DISSERTATION

ON

A PROSPECTIVE STUDY OF INGUINAL HERNIA PATIENTS

MANAGED BY THREE STITCH HERNIOPLASTY

Dissertation submitted to

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CERTIFICATE

This is to certify that this dissertation entitled "**A PROSPECTIVE STUDY OF INGUINAL HERNIA PATIENTS MANAGED BY THREE STITCH HERNIOPLASTY"** is the bonafide original work of **Dr.MANIKANDAN.P** in partial fulfilment of the requirements for M.S Branch -I (General Surgery) Examination of the Tamilnadu Dr. M.G.R. Medical University to be held in APRIL - 2013. The period of study was from July 2011 – June 2012.

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DECLARATION

I, **Dr . MANIKANDAN . P** , solemnly declare that the dissertation titled **" A PROSPECTIVE STUDY OF INGUINAL HERNIA PATIENTS MANAGED BY THREE STITCH HERNIOPLASTY"** is a bonafide work done by me at Thanjavur Medical College, Thanjavur during July 2010 to June 2012 under the guidance and supervision of **Prof.Dr.T.KARUNAHARAN, M.S.,** Unit Chief S-VI, Thanjavur Medical College, Thanjavur.

This dissertation is submitted to Tamilnadu Dr. M.G.R Medical University towards partial fulfilment of requirement for the award of **M.S. degree (Branch -I) in General Surgery**.

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CONTENTS

INTRODUCTION :

HERNIA :

Hernia is defined as an abnormal protrusion of a viscus or a part of the viscus through a normal or an abnormal opening in the walls of its containing cavity.

Hernia may be spontaneous or acquired.

The external abdominal hernia is the most common form of spontaneous hernia.

The treatment options for hernia repair, is still controversial because hernias are polymorphous lesions and because of the choice of operations and the features of the patients are diverse.

Recurrence rate in hernia surgery needs further evaluation.

Hence the treatment option for hernia should be concerned with prevention of recurrence, prevention of infections and economic considerations.

The purpose of this study is to report the observations made in the postoperative follow up of hernia repair by three stitch hernioplasty method in the department of General Surgery, Thanjavur medical college, over a period of 2 years.

AIM OF MY STUDY :

To analyse the following complications in inguinal hernia patients managed by three stitch hernioplasty :

1. Recurrence of inguinal hernia
2. Chronic groin Pain
3. Foreign body sinus
4. Seroma
5. Hematoma
6. Wound infection

REVIEW OF LITERATURE :

HISTORY :

The word “hernia” is derived from Latin term, meaning “a rupture”. The earliest reports of abdominal wall hernias date back to 1500 BC. During this early era, abdominal wall hernias were treated with trusses or bandage dressings. The first evidence of operative repair of groin hernia dates to the first century AD. The original hernia repairs involved wide operative exposures through scrotal incisions requiring orchidectomy on the involved side. Centuries later, around 700 AD, principles of operative hernia repair evolved to emphasize mass ligation and en bloc excision of the hernia sac, cord, and testis distal to the external ring. The first report of groin hernia classification based on the anatomy of the defect (i.e. inguinal versus femoral) dates to the 14^{th} century and the anatomical descriptions of direct and indirect types of inguinal hernia were first reported in 1559.

Bassini revolutionized the surgical repair of the groin hernia with his novel anatomical dissection and low recurrence rates. He first performed his operation in 1884, and published his initial outcomes in 1889. Bassini reported 100% follow-up of patients over a 5 year period, with just 5 recurrences in over 250 patients. This rate of recurrence was unheard of

at the time and marked a distinct turning point in the evolution of herniorraphy. Bassini's repair emphasizes both the high ligation of the hernia sac in the internal ring, as well as suture reinforcement of the posterior inguinal canal. The operation utilizes a deep and superficial closure of the inguinal canal. In the deep portion of the repair, the canal is repaired by interrupted sutures affixing the transversalis fascia medially to the inguinal ligament laterally. This requires an incision through the transversalis fascia. The superficial closure is provided by the external oblique fascia.

In addition to bassini's contributions, the first true Cooper's ligament repair, which affixes the pectineal ligament to Poupart's ligament and thereby repairs both inguinal and femoral hernia defects, was introduced by Lotheissen in 1898. McVay further popularised the Cooper's ligament repair with the addition of a relaxing incision to reduce the increased wound tension.

The advances in groin hernia repair in the century following Bassini have shared the primary goal of reducing the long term hernia recurrence rates. To this end, efforts have been directed at developing a repair that imparts the least tension on the tissues that are brought together to repair the hernia defect. Darn repairs were first introduced in the early 20^{th} century to reduce wound tension by using either autologous tissue or synthetic suture to bridge the gap between fascial tissues. Muscle and fascial flaps were attempted without consistent success. In 1918, Handley introduced the first use of silk as a prosthetic darn

and nylon followed several years later. However, it was found that heavy prosthetic material increased the risk of wound infection, and the silk suture ultimately lost its strength over time. The use of autologous or synthetic patches was also attempted in order to reduce wound tension and improve rates of recurrence. The first patches, beginning in the early 20th century, consisted of silver wire filigree sheets that were placed along the inguinal canal. Over time, the sheets suffered from metal fatigue leading to hernia recurrence. Reports of the wire patches eroding into adjacent inguinal structures and even the peritoneal cavity itself, caused even more concern with this technique. The modern synthetic patch, made of a plastic monofilament polymer (polyethylene), was introduced by Usher in 1958. Lichentsein, who developed a sutureless hernia repair using a plastic mesh patch placed across the inguinal floor, further popularized this technique.

In the search for a technical means to reduce recurrence, emphasis was also placed on a meticulous dissection that would avoid placement of a prosthetic mesh. The most popular version was the Shouldice technique, initially introduced in 1958, and in essence a modification of Bassini operation. This technique involves meticulous dissection of the entire inguinal floor and closure of inguinal canal in four layers. The transversalis fascial layer itself is closed in two layers, as opposed to the single layer of interrupted suture advocated by Bassini. While the operation can be technically challenging to the beginner, it

has been associated with excellent long-term outcomes and low recurrence rates.

Today, laparoscopic techniques have been validated as safe and effective in the treatment of groin hernias and have become common place. The laparoscopic approaches were initially developed in the early 1990s as laparoscopic techniques diffused throughout other specialities of general surgery.

ANATOMY OF INGUINAL HERNIA :

An inguinal hernia is the protrusion of part of the contents of the abdomen through the inguinal region of the abdominal wall. This inguinal region is a weak part of the abdominal wall by the presence of the inguinal canal, the deep inguinal ring and the superficial inguinal ring.

THE INGUINAL CANAL :

The inguinal canal is triangular slit almost horizontal in direction which lies just above the inner half of the inguinal ligament. It commences at the deep inguinal ring and ends at the superficial inguinal ring. In infant the superficial and deep inguinal rings are almost superimposed and the obliquity of this canal is slight. In adult the inguinal canal is about 3.75 cm (1 ½ inch) long and is directed downwards and medially from the deep to the superficial inguinal ring. This canal has been developed due to descent of testis in the embryonic life.

THE DEEP INGUINAL RING :

It is an opening in the fascia transversalis 1.25 cm (1/2 inch) above the mid-inguinal point i.e. midpoint between the symphysis pubis and the anterior superior iliac spine. It is of an oval shape, the long axis being vertical. It varies in size in different individuals and is much larger in the male than in the female. At its margins the fascia transversalis is condensed. Medially it is related to the inferior epigastric vessels. It transmits the spermatic cord in the male and the round ligament of the uterus in the female.

THE SUPERFICIAL INGUINAL RING :

It is an interval in the aponeurosis of the external oblique muscle. It is situated just above and lateral to the crest of the pubis. The aperture is somewhat triangular with its long axis oblique corresponding to the course of the fibres of the aponeurosis. It is smaller in the female. Its base is formed by the crest of the pubis and its sides by the margins of the opening of the aponeurosis which are called the crura of the ring. The lateral crus of the ring is stronger. There are some fibres which course at right angles to the fibres of the aponeurosis. Some of these fibres may arch over the superficial inguinal ring and are called the intercrural fibres. The superficial inguinal ring gives passage to the spermatic cord and ilio-inguinal nerve in case of females.

INGUINAL LIGAMENT (POUPART'S LIGAMENT):

It is the thickened lower part of external oblique aponeurosis from the anterior superior iliac spine laterally to the superior ramus of the pubis. The middle one-third has a free edge. The lateral two-thirds are the underlying iliopsoas muscle and fascia.

CONJOINED TENDON (AREA) :

The conjoined tendon is formed by the fusion of the internal oblique aponeurosis with similar fibres from the aponeurosis of transversus abdominis muscle and gets inserted into the pubic tubercle, the pectineal ligament and the superior ramus of the pubis.

BOUNDARIES OF THE INGUINAL CANAL ;

ANTERIORLY – throughout its whole length there are skin, the superficial fascia and the aponeurosis of the external oblique and its lateral one-third there are the fleshy fibres of the origin of the internal oblique.

POSTERIORLY – the transversalis fascia along the whole length of the canal separates it from the extraperitoneal connective tissue and the peritoneum. In the medial half there are the conjoined tendon (combination of internal oblique and transverses muscles) and reflected part of the inguinal ligament.

ABOVE – there are arched fibres of the internal oblique and transverses abdominis before they fuse to form the conjoined tendon.

BELOW OR FLOOR - is formed by the grooved upper surface of the inguinal ligament and its union with the fascia transversalis. At its medial end there is lacunar ligament.

