

**“A CLINICAL STUDY ON INCISIONAL HERNIA IN TVMCH
PATIENTS”**

**A DISSERTATION SUBMITTED TO THE TAMILNADU
DR MGR MEDICAL UNIVERSITY
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In partial fulfillment of the requirement for the degree of

M.S. (GENERAL SURGERY)

BRANCH – I

Register No: 221711356



DEPARTMENT OF GENERAL SURGERY

TIRUNELVELI MEDICAL COLLEGE

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PRINCIPAL INVESTIGATOR: Dr.G.JOHN NICKSON, MBBS.,

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Dear Dr.G.JOHN NICKSON, MBBS, The Tirunelveli Medical College Institutional Ethics Committee (TIREC) reviewed and discussed your application during The IEC meeting held on 27.10.2017.

THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED

1. TIREC Application Form
2. Study Protocol
3. Department Research Committee Approval
4. Patient Information Document and Consent Form in English and Vernacular Language
5. Investigator's Brochure
6. Proposed Methods for Patient Accrual Proposed
7. Curriculum Vitae of The Principal Investigator
8. Insurance /Compensation Policy
9. Investigator's Agreement with Sponsor
10. Investigator's Undertaking
11. DCGI/DGFT approval
12. Clinical Trial Agreement (CTA)
13. Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)
14. Clinical Trials Registry-India (CTRI) Registration


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1. The approval is valid for a period of 2 year/s or duration of project whichever is later
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17

CONTENTS

	Title	Page No.
1	INTRODUCTION	1
2	AIMS AND OBJECTIVES	4
3	REVIEW OF LITERATURE	5
4	MATERIALS AND METHODS	72
5	RESULTS	74
6	DISCUSSION	83
7	CONCLUSION	84
8	BIBLIOGRAPHY	
9	ANNEXURE	
	i. PROFORMA	
	ii. MASTER CHART	

ABBREVIATIONS

PTFE –POLY TETRA FLUORO ETHYLENE

ACS – ANTERIOR COMPONENT SEPERATION

IPOM – INTRA PERITONEAL ONLAY MESH

COPD – CHRONIC OBSTRUCTIVE PULMONARY DISEASE

BMI - BODY MASS INDEX

HTN – HYPERTENSION

DM - DIABETES MELLITUS

CVS - CARDIOVASCULAR SYSTEM

DVT - DEEP VEIN THROMBOSIS

INTRODUCTION

Incisional hernia is defined by Korenkov³² et al, as any abdominal wall gap with or without a bulge in the area of a postoperative scar palpable by clinical examination or imaging. It is a frequent long term complication of abdominal surgeries. Incidence reported as 11-20%. Vertical incisions may have a higher risk of hernia formation than transverse or oblique incisions.^(1,2)



Many factors are associated with incisional hernia like age, sex, obesity, chest infections, nutritional status of the patient, type of incision

and most important the wound infection¹. All these factors presents a challenging problem to the surgeon. Of all hernias encountered, incisional hernias can be the most frustrating and difficult to treat. It occurs as a result of excessive tension and inadequate healing of a previous incision, which may be associated with surgical site infection.

Obesity is a major risk factor for the development of incisional hernia, because of increased tension on the abdominal wall from the excessive bulk of a thick pannus and large omental mass. Steroids and chemotherapeutic drugs, surgical site infection can contribute to poor wound healing which increases the risk for development of an incisional hernia.

Large hernias results in loss of abdomen domain. It occurs when the abdominal contents no longer reside inside the abdominal cavity. It can also results from inability to close the abdomen primarily because of bowel edema, abdominal packing, peritonitis and repeated laparotomy. Loss of abdominal domain, compromises the natural rigidity of the abdominal wall and also results in retraction of abdominal musculature, bowel edema, stasis of splanchnic circulation, retention of urine and constipation.

During the repair of a large defect with loss of abdominal domain, return of displaced viscera may lead to increased abdominal pressure, abdominal compartment syndrome and acute respiratory failure. This study has been undertaken to assess the various risk factors leading to the development of this condition and the different modalities of treatment practiced in our setup.

AIMS AND OBJECTIVES

1. To estimate various etiological factors of incisional hernia and distribution of cases in relation to age and sex.
2. To estimate the various modalities of treatment and early postoperative complications.

REVIEW OF LITRATURE

“They learnt from operating that they did not learn from operating.”

The term hernia is probably derived from the Greek word “Hernios” meaning a bud, a branch or an off shoot. The rapid development of abdominal surgery since last century brought in its wake an increased incidence of incisional hernia. A large number of attempts have been made for repair of incisional hernias for the last hundred years resulting in a bewildering number of techniques.

Maydl³ (1886) first used a technique which well high approached present day standards. He dissected out the various musculo-fascial layers and repaired them separately. Witzel in 1890, Goepel in 1900, Barlet⁴ in 1903, Mc Arthur⁵ in 1901 described the repair of incisional hernia from continuous fascial sutures from the external oblique in autoplasmic suture of hernia.

Koontz⁶ and Throckmorton⁷ (1948) introduced tantalum gauze. These foreign materials had the disadvantage of metal fatigue with subsequent fragmentation, sinus formation and perforation of bowel with fistula consequent to fragment penetration. Judd⁸ in 1912 and Gibson⁹ in 1916 both described repair technique based on extensive anatomic dissection of the scar and adjacent tissues. Gibson again in 1920 reported having

repaired successfully (quoted Ponka, 1980) 8 cases of large incisional hernia using lateral muscle relaxing incisions in the anterior rectus sheath, parallel to midline.

Techniques with extensive tissue dissection were described by Nuttal in 1932, Dixon (1929), Watson (1938), Wells (1956), Maingot (1958) and Madden (1964). These techniques frequently resulted in recurrence because the tissues were sutured. Fascia lata grafts used in the form of strips or sheets were first reported by Mc Arthur⁵ in 1901, Kirschner in 1910, Gallie in 1921 and again in 1923, 1924, 1932 popularised use of fascia lata grafts. Hamilton in 1968 published a large series of hernia patients treated successfully with fascia lata grafts.

Mair¹⁰ in 1945 advocated the use of skin in sheets or strips. Hamilton in 1968 also used the same material. However these tissues tends to get absorbed and were associated with high recurrence rates. Harvesting the graft was another problem as were complications such as sinus formation, dermoid cyst and even malignant changes.

While the patchers were patching, the darners were seeking ideal method of darning. Darn techniques involving aponeurosis of external oblique strips were described by Burton (1959). Gosset (1953) reported

using skin ribbon sutures. Moloney (1948) used nylon and Maingot (1958) reported repair using floss silk.

The new era of darning started with the advent of newer materials when Abel (1960) used stainless steel wire for the lattice work after constructing the new linea alba in midline incisional hernia. Hunter in 1971 described an almost same technique using monofilament nylon. This trend has culminated in the description by Abrahamson (1987) of his shoelace darn technique in repair of incisional hernias. The modern era of prosthetic hernia repair began in 1958 when Usher.F.C¹¹ reported his experience with polyethylene (marlex) mesh. Later polyamide (nylon) mesh and recently PTFE (Polytetra fluoro ethylene) were introduced. These three materials have revolutionized the surgery of incisional hernia, so that earlier methods have become of historical interest and have been now abandoned.

To prevent the development of chronic seroma in the abdominal wall after incisional hernia repair with a prosthetic material, Usher in 1971, recommended the relative use of large romovac drains and the postoperative application of an encircling Elastoplast girdle. Durden and Pemberton in 1974 also advocated the use of closed suction drains whenever a non-absorbable mesh is inserted into the wound and also

reported their experience with the use of Dacron mesh for incisional hernia repair.

More recently use of expanded PTFE mesh has been reported by Sher (1980), Jenkins (1983) and Baner (1987). These materials cause little tissue reaction, are strong and less infection rate. Jayanth Sharma¹² et al in their study have stated that incisional hernia occurring through midline incision was the most common variety requiring prolene mesh repair (7.5%).

Lichtenstein¹³ in 1991 reported that monofilament polypropylene stimulates a strong fibroblastic response and has a marked resistance to infection. Laparoscopic incisional hernia repair is becoming increasingly popular. An intraperitoneal mesh is sutured or tacked into place with the mesh extending a clear 5 cm beyond the edges of the defect¹⁴.

Comparative studies conducted by K. Cassar and A. Munro¹⁵ (2002) for surgical treatment of incisional hernia concluded that anatomical repair for incisional hernia carries an unacceptably high recurrence rate (31-49%). The results for open mesh and laparoscopic mesh techniques are encouraging with recurrence rates of 0-10% and 0-9% respectively.

The laparoscopic methods result in less postoperative morbidity, less duration of hospital stay and early return to work with comparable recurrence rates. However they are more expensive, more time consuming and technically demanding, with a long learning curve.

ANATOMY OF ANTERIOR ABDOMINAL WALL

Divided into 9 regions by transpyloric plane, transtuberular plane and right and left lateral planes. Transpyloric plane passes through midpoint between suprasternal notch and pubic symphysis & corresponds to lower border of L1. Transtuberular plane passes through tubercles of iliac crests & corresponds to upper border of L5. Right and left lateral planes passes through midinguinal point.

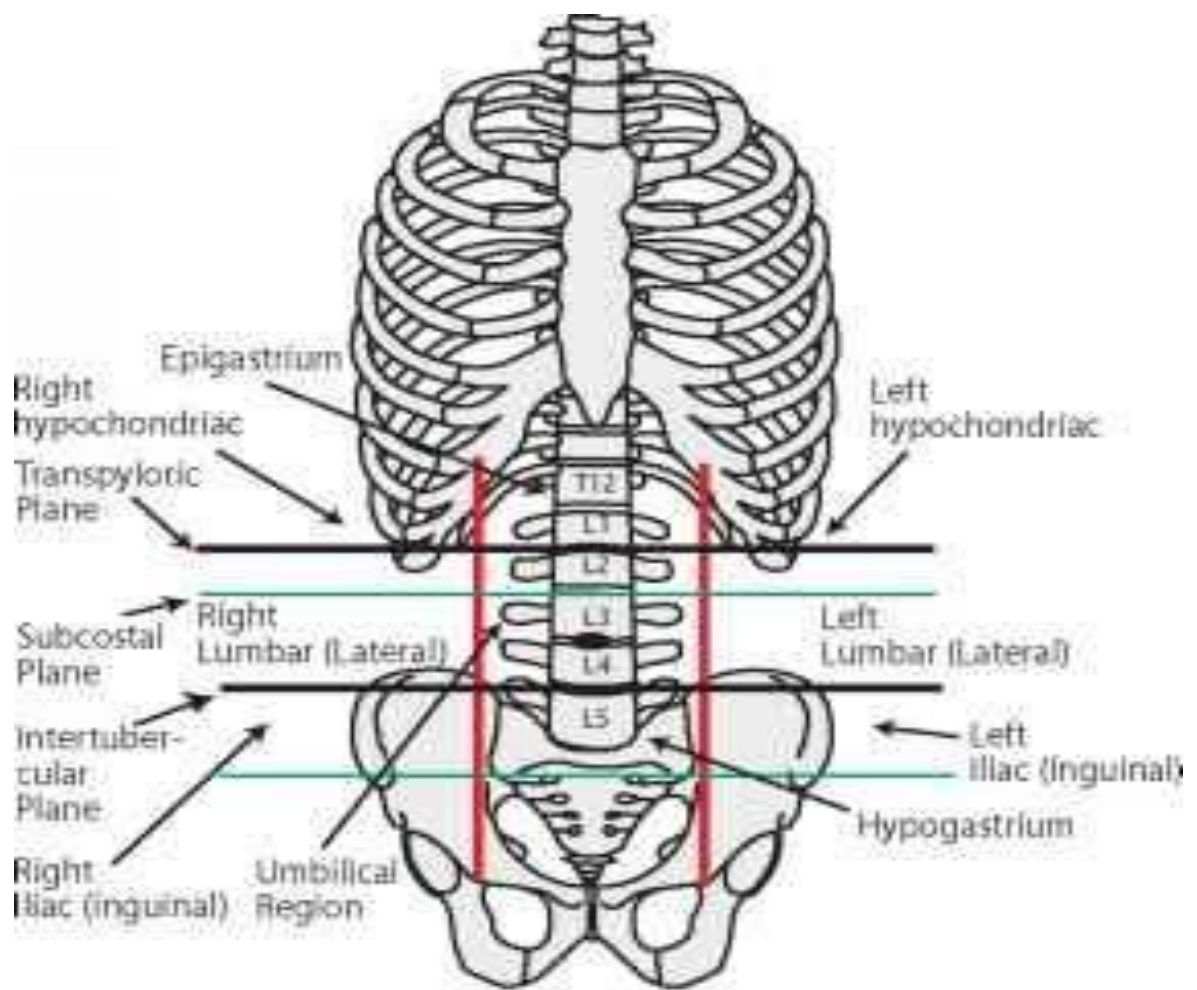


Fig. 1.1. Various regions of the anterior abdominal wall

LAYERS OF ANTERIOR ABDOMINAL WALL

Skin,

Superficial fascia,

External oblique muscle,

Internal oblique muscle,

Transverse abdominis,

fascia transversalis,

Extraperitoneal tissue,

Parietal peritoneum.

