of completed mesh fixation



Laprosopic instruments



Laprosopic instruments

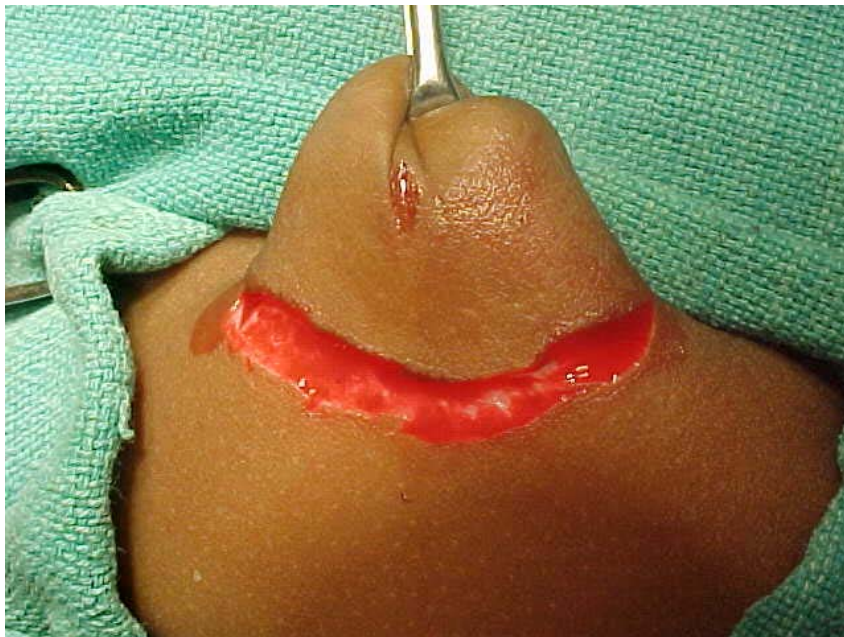
PROCEDURE COMPLETED



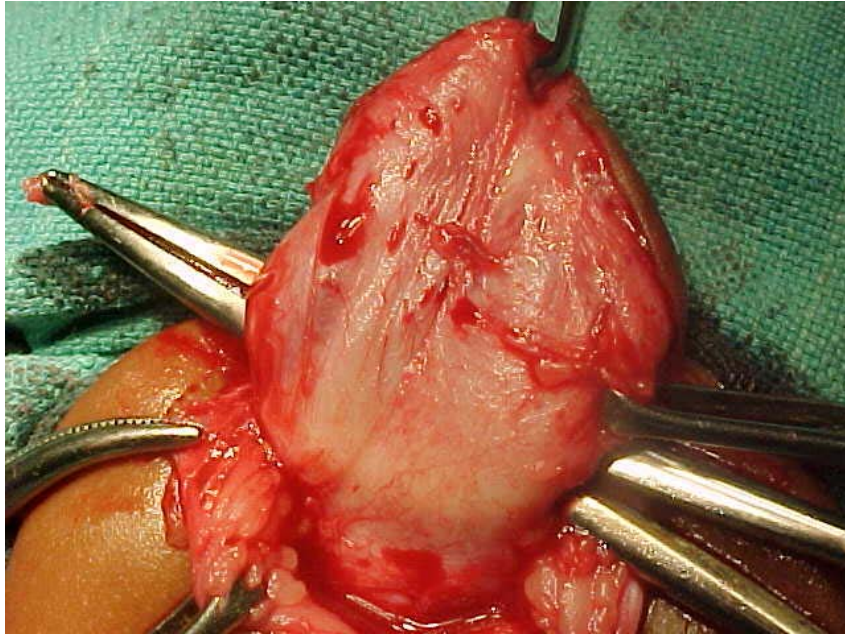
OPEN ANATOMICAL REPAIR (MAYO)