Presence of the canal weakens the lower part of the anterior abdominal wall. But the obliquity of the canal to some extent compensates, as increase in intra-abdominal pressure will cause approximation of the posterior wall to the anterior wall of the canal. The posterior wall is strengthened by the conjoined tendon and the reflected part of the inguinal ligament precisely behind the superficial inguinal ring and the fleshy fibres of the internal oblique strengthens the anterior wall of the canal in front of the deep inguinal ring.

CONTENTS OF THE INGUINAL CANAL :

1. Ilioinguinal nerve in both sexes and is particularly seen in the medial part of the canal. It pierces the internal oblique muscle distributing filaments to it and then enters the inguinal canal in its midway and lies below the spermatic cord to accompany it through the superficial inguinal ring.
2. In case of male the spermatic cord and its coverings.
3. In case of female the round ligament of the uterus.

COVERINGS OF THE SPERMATIC CORD :

When the testis descends through the abdominal wall into the scrotum it drags its vessels and nerves alongwith its ductus deferens. These structures meet

at the deep inguinal ring and form the spermatic cord, which extends from the deep inguinal ring to the posterior border of the testis.

In passing through the inguinal canal the spermatic cord acquires coverings from the different layers of the abdominal wall and these coverings from within outwards are –

1. Internal spermatic fascia is derived from the fascia transversalis at the deep inguinal ring.
2. Cremasteric fascia which consists of a number of muscular fascicule derived from the internal oblique muscle. The muscular fascicule constitutes the cremaster.
3. The external spermatic fascia is a thin fibrous membrane continuous above with the aponeurosis of the external oblique abdominis at the superficial ring.

STRUCTURES OF THE SPERMATIC CORD :

1. The main constituent is vas deferens.
2. Arteries of the spermatic cord are – testicular artery, artery of vas deferens and artery to the cremaster.
3. Pampiniform plexus of testicular veins.
4. Lymph vessels of the testis.

5. Nerves – testicular plexus of sympathetic nerves which accompany the testicular artery and the artery of the ductus deferens, and the genital branch of the genitofemoral nerve.

MECHANISMS WHICH PREVENT HERNIA IN THE INGUINAL REGION :

Though inguinal region is a weak spot in the abdominal musculature, rise in intra-abdominal pressure would have caused inguinal hernia in every individual. So there must be some defensive mechanisms which prevent hernia to occur. These are :

1. Obliquity of the inguinal canal - when there is rise in intra-abdominal pressure the posterior wall is apposed to the anterior wall and thus prevents coming out of abdominal content through inguinal canal.

2. Shutter mechanisms of the arched fibres of the internal oblique and transversus abdominis will bring down these muscles towards the floor when they are contracted during rise of intra-abdominal pressure. It has been postulated that occurence of direct inguinal hernia is often due primarily to a higher position of this transversus aponeurotic arch. So, when this muscle contracts, the arch is brought down, but it does not reach the inguinal ligament thereby leaving a weak area in the posterior wall of the inguinal canal.

3. Sphincter action of the transversus abdominis and internal oblique muscles at the deep inguinal ring. There is transversalis fascial sling which is derived from the transversalis fascia and this sling reinforces the medial and inferior margin of the ring. When the transversus abdominis contracts it pulls the transversalis fascial sling superiorly and laterally.

4. Ball valve action of the cremaster muscle pulls up the spermatic cord into the canal and plugs it during rise in intra-abdominal pressure.

5. In front of the deep inguinal ring there are strong fibres of the internal oblique. This prevents entry of any abdominal content through the deep inguinal ring.

6. Strong conjoint tendon is there in front of Hesselbach's triangle to prevent direct inguinal hernia

HESSELBACH'S TRIANGLE:

It is a weak spot of the anterior abdominal wall, through which direct inguinal hernia protrudes. Boundaries of the triangle are:

1. Lateral border of rectus abdominis muscle medially
2. Inferior epigastric vessels laterally
3. Below by the medial part of inguinal ligament

FRUCHAUD'S MYOPECTINEAL ORIFICE :

It is an osseo-myo-aponeurotic tunnel through which all groin hernia comes out. Boundaries are:

1. Medially – lateral border of rectus sheath
2. Laterally – iliopsoas muscle
3. Inferiorly – pecten pubis and fascia covering it
4. Superiorly – arched fibres of internal oblique and transverses abdominis muscle.

ILIOPECTINEAL ARCH :

The iliopectineal arch is a medial thickening of the iliac fascia deep to inguinal ligament. It extends from iliopubic tract towards the anterior border of the femoral canal.

ILIOPUBIC TRACT:

It is the aponeurotic band extending from the anterior inferior iliac spine to the pubic tubercle. It forms part of a deep musculoaponeurotic layer that reinforces the inguinal canal behind the transversus abdominis muscle and aponeurosis and the transversalis fascia. The tract passes medially, contributing to the inferior border of the internal ring. It crosses the femoral vessels to form the anterior margin of the femoral sheath, together with the transversalis fascia. The tract curves around the medial surface of the femoral sheath to attach to the pectineal ligament. It can be confused with the inguinal ligament.

LACUNAR LIGAMENT (GIMBERNAT'S LIGAMENT) :

It is the most inferior portion of the inguinal ligament. It is formed from the external oblique fibres arising at the anterior superior iliac spine. Its fibres recurve through an angle less than 45 degrees before attaching to the pectineal ligament.

PECTINEAL LIGAMENT (COOPER'S LIGAMENT):

It is the periosteal extension of the lacunar ligament along the pectineal line. It is thick, strong tendinous band formed principally by tendinous fibres of the lacunar ligament and aponeurotic fibres of the internal oblique, transversus abdominis, and pectineus muscles, and with variation, the inguinal falx. It covers the periosteum of the superior pubic ramus, the pectinate line and the upper part of the pectinate fascia. It is often used in surgical hernia repair, because it is a firm anchor for muscular tendinous and fascial layers of the groin.

FALX INGUINALIS (HENLE'S LIGAMENT):

It is the lateral, vertical expansion of the rectus sheath that inserts on the pectin of the pubis. Present in 30 to 50 percent of individuals. It is fused with transversus abdominis aponeurosis and transversalis fascia.