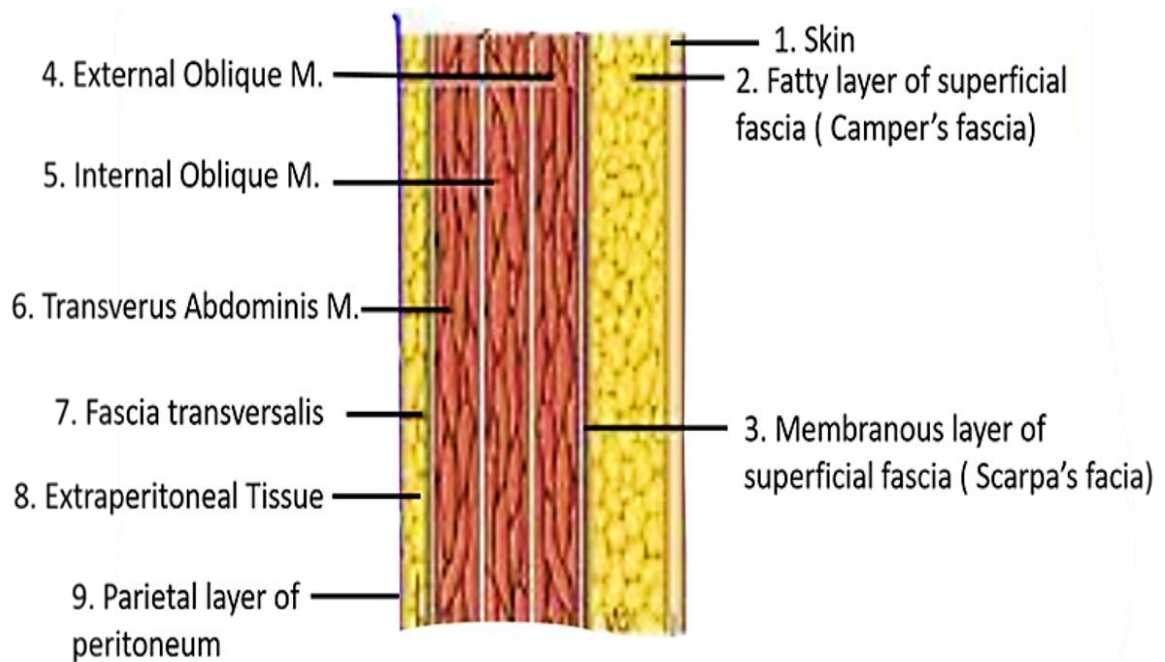


Figure 2:

SKIN

The skin is loosely attached to underlying tissue. It shows certain surface markings such as umbilicus, Mcburney's point etc. Cutaneous nerves and dermatomes of anterior abdominal wall are clinically important

Lower 5 intercostal (T7 to T11) , subcostal(T12) and the ilio-hypogastric (L1) nerves, supply the skin segmentally. There are 7 dermatomes from T7 to L1. T7 is located over xiphoid process. T10 overlies the band of skin at the level of the umbilicus. L1 lies on pubic symphysis and inguinal ligament.

SUPERFICIAL FASCIA

It is composed of superficial fatty layer(CAMPER'S FASCIA) & deep membranous layer(SCARPA'S FASCIA). Fatty layer is continuous below with superficial fascia of perineum and thigh. Membranous layer passes in front of inguinal ligament into the thigh to become continuous with the membranous layer of superficial fascia of upper part of thigh. In the midline it passes in front of the pubis and continuous with membranous layer of superficial fascia in perineum. Thus the potential space between the membranous layer and the external oblique aponeurosis is in continuous with superficial perineal pouch.

ANTEROLATERAL MUSCLES OF ANTERIOR ABDOMINAL WALL

1. EXTERNAL OBLIQUE MUSCLE.
2. INTERNAL OBLIQUE MUSCLE.
3. TRANSVERSE ABDOMINIS.

They are fleshy laterally and aponeurotic medially, and all aponeurotic parts form the rectus sheath.

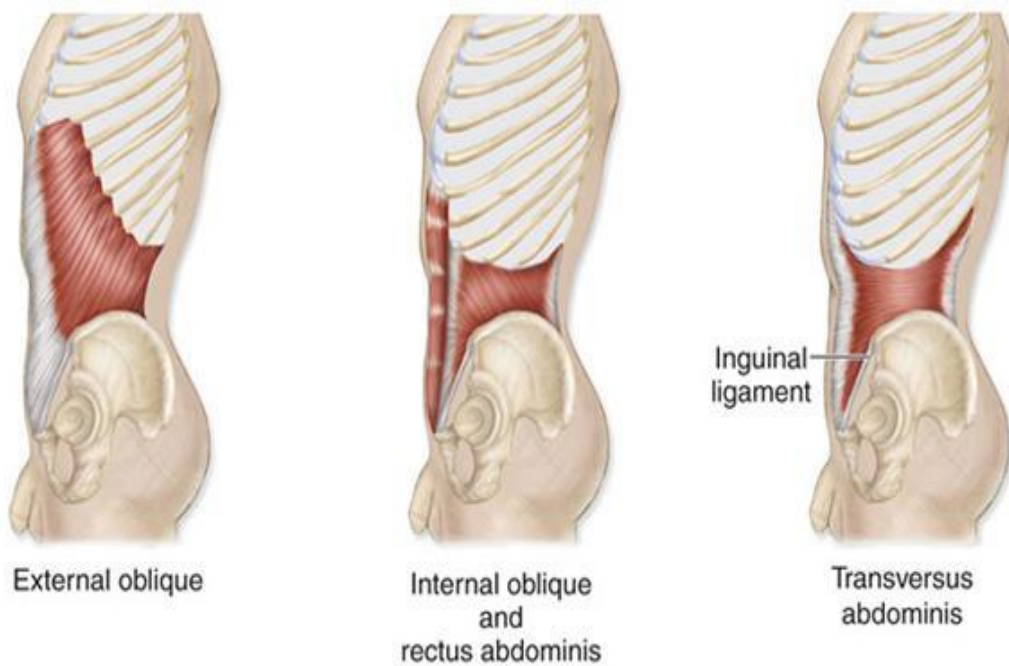


Figure 3:

EXTERNAL OBLIQUE MUSCLE

ORIGIN:

Outer surfaces of 5-12 ribs.

INSERTION:

It has a wide insertion.

1. Fibers from 11&12th ribs form free posterior border and inserted to anterior 2/3 of outer lip of iliac crest.
2. Fibers from 5-10th ribs form wide aponeurosis and get inserted to xiphoid process, linea alba ,pubic crest and pubic tubercle. Its free margin inrolled to form inguinal ligament.

NERVE SUPPLY:

Lower five intercostal nerves and subcostal nerves.

INTERNAL OBLIQUE MUSCLE

ORIGIN :

Lateral 2/3rd of upper surface of inguinal ligament and anterior 2/3rd of iliac crest and thoracolumbar fascia.

INSERTION:

Lower borders of 10,11,12th ribs.

Aponeurotic insertion to costal cartilages of 7,8,9th ribs at costal margin and entire length of linea alba. They form conjoint tendon and insert to pubic crest and pectan pubis.

NERVE SUPPLY :

Lower five intercostal, subcostal, ilio-hypogastric , ilio-inguinal.

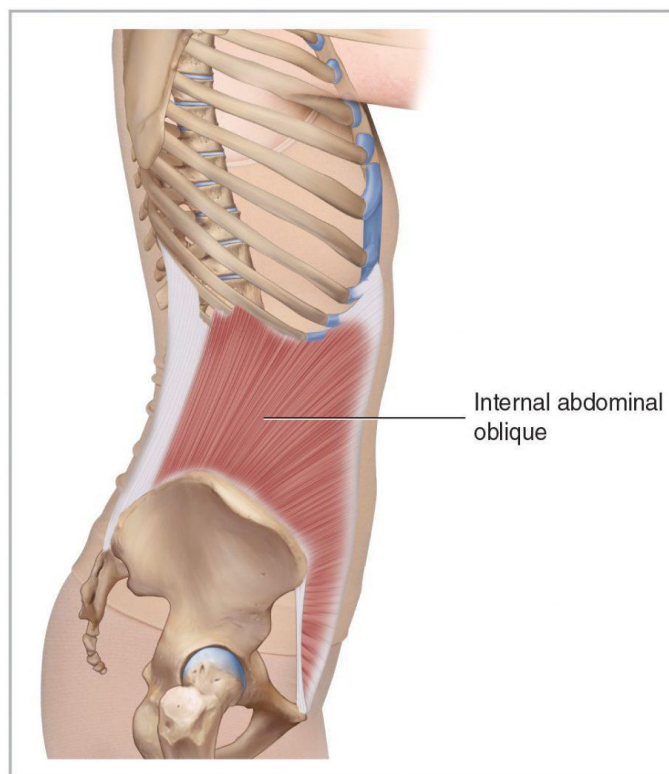


Figure 4:

TRANSVERSE ABDOMINIS:

ORIGIN :

Inner aspect of lower six costal cartilages near costal margin, thoracolumbar fascia, anterior 2/3rd of iliac crest and lateral 1/3rd of upper surface of inguinal ligament.

INSERTION :

Linea alba.

NERVE SUPPLY :

Lower five intercostal, subcostal, ilioinguinal , iliohypogastric nerves.

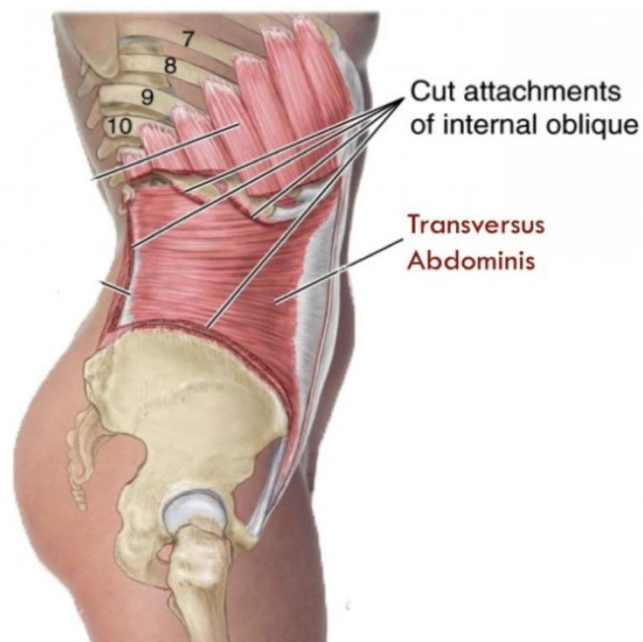


Figure 5:

RECTUS SHEATH

Its an aponeurotic covering for the rectus abdominis and pyramidalis muscles on either side of linea alba.

ABOVE THE LEVEL OF COSTAL MARGIN :

anterior wall is by aponeurosis of external oblique muscle only

Posterior wall is deficient so muscle rest directly on 5,6,7 costal cartilages.

FROM COSTAL MARGIN TO MIDWAY BETWEEN UMBILICUS AND PUBIC SYMPHYSIS.

Anterior wall by fusion of aponeurosis of external oblique with anterior lamina of aponeurosis of internal oblique. Posterior wall by fusion of posterior lamina of internal oblique aponeurosis with aponeurosis of transverse abdominis.

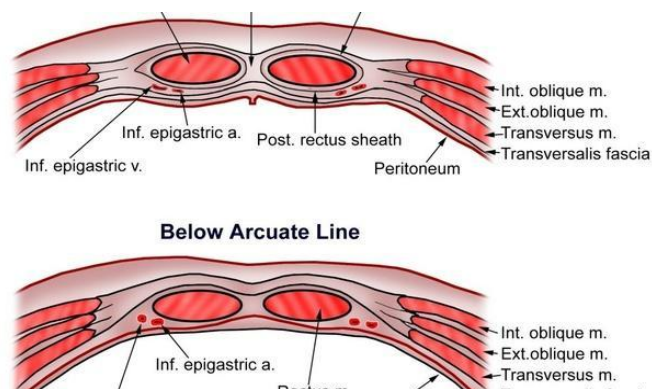


Figure 6:

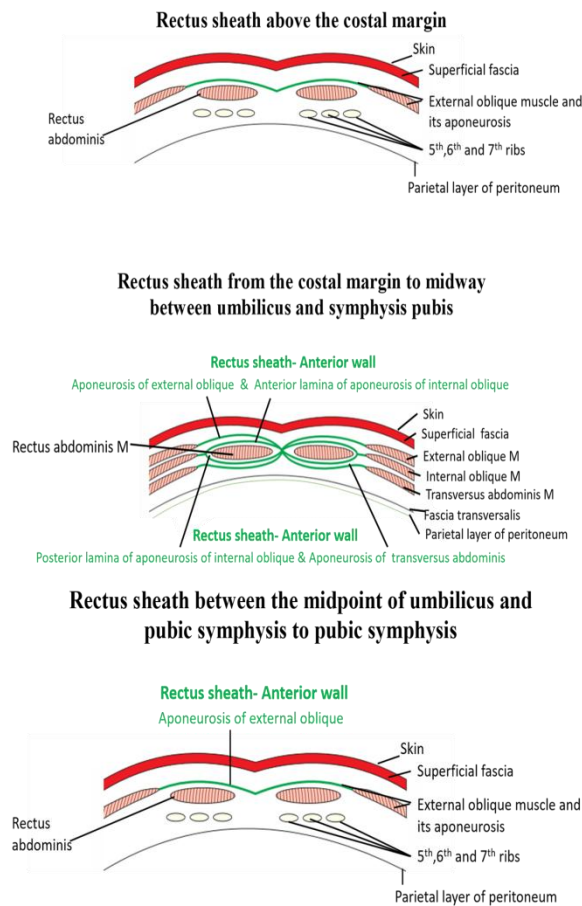


Figure7:

BELOW THE LEVEL OF THE POINT MIDWAY BETWEEN UMBILICUS AND PUBIC SYMPHYSIS.