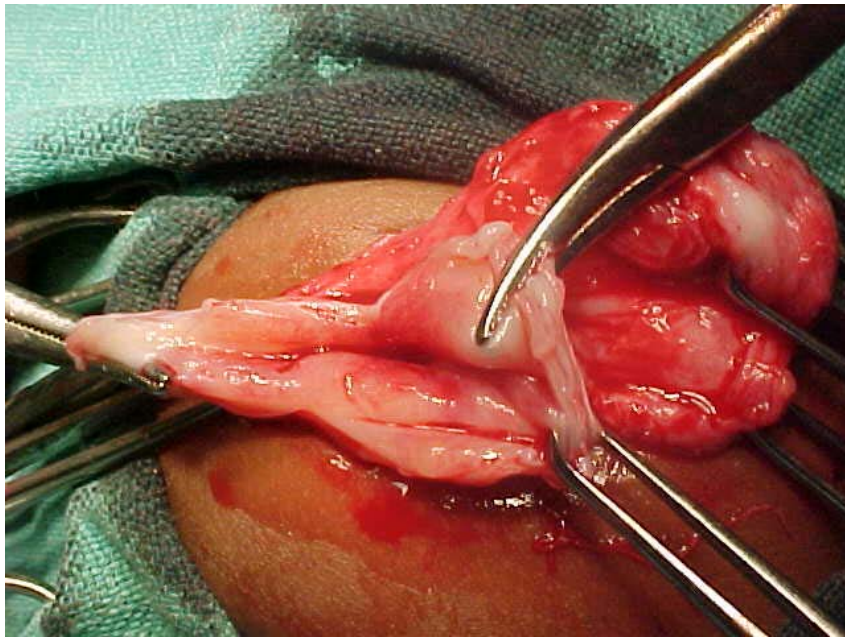
CURVEILINEAR



DISSECTION



SAC DISSECTION



SAC OPENED

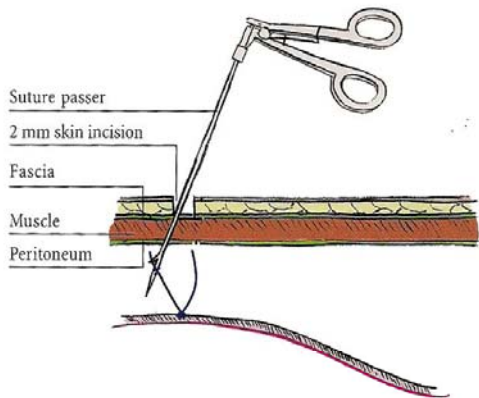


DOUBLE BREAST SUTURE

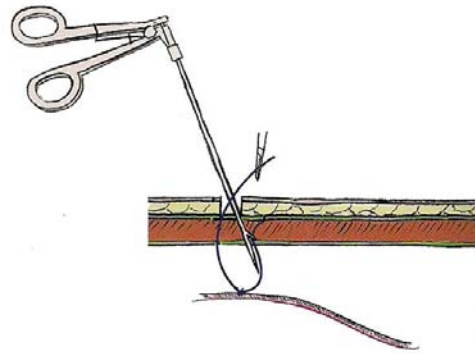


MESH FIXATION

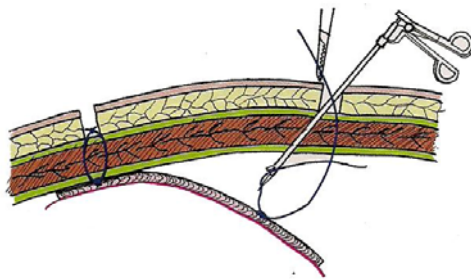
TRANSFASCIAL SUTURE FIXATION TECHNIQUE



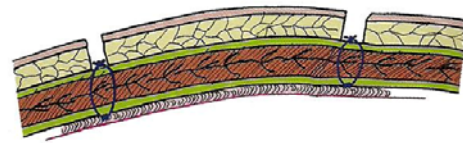
The suture passer is introduced through a 2 mm stab incision on the skin and one end of the prolene suture (Tagged to parietex mesh) is grasped and pulled out. In case of large size mesh extra stitches are made on either sides on the lateral aspect and in the middle, for better fixation.



The suture passer is introduced through the same stab incision on a different axis. The entry of the suture passer on the fascia should be few mm away from the previous entry.



Both the ends of prolene suture material are approximated over the fascia. A similar procedure is performed on all corners of the mesh.



Completed trans fascial suturing. The mesh is secured firmly to the abdominal wall. The small incisions on the skin heals completely with minimum scar.

PROFORMA

Name of the patient :

Age/Sex:

Occupation:

Place:

Complaints:

H/o present illness

Past history

Diabetes mellitus, Hypertension, Bronchial asthma

TB

Personal history

H/o hard muscle work, smoking

General Examination

Obesity

Anaemia

Features of cirrhosis with portal hypertension

Ascites

Features of congestive cardiac failure

Features of nephritic syndrome

Local examination

Swelling: Site, size, shape, surface, ulcer any bowel movement

Cough impulse

Defect size : <3cm (or) >3cm

Swelling complications : Reducible, irreducible, obstructed,

Strangulated, incarcerated, inflamed

Investigation : Ultrasound abdomen and pelvis

Surgery planned

1. Open :
 1. Anatomical repair (Mayo's repair)
 2. Mesh repair – Hernioplasty
2. Laproscopic:
 1. Anatomical repair (Shoelace technique)
 2. Mesh Repair

Postoperative complications

Number of days stayed in hospital post-operatively.

Date of discharge

Look for recurrence

Look for any complications

MASTER CHART

S.NO	NAME	AGE/ SEX	IP NO	DEFECT SIZE	LAPROSCOPIC REPAIR		POST OPERATIVE COMPLICATI ONS	NO. OF DAYS STAYED POST OPERATIVELY	FOLLOW UP PERIOD IN MONTHS	OTHERS
					ANATOMICAL REPAIR [SHOELACE]	MESH REPAIR				
1	Pandiyaraj	15/M	35762	2x2 cm	Yes			3	20	
2	Malar	30/F	59340	1.5x1.5 cm	Yes			3	14	
3	Murugan	44/M	59477	2x2 cm	Yes			4	14	
4	Thavanmani	40/F	58745	1.5x1.5 cm	Yes			3	20	
5	Indirani	59/F	58714	2x2 cm	Yes			3	14	
6	Damodharan	40/M	583307	3x2 cm	Yes			3	10	
7	Lakshmi	45/F	58732	1.5x1.5 cm	Yes		Seroma	3	9	
8	Pannerselvam	36/M	67930	2x2 cm	Yes			3	7	
9	Buvenshwari	29/F	73406	1.5x1.5 cm	Yes			3	18	
10	Saboornisha	21/F	1044	3x3 cm	Yes			3	20	
11	Kala	26/F	52622	2x2 cm		Yes		3	20	
12	Lakshmi	29/F	55003	3x2.5 cm		Yes		3	18	
13	Radhakrishnan	43/M	031852	3x3 cm		Yes		2	18	
14	Maheswari	29/F	42514	3x2 cm		Yes		3	12	
15	Thangarathinam	40/F	83748	3x2 cm		Yes		3	13	
16	Kanmani	26/F	93375	1.5x1.5 cm		Yes		3	8	
17	Bagialakshmi	34/F	81885	4x3 cm		Yes		3	8	
18	Muthu	60/M	98752	3x2 cm		Yes		3	8	
19	Arumugam	55/M	46474	4x3 cm		Yes		3	9	
20	Indirani	54/F	45882	3x2 cm		Yes		9	8	

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