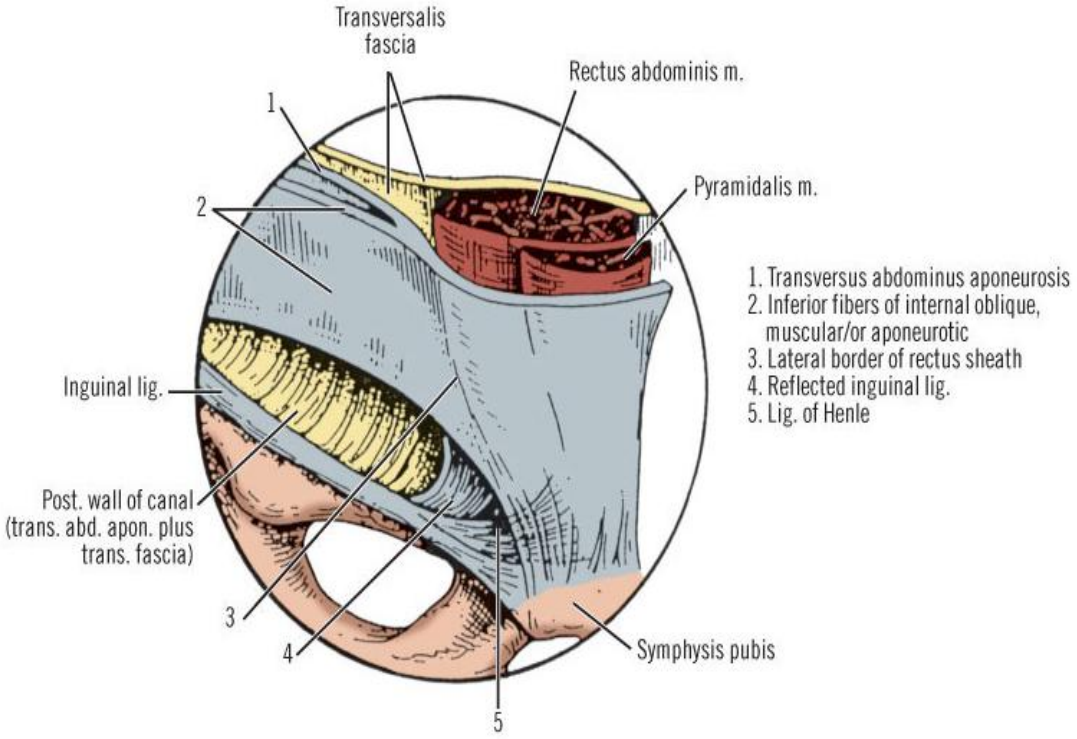

FIG 1. REFLECTED PORTION OF INGUINAL LIGAMENT

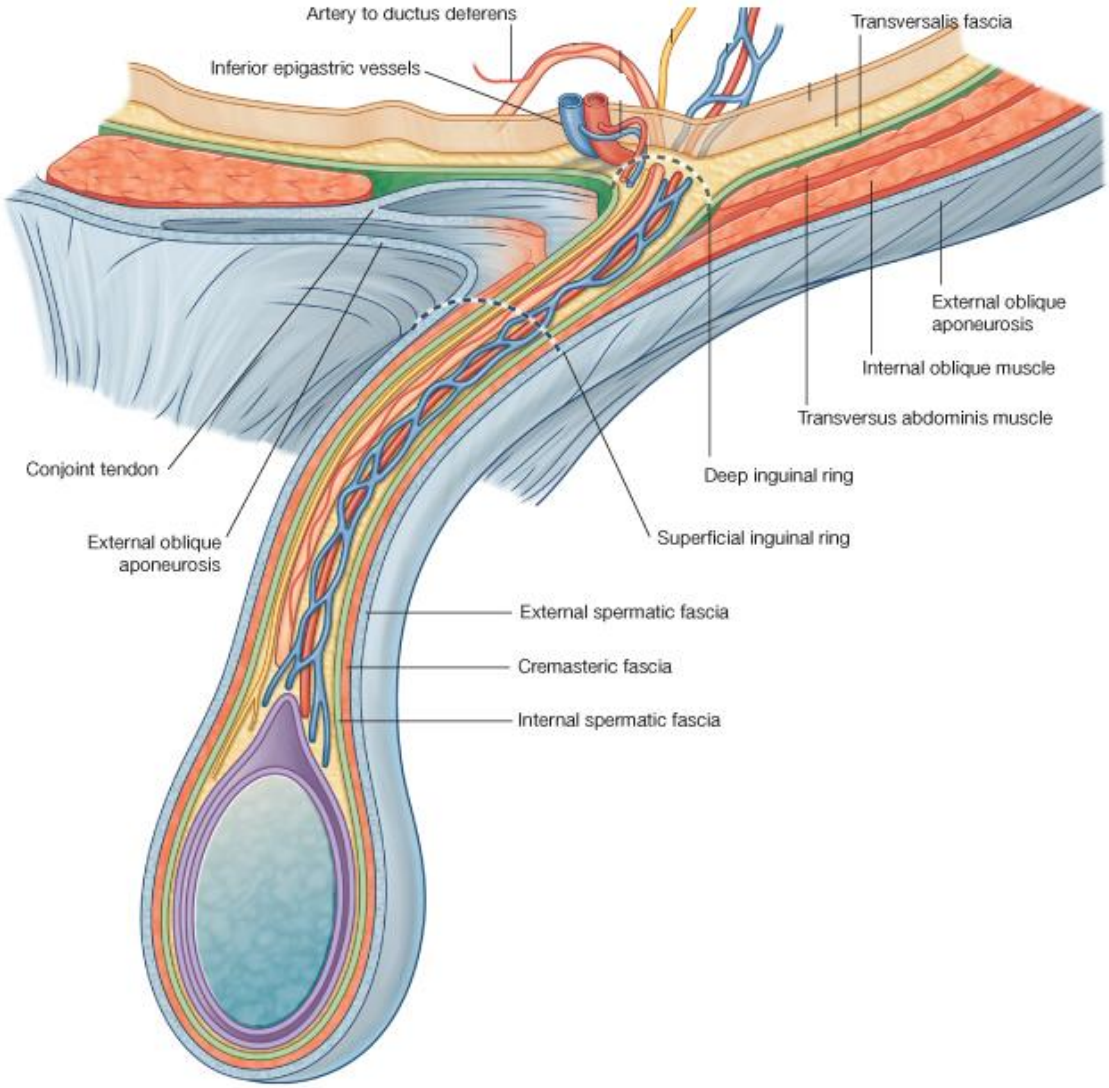

FIG 2. INGUINAL CANAL AND ITS CONTENTS

REFLECTED INGUINAL LIGAMENT (COLLE'S LIGAMENT):

Colle's ligament is formed by the aponeurotic fibres from the lateral crus of the external ring, which pass medially and upwards, behind the medial crus, to blend with the opposite external oblique aponeurosis

SPACE OF RETZIUS:

The most medial aspect of the preperitoneal space (the medial separation of the transversalis fascia and peritoneum), that which lies immediately superior to the bladder, is alternately known as the Retzius space.

RETROINGUINAL (EXTRAPERITONEAL) SPACE OF BOGROS:

Space of Bogros is related to the transversalis fascia. It is the lateral extension of the retropubic space of Retzius. It is located just beneath the posterior lamina of the transversalis fascia i.e. membranous layer of preperitoneal tissue and above the peritoneum. This space is used for preperitoneal access to the fossae of the anterolateral abdominal wall whereupon the groin hernias arise.

TRIANGLE OF DOOM:

It is formed medially by vas deferens and laterally by vessels of spermatic cord, with apex pointing superiorly. Contents of the triangle are external iliac vessels, deep circumflex iliac vein, femoral nerve and genital branch of genitofemoral nerve.

TRIANGLE OF PAIN:

This triangle is conceptualized as the space bordered by the iliopubic tract and gonadal vessels. Contents of this triangle are lateral femoral cutaneous nerve, femoral branch of the genitofemoral nerve and femoral nerve.

CIRCLE OF DEATH:

It is a vascular continuation formed by the common iliac, internal iliac, obturator, aberrant obturator, inferior epigastric and external iliac vessels.

INCIDENCE:

Hernias are a common problem. True incidence of hernia is unknown. Five percent of the population will develop an abdominal wall hernia; the prevalence may be even higher. Seventy five percent of all hernias occur in inguinal region and two thirds of them are indirect. Inguinal hernia is 25 times more common in men. Indirect inguinal hernia is the most common, regardless of gender.

Both indirect inguinal and femoral hernias occur more commonly on the right side. This is due to delay in atrophy of the processus vaginalis after the normal slower descent of the right testis to the scrotum during foetal development. Predominance of right side femoral hernias is thought to be due to the tamponading effect of sigmoid colon on left femoral canal.

Prevalence of hernias increases with age. One to three percent of groin hernias go for strangulation and is more common at the extremes of life. Most of the strangulated hernias are indirect inguinal hernias.

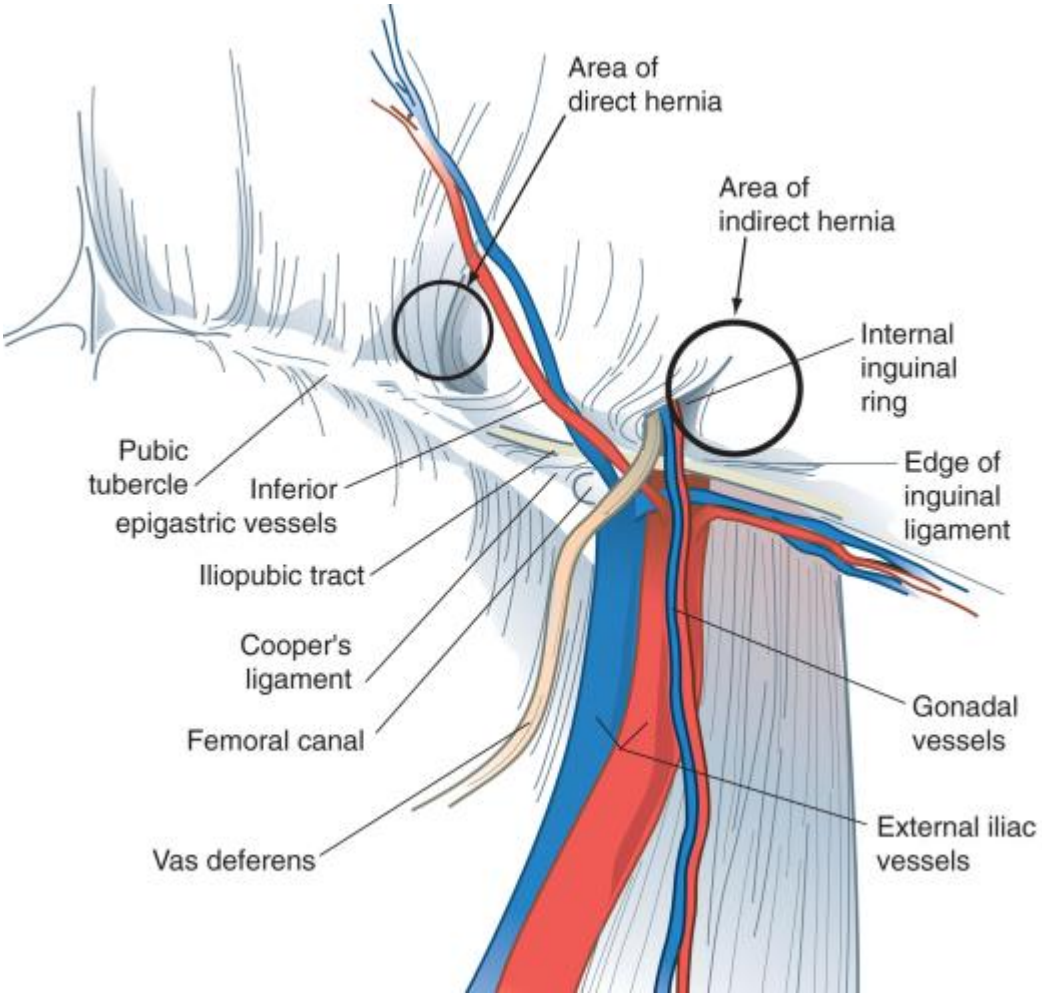

FIG 3. PREPERITONEAL STRUCTURES IN THE RIGHT INGUINAL SPACE

ETIOLOGY OF INGUINAL HERNIAS:

Inguinal hernias may be considered congenital or acquired diseases. The risk factors are multifactorial, the common denominator being a weakness in the

anterior abdominal wall musculature. Congenital hernias can be considered an impedance of normal development. The testis descends from the intra-abdominal space into the scrotum in the third trimester. This descent is preceded by gubernaculums and a diverticulum of peritoneum, which becomes the processus vaginalis. The processus vaginalis closes between 36 and 40 weeks. Failure of this closure results in patent processus vaginalis and thus results in indirect inguinal hernia in preterm babies. Processus vaginalis continues to close as the child ages within the first few months of life.