Anterior wall by fusion of aponeurosis of 3 muscle. Posterior wall is deficient so rectus muscle rest directly on fascia transversalis.

CONTENTS.

Rectus abdominis and pyramidalis.

Superior and inferior epigastric vessels.

Lower five intercostal nerves and subcostal nerves.

RECTUS ABDOMINIS

ORIGIN :

Arise by 2 tendinous heads. Medial from anterior surface of symphysis pubis and lateral from pubic crest.

INSERTION :

To xiphoid process and 5,6,7th costal cartilages. It has 3 tendinous intersections which are located at tips of xiphoid process at umbilicus and midway between the previous two. Each intersection is attached to the anterior wall of rectus sheath but not the posterior wall. The intersections divide the long muscle into shorter segments for better action.

NERVE SUPPLY :

Lower five intercostal nerves and subcostal nerves supply the rectus muscle.

LINEA ALBA :

It is a tendinous raphe extending from xiphoid process to pubic symphysis. It is formed by the decussation of the fibers in the aponeurosis of flat muscle of either sides. Considered as a common insertion of right and left oblique and transverse abdominis muscles.

NERVES OF ANTERIOR ABDOMINAL WALL

THORACOLUMBAR NERVES (LOWER FIVE INTERCOSTAL NERVES T7-T11)

The 7 and 8th intercostal nerves enter abdominal wall between the digitations of transverse abdominis and then curve superomedially to reach posterior aspect of internal oblique aponeurosis . They pierce posterior wall of rectus sheath.

9-11th intercostal nerves pass through the gap between digitations of diaphragm and transverse abdominis. They pierce lateral margin of rectus sheath.

SUBCOSTAL NERVE (VENTRAL RAMUS OF 12TH THORACIC NERVE)

It perforates the aponeurotic origin of transversus muscle at the lateral margin of thoracolumbar fascia to enter the neurovascular plane of anterior abdominal wall.

Inside rectus sheath it supplies rectus abdominis and pyramidalis muscle. Its lateral cutaneous branch supplies skin over lateral part of gluteal region. Its anterior cutaneous branch supplies infraumbilical skin.

ILIOHYPOGASTRIC NERVE (L1) :

It comes out from lateral margin of psoas major muscle and runs laterally in lumbar region, lying in front of anterior layer of lumbar fascia and behind the kidney. Then it enters the neurovascular plane of anterior abdominal wall by piercing the aponeurotic origin of transversus abdominis muscle.

After giving its lateral cutaneous branch, a little behind the iliac tubercle, it pierces the internal oblique muscle to course downwards and medially between the external oblique aponeurosis and internal oblique.

Just above the superficial inguinal ring it pierces the aponeurosis of external oblique and terminates as anterior cutaneous branch , which supplies skin above pubis. Its lateral cutaneous branch supplies skin of gluteal region. Motor branches supply the internal oblique and transverse abdominis muscle.

ILIO-INGUINAL NERVE

Nerve is smaller and lies at a little below the level compared to iliohypogastric nerve. It pierces the transversus abdominis near the anterior end of the iliac crest and run downwards and medially to pierce the arched fibers of the internal oblique and enter the inguinal canal.

It accompanies the spermatic cord and comes out through the superficial ring. It gives motor branches to the internal oblique and transversus muscles. It has no lateral cutaneous branch. It supplies the skin of upper part of the medial surface of thigh and the skin covering the root of penis and the upper part of scrotum in male or the mons pubis and adjacent labial majora in females.

ARTERIES OF ANTERIOR ABDOMINAL WALL

SUPERIOR EPIGASTRIC ARTERY:

It enters the rectus sheath by passing through the gap between the sternal and costal origins of the diaphragm. The artery lies deep to rectus abdominis muscle resting on the posterior wall of rectus sheath and ends by anastomosing with inferior epigastric artery at level of umbilicus.

MUSCULOPHRENIC ARTERY

It pierces the diaphragm between the costal slips of origin to enter the anterior abdominal wall.

The 10th and 11th posterior intercostal arteries and the subcostal artery enter along with the corresponding nerves into the neurovascular plane of abdominal wall. The subcostal artery accompanies the subcostal nerve.

INFERIOR EPIGASTRIC ARTERY

It is a branch of external iliac artery . Its surface marking corresponds to a line joining mid inguinal point to a point about 1 fingerbreadth from the midline at the level of anterior superior iliac spine. It lies medial to the deep inguinal ring and ascends in the extra peritoneal tissue towards the

rectus sheath, it pierces the transversalis fascia to enter inside the sheath by crossing the arcuate line.

It gives muscular and cutaneous branches. It gives 2 named branches outside the rectus sheath, the cremasteric and pubic. The cremasteric branch enters the spermatic cord and the pubic branch passes medially in close relation to the lacunar ligament to anastomose with pubic branch of obturator artery. When the pubic branch of inferior epigastric artery is large, it is called abnormal obturator artery. This artery is often called artery of death since it may be injured while cutting lacunar ligament.

DEEP CIRCUMFLEX ILIAC ARTERY

It is a branch of the external iliac artery. It courses laterally along the inguinal ligament towards the anterior superior iliac spine. It gives a large ascending branch which travels in the neurovascular plane and terminates by anastomosing with iliolumbar and superior gluteal arteries.

ANATOMY OF ABDOMINAL INCISIONS AND CLOSURES

The choice of incision and closing such wounds are the most important factors. The suitable incisions are must to guide direct access to the anatomy to be investigated and must also provide sufficient room for the required procedure to be performed. Any mistake which results in serious complications.

Therefore to prevent such complications, certain principles should be followed.

The principles governing abdominal incisions are:

1. Incision must give ready and direct access to the part to be dealt with.
2. The incision should be extensible in a direction that will allow for any probable enlargement of the scope of the operation.
3. Security: The closure of the wound must be reliable and ideally should leave the abdominal wall as strong after the operation as before.
4. As far as possible, muscles must be retracted or split in the direction of their fibres rather than cut across.

5. The incision must traverse the muscle rather than fascia, as the scar left in the peritoneum is best protected.
6. Incisions placed across the blood and nerve supply are prone for postoperative complication of dehiscence.
7. Oblique and transverse incisions are stronger and less liable for disruption and herniation.
8. The opening made through the different layers of the abdominal wall must as far as possible, not be superimposed.
9. Reentry into the abdomen should be performed through the previous incision, since hernia can be repaired at the same time.
10. In children, skin incision should confine to Langer's lines, otherwise the scar becomes hypertrophic and unsightly with age.

The principles governing abdominal closure are:

1. The sutures should not be tightened too tightly to avoid interruption of the circulation resulting, in areas of focal necrosis.
2. The drainage tube should be inserted through a separate small incision otherwise it infects the main wound and weakens the scar.
3. When wound tension is anticipated, deep tension sutures can be used and if they have been employed, they are left in situ for 14 days.
4. Non-absorbable suture materials – should be used to suture the fascial layers.

DIFFERENT INCISIONS :

- Dividing no muscles- median, paramedian, pararectal, Pfannensteil's.
 - Splitting muscles- paramedian muscle splitting, McBurney, Lanz, hernia incision.
- Dividing muscles- Subcostal (Kocher), Rutherford Morrison, transverse incision,
 - oblique lumbar (Morrison).

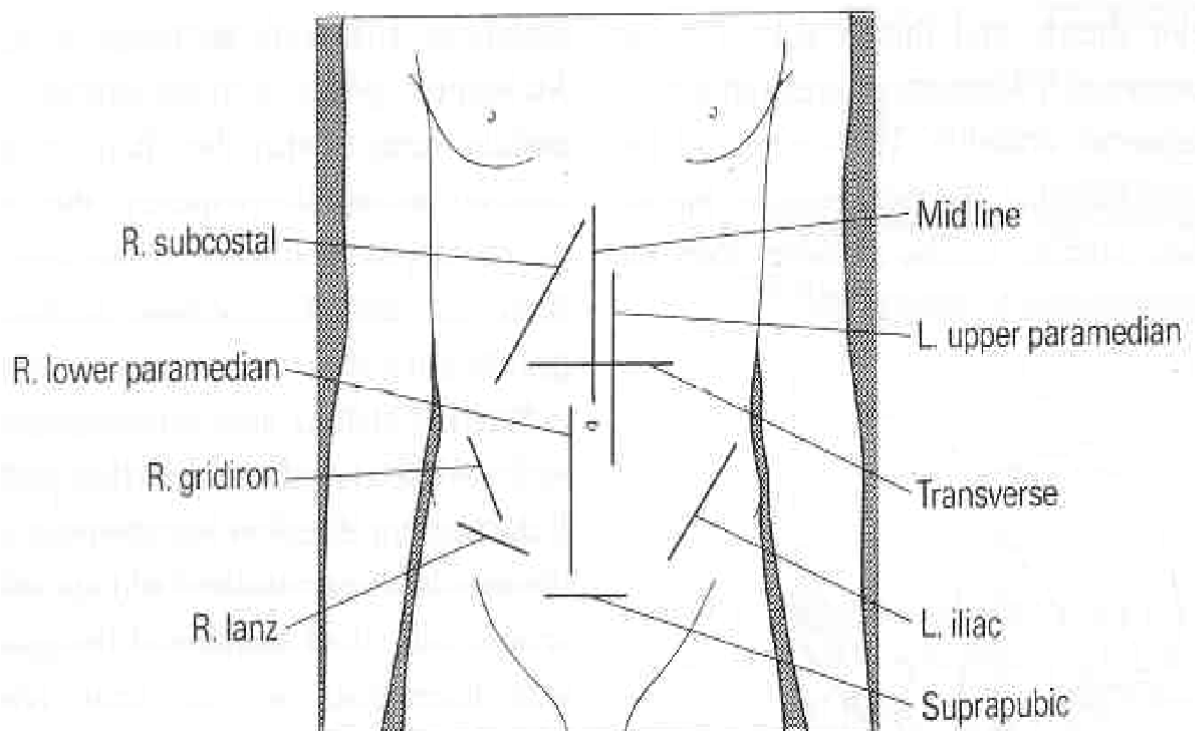


Figure 8:

COMMONLY USED INCISIONS:

1. Midline incisions:

It is vertical, either above or below umbilicus. Commonly used for exposure in a wide range of intraabdominal surgeries. Muscle fibres are not divided. Nerves are not injured. It is very quick to open and close. It can also be extended and has the advantage of being able to be reused again and again. Particularly very useful in presence of peritoneal contamination since, tissue exposure is minimized.

2. McBurney's grid iron incision:

It is routinely done for open appendicectomy. It is an example of utilizing the muscle tension to achieve a secure wound closure. Muscles can be divided, if further access is required in an upward or downward direction. Ilio-inguinal nerve may be injured, which causes incisional hernia.

3. Kocher's subcostal incision:

Right side incision is used for gall bladder, biliary tract surgeries and on left side, used for splenectomy. The incision starting exactly at the middle about 2.5 – 5 cm below the xiphisternum, runs outwards and

downwards one inch below and parallel to costal margin. All muscles are divided in the same line. Only disadvantage is, it takes longer time to open and close the abdomen.

4. Paramedian incision:

This can be made on either side of midline and both supra and infra umbilical region of the abdomen, parallel and one inch from midline. Vertical incision is placed over the midrectus sheath and rectus muscle is retracted laterally. Later posterior rectus sheath is incised vertically. Advantage is, it gives a strong scar. More time is required for its performance and the difficulty in performing this incision, when a previous laparotomy scar has to be reopened are the major disadvantages .

THE MOST DESTRUCTIVE INCISIONS ARE:

1) Pararectus incision:

It divides the intercostal nerves and blood vessels, as they pass medially. Incision is just lateral to the rectus muscle.

2) Long oblique incision:

This is used for kidney exposure, starts from the renal angle and passes just

below and parallel to the 12th rib anteriorly, upto the lateral border of rectus muscle. This type of incision, cuts posteriorly lattismus dorsi, serratus posterior inferior and anteriorly, flat muscles of anterior abdominal wall. Peritoneum is stripped forward and the lumbodorsal fascia incised posteriorly to expose the kidney with its fascial sheath. It may divide lateral cutaneous branch of 12th thoracic nerve and also ilioinguinal and iliohypogastric nerves. While closing it, muscles are repaired by two tiers of sutures.

3) Multiple incisions:

Multiple incisions in a same patient produce areas of weakness in between them. A number of hernias have been developed at the angle formed by a vertical midline incision followed by a subcostal incision.

PREDISPOSING FACTORS

Many factors may cause failure of wound to heal adequately and lead to the development of incisional hernia. The important predisposing factors are: -

1. Poor surgical technique
2. Sepsis.

1. POOR SURGICAL TECHNIQUE:

NONANATOMIC INCISIONS:

The vertical pararectus incision, along the outside of the lateral border of rectus sheath, which destroys the vascularity and nerve supply of the tissue medial to the incision causing them to atrophy. It is commonly believed that these hernias are more common in vertical incisions compared with transverse or oblique incisions.

LAYERED CLOSURE:

Layered closure technique have a greater incidence of incisional hernia as compared to those wounds that were closed with single layer mass closure technique¹⁶.

INAPPROPRIATE SUTURE MATERIAL:

With absorbable suture materials that lose 80% of their strength within 14 days of suturing, incisional hernia has been more common in that scenario. The sutures are entirely responsible for the integrity of the wound for the first 6 months. Hence ideal suture material for abdominal closure is monofilament stainless steel wire used in the form of integrated mass closure. Polypropylene and polyamide sutures can also be used.