Presumed causes of groin herniation:

- Coughing
- Chronic obstructive pulmonary disease
- Obesity
- Straining Constipation Prostatism
- Pregnancy
- Birthweight < 1500 gms
- Family history of a hernia
- Valsalva's maneuvers

- Ascites
- Upright position
- Congenital connective tissue disorders

- Defective collagen synthesis
- Previous right lower quadrant incision
- Arterial aneurysms
- Cigarette smoking
- Heavy lifting
- Physical exertion

Connective tissue disorders associated with groin herniation:

- Osteogenesis imperfecta
- Cutis laxa
- Ehlers-danlos syndrome
- Hurler-hunter syndrome
- Marfan syndrome
- Congenital hip dislocation in children
- Polycystic kidney disease
- Alpha 1 antitrypsin deficiency
- Williams syndrome
- Androgen insensitivity syndrome

- Robinow’s syndrome
- Serpentine fibula syndrome
- Alport’s syndrome

- Tel hashomer camptodactyly syndrome
- Leriche’s syndrome
- Testicular feminization syndrome
- Rokitansky-mayer-kuster syndrome
- Goldenhar’s syndrome
- Morris syndrome
- Gerhardt’s syndrome
- Menke’s syndrome
- Kawasaki disease
- Pfannenstiel syndrome
- Beckwith-weidemann syndrome
- Rubinstein-taybi syndrome
- Alopecia-photophobia syndrome

CLASSIFICATION OF INGUINAL HERNIAS:

A number of classification systems have been developed. A common clinical System relates to location of hernia and subdivides them in indirect, direct and femoral hernias. This system does not take into account the complexity of hernia. An ideal classification system would preoperatively stratify hernias and allows appropriate approach to repair. Preoperative classification relies heavily upon physical examination. A number of authors have attempted to devise a

standardized classification system (Rutkow, Robbins, Gilbert, Nyhus and Schumpelick)

Intraoperative assessment is required for Gilbert's classification. Gilbert divided hernia into five types. Rutkow and Robbins further expanded the gilbert classification to include types 6 and 7.

GILBERT'S CLASSIFICATION SYSTEM:

Type 1 – small internal ring, indirect inguinal hernia

Type 2 – moderately dilated internal ring, indirect inguinal hernia

Type 3 – large internal ring (greater than two fingerbreadths),

Indirect inguinal hernia

Type 4 – direct inguinal hernia with complete disruption of the inguinal floor

Type 5 – direct hernias with a small diverticular opening of not more than,

one fingerbreadth

Type 6 – pantaloon hernia, which is a combination of a direct and indirect sac

Type 7 – femoral hernia

The Nyhus classification is more detailed. It assesses, in addition to location and size of the defect, the integrity of the inguinal ring and inguinal floor. One of the most widely used classifications.

NYHUS CLASSIFICATION SYSTEM:

Type I – indirect hernia; internal ring is of normal size and configuration; typically in infants, children, small adults; occurs primarily as a congenital hernia

Type II – indirect hernia; internal ring enlarged without impingement on the floor of the inguinal canal; does not extend to the scrotum

Type IIIA – Direct hernia; size is not taken into account

Type IIIB – indirect hernia that has enlarged enough to encroach upon the posterior inguinal wall; indirect sliding or scrotal hernias are usually placed in this category because they are commonly associated with extension to the direct space; also includes pantaloon hernias

Type IIIC – Femoral hernia

Type IV – Recurrent hernia; modifiers A – D are sometimes added, which correspond to indirect, direct, femoral and mixed, respectively

Another major classification system is that of Schumpelick. This is widely used in Europe. The major feature of this system is the addition of orifice sizing to traditional systems. An L indicates a lateral indirect site, M represents medial direct, and F for femoral. The defects are then graded according to size with type 1 being less than 1.5 cm in diameter, type II being 1.5 to 3 cm, and type III being more than 3 cm. This system seems to be more objective, but the

differences in the extent of abdominal distention during pneumoperitoneum, affects the measurements.

CLINICAL MANIFESTATIONS:

Groin hernia can present in many ways, from asymptomatic hernia to frank peritonitis in a strangulated hernia. The most common symptom with which the patient presents is a dull feeling of discomfort or heaviness in groin region exacerbated by straining the abdominal musculature, lifting heavy objects or defecation. These maneuvers increase the intra-abdominal pressure and worsen the feeling of discomfort and force the hernia content through the hernia defect. Pain arises when a tight ring of fascia outlining the hernia defect compresses intra-abdominal structures with a visceral neuronal supply. In reducible hernia discomfort resolves, as pressure is released when the patient stops straining. Pain is often worse at the end of the day. Physically active patients experience pain more often, than those who lead a sedentary life style.

Overwhelming or focal pain should raise the suspicion of incarceration or strangulation. Incarceration occurs when the hernia contents are trapped in the hernia defect so that they cannot be reduced back into the abdominal cavity. When the lumen of the bowel gets constricted by the hernia defect, it results in intestinal obstruction. Later, the venous outflow is impeded by the tight circumferential pressure produced by the hernia defect and finally results in congestion, oedema and tissue ischemia. Ultimately the arterial blood supply to

the hernia contents gets compromised, resulting in tissue loss and necrosis, to be called as strangulated hernia.

All patients presenting with bowel obstruction requires a thorough examination of the groin region for ruling out inguinal and femoral hernias. On examination, incarcerated hernia is mildly tender due to venous congestion, whereas a strangulated hernia will be tender and warm and may have surrounding skin erythema secondary to inflammatory reaction from the ischemic bowel. In addition, there will be fever, hypotension from early bacteraemia and a leukocytosis. Incarcerated hernia requires surgery on an urgent basis i.e. within 6 – 12 hours of presentation. When there is a delay for any reason, serial physical examination is mandatory for any changes in the hernia site indicating the onset of tissue loss. Strangulated hernia requires emergency surgery immediately following surgery. It is also important to recognise that incarcerated omental fat alone, can produce significant pain and tenderness on examination.

RARE VARIETIES OF INGUINAL HERNIA:

1. **SLIDING HERNIA** (SYN. HERNIA-EN-GLISSADE) :

   It is a hernia in which a piece of extraperitoneal bowel may slide down into the inguinal canal pulling a sac of peritoneum with it. In such a

hernia the caecum on the right side, the pelvic colon on the left side or the urinary bladder on either side may slide down. There may be the usual contents in the sac. The peculiarity is that the posterior wall of the hernia sac is not formed by the peritoneum alone but by a viscus which lies behind the peritoneum. It may occur with both direct and indirect hernia.

This type of hernia is usually seen in older men. Sliding hernia may be suspected when it reappears very slowly after reduction. When a large globular hernia descends into the scrotum the condition is suspected. This condition may be associated with strangulated small intestine within the sac or a strangulated large intestine outside the sac.

2. **INTERSTITIAL HERNIA** :

In this hernia, the hernia sac lies in between the muscle layers of the abdominal wall. The hernia is usually incomplete. It is commonly associated with an undescended testis. According to the position of the hernia sac such hernia can be classified into:

(a). Preperitoneal or intraparietal – in this type the hernia sac lies between the peritoneum and the fascia transversalis.

(b). Interparietal – in this type the hernia sac lies between internal oblique muscle and the external oblique aponeurosis.

(c). Extraparietal – the hernia sac lies outside the external oblique aponeurosis in the subcutaneous tissue.

3. **RICHTER'S HERNIA :**

   In this condition only a portion of the circumference of the bowel becomes strangulated. This condition often complicates a femoral hernia and rarely an obturator hernia. It is particularly dangerous as operation is frequently delayed because the clinical features resemble gastroenteritis. Intestinal obstruction may not be present until and unless half of the circumference of the bowel is involved. The patient may or may not vomit. Intestinal colic is present but the bowels are opened normally.

   There may be even diarrhoea. Absolute constipation is delayed until paralytic ileus supervenes.

4. **LITTRE'S HERNIA** :

   In this condition, meckel's diverticulum is the content of the sac.

5. **MAYDL'S HERNIA** (SYN. HERNIA-EN-W) :

   In this condition, two loops of bowel remain in the sac and the connecting loop remains within the abdomen and becomes strangulated. The loops of the hernia look like a 'W'. The loop within the abdomen becomes first strangulated and can only be suspected when tenderness is elicited above the inguinal ligament along with presence of intestinal obstruction.

DIFFERENTIAL DIAGNOSIS FOR GROIN HERNIA:

- Malignancy
  - Lymphoma

    - Retroperitoneal sarcoma
    - Metastasis
    - Testicular tumour
- Primary testicular
    - Varicocele
    - Spermatocele
    - Epididymitis

    - Testicular torsion
    - Hydrocele
    - Ectopic testicle
    - Undescended testicle
- Diffuse lipoma of the cord
- Femoral artery aneurysm or pseudoaneurysm
- Lymph node
- Sebaceous cyst
- Hidradenitis
- Cyst of the canal of Nuck (female)
- Saphenous varix
- Psoas abscess
- Haematoma

- Ascites

DIFFERENTIAL DIAGNOSIS OF INGUINOSCROTAL SWELLINGS :

1. **ENCYSTED HYDROCELE OF THE CORD** :

   When a portion of the funicular process persists and remains patent, but shut off from the tunica vaginalis below and the peritoneal cavity above, it eventually becomes distended with fluid and presents a cystic swelling either in the inguinal or inguinoscrotal region or in the scrotum.

   Fluctuation test and translucency test will be positive. One can very well 'get above the swelling'. If the swelling is held at its upper limit and the patient is asked to cough there will be no impulse on coughing. This shows that it has no connection with hernia nor with peritoneal cavity. If the testis is pulled down the swelling will also come down and becomes immobile. This is the traction test. The testis can be felt apart from the swelling.

2. **VARICOCELE :**

   It is a condition in which the veins of the pampiniform plexus become dilated and tortuous. Usually the left side is affected, probably because (i) the left spermatic vein is longer than the right, (ii) the left spermatic vein enters the left renal vein at a right angle, (iii) at times the left testicular artery arches over the left renal vein to compress it and (iv) the left colon

when loaded may press on the left testicular vein. In the beginning the patient will experience aching or dragging pain particularly after prolonged standing. The swelling appears when the patient stands and disappears when he lies down with the scrotum elevated. The impulse on coughing is more like a thrill. On palpation it feels like a 'bag of worms'. After occluding the superficial inguinal ring with a thumb if the patient is asked to stand up the varicocele fills from below. It must be remembered that a rapid onset of varicocele on the left side suggests carcinoma of the

kidney. Early vascular metastasis is characteristic of this disease. So the renal vein is often involved earlier by permeation, which may block the opening of the left spermatic vein and thus causes quick formation of varicocele on the left side. On the right side the inferior vena cava, into which the right spermatic vein drains, is affected later by permeation and that is why onset of varicocele due to carcinoma of the kidney is rarer on the right side.

3. **LYMPH VARIX OR LYMPHANGIECTASIS** :

   It is a condition in which the lymphatic vessels of the cord become dilated and tortuous caused by obstruction due to filariasis. Past history of periodic attacks of fever with simultaneous development of pain and swelling of the cord are the main symptoms of this condition. The swelling appears on standing and disappears spontaneously on lying

down, although slower than in case of varicocele. The impulse on coughing is thrill-like and not the typical expansile impulse found in a case of hernia. On palpation it feels soft, cystic and doughy. Presence of eosinophilia and living micro-filariae in the blood drawn at night are very much diagnostic.

4. **FUNICULITIS :**

Besides gonococcal infection funiculitis may be caused by filariasis particularly in this country. Aching in the groin with variable degree of

fever are the presenting symptoms in majority of cases. Initial symptoms may be those of acute prostatitis. The inguinal and inguinoscrotal regions will be inflamed and the skin becomes red, oedematous and shiny. It is sometimes very difficult to differentiate from a small strangulated hernia. While the former condition is mainly treated by conservative means, immediate operative intervention is the only life saving measure for the latter condition. So differentiation is imperative. Palpation just above the deep inguinal ring is of great help in differentiating these two conditions. In a strangulated hernia the abdominal contents can be felt as they enter the deep inguinal ring whereas in funiculitis no such structure can be felt.

5. **DIFFUSE LIPOMA OF THE CORD :**

This is a very rare condition. The cord feels soft and lobulated. The swelling is irreducible having no impulse on coughing.

6. **INFLAMMATORY THICKENING OF THE CORD :**

Tuberculosis often gives rise to this condition. Slight ache in the testis with generalised symptoms of tuberculosis often ushers this condition. Indurated and slightly tender nodular thickening of the cord can be felt. Epididymis is obviously tender, enlarged and nodular. Rectal examination may reveal indurated seminal vesicle of the corresponding side and sometimes of the contralateral side. In late cases cold abscess develops in the lower and posterior aspect of the scrotum which may discharge itself

resulting in formation of a sinus. About two-thirds of the cases active tuberculosis of the renal tract may be evident.

7. **MALIGNANT EXTENSION OF THE TESTIS** :

This can be easily diagnosed by presence of malignant growth in the testis. The cord feels hard and nodular. There may be secondary deposits in the pre- and para- aortic and even the left supraclavicular lymph nodes.

8. **TORSION OF THE TESTIS** :

It is mainly a cause of the swelling of scrotum but an undescended testis may frequently undergo torsion which is a subject matter of this chapter. This condition mimics a strangulated hernia. It will give rise to a tense and tender swelling without an impulse on coughing. Absence of testis in the scrotum should arouse suspicion of this condition. Slight fever, no constipation and dullness on percussion will go in favour of torsion.

9. **RETRACTILE TESTIS :**

   This condition is quite common in children and is often diagnosed as ectopic testes due to the fact that in majority of cases the testis lies in the superficial inguinal pouch. Strong contraction of the cremaster muscle may pull the testis up from the scrotum into the superficial inguinal pouch. The testis is usually well developed, the scrotum is also normally developed and the testis can be brought down to the bottom of the scrotum.

DIFFERENTIAL DIAGNOSIS OF GROIN SWELLINGS:

1. **FEMORAL HERNIA**.
2. **SAPHENA VARIX :**

   It is a saccular enlargement of the termination of the long saphenous vein. This swelling usually disappears completely when the patient lies down. The so called impulse on coughing is present in this condition as well, but it is actually a fluid thrill and not an expansile impulse to the examining fingers. Sometimes a venous hum can be heard when the stethoscope is applied over the saphenous varix.

3. **ENLARGED LYMPH NODES** :

A search for a possible focus of infection should be made in the drainage area which extends from the umbilicus down to the toes including the terminal portions of the anal canal, urethra and vagina (i.e. the portions developed from the ectoderm). The gland of Cloquet lying within the femoral canal may be enlarged and simulates exactly an irreducible femoral hernia. If any focus cannot be found out or any cause of enlargement of lymph nodes cannot be detected, the nature of the lump remains a matter of opinion which is best settled urgently in the operation theatre.

4. **PSOAS ABSCESS :**

   This is usually a cold abscess tracking down from Pott's disease. It is a reducible swelling and gives rise to impulse on coughing. It is a painless swelling and if the pulsation of the femoral artery can be palpated it will be appreciated that the swelling is lateral to the artery (cf. Femoral hernia which is medial to the femoral artery). Sometimes there is an iliac part of the abscess which is determined by cross fluctuation. Examination of the back and corresponding iliac fossa including x-rays clarifies the diagnosis.

5. **AN ENLARGED PSOAS BURSA** :

This bursa lies in front of the hip joint and under the psoas major muscle. It often communicates with the hip joint. In osteoarthritis of the hip joint this bursa becomes enlarged and produces a tense and cystic swelling below the inguinal ligament. This swelling diminishes in size when the hip joint is flexed. Presence of osteoarthritis in the hip joint, a cystic swelling, absence of impulse on coughing and that the swelling diminishes in size during flexion of the hip joint are the diagnostic points in favour of this condition.

6. **UNDESCENDED AND ECTOPIC TESTES** :

An undescended testis is one which is arrested at any point along its normal path of descent. An ectopic testis is one which has deviated from

its usual path of descent. In both the conditions the scrotum of the same side will be empty. If the swelling is within the inguinal canal it is probably an undescended testis. The testis is recognised by its shape, feel and 'testicular sensation'. Ascertain whether the testis is lying superficial or deep to the abdominal muscles by the 'rising test'. The commonest site of an ectopic testis is just above and lateral to the superficial inguinal ring and superficial to the external oblique aponeurosis. It must be remembered that an undescended testes is always smaller and less developed than its fellow in the scrotum but an ectopic testis is usually well developed. Sometimes an undescended testis may be associated with

an inguinal or an interstitial hernia. Ectopic testis may also be found at (1). The root of the penis (pubic type), (2). The perineum (perineal type), (3). Rarely at the upper and medial part of the femoral triangle (femoral type).

7. **LIPOMA**
8. **HYDROCELE OF A FEMORAL HERNIAL SAC :**

   This is an extremely rare condition in which the neck of the sac becomes plugged with omentum or by adhesions. The hydrocele of the sac is thus produced by the secretion of the peritoneum.

9. **FEMORAL ANEURYSM :**

   Expansile pulsation is the pathognomonic feature of this condition.

TREATMENT:

Regardless of the type and location of hernia, the treatment is surgical repair. Elective surgery is done to alleviate the symptoms and prevent the complications. The risk of elective groin hernia repair, even in the patient with co-morbid illness is exceedingly low. Outcomes of surgical repair are excellent with rapid return to baseline health and with minimal morbidity. Emergency repair is done in case of complications of hernia.

ANAESTHESIA FOR HERNIA REPAIR:

A variety of anaesthesia options are available for groin hernia repairs. Open hernia repairs are most often performed using either local or regional (spinal or epidural) anaesthesia. Laparoscopic hernia repairs usually require general anaesthesia to provide complete muscle relaxation needed to achieve insufflation of the preperitoneal or peritoneal space. Local anaesthesia can be administered by directly infiltrating the tissues to be incised or by blocking the ilioinguinal and iliohypogastric nerves. The advantages of local anaesthesia are less postoperative pain and nausea, shorter time spent in hospital. Spinal or continuous epidural

anaesthesia allows the operating surgeon a greater freedom to maneuver within the operative field since the anaesthetised area is larger than in local anaesthesia. These modes of anaesthesia have their own infrequent risks like urinary retention, prolonged anaesthetic effect, hypotension, and spinal headache. They are associated with longer in-hospital recovery times on the day of surgery.

OPERATIVE TECHNIQUES :

Successful surgical repair of hernia depends on tension-free closure of the defect, to attain lowest recurrence rate as possible.

Inguinal hernia repair procedures:

1. Fascial repairs :

- Bassini
- Bassini with Tanner’s slide
- Shouldice
- Ferguson
- McVay

2. Open tension free prosthetic repairs :

- Stoppa
- Lichenstein
- Plug repair

3. Laparoscopic

- Transabdominal preperitoneal (TAP)
- Total extraperitoneal approach (TEP)

4. Percutaneous endoscopic external ring repair (PEER)

- Lichenstein
- Plug

There are many different methods of hernia repair, but the most commonly followed ones are only mentioned above.