SUTURING TECHNIQUE:

If a single stitch in an interrupted closure is very tight, ischemia will develop in the tissue enclosed. In this technique more knots, more foreign materials will be deposited resulting in wound infection. The rate of incisional hernia is high, if the SL: WL is less than 4. Excessive tension placed on the sutures reduces local blood flow and which is associated with increased wound infection rate.

2. SEPSIS:

Sepsis is the second major cause of the early wound failure in 50% of postoperative hernias, which develops within first year of operation. It may range from acute cellulitis with, fascitis and necrosis of tissues on both sides of incision to low-grade chronic sepsis around the suture materials.

The infection causes inflammation and edema of surrounding tissues, which becomes soft and weakened so that the sutures tear the tissues.

3. DRAINAGE TUBES:

Drainage tubes brought out through the surgical wound are a potent cause of postoperative hernias. Since the tissue planes along the tract are not sutured, an open and weak passage is present throughout the layers of the surgical wound, through which a hernia may develop.

4. OBESITY:

Excessive fat in the omentum and subcutaneous tissue, causes increased strain on the wound in the early postoperative period. Poor muscle tone and lack of muscle mass are other causative factors in the development of incisional hernia. Obese patient undergoing surgical procedure, are at risk of postoperative pulmonary complications, wound infection and deep vein thrombosis.

5. GENERAL CONDITION:

- a. AGE: Wound healing is impaired in older patients.
- b. GENERALIZED WASTING AND MALNUTRITION – patients who have lost a significant amount of weight and patients with low serum

albumin reflects a state of malnutrition, are at increased risk for poor wound healing.

c. **STEROIDS:** Impaired wound healing is observed in patients receiving long term steroid therapy. This is mainly due to defective immune responses with consequent impaired deposition and polymerization of collagen in the wound. Other factors include avitaminosis (especially vitamin-C), malignancy, anemia, jaundice, ascites and alcoholism.

6. POST OPERATIVE CONDITION:

Postoperative abdominal distension due to prolonged postoperative paralytic ileus, urinary retention and chest complications such as pulmonary collapse, bronchopneumonia and asthma. Postoperative retching and vomiting also increases the strain on the wound and predisposes to incisional hernias.

7. TYPE OF OPERATION:

Certain types of operations predisposes to incisional hernia. It includes laparotomy for generalized or localized peritonitis, patients with perforated peptic ulcer, acute appendicitis, diverticulitis, acute pancreatitis, intraabdominal malignancies, chronic inflammatory bowel

disease and reoperation through original incision within the first 6 months of initial procedure.

8. POST OPERATIVE WOUND DEHISCENCE (BURST ABDOMEN):

Rupture of all the layers of abdominal wall with extrusion of the abdominal contents is termed as burst abdomen. It occurs in approximately 1% of all laparotomy wounds and associated with 20% mortality. Wound dehiscence occurs due to slippage of knots or placing insufficient number of sutures. Development of hernia is a common complication of abdominal and flank wounds. Its incidence after primary healing is approximately 1%, increases to 10% for infected wounds and 30% after dehiscence and re closure.

CLINICAL MANIFESTATIONS

The patient complains of an unsightly bulge in the previous surgical scar associated with pain and discomfort. They also have a dragging sensation, which gets aggravated by coughing and straining. Majority of patients with incisional hernia do not experience any symptoms. In large dependent hernias, areas of skin may undergo ischaemic necrosis due to constant pressure, and may ulcerate and rarely the hernia may rupture. If the hernia strangulates, the symptoms of acute intestinal obstruction and bowel ischaemia will supervene. Patient often gives a history of repeated attacks of incomplete bowel obstruction manifesting as colicky pain, constipation vomiting.

INCIDENCE

The incidence of incisional hernia differs. In 1887 John Himans of Boston reported as, an incidence of 10% of incisional hernia among 184 laparotomies. In 1993 Cave¹⁷ (1967) found that, an incidence of 6% of incisional hernia post laparotomy wounds. Rodney Maingot concludes that incisional hernia occur in 1-14% of patients undergoing transperitoneal abdominal surgeries. Akman (1962) states that 67.8% of hernias were

apparent by one year and 97.7% within 5 years of surgery. 1.4% occurred after 5 years.

Goligher¹⁸ and colleagues in 1975 reported that they did not encounter even a single incisional hernia among 108 laparotomies, which was closed by all coats interrupted wire suture. Donaldson¹⁹ and colleagues (1982) at St. Janne's hospital Leeds, found only a single incisional hernia among 231 laparotomies, using the lateral paramedian incision. Bucknall¹ and his colleagues (1982) meticulously studied and followed 1129 laparotomy wounds in adults for about 12 months after the surgery. They identified 84 cases of incisional hernia (7.4%). Pollock²⁰ in 1981 monitored 961 patients and detected 96 cases of incisional hernia (10%), 6 months after laparotomy.

INVESTIGATIONS

Incisional hernia is often a clinical diagnosis. Ultrasonography is single most useful diagnostic test and will often reveal an impalpable defect, particularly in obese patient, size of the defect and its contents. It also detects other associated intraabdominal pathologies, which can be dealt during surgery

Other investigations have to be done as routinely, to assess the fitness for surgery, like Hemoglobin, RBS, FBS & RBS for diabetes, blood urea and serum creatinine for assessing renal function, liver function tests and urine examination. ECG to assess cardiac status and chest X-ray to detect lung diseases.

PREVENTION

Gained with the knowledge of various causative factors, many authors proposed various preventive methods, which may help in preventing the development of incisional hernia.

A. INCISION:

Lateral paramedian incision should be used wherever it is possible. Donaldson¹⁹ and colleagues in 1982 states 0.37% incisional hernia and

Guillow et al (1980) found that 0% incidence, while using lateral paramedian incision.

B. USE OF CORRECT SUTURE MATERIAL:

For closure of fascia and aponeurosis, use non absorbable suture material like Nylon or Prolene. Twin strands of suture material are better than a thick single strand.

C. CLOSURE OF LAPAROTOMY WOUND:

Mass closure is always better than layered closure of abdominal incision¹⁶.

Peritoneal layer need not to be sutured²¹. Use of prolene or nylon for skin closure as stitch abscess is less common when compared with silk.

D. METICULOUS OPERATING TECHNIQUE:

Thorough preparation of skin, prior to incision and the draping towels should be carefully clipped to the wound edges. It is necessary to handle the tissues gently. Take minimum tissue in haemostat. Rather than tying the small bleeders it should be cauterized. Complete haemostasis should be achieved, as haematoma commonly leads to wound sepsis. No dead space

should be left in the wound, as it causes collection of seroma and leads into wound infection.

E. PROPHYLACTIC ANTIBIOTICS:

Useful to prevent wound infection, which may lead to wound dehiscence. Polk et al²² recommended the use of prophylactic antibiotics, both in clean and contaminated wounds. These antibiotics attain therapeutic concentration along the incision site and prevent wound infection. Rios et al²³ stated that prophylactic antibiotics is useful in abdominal incisional hernia repair surgery, especially during implantation of prosthetic material.

F. USE OF MESH/ DARN:

When there is chances of tension while approximating the rectus sheath, PTFE²¹ or Marlex mesh¹¹ can be used. Darn repair²⁴ should be done using monofilament nonabsorbable sutures²⁵ is an alternative method.

G. WOUND INFECTION:

Clean the wound margins with saline, povidone iodine or tetracycline when there is risk of wound sepsis. Skin and subcutaneous tissue can be

left open if sepsis is suspected. Kanamycin / Bacitracin are used to irrigate the wound margins and mesh soaked in antibiotic solution helps to reduce wound infection rate.

H. DRAINAGE TUBE:

If wound infection is suspected, the fine suction tube to drain the skin wound are used, that should be brought out through the stab wound, away from incision site.

I. OBESITY:

Weight reduction is advisable in all elective cases, as it will prevent the recurrence of incisional hernia and postoperative complications.

J. GENERAL BUILD OF PATIENT:

In debilitated patients wound dehiscence is common. Correction of anemia, respiratory tract infection and Chest physiotherapy in COPD prior to surgery are the crucial factors reduce postoperative morbidity.

K. ANAESTHESIA:

There is a chance of wound disruption, which occurs with equal frequency after local, spinal, inhalation anaesthesia. Hence an efficiently administered general anaesthesia with adequate muscle relaxation and smooth extubation, avoiding struggling is advantageous in hernia repair. Avoid postoperative vomiting and retching.

PREOPERATIVE OPTIMIZATION:

It includes weight reduction, nutritional support, control of significant comorbidities like pulmonary, cardiac, hepatic and immunologic diseases, control of diabetes and cessation of smoking.

1. Repair should be delayed for atleast 1 year after the surgery which causes the hernia, as this time is taken for the maturation of collagen.
2. Weight reduction programs with goal of BMI less than 30-40 kg/m².
3. Wait for all the infection and sinuses to heal.
4. Cessation of smoking: Stop atleast 2wks prior to operation. Start respiratory exercises a week before surgery.
5. Management of comorbid diseases: COPD, HTN, DM, CVS, Renal and other general illnesses should be diagnosed, assessed and treated adequately.
6. Optimal skin hygiene: Twice daily antiseptic showers to decrease skin flora. Treatment of ulcer and fungal infection in obese or diabetic patient, if present.
7. Treatment of nutritional and vitamin deficiency: Treat hypoalbuminemia with enteric hyperalimentation. Vitamin A, B & C can be provided as oral

or parenteral preparation and should be given for 3 to 4 weeks before surgery.

8. Low dose DVT prophylaxis: Due to high risk of deep vein thrombosis, a dose of 5,000 units heparin started 8th hourly, subcutaneously the night before operation and continue until the patient can walk and fit for discharge from the hospital.

9. Progressive pneumoperitoneum: Used to stretch the abdominal wall muscles prior to surgery. It increases the capacity of retracted abdominal cavity, allows the reduction of the hernia contents and improves diaphragmatic function.

PROCEDURE: 22g needle, 50 ml syringe and 3-way stopcock. Introduce the needle into the peritoneal cavity away from the hernia about 600 ml of air is injected initially. This is increased by 200 ml on alternate days until the total volume of 2000- 2500 ml /day is reached by end of 2nd week.

Complications: Urinary retention, respiratory distress and subcutaneous emphysema.

10. Perioperative antibiotic prophylaxis should be used.

TREATMENT

General Considerations:

The ideal treatment option for incisional hernia is surgery only. The choice of treatment depends on the size of hernia, presence of symptoms, presence or absence of complications and general status of the patient. The major considerations in the incisional hernia repair include the following,

1. CHOICE OF INCISION:

Whenever possible a transverse closure of abdominal wound should be used. An ellipse of redundant skin is usually removed. These surgeries require a good deal of undermining of the subcutaneous tissues and if some portion of skin is not sacrificed, the circulation is affected and necrosis of the skin edges may occur.

2. ISOLATION OF HEALTHY FASCIA:

The operation essentially consists of a good and proper dissection of the abdominal wall and identification of its layers. The sac is exposed and all the fat and areolar tissue should be removed.

3. CLOSURE OF THE SAC:

After opening the sac, contents of the sac free from the adhesions, reduce the abdominal contents, excess omentum should be removed. Achieve perfect haemostasis.

4. ANATOMICAL vs MESH REPAIR:

Patient with poor abdominal muscle tone and in cases of recurrent hernia, the anatomy may be so distorted and the tissue defect may be so large enough, that it is impossible to find fascial layers and with muscle under it. In such cases the defect has to be repaired by using a graft or mesh.

5. DRAINS:

Suction tube drain with multiple perforations, kept in place for 5-6 days. It is always necessary to insert drain in all cases, except in small incisional hernias.

7. ANTIBIOTICS:

Given as a prophylaxis preoperatively, prior to surgery until the 6th postoperative day²⁶. According to Robert. J. Baker²¹, antibiotics are not

required, when an effectively closed suction drainage is used, unless the patient is diabetic or if pus is encountered during the surgery.

INDICATIONS FOR SURGERY:

- a) Symptoms: Pain and discomfort
- b) Cosmetic purpose
- c) Giant hernias with small opening having risk of strangulation.
- d) History of repeated attacks of subacute obstruction, incarceration and irreducibility.

CONTRAINDICATIONS:

- a) Morbid obesity,
- b) Continuing deep sepsis,
- c) Skin infection and Intertrigo.

SURGICAL OPTIONS:

OPEN HERNIA REPAIR

- 1) Suture repair**
- 2) Mesh repair**

LAPAROSCOPIC REPAIR

- 1) Primary fascial closure**
- 2) Mesh fixation**
- 3) Robotic repair**

ABDOMINAL WALL RECONSTRUCTION TECHNIQUES

- 1) Bridged repair**
- 2) Anterior component separation (ACS)**
- 3) Perforator sparing ACS**
- 4) Endoscopic ACS**
- 5) Posterior component separation**

PREOPERATIVE TISSUE EXPANSION

1)Tissue expanders

2)Progressive pneumoperitoneum

ANATOMICAL REPAIR

REPAIR OF ABDOMINAL WALL:

1. Anatomical layer-by-layer reconstruction.
2. Catell's procedure.

OVER LAP METHODS:

- 1.Mayo's repair
- 2.Layered reconstruction of the defect.
- 3.Vertical overlap of the anterior sheaths of rectus muscle (Rutherford Morrison's repair).
- 4.Judd's double breasting method.
- 5.Muscle flap.

DARN REPAIR:

1. Maingot's keel operation
2. Shoelace darn repair.
3. Burton's fingered fascia lata graft repair.

NUTTAL'S OPERATION

GRAFT/MESH REPAIR

1. Autologous graft
2. Heterologous graft
3. Synthetic mesh.

TYPES OF MESH REPAIR

Underlay

Inlay

Overlay

Combined underlay and overlay graft.