Essential steps followed in open inguinal hernia repair :

All of the open anterior herniorraphy techniques begin with a transversely oriented slightly curvilinear skin incision of approximately six to eight centimetres positioned one to two fingerbreadths above the inguinal ligament. The subcutaneous tissue and scarpa's tissues are dissected. Three named veins cross the field namely the superficial epigastric vein, the superficial external pudendal vein and the superficial circumflex iliac vein. These veins are cut and ligated. The external oblique aponeurosis is identified and cleaned. The superficial inguinal ring is identified inferomedially. The external oblique aponeurosis is incised sharply and opened along its length through the external ring with fine scissors, taking care not to injure the iliohypogastric and ilioinguinal nerves. A plane of cleavage is created between the external oblique aponeurosis and conjoined tendon superiorly and inguinal ligament inferiorly. The spermatic cord is mobilised. The cremasteric muscle fibres lying over the cord is dissected using blunt and sharp dissection, followed by internal spermatic fascia. An indirect hernial sac will be identified in an anteromedial position extending superiorly through the internal ring. A direct sac will be present as a weakness in the floor of the canal posterior to the cord.

The specifics of common techniques for hernia repair are discussed below.

BASSINI'S HERNIORRHAPHY:

Bassini first performed herniorrhaphy in 1884. Bassini dissected the hernia sac upto the internal ring and ligated the neck of hernia sac high up near the deep inguinal ring. He also reinforced the posterior wall of the inguinal canal by apposing internal oblique, transversus abdominis and upper leaf of fascia transversalis to lower leaf of fascia transversalis and inguinal ligament using interrupted silk sutures. The rectus sheath comes

in the medial end of the repair. The external oblique aponeurosis is sutured in front of the cord.

SHOULDICE REPAIR :

This is a multilayered repair of hernia first practised at Shouldice clinic, Toronto. The operation is usually done under local anaesthesia, using stainless steel wire or prolene as suture material. Skin incision is made in the groin from anterior superior iliac spine to the pubic tubercle. Cremaster muscle is excised. Hernial sac is dissected and ligated at the neck at the deep inguinal ring. Redundant transversalis fascia is excised from deep ring to pubic tubercle. The lower flap of transversalis fascia is sutured behind the upper flap of fascia transversalis. The upper flap of fascia transversalis is sutured to inguinal ligament from deep inguinal ring to the pubic tubercle. This double breasting of fascia transversalis forms

a new strong posterior wall of the inguinal canal. The posterior wall is further strengthened by double layer of suture apposing conjoint tendon to the inguinal ligament starting from pubic tubercle and carrying laterally to deep ring and back from deep inguinal ring to the pubic tubercle. The cut margins of the external oblique aponeurosis is sutured in front of the cord in two layers. Recurrence rate following this type of repair is less than one percent.

MODIFIED SHOULDICE REPAIR FOR INGUINAL HERNIA :

Berliner modified six layered Shouldice repair of inguinal hernia. He initially started repair of posterior wall in three layers and later modified it with repair in two layers. The fascia transversalis is split from pubic tubercle to the deep inguinal ring. The upper leaf of fascia transversalis and transversus abdominis aponeurosis is apposed to lower leaf of fascia transversalis. The second layer of continuous suture approximate the superior margin of fascia transversalis and transversus abdominis aponeurosis to the inguinal ligament. The external oblique aponeurosis is sutured in front of the spermatic cord in single layer.

MODIFIED BASSINI'S REPAIR :

There are various modifications of Bassini's repair. Lichenstein's modification of Bassini's repair is as follows :

Herniotomy is done first. The lower edge of the transversus abdominis aponeurosis and the conjoint tendon with fascia transversalis attached to it is apposed to inguinal ligament with interrupted non absorbable suture. Tension may be relieved by Tanner's slide. The internal oblique muscle is bulky here and does not hold suture well. So it is not included in suture in modified Bassini's repair.

MacVay REPAIR :

It is also known as Lothiessan's repair or Cooper's ligament repair. Herniotomy is done. The Cooper's ligament is dissected by dividing the iliopubic tract. Beginning at pubic tubercle, a series of sutures are placed apposing the lower edge of the fascia transversalis and aponeurosis of transversus abdominis with the cooper's ligament upto the medial margin of femoral vein. Femoral ring is closed by interrupted suture apposing the Cooper's ligament to anterior femoral fascia and inguinal ligament. In the lateral part of the transversus aponeurosis and fascia transversalis is apposed to the inguinal ligament with interrupted sutures. The external oblique aponeurosis is sutured in front of the spermatic cord.

LICHTENSTEIN TENSIONLESS REPAIR:

In 1993, Lichtenstein described a technique of repair of both direct and indirect hernia by a tension free technique by placement of a mesh in the defect of inguinal canal, without closing the defect by direct suturing.

Procedure may be done under local anaesthesia. The hernia sac is dealt with by dissecting the sac and invaginating it into the abdomen. In case of large direct hernia this sac may be invaginated by imbricating suture using an absorbable suture to allow proper placement of the mesh.

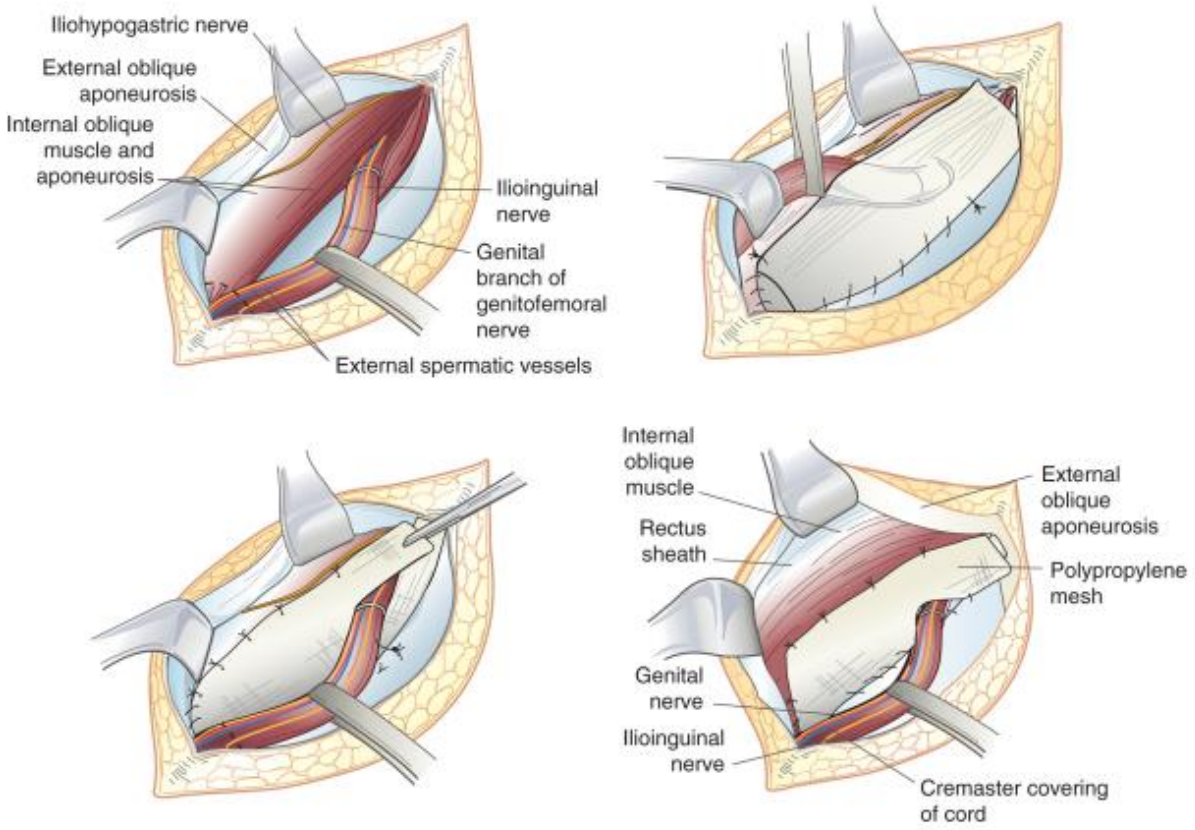

FIG 4. LICHTENSTEIN METHOD OF HERNIA REPAIR

A mesh of size 8 cm * 6 cm is sutured along the lower edge to pubic tubercle, the lacunar ligament and the inguinal ligament beyond the deep ring with a continuous suture of 3-0 polypropylene. The medial edge of the mesh is sutured to the rectus sheath. The superior edge is sutured to the conjoint tendon. The lateral edge of the mesh is split around the cord at the deep inguinal ring. The two split arch of the mesh are then crossed over each other and sutured down to the inguinal ligament to create new deep ring. The external oblique aponeurosis is sutured in front of the spermatic cord.

RIVES PROSTHETIC REPAIR :

Rives recommended placement of mesh in the preperitoneal space. The hernial sac is dealt with. The fascia transversalis is slit open and is dissected all around widely to create a preperitoneal space. The lower margin of the mesh is folded over and stitched to the Cooper's ligament and fascia iliaca. The mesh is passed upward behind the cord, transversalis fascia, transversus abdominis

aponeurosis and rectus sheath into the preperitoneal space. The mesh is fixed above by interrupted suture to the combined thickness of internal oblique, transversus abdominis muscle and the edge of the rectus sheath.

The superolateral edge of the mesh is split to accommodate the cord and the tails of the mesh are also fixed to the full thickness of internal oblique and transversus abdominis muscle. The mesh is covered by suturing the musculoaponeurotic arch of the transversus abdominis and internal oblique muscle and fascia transversalis above to the fascia transversalis and inguinal ligament below. The external oblique is closed in front of the cord. Rives also uses a midline subumbilical abdominal approach with a preperitoneal dissection to place a large sheet of mesh over the inguinal defect between the peritoneum and the abdominal wall. This technique is recommended for difficult recurrent hernia where Cooper's ligament is already destroyed.

LICHTENSTEIN'S TENSIONLESS REPAIR:

Lichtenstein, in 1993, described a tension free technique of repair for both direct and indirect hernia by placement of a mesh in the hernia defect, without closing the defect by direct suturing. The hernia sac is dissected and invaginated in case of direct hernia and, by transfixing at the level of deep ring and excising the excess sac in case of indirect hernia. A mesh of size 8 cm * 6 cm is sutured continuously with 3-0 prolene along the lower edge to pubic tubercle, the lacunar ligament and the inguinal ligament beyond the deep ring. Medially the

mesh is sutured to the rectus sheath. Superiorly it is sutured to the conjoint tendon. The lateral edge of the prolene mesh is split around the cord at the deep

ring. The two split arch of the mesh are then crossed over each other and sutured down to the inguinal ligament to create a new deep ring. The external oblique aponeurosis is sutured in front of the spermatic cord.

STOPPA'S REPAIR :

Stoppa devised a technique called giant prosthetic reinforcement of visceral sac (GPRVS). Here, a large sheet of mesh is placed between the peritoneum and anterior, inferior, lateral wall of abdomen. The mesh lies in the lower abdomen and pelvis, from one end to the other by enveloping the lower half of the parietal peritoneum. The mesh gets incorporated with the parietal peritoneum by scar tissue. By either a midline abdominal incision or Pfannenstiel incision, the mesh may be placed in the preperitoneal space. Unilateral mesh placement may be done by an inguinal incision. The mesh is shaped like a chevron and its width is 2 cm less than the distance between the two anterior superior iliac spines. The vertical dimension equals the distance between the umbilicus and the pubic symphysis. The large prosthesis does not require any anchoring suture, if correctly placed. It may also be fixed by a single suture to umbilical fascia. The stoppa's technique is particularly useful for :

- Elderly patient with bilateral hernias
- Large hernias
- Recurrent hernias
- Patient with collagen disease, Ehler's Danlos syndrome or Marfan's syndrome

PLUG AND PATCH TECHNIQUE :

Gilbert's modification of Lichtenstein repair, known as plug and patch technique, was later popularized by Rutkow and Robbins. Here a prosthetic mesh is placed in similar fashion to Lichtenstein technique (i.e., the patch), and in addition a prosthesis is placed in the internal ring (i.e., the plug). The leaflets of the plug and patch reinforce the internal ring. Initially a flat piece of prolene mesh is rolled into a tight cylinder and placed alongside the spermatic cord as it passes through the deep ring. Presently modifications have included shaping the plug into a flower or umbrella configuration, with the apex pointing intra-abdominally serving as a preperitoneal prosthesis. When the intra-abdominal pressure increases, it acts on the plug, opening its leaflets and creates a protective valve. Preformed plugs in various sizes are available. These plugs are usually fixed to the margins of the deep ring with one or several interrupted sutures.

ILIOPUBIC TRACT REPAIR :

This technique was popularized by Nyhus and Condon. Visualisation of the inguinal ligament is not possible in the preperitoneal approach. The iliopubic

tract serves as an analogous function by providing a strong point of fixation in the preperitoneal space. A preperitoneal tissue-based repair with implantation of mesh is combined in this method. A transverse abdominal incision is made two fingerbreadths above the pubic symphysis and access is gained to the preperitoneal space. Anterior rectus sheath must be incised and the posterior aspect of the sheath is exposed by medially retracting the rectus abdominis muscle. The external and internal oblique muscles, transversus abdominis muscle are incised to reach the transversalis fascia. The preperitoneum is exposed and dissected. The transverse aponeurotic arch is sutured to Cooper's ligament and the iliopubic tract using interrupted stitches and the floor of the inguinal canal is reconstructed and the femoral canal is obliterated by suturing the transversalis fascia to cooper's ligament. The internal ring is tightened by suturing the leaflets of the transversalis fascia to the iliopubic tract. A mesh is placed over the posterior aspect of fascia transversalis fascia and fixed to pectinate ligament and above the inguinal ligament.

KUGEL REPAIR:

Aims to maximize on the preperitoneal approach. Minimises the length of skin and fascia incision. Halfway between the anterior superior iliac spine and

pubic tubercle, an oblique skin incision is made approximately 2 to 3 cm above the internal ring. Muscle splitting incisions made to open the abdominal wall.

Blunt dissection is performed deep to the inferior epigastric vessels, within the preperitoneal space. To prevent recurrence, placing the patch sufficiently posterior is the most critical part. Preperitoneal pocket is created for placing the mesh. A 8 * 12 cm size mesh is placed. It is composed of two sheets of polypropylene and there is a slit in the anterior layer to accommodate a single digit or instrument for mesh positioning. The self-retaining single monofilament fiber around the periphery allows it spring open. The mesh should be placed parallel to the inguinal ligament, with three fifths above the inguinal ligament. The fascia transversalis fascia is closed with absorbable stitch, including the anterior surface of the mesh to prevent its migration.

PROLENE HERNIA SYSTEM:

This technology was constructed for the advantage of having both the anterior and preperitoneal repair by using an open approach. The mesh consists of an onlay patch, an underlay patch and a connector. The underlay patch is kept on the preperitoneal space and the onlay patch is placed along the floor of the inguinal canal. This system overlaps direct, indirect and femoral site defects. The overlay flap reinforces the inguinal floor like that of a tension free repair.

The anterior layer of the mesh is secured to the pubic tubercle, inguinal ligament and the internal oblique muscle. The slit in the overlay flap accommodates the spermatic cord. The bilayer connector prevents the migration

of mesh and ensures its correct positioning. The greatest advantage of this technique is a preperitoneal reinforcement.

LAPAROSCOPIC INGUINAL HERNIA REPAIRS:

Ger in 1979 first performed the laparoscopic groin hernia repair. The laparoscopic approach uses mesh to repair the hernia defect in a plane posterior to the defect (either in the preperitoneal space or from within the peritoneal cavity) and whereas the open approaches repair the hernia anterior to the defect. The predominant techniques of laparoscopic inguinal hernia repair:

1. Transabdominal preperitoneal repair (TAPP)
2. Totally extraperitoneal repair (TEP)
3. Intraperitoneal onlay mesh (IPOM)

TRANSABDOMINAL PREPERITONEAL REPAIR;

This was the first laparoscopic hernia repair technique to be performed. Ports are placed through the umbilicus and on either side of the rectus muscle. The defect is well visualised from the peritoneal cavity. The median umbilical ligament (urachus), the medial umbilical ligament (umbilical artery remnant)

and the lateral umbilical fold (peritoneal reflection over the inferior epigastic vessels) are identified. Superior to the hernia defect, the parietal peritoneum is incised and reflected inferiorly to expose the hernia defect along with epigastric

vessels, Cooper's ligament, the pubic tubercle and the iliopubic tract. The peritoneal sac is pulled back into the peritoneal cavity in direct hernia and a space is created between the peritoneal layer and the transversalis fascia. The peritoneal sac is retracted off from the cord structures in case of indirect hernia or the sac can be divided distal to the internal ring. A large prolene mesh is placed between the peritoneum and transversalis fascia and is tacked to the pubic tubercle, cooper's ligament and anterior superior iliac spine. The incised peritoneal flap is then closed. There is a risk that the mesh will be in direct contact with the bowel and lead to postoperative adhesions.

TOTALLY EXTRAPERITONEAL REPAIR:

It is currently the most popular laparoscopic technique. Repair is done entirely within the preperitoneal space. Here a plane is created between the peritoneum and abdominal wall tissues. This preperitoneal space is insufflated. Inferior to the umbilicus, an incision is made and the ipsilateral anterior rectus sheath is incised. Rectus muscle should be retracted laterally. Preperitoneal space is bluntly dissected to facilitate insufflation. Two additional ports are

placed between the umbilicus and pubic symphysis in the midline. A large prosthetic mesh is placed into the preperitoneal space and positioned deep to the hernia defect from a posterior approach.

INTRAPERITONEAL ONLAY MESH TECHNIQUE :

Developed as a simplified version of the Transabdominal preperitoneal repair. The technique does not require an extensive mobilization of the peritoneal flaps as well as dissection of the preperitoneal space. Here, a large mesh is stapled or sutured directly posterior to the peritoneum. Once the peritoneum scars to the mesh, connective tissue ingrowth occurs and the peritoneum will not be mobile to herniate and the intra-abdominal pressure will keep the abdominal contents posterior to the mesh. There is a high risk of adhesion formation due to direct exposure of mesh to the intra-abdominal contents. Another disadvantage is that, in large inguinal hernias, the mesh and peritoneum can herniate together through the defect.

An issue that has to be studied further in laparoscopic hernia repair is the anatomical disturbance of the space of Retzius. Suprapubic prostatectomy can be performed by dissecting this space and this is made difficult following laparoscopic hernia repair.