Marlex peritoneal sandwich technique.

Rives- stoppa's repair.

1) ANATOMICAL RECONSTRUCTION:

Recommended for small and moderate size incisional hernias. The ideal method is to excise all scar tissue, separation of sac, opening of sac, remove the adhesions between sac and contents and between contents. The peritoneum is closed using “0” chromic catgut, continuous sutures. Then the muscle layers are approximated with interrupted sutures of chromic catgut and the fascia is closed using non- absorbable suture material interruptedly. Subcutaneous tissues are approximated with catgut. Skin edges are approximated with silk or ethilon.

2) CATTELL’S PROCEDURE:

Recommended for giant incisional hernias, which can be repaired without grafts or prosthesis. Catell described this method in 1926, as open the sac, release the adhesions, peritoneum and abdominal wall are approximated at the neck of the sac from inside with interlocking sutures of chromic catgut and excise the excess sac. Cut edges of the base of the sac are approximated with non-absorbable sutures.

An elliptical incision is made 2cm lateral to previous suture line, include the scar. The medial borders of the incision are approximated in the midline by interrupted sutures. The lateral edges of the fascia, which

are far from the overlying muscles, are approximated with interrupted sutures at the upper and lower ends of the wound.

Alternating stitches approximates the muscles and the remaining fascial layer. If there is tension in the final fascial layer, relaxation incisions are made well laterally. Subcutaneous tissue is approximated with plain catgut and the skin is closed with subcuticular continuous non-absorbable suture.

OVERLAP METHODS

1. MAYO'S REPAIR:

After opening the sac near its neck and dissecting off any adherent bowel, the sac is excised off. Lateral incisions are made from the defect ring in the healthy aponeurosis and a series of mattress sutures placed. This is suitable only for the incisional hernias with vertical small defect.

2. VERTICAL OVERLAP TECHNIQUE:

Method of choice for vertical paramedian incisional hernias. It includes mobilization of the sac and its opening, releasing the adhesions and excision of the sac. Medial margin of the defect is opened to separate the anterior and posterior rectus sheath throughout the whole length of the

defect. The posterior rectus sheath and peritoneum are approximated with catgut as a single layer. Anterior rectus sheath is then separated from the rectus muscle and vertically overlapped in double breast fashion one over another and sutured in two rows with interrupted non absorbable sutures- the first as mattress and the second as simple suture.

3. JUDD'S DOUBLE BREASTING METHOD:

In this method, the flaps consisting of peritoneum, muscles, fascia and scar tissue are overlapped over a similar flap on the opposite side.

4. USE OF MUSCLE FLAP:

Described by Tansini in 1896, which is composed of latissimus dorsi muscle, rectus femoris muscle, tensor fascia lata, lumbodorsal fascia and pregluteal fascia below the iliac crest which received its nourishment by thoracodorsal artery and nerve.

In this method, flaps are raised and passed through a subcutaneous tunnel to the anterior abdominal wall, where the pregluteal and lumbodorsal fascia are sutured to the margins of the defect. Loose abdominal skin can then cover the flap and skin of the back incision is closed. Drains are placed, one at donor site and another at repair site.

Disadvantages: Needs large area of dissection, more complex and results in donor site defects and functional limitations.

DARN REPAIR

1. KEEL'S OPERATION (MAINGOT'S):

Here the peritoneum is not opened and any inadvertent opening is closed with absorbable sutures. Sac is then inverted and fibro-aponeurotic ring is defined which is closed with a series of mattress sutures of non-absorbable suture materials. After tying of these sutures, their knots are hidden from the view.

Continuous Cushing's stitch is then passed through the healthy aponeurotic layer uniting opposing muscles which inverts the previous stitches. Drains are kept longitudinally and brought out through a separate stab incision, away from the main wound. Since it does not involve opening of peritoneal sac, postoperative ileus is not an issue here.

2. MODIFIED KEEL REPAIR:

Here the sac is opened, adhesions were released. Then the sac is closed and keel repair carried out.

3. SHOELACE DARN REPAIR:

Abrahmson described this technique. After dissection of the sac, the sac is inverted and over it a new linea alba is created after incising whole length of rectus sheath longitudinally, 1.5 cm away from medial margin and suturing the medially reflected margins together continuously in the midline with monofilament nylon. The resultant thinly separated recti and anterior rectus sheath are then closed with doubled '0' monofilament nylon 3 metres long. The suture begins at one end from inside out and through the same leaf outside in, takes a bite on new midline to the other side.

At this stage the advancing end of suture is slipped through the loop at the end of the suture and the shoelace darn continued till it reaches the lower limit where the nylon is tied with a loop in the loop (Aberdeen) knot under the rectus sheath. With this the cut edges of the rectus have been brought parallel and rectus muscle is no longer splayed.

Drain is placed and subcutaneous fat and skin closed.

Advantages: It is extraperitoneal and involves only two suture lines placed in a normal healthy tissues.

4. BURTON'S FINGERED FASCIA LATA GRAFT REPAIR:

This method is ideal for repair of giant incisional hernias. Technique is, the margins of the ring are held with a number of artery forceps on either side. Fascia lata graft larger than the size of the gap is taken and is placed over the ring. Several parallel lateral incisions are made on either side of the excess of part of the graft, so as to create a number of lateral strips of about 2cms wide. The fascia lata graft thus prepared is laid subperitoneally. Few slits are made through the slits of the fascial margins and then tightened. The strips are folded back, twisted in pairs with the opposite side strips and fashioned with additional thick silk sutures to prevent slipping of twisted loops.

NUTTAL'S OPERATION:

This is recommended for midline subumbilical incisional hernias with a large defect, seen immediately above the pubic symphysis.

TECHNIQUE:

Two crescentric incisions meeting just below the umbilicus and above the symphysis are used and the skin and fat are reflected on either side for a distance adequate to expose the lower halves of the rectus muscles and their sheaths. The sac is opened and excess sac is cut away,

adherent omentum or bowel is detached and edges of the mobilized peritoneum are sutured. Rectus sheath is incised longitudinally on each side, after which the sheaths are mobilized and retracted laterally in order to expose the outer border of the muscle and to afford a good view of the short tendinous origin of the rectus muscles from the pubic symphysis.

Each rectus muscle is then detached, from its origin as close to the bone as possible and without interfering with its nerve supply. The tendon of the left rectus muscle is then drawn downward to the opposite side of the pubis and sutured to the ligament and fibrous tissues here. The opposite muscle is then sutured to ligaments and fibrous tissues of contralateral side, a series of loosely applied interrupted sutures are next inserted along the edges to maintain the good opposition of the overlapping muscles. The margin of the aponeurotic sheath on either side is then brought together in the midline by a continuous suture or by a series of interrupted nylon sutures, thereby obliterating the triangular gaps on either side at the outer border of the rectus muscle

BIOMATERIALS

Modern evolution of prosthetic materials has slowly replaced most of the older types of repair. Biomaterial is defined as any synthetic or non pedicled natural substance that can be used for tissue replacement.

These materials can be classified as

AUTOGRAFTS:

- a) Autologous cutis graft
- b) Whole skin graft
- c) Fascia lata graft
- d) Tendon (plantaris) grafts.

a) **AUTOLOGOUS CUTIS GRAFTS:** They assume the histological character and gross functions of aponeurosis or tendon what we replace. Loeve first used this graft in 1913. Rehn in 1914 and Canadéy²⁷ in 1942 used cutis grafts in repair of giant incisional hernias. Complications: Due to retained epidermal elements like Sinus tracts, sepsis, cyst and squamous cell carcinoma have lead to using this method obsolete.

b) FASCIA LATA GRAFT:

In 1901 McArthur⁵ used pedicled strips of external oblique aponeurosis for herniorrhaphy. Gallie and Leo Measurier²⁸ used free fascia lata strips using a loose weave of fascial strips. These free fascial strips were infiltrated by fibroblast and a new structure is created. Recurrence rates is 10-15%.

HOMOGRAFTS:

Aortic and dural homograft: Lyophilized aortic homograft obtained from artery bank has been used. Preserved dural graft obtained from the unembalmed bodies. It is much stronger than fascia lata graft due to its multidirectional fibres. Complications: Infection, seroma and fatal viral encephalitis.

HETEROGRAFT:

Porcine dermal heterograft: Porcine corneum used with proteolytic enzyme and glutaraldehyde was used.

Complications: Postoperative infection and seroma.

Bovine fascia heterograft: Used to close large defects in abdominal wall or chest. It is strong and durable but has high infection rate.

METALLIC MATERIALS

- a) Stainless Steel
- b) Tantalum
- c) Silver

DISADVANTAGES: Pain, fragmentation, extrusion, early loss of tensile strength, infection and seroma formation.

SYNTHETIC PLASTIC MATERIALS

1) Absorbable Synthetic Material:

Polydioxanone, polyglycolic acid polymer (Dexon, vicryl), polygalactin are few examples of absorbable synthetic material used for hernia repair. Since these sutures extend support to the wound for 6 weeks only, hence their use in hernia repair is dangerous. Incidence of 4.2 % incisional hernias is reported if linea alba is closed with these type of sutures²⁹

2) Non Absorbable Synthetic Material:

Polyethylene (marlex¹¹), polyamide (nylon), polyester, synthetic acrylic (orlon), polyvinyl sponge (ivolon), PTFE (Poly Tetra Fluoro Ethylene mesh), Dacron mesh(mersilene), Dacron reinforced silicon (sialastic), expanded PTFE (Goretex) are the various types of nonabsorbable synthetic material are also available for hernia repair. Only problem with this type of synthetic material is the risk of seroma formation, sinus formation and susceptibility to infection.

3) Carbon implants and composites: Flexible filamentous carbon attracts fibroblastic ingrowth and leads to functioning dense connective tissue structure with collagen bundles oriented along the lines of stress. Carbon implants gradually fractionates and is slowly removed by phagocytic action of immune system³⁰.

OPERATIVE TECHNIQUE:

Three main positions for placement of mesh are onlay, inlay and sublay positions. In onlay technique, mesh is placed over the anterior fascia and under the subcutaneous tissue. Inlay mesh is sutured to the margin of the aponeurosis. Here mesh acts as a bridge between the two fascial edges. Sublay (extraperitoneal underlay), mesh is placed retromuscularly and preperitoneally.

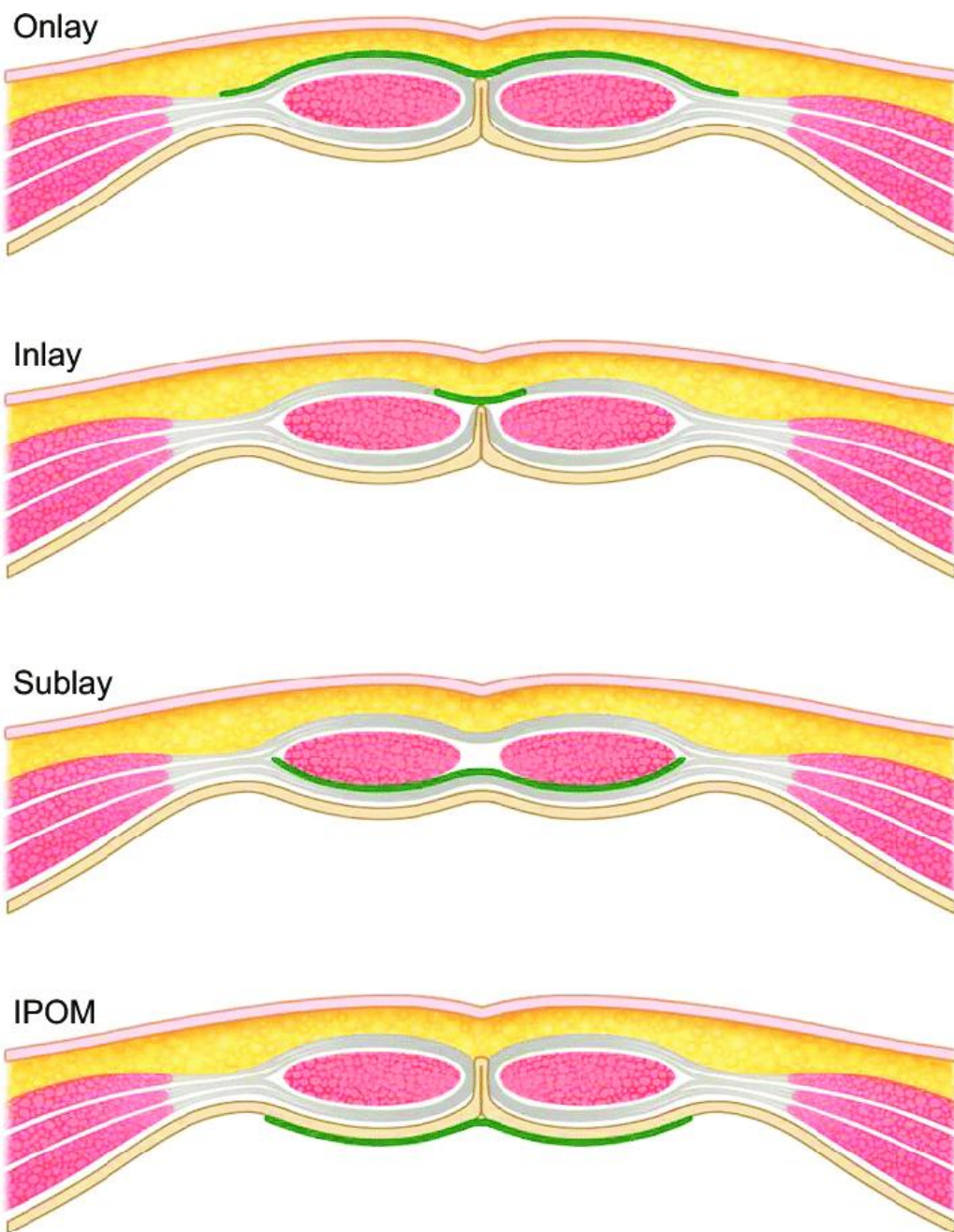


Figure 9:

DESIRABLE QUALITIES OF A PROSTHETIC MATERIAL:

Cumberland in 1952 has listed several criteria for a desirable foreign material to be used in hernia repair.

- a) Tissue reaction – it should be relatively inert biologically and clinically.
- b) Durability – Indestructible in human tissues.
- c) Strength
- d) Flexibility and pliability
- e) It should be smooth so as not to injure the viscera or vessels.
- f) Easy handling
- g) Tolerance – Must be able to withstand the effects of infection.
- h) Non fragmentation
- i) Non wandering
- j) Availability
- k) Porosity – because it permits ingrowth of fibrous tissues and capillaries.
- l) It must be easily sterilized
- m) It must be radio translucent.

GENERAL PRINCIPLES IN PROSTHETIC REPAIR:

- 1) Timing – when infection is present, repair should be deferred.
- 2) Avoidance of undue tension
- 3) Suture materials like synthetic non-absorbable monofilament must be used.
- 4) Adequate haemostasis must be achieved.
- 5) Drainage – a closed suction drain is essential
- 6) Antibiotic prophylaxis – pre and post operatively.

LAPAROSCOPIC HERNIA REPAIR

In 1993, LeBlanc and Booth introduced this new technique of hernia repair. Laparoscopic repair of abdominal incisional hernia with dual mesh plug biomaterial adheres to the principles of hernia repair without extensive dissection.

PROCEDURE: After inserting the ports, the initial step is to visualize the hernia, release all adhesions and reduce its contents. Then the mesh is prepared according to the size of the defect. The four corners of the mesh are marked with easily identifiable signs such as circle, square or triangle. Mark the corresponding corners of hernia. At each of the four corners of

the mesh, a nonabsorbable suture is placed, tied and cut leaving six inch tails, the knots are placed on the surface of the mesh, which will be in contact with the abdominal wall.

The mesh is then inserted to the abdominal cavity through 10 mm port and anchor the four stitches to the abdominal wall. The strings are tied with knot in the subcutaneous tissue. The abdomen is deflated and the fascial defects are closed and then skin closure is performed.

Advantages:

- Tension free repair
- Long incision and extensive dissection is avoided
- Less pain, shorter duration of hospital stay, early return to normal activities.

Complications: Seroma formation, recurrence, haematoma, infection, prolonged ileus and bowel obstruction.

POST OPERATIVE CARE

1. Nasogastric aspiration was done 2 hourly to keep stomach decompressed. Ryle's tube was removed once patient passed flatus.
2. Deep breathing exercises were commenced as soon as patient was able to do them. Patients were encouraged to move limbs while in bed.
3. Operative wound was dressed and supported with elastoplast. All patients were instructed to support their operated wound in case of cough or vomiting.
4. Chest physiotherapy and tincture benzoin inhalations were started from the post op evening.
5. I/V fluids – till patient passed flatus.
6. Early limited ambulation was done as soon as patient was able to bear the pain.
7. Suction drain was kept till the drainage became less than 25 cc in 24 hrs.
8. Broad spectrum antibiotics continued till the removal of suction drain.
9. Laxatives – to avoid straining while passing stools.
10. Skin sutures removed on 8th -10th postoperative day.

11. Following discharge, patient was advised to restrict heavy work for 6 months and in child bearing age, females were advised to avoid pregnancy for 1 yr.

12. Sexual intercourse should be abstained, for a month or more after surgery.

POST OPERATIVE COMPLICATIONS

GASTROINTESTINAL: Paralytic ileus may result due to mobilization and excessive handling of intestines. Ileus contributes to poor healing through increased intraabdominal pressure with resultant impaired circulation to the repair site, thus increasing stress on wound which may result in recurrence of hernia.

PULMONARY: Respiratory tract diseases add increased stress on the suture line by increasing the intraabdominal pressure. Allergic conditions causes coughing or sneezing, which should be properly treated.

URINARY: After operations on lower abdominal incisional hernia, often patients will have retention of urine. Catheterization of the bladder with an indwelling Foley's catheter obviates these complications.

THROMBOPHLEBITIS: When the contents of the massive hernial sac are reduced into the abdominal cavity, the increase in intraabdominal pressure causes venous hypertension in the lower extremities with an increase in the incidence of

DVT: This can be prevented by low dose heparin prophylaxis. Active limb movements in early postoperative period are also helpful.

LOCAL COMPLICATIONS:

SEROMA:

The development of seroma is a common complication. A recurring accumulation of serum in abdominal wall usually calls for repeated needle aspirations and external application of mild pressure, but rarely a tube is inserted for continuous wound drainage.

HAEMATOMA:

Small haematoma need not be disturbed, but the blood outside the vascular system is a type of necrotic or dead tissue. Small subcutaneous drains are desirable if necessary.

WOUND INFECTION:

Minor – These are superficial infections associated with minor skin loss at the margin of the wound. Major – These are suppurations, which occur in the depth of the wounds. Drainage is essential, C&S obtained and antibiotic irrigations must be used.

ABDOMINAL WALL SINUSES:

As a result of infection in wounds containing foreign bodies, persistent draining sinuses are frequent. These sinuses may be due to the infection in sutures or infection in sheets of implanted materials.

RECURRENCE AND MORTALITY:

Recurrence rate for the repair of incisional hernia

Author	Type of repair	No of cases	Recurrence	Percentage	Mortality
Rodney Maingot	Keel	115	5	4.3	0
Abrahamson	Shoelace	300	6	2.0	0
Adloff and Arnaud	Mersilene mesh	130	6	4.5	1.5%
Usher	Two layer marlex mesh	96	10	10.4	0

Table 1:

The mortality rate for incisional surgery with adequate preoperative preparation, using modern anaesthetic agents and performed by an experienced surgeon should approach zero.

MATERIALS AND METHODS

This is a hospital based Cross sectional study, performed in the Department of General Surgery, Tirunelveli Medical College Hospital, during the period of two years from Nov 2017 to July 2019.

Source of data:

Patients admitted in Tirunelveli Medical College Hospital, who have been diagnosed as a case of incisional hernia, will be closely monitored from the day of admission till the day of discharge.

METHOD OF COLLECTION OF DATA:

After admission, data to be collected regarding clinical history, examination, diagnostic investigations, operative procedure and early postoperative complications.

INCLUSION CRITERIA:

All incisional hernia patients irrespective of age and sex.

EXCLUSION CRITERIA:

Incisional hernias associated with other abdominal wall hernias.

Pregnant women with incisional hernia.

DURATION OF STUDY: Two years.

STATISTICAL METHODS IN ANALYSIS OF DATA:

All the datas were tabulated, graphical analysis were made and statistically analyzed by using SPSS software.

ANALYSIS AND RESULTS

DISTRIBUTION OF PATIENTS ACCORDING TO AGE

AGE	Frequency	Percent
<40	12	24.0
41-50	19	38.0
51-60	9	18.0
>51	10	20.0
Total	50	100.0

Table No 2

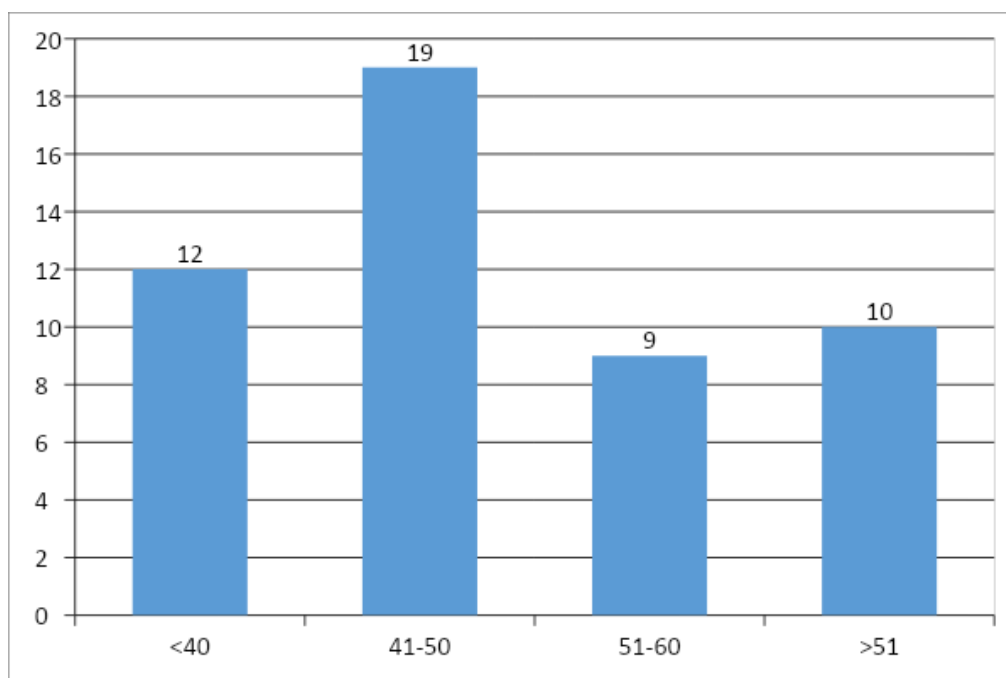


Chart No 1

DISTRIBUTION OF PATIENTS ACCORDING TO SEX

SEX	Frequency	Percent
Male	4	8.0
Female	46	92.0
Total	50	100.0

Table No 3

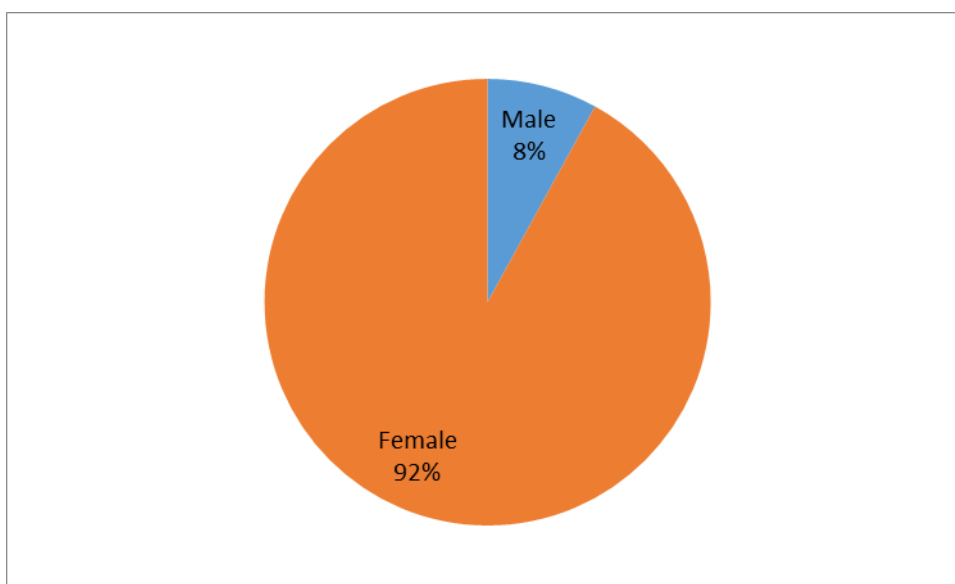


Chart No 2

PREVIOUS INCISION USED Table No 4

INCISION	Frequency	Percent
INFRAUMBILICAL TRANSVERSE	16	32.0
INFRAUMBILICAL SMILEY	5	10.0
LOWER MIDLINE	3	6.0
MCBURNEY S OBLIQUE	4	8.0
PFANNENSTEIL	14	28.0
UPPER MIDLINE	4	8.0
PORT SITE	2	4.0
LOWER PARAMEDIAN	1	2.0
LEFT LOIN	1	2.0
Total	50	100.0

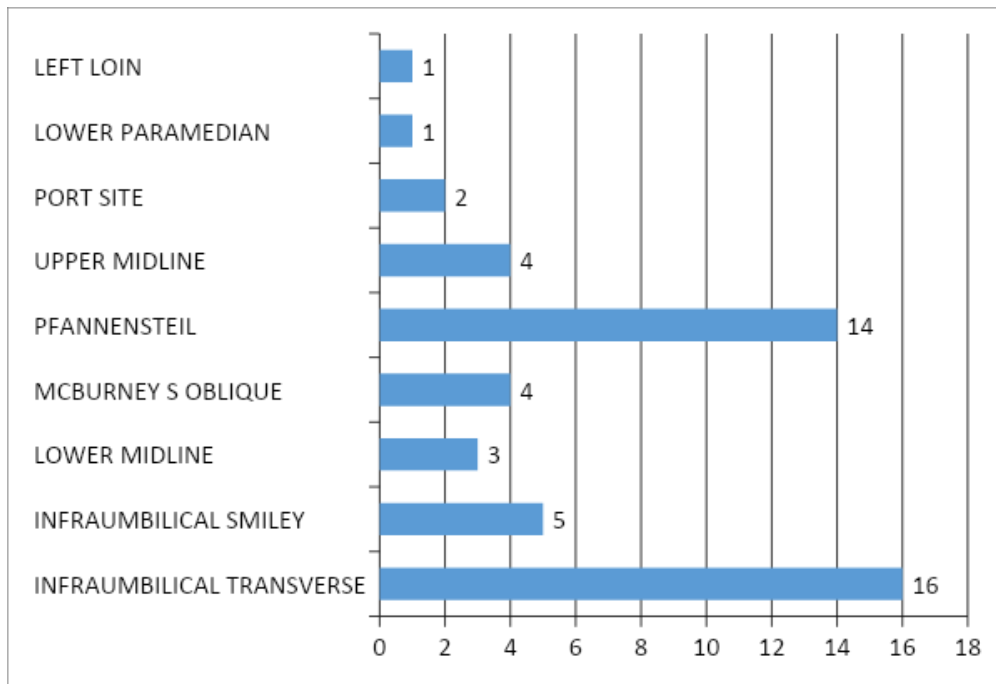


Chart No 3

EMERGENCY / ELECTIVE

	Frequency	Percent
ELECTIVE	27	54.0
EMERGENCY	23	46.0
Total	50	100.0

Table No 5

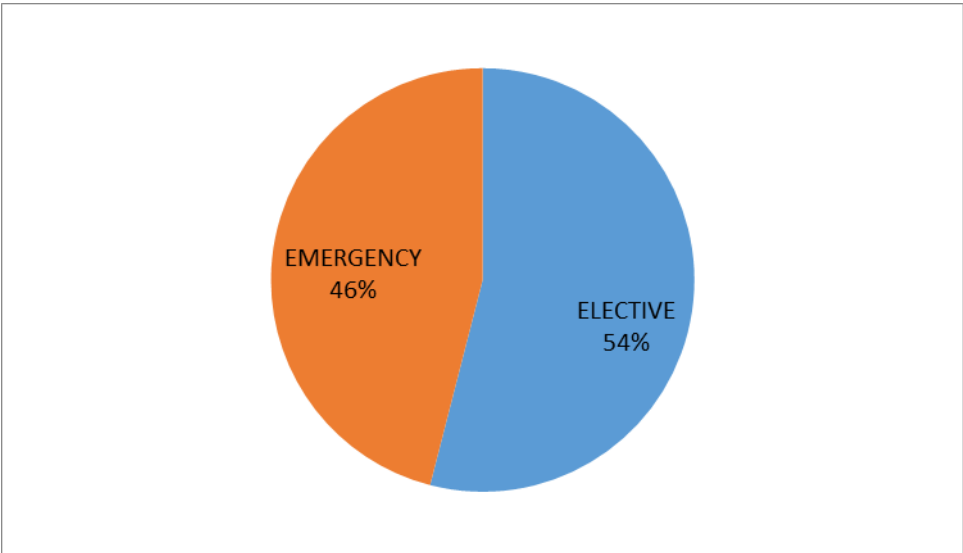
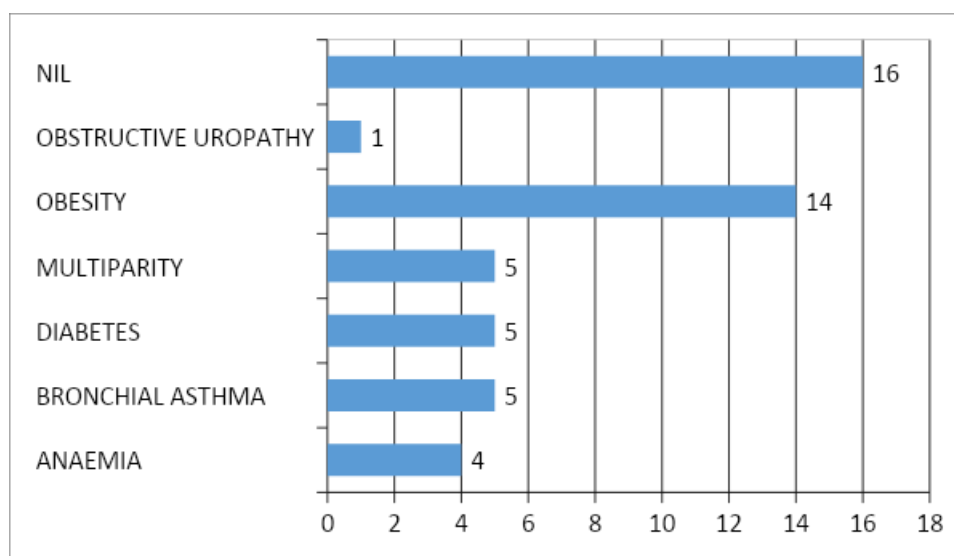


Chart No 4

**DISTRIBUTION OF PREDISPOSING FACTORS AMONG
INCISIONAL HERNIA PATIENTS** Table No 6

	Frequency	Percent
ANAEMIA	4	8.0
BRONCHIAL ASTHMA	5	10.0
DIABETES	5	10.0
MULTIPARITY	5	10.0
OBESITY	14	28.0
OBSTRUCTIVE UROPATHY	1	2.0
NIL	16	32.0
Total	50	100.0

Chart No 5

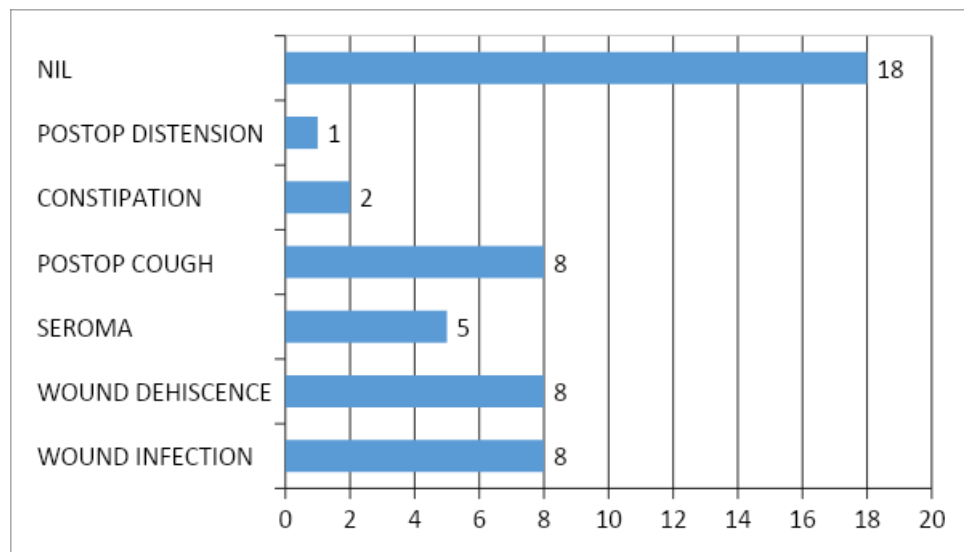


POSTOPERATIVE COMPLICATIONS OF PREVIOUS SURGERY

Table No 7

	Frequency	Percent
WOUND INFECTION	8	16.0
WOUND DEHISCENCE	8	16.0
SEROMA	5	10.0
POSTOP COUGH	8	16.0
CONSTIPATION	2	4.0
POSTOP DISTENSION	1	2.0
NIL	18	36.0
Total	50	100.0

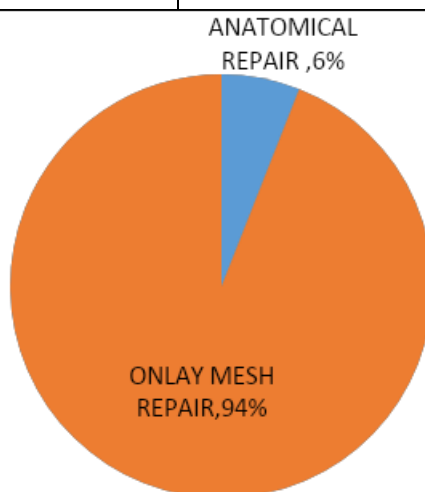
Chart No 6



ANATOMICAL vs MESH REPAIR Table No 8

Chart No 7

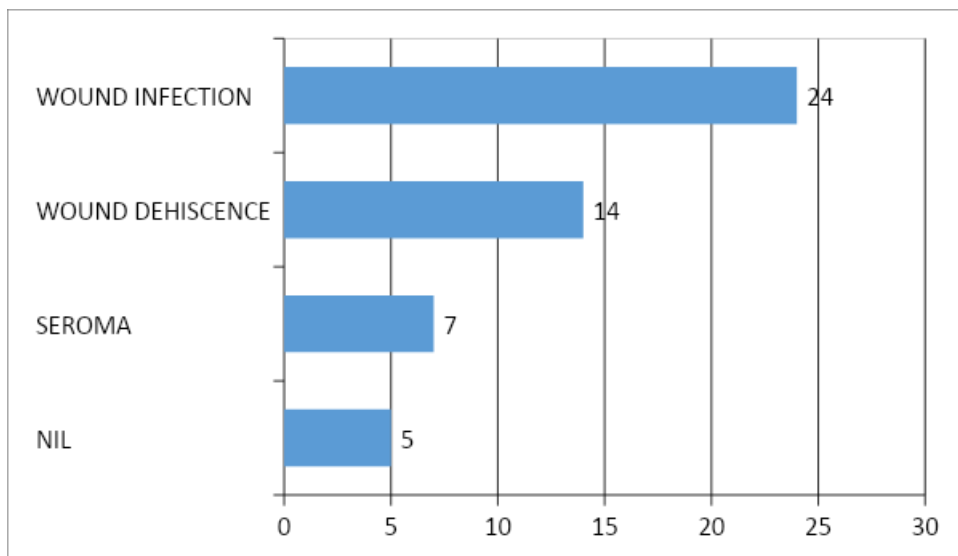
	Frequency	Percent
ANATOMICAL REPAIR	3	6.0
ONLAY MESH REPAIR	47	94.0
Total	50	100.0



POSTOPERATIVE COMPLICATIONS Table No 9

	Frequency	Percent
NIL	5	74.0
SEROMA	7	12.0
WOUND DEHISCENCE	14	2.0
WOUND INFECTION	24	12.0
Total	50	100.0

Chart No 8



DISCUSSION

Fifty cases of incisional hernia studied in our hospital and presented in the following study may not reflect all the aspects of incisional hernia because the study population is small and the follow up has been for a short period of time. While the maximum age of incidence in our study is 41-50 years. Gajraj, ellis²¹ and george in their study noticed 49.4 years as their mean age of incidence. The oldest patient in our study was 72 years and the youngest was 32 years.

In this study among 50 cases presented, 4 were men and 46 cases were women with female to male ratio being 12:1 approximately. According to regnad et al, incisional hernia was found at the sex ratio of 5:1.

In our study 32% of the incisional hernia occurred in infraumbilical transverse incision. This may be due:

1)Intraabdominal hydrostatic pressure is higher in lower abdomen compared to upper abdomen in erect position i.e., 20 cm of water and 8 cm of water respectively.

2)Absence of posterior rectus sheath below arcuate line.

3) This incision is used in gynaecological surgeries who have poor abdominal wall musculature.

This is comparable with A.B.Thakore et al studies (67.1%) and Goel and Dubey studies (44.6%).

Obesity was associated with 3 fold increase in herniation in bucknall¹ et al study. In our study 28 % of the patients were obese. In our study 54 % of the patients developed incisional hernia after elective surgery and 46 % following emergency surgery. This is comparable with the studies done by bucknall¹ et al, where they reported that there is no significant difference in occurrence of incisional hernia following elective or emergency surgeries.

The occurrence of incisional hernia following surgeries underwent for gynaecological problems is seen in 72 % of the patients. Ponka³ noted 36 % incidence in patients following gynaecological procedures and goel and dubey noted 28.76 % incidence.

Wound infections are found in 16 % of the patients as the postoperative complications in our study. Bucknall¹ et al, in their study noted 48.8 % of the cases had wound infections following their previous surgery.

With thorough patient evaluation, preoperative skin preparation, meticulous operative technique, use of nonabsorbable sutures for musculo-aponeurotic tissue, use of suction drain, use of perioperative broad spectrum antibiotics, nasogastric aspiration, early ambulation and chest physiotherapy, complication rates in our study were minimized.

With prosthetic mesh, defects of any size can be repaired without tension. The polypropylene mesh, by inducing inflammatory response sets up scaffolding that in turn induces the synthesis of collagen. Thus the superiority of mesh repair over suture repair can be accounted for.

CONCLUSION

In this study, various risk factors, clinical presentation of incisional hernia were evaluated and treated with anatomical or onlay polypropylene mesh repair during the period of Nov 2017 to July 2019 in the Department of General Surgery, Tirunelveli Medical College Hospital. It was found that incisional hernia is the second most common type of hernia in our hospital. It is more common in females, especially the multiparous. All the patients present with swelling and pain can be an associated symptom. Cough impulse was present in all the cases and the swelling reduced on lying supine.

Over half the patients had undergone the previous surgery within 2 years. Common postop complications in the previous surgery were surgical site infection and respiratory tract infection. Risk factors associated with incisional hernia are Lower abdomen incision, multiparity, obesity, surgical site infection and wound dehiscence in post op period. Patients with anaemia are more prone to develop Incisional hernia. Size of the defect can vary, and in our study ranged from 3cm diameter up to >10 cm diameter. Seroma formation and surgical site infection were the common complications in the post-operative period. No recurrence was seen in the

follow up of the patients. Usage of midline incision should be restricted to surgeries, in which unlimited access to the peritoneal cavity is necessary.

Strict aseptic technique and meticulous closure of the abdominal wound is necessary to prevent incisional hernia. Proper preoperative preparation of High risk patients, plays an important role in preventing incisional hernia. Compared with anatomical repair, mesh repair results in less postoperative complications provided drains are used.

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CASE PROFORMA

1. Case No:

2. Name:

3. Age/Sex:

4. Address:

5. IP No:

6. Unit/Ward:

7. Date of Admission:

8. Date of Surgery:

9. Date of Discharge:

10. Detailed History :

-Presenting complaints- swelling, pain over swelling, vomiting, constipation.

-Duration since surgery

-Associated co-morbidities – Obesity, Diabetes Mellitus, Hypertension, COPD /Bronchial Asthma

-Previous surgical History – Type of surgery, Type of incision, Emergency or Elective.

- Postoperative period – Wound infection, Wound dehiscence, postoperative cough, h/o repeat surgery.

11. General Examination:

12. Local Examination:

Inspection

Palpation

Percussion

Auscultation

13. Clinical diagnosis:

14. Investigations:

CBC

RBS

RFT

15. Radiological investigations:

Chest X-ray

X-ray abdomen erect posture

USG and CT Abdomen and Pelvis – To detect size of defect,
contents

16. Surgical procedure done:

Anatomical repair

Onlay mesh repair

17. Early postoperative Complications:

No complications

Seroma

Local wound infection,

Wound dehiscence

Expired

நோயாளிகளுக்கு அறிவிப்பு மற்றும் ஒப்புதல் படிவம்
(மருத்துவ ஆய்வில் பங்கேற்பதற்கு)

ஆய்வு செய்யப்படும் தலைப்பு:
பங்கு பெறுவரின் பெயர்:
பங்கு பெறுவரின் வயது:

		பங்கு பெறுவர் இதனை குறிக்கவும் ✓
1.	நான் மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்களை படித்து புரிந்து கொண்டேன். என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டுள்ளது என அறிந்து கொண்டேன்.	<input type="checkbox"/>
2.	நான் இவ்வாய்வில் தன்னிச்சையாக தான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும், எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.	<input type="checkbox"/>
3.	இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.	<input type="checkbox"/>
4.	இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக் கொள்ள மறுக்க மாட்டேன்.	<input type="checkbox"/>
5.	இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக் கொள்கிறேன் எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின் படி நடந்து கொள்வதுடன், ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ, அல்லது எதிர்பாராத, வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ உடனே இதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன்.	<input type="checkbox"/>

பங்கேற்பவரின் கையொப்பம் / இடம்
கட்டைவிரல் ரேகை
பங்கேற்பவரின் பெயர் மற்றும் விலாசம்
ஆய்வாளரின் கையொப்பம் / இடம்
ஆய்வாளரின் பெயர்
மையம்
கல்வியறிவு இல்லாதவற்கு (கைரேகை வைத்தவர்களுக்கு) இது அவசியம் தேவை
சாட்சியின் கையொப்பம் / இடம்
பெயர் மற்றும் விலாசம்

CASE. NO	NAME	A GE			IP NO	DOA	PREVIOUS PROCEDURE UNDERWENT	TYPE OF INCISION		EMERGENCY/E LECTIVE		PREDISPO SING FACTORS		POSTOP COMP IN PREV SX		P/D	POSTOP COMPLICATIO NS		
3	GOWRI	46	2	2	355 11	22-05-2018	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	NIL	1
4	SANTHANAM	65	4	2	380 05	31-05-2018	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	MULTIPARITY	4	SEROMA	3	ONLAY MESH REPAIR	3	NIL	1
5	GANDHI	35	1	2	605 66	30-08-2018	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	NIL	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1
8	KALYANI	49	2	2	752 11	25-10-2018	UMBILICAL HERNIA -ANAT. REPAIR	INFRAUMBILICAL SMILEY	2	ELECTIVE	1	BROCHIAL ASTHMA	2	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	NIL	1
9	POOMANI	65	4	2	736 92	19-10-2018	LAPAROTOMY FOR DUODENAL PERFORATION	UPPER MIDLINE	6	EMERGENCY	2	ANAEMIA	1	WOUND INFECTION	1	ONLAY MESH REPAIR	3	NIL	1
10	KALNNAKI	43	2	2	737 65	22-10-2018	TAH/BSO FOR FIBROID UTERUS	PFANNENSTEIL	5	ELECTIVE	1	NIL	7	SEROMA	3	ONLAY MESH REPAIR	3	NIL	1
11	GOMU	65	4	2	701 09	05-10-2018	LAP.STERILIZATION	PORT SITE	7	ELECTIVE	1	NIL	7	POSTOP COUGH	4	ONLAY MESH REPAIR	3	NIL	1
13	SELVI	55	3	2	921 11	20-12-2018	INCISIONAL HERNIA ANAT. REPAIR	PFANNENSTEIL	5	ELECTIVE	1	OBESITY	5	WOUND INFECTION	1	ONLAY MESH REPAIR	3	NIL	1
14	VALLIYAMMAL	70	4	2	926 73	26-12-2018	PARAUMBILICAL HERNIA - MESHPLASTY	INFRAUMBILICAL SMILEY	2	ELECTIVE	1	DIABETES	3	NIL	7	ANATOMICAL REPAIR	2	NIL	1
15	KAMALAM	72	4	2	925 05	26-12-2018	TAH/BSO FOR FIBROID UTERUS	LOWER PARAMEDIAN	8	ELECTIVE	1	BROCHIAL ASTHMA	2	SEROMA	3	ONLAY MESH REPAIR	3	NIL	1
16	SABIYAL BEGAM	35	1	2	922 34	23-12-2018	PUERPERAL STERILIZATION	INFAUMBILICAL TRANSVERSE	1	ELECTIVE	1	NIL	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1

19	KOASLAI	44	2	2	611 1	12-01- 2019	UMBILICAL HERNIA -ANAT. REPAIR	INFAUMBILICAL SMILEY	2	ELECTIVE	1	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	NIL	1
20	VADIVU	32	1	2	704 9	29-01- 2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	ANAEMIA	1	NIL	7	ONLAY MESH REPAIR	3	NIL	1
21	CHINNAMM AL	55	3	2	888 9	12-02- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	BROCHIAL ASTHMA	2	POSTOP COUGH	4	ONLAY MESH REPAIR	3	NIL	1
22	SHANTHI	47	2	2	705 5	29-01- 2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	NIL	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1
23	VADIVAMM AL	34	1	2	191 76	22-03- 2019	TAH/BSO FOR FIBROID UTERUS	PFANNENSTEIL	5	ELECTIVE	1	NIL	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1
24	PARAMESH WARI	60	3	2	227 95	29-03- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	EMERGENCY	2	DIABETES	3	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	NIL	1
27	ABIRAMI	34	1	2	209 99	24-03- 2019	LAPAROTOMY FOR APPENDICULAR PERFORATION	UPPER MIDLINE	6	EMERGENCY	2	OBESITY	5	WOUND INFECTION	1	ONLAY MESH REPAIR	3	NIL	1
28	THANGAMA YIL	52	3	2	208 74	22-03- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	NIL	1
29	MOOKAMM AL	46	2	2	200 23	18-03- 2019	PARAUMBILICAL HERNIA -ANAT. REPAIR	INFRAUMBILICAL SMILEY	2	EMERGENCY	2	NIL	7	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	NIL	1
31	ANNAKAMU	65	4	2	289 89	20-04- 2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	NIL	7	CONSTIPATION	5	ONLAY MESH REPAIR	3	NIL	1
32	SUBBU GANDHI	32	1	2	305 59	29-04- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	ANAEMIA	1	NIL	7	ONLAY MESH REPAIR	3	NIL	1
33	SUDALI	45	2	2	317 87	01-05- 2019	OPEN APPENDICECTOMY	MCBURNEY S OBLIQUE	4	EMERGENCY	2	NIL	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1

34	PUSHPAM	65	4	2	319 27	03-05- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	BROCHIAL ASTHMA	2	WOUND INFECTION	1	ONLAY MESH REPAIR	3	NIL	1
36	PALANIYAN DI	45	2	1	345 45	14-05- 2019	LAPAROTOMY FOR DUODENAL PERFORATION	UPPER MIDLINE	6	EMERGENCY	2	OBESITY	5	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	NIL	1
37	MAHESHWARI	33	1	2	318 54	03-05- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	NIL	1
38	MURUGAN	46	2	1	409 09	11-06- 2019	UMBILICAL HERNIA -ANAT. REPAIR	INFRAUMBILICAL SMILEY	2	EMERGENCY	2	NIL	7	SEROMA	3	ONLAY MESH REPAIR	3	NIL	1
39	MARUDHAIYA	57	3	1	434 77	14-06- 2019	LEFT PYELOLITHOTOMY	LEFT LOIN	9	ELECTIVE	1	BPH	7	NIL	7	ONLAY MESH REPAIR	3	NIL	1
40	SOLAYAMMAL	47	2	2	447 87	17-06- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	NIL	7	SEROMA	3	ONLAY MESH REPAIR	3	NIL	1
41	ALAGUDUR AICHI	32	1	2	475 72	29-06- 2019	OPEN APPENDICECTOMY	MCBURNEY S OBLIQUE	4	EMERGENCY	2	OBESITY	5	POSTOP COUGH	4	ONLAY MESH REPAIR	3	NIL	1
43	KALAIVANI	65	4	2	471 87	27-06- 2019	TAH/BSO FOR FIBROID UTERUS	PFANNENSTEIL	5	ELECTIVE	1	NIL	7	WOUND INFECTION	1	ONLAY MESH REPAIR	3	NIL	1
44	PETCHIAMMAL	47	2	2	442 90	17-06- 2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	OBESITY	5	POSTOP COUGH	4	ONLAY MESH REPAIR	3	NIL	1
45	MARIAPPAN	49	2	1	449 35	19-06- 2019	OPEN APPENDICECTOMY	MCBURNEY S OBLIQUE	4	EMERGENCY	2	DIABETES	3	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	NIL	1
46	KALAI	45	2	2	509 89	23-07- 2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	NIL	1
48	GNANASOONDARI	55	3	2	293 30	28-04- 2018	CLASSICAL CAESAREAN	LOWER MIDLINE	3	EMERGENCY	2	MULTIPARITY	4	WOUND INFECTION	1	ANATOMICAL REPAIR	2	NIL	1

49	KALAIYARAS I	46	2	2	30122	28-04-2018	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	ANAEMIA	1	NIL	7	ONLAY MESH REPAIR	3	NIL	1
50	LAKSHMI	55	3	2	21973	28-03-2018	PUERPERAL STERILIZATION	INFARUMBILICAL TRANSVERSE	1	ELECTIVE	1	NIL	7	CONSTIPATION	5	ANATOMICAL REPAIR	2	NIL	1
1	CHINNATHA I	63	4	2	7458	29-01-2018	LAPAROTOMY FOR SPLENIC ABSCESS	UPPER MIDLINE	6	ELECTIVE	1	DIABETES	3	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	SEROMA	2
7	MUPPIDATH I	45	2	2	72543	19-10-2018	LSCS	PFANNENSTEIL	5	EMERGENCY	2	MULTIPARITY	4	POSTOP COUGH	4	ONLAY MESH REPAIR	3	SEROMA	2
12	VASANTHI	32	1	2	93283	29-12-2018	LSCS	PFANNENSTEIL	5	EMERGENCY	2	OBESITY	5	POSTOP DISTENSION	6	ONLAY MESH REPAIR	3	SEROMA	2
25	PARVATHI	44	2	2	21967	27-03-2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	BROCHIAL ASTHMA	2	NIL	7	ONLAY MESH REPAIR	3	SEROMA	2
26	KASTHOORI	55	3	2	21785	26-03-2019	OPEN APPENDICECTOMY	MCBURNEY S OBLIQUE	4	EMERGENCY	2	NIL	7	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	SEROMA	2
35	SELVI	35	1	2	36593	20-05-2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	OBSTRUCTIVE UROPATHY	6	NIL	7	ONLAY MESH REPAIR	3	SEROMA	2
42	SANTHAKU MARI	35	1	2	47175	27-06-2019	LSCS	PFANNENSTEIL	5	EMERGENCY	2	OBESITY	5	NIL	7	ONLAY MESH REPAIR	3	SEROMA	3
2	MARIAMMAL	40	1	2	6595	25-01-2018	CLASSICAL CAESAREAN	LOWER MIDLINE	3	EMERGENCY	2	MULTIPARITY	4	POSTOP COUGH	4	ONLAY MESH REPAIR	3	WOUND INFECTION	4
6	CHINNATHA I	50	2	2	71588	10-10-2018	LAP.STERILIZATION	PORT SITE	7	ELECTIVE	1	OBESITY	5	WOUND INFECTION	1	ONLAY MESH REPAIR	3	WOUND INFECTION	4
17	KANAGAM MAL	54	3	2	90001	16-12-2018	LSCS	PFANNENSTEIL	5	EMERGENCY	2	MULTIPARITY	4	WOUND INFECTION	1	ONLAY MESH REPAIR	3	WOUND INFECTION	4

18	NILOBER BANU	48	2	2	890 07	12-12-2018	CLASSICAL CAESAREAN	LOWER MIDLINE	3	EMERGENCY	2	NIL	7	POSTOP COUGH	4	ONLAY MESH REPAIR	3	WOUND DEHISCENCE	4
30	KRISHNAVE NI	42	2	2	193 30	16-03-2019	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	OBESITY	5	POSTOP COUGH	4	ONLAY MESH REPAIR	3	WOUND INFECTION	4
47	MUTHAMMAL	64	4	2	307 19	29-11-2018	PUERPERAL STERILIZATION	INFRAUMBILICAL TRANSVERSE	1	ELECTIVE	1	DIABETES	3	WOUND DEHISCENCE	2	ONLAY MESH REPAIR	3	WOUND INFECTION	4