COMPLICATIONS OF HERNIA REPAIR:

- Seroma
- Hematoma :
  - Wound
  - Scrotal
  - Retroperitoneal
- Wound infection
- Bladder injury
- Osteitis pubis
- Cord and testicular :
  - Hematoma
  - Ischemic orchitis
  - Testicular atrophy
  - Dysejaculation
  - Division of vas deferens
  - Hydrocele
  - Testicular descent
- Prosthetic complications :
  - Contraction
  - Erosion

- Infection
- Rejection
- Fracture

- Chronic groin pain :
  - Nociceptive:
    - Somatic
    - Visceral
  - Neuropathic:
    - Iliohypogastric
    - Ilioinguinal
    - Genitofemoral
    - Lateral cutaneous
    - Femoral
- Recurrence
- Laparoscopic related :
- Visceral injury :
  - Bowel perforation
  - Bladder perforation
- Vascular injury :
  - intra-abdominal
  - Retroperitoneal

- Abdominal wall

- gas embolism

- Trocar site complications :

  - Hematoma

  - Hernia

  - wound infection

  - keloid

- Bowel obstructions :

  - Adhesions

  - Trocar or peritoneal closure site hernia

- Miscellaneous :

  - Hypercapnia

  - Diaphragmatic dysfunction

- General complications :

    Pulmonary – atelectasis, pneumonia and pulmonary embolism

    Cardiac – particularly in patient with overt cardiac diseases

    Urinary retention

    Paralytic ileus

    Nausea and vomiting

RECURRENCE :

It is rare in the early postoperative setting, occurs secondary to undue tension on the repair, deep infection or tissue ischemia. No advantage in limiting the postoperative activities. As soon as the postoperative discomfort is over, the

patient can return to normal activities. There is no evidence to prove that prolonged rest can reduce the chance of recurrence. It depends on the technique used for hernia repair and not on the postoperative activity of the patient. Emergency surgery for strangulated or incarcerated hernia increases the risk of postoperative recurrence. The inherent inflammation, tissue ischemia and fascial oedema in strangulated hernia provides an environment for hernia repair to be done under undue tension or through unhealthy tissue. Tobacco use and smoking has a role in recurrence of hernia. The relationship between smoking and hernia formation or recurrence was first established in 1981. Research has identified some proteolytic enzymes to degrade the connective tissue components.

INFECTION :

Infection of mesh or hernia wound is an uncommon complication. Infection is an important etiology for hernia recurrence. Incidence of wound infection after hernia repair is 1% or less. Skin flora are the most common organisms when infection occurs and gram positive antibiotics should be given to treat it. When

mesh gets infected, aggressive use of antibiotics is indicated. Mesh removal is rarely done, when mandated, primary closure or redo herniorrhapy should be done. Hematoma formation must be avoided as it provides a nidus for infection deep in the hernia wound and mesh. It is therefore recommended that patient on

aspirin or clopidogrel must to taking the drugs atleast one week prior to the surgery.

NEURALGIA :

Post-operative groin pain (neuralgia) in varying degrees following herniorrhapy is common. The ilioinguinal, iliohypogastric, genital branch of genitofemoral nerve and the lateral femoral cutaneous nerve are most commonly involved. Lateral femoral cutaneous nerve is most commonly involved in laparoscopic hernia repair and the other three nerves are involved in open hernia repair. Entrapment of nerve in the mesh or suture line gives rise to pain. Ilioinguinal and iliohypogastric nerves are injured while elevation of external oblique fascial flaps. The genitofemoral nerve is injured during the cord isolation and cremasteric muscle stripping procedure. This can be avoided by carefully preserving the nerves while dissection or by intentionally sacrificing them at the time of surgery. A region of sensory deprivation in the inner upper thigh and hemiscrotum occurs, but is better tolerated. Nerve injury can be avoided in

laparoscopic repair by avoiding tack or staple placement below the iliopubic tract.

Neuralgias can be managed conservatively in the initial period. Local anaesthetic injection in the affected area can help. When this fails to control the

pain, groin re-exploration should be done and the affected nerve branches must be ligated or excised.

BLADDER INJURY :

Bladder gets inadvertently injured during the direct inguinal sac dissection, particularly in case of sliding hernia. When bladder injury occurs, the sac should be opened and bladder should be repaired in two layers with absorbable sutures. A urethral catheter is placed for a minimum of 1 – 2 weeks.

TESTICULAR INJURY :

Testicular swelling and atrophy occur after inguinal hernia surgery. Oedema or hematoma of the inguinal canal tracks down inferomedially and cause oedema of the scrotum or testis. A tender testicle or an atrophic testicle can occur due to injury to the blood supply to genitals during the surgery, while dissection and isolation of the cord. The testis will atrophy without significant infection. A tender testicle needs ultrasound evaluation to rule out torsion of testes or

abscess. Very rarely testes can go for necrosis and in such cases, orchidectomy is needed.

VAS DEFERENS INJURY :

Rare complication that occurs in male patients after inguinal hernia surgery. Transection of vas is the most serious to occur. It needs immediate

reanastamoses in children and young adult, whereas ligation of both the ends only is needed for older adults. The most worrisome complication of vas deferens inury is formation of antisperm antibodies in the patient's serum and finally leading to infertility.

CONSERVATIVE MANAGEMENT OF INGUINAL HERNIA :

1. NO TREATMENT – this is indicated in a patient
   (i) with severe general ill-health,
   (ii) with a short life expectancy and
   (iii) in those who refuse operation.

In modern anaesthesia, surgery can be safely undertaken in all ages, only those old patients who are suffering from chronic bronchitis and not particularly cured by medicinal treatment may be considered unsuitable for operation.

2. TRUSS :–

A truss does not cure a hernia, with the sole exception of the newborn infants. A truss is used to prevent hernia to come out of the superficial inguinal ring. The requirements are :

(i) that the hernia should be easily reducible,

(ii) that the patient should be reasonably intelligent.

The indications are

(i) those who refuse operation. They must be informed about the complications of using a truss.

(ii) in old patients suffering from diseases like chronic bronchitis, enlarged prostate, constipation, etc., where surgery even if performed runs the risk of recurrence. Moreover severe cardiorespiratory disorder may be to certain extent dangerous for general anaesthesia. In those whose life expectancy is very limited a truss may be indicated.

(iii) in children a truss if properly used continuously for 2 years without allowing the hernia to descend even once during this period, the hernia may be cured by causing adhesions. But it must be remembered that a truss is contraindicated if there is an associated undescended testis. Early operation is indicated in such cases.

The contraindications for using a truss are

(i) when the hernia is irreducible,

(ii) when the patient does strenuous job or suffers from chronic bronchitis,

(iii) when the hernia is associated with an undescended testis,

(iv) if there is an associated huge hydrocele,

(v) if the patient is not intelligent enough to position the truss properly and to clean the hernia area.

Mode of action –

(a) a truss acts by pressing the anterior wall against the posterior wall. It also presses on the deep ring and prevents the hernia to come out.

(b) adhesions gradually develop in the inguinal canal so that the hernia may not find access to come out.

Dangers of using a truss – as a rule the truss should be condemned.

(i) It causes pressure atrophy of the muscles of the inguinal region and considerably reduces the chance of successful operation at a later date.

(ii) Improper use can lead to obstruction or even strangulation of the hernia.

(iii) If it is not used after complete reduction of the hernia it may induce damage to the hernia contents e.g. bowel

(iv) Improper cleanliness of the inguinal region will produce an unhealthy skin which may lead to difficulty in wound healing if operation is undertaken later on. Other skin problems may also appear which will force the patient to reject truss.

(v) Adhesions may develop between the hernia sac and the inguinal canal which is also not good for subsequent operation if required.

(vi) Above all as the chance of strangulation remains there, use of truss should always be condemned.

Method of use –

(a) a truss should be used in lying down position after reducing the hernia completely

(b) Truss should be used throughout the day, except at night. It should be worn again before getting up of the bed.

MATERIALS AND METHODS

- ### Type of Study

Prospective study

- ### Cases

100 cases of inguinal hernia patients admitted at Thanjavur Medical College.

- ### Inclusion Criterias

1. Indirect inguinal hernia
2. Direct inguinal hernia
3. Age 21 - 60 years
4. Good muscle tone

- ### Exclusion Criterias

1. Recurrent hernia
2. Sliding hernia
3. Hypotonia
4. Age more than 60 years
5. Bladder outlet obstruction
6. LRI / COPD
7. Ischemic heart disease

- **Materials Used**

  Polypropylene prosthetic mesh

- **Period of Study**

  July 2010 to June 2012

- **Place**

  Department of General Surgery, Thanjavur Medical College & Hospital

- **Method of Study**

100 Inguinal Hernia patients admitted in Thanjavur Medical College & Hospital during the study period who satisfied the inclusion and exclusion criteria were included in the study. For all these patients, the usual Lichtenstein's repair was not done, but a slightly modified procedure, three stitch hernioplasty was done after getting their consent.

In this procedure the following steps were carried out. The patient was made to lie in supine position after giving spinal anaesthesia. Parts painted and draped. The inguinal skin incision is made in the medial two thirds and 2 cms above the inguinal ligament. Incision deepened to reach the external oblique aponeurosis. Three named veins that are present in the subcutaneous plane are cut and ligated. External oblique aponeurosis cut open along the direction of its

fibres and the superficial inguinal ring is cut open. A plane of cleavage is created between the external oblique aponeurosis and the conjoint tendon superiorly. The inguinal ligament is well defined by dissecting in the floor of inguinal canal. The cremasteric muscle with cord structures is hooked out. Ilioinguinal nerve is preserved to avoid entrapment and chronic pain in the postoperative period. Direct hernia sac, if present (medial to the inferior epigastric artery) must be invaginated by apposing the fibres of transversalis fascia, if the sac is small. For large direct hernias, the sac is opened and the transversalis fascia is repaired. In case of indirect inguinal hernia, the cremasteric muscle fibres are cut open followed by the internal spermatic fascia. The sac is identified as a glistening white structure and is dissected upto the deep ring, after lateralising the cord structures. Sac is cut open at the fundus and the contents, if any must be reduced. Sac is transfixed at its neck and excess sac excised. The sac is pushed inside the deep ring. When the deep ring is patulous, the transversalis fascia is plicated by suture narrowing the deep ring (Lytle's repair). Now the prolene mesh is fashioned as in Lichtenstein's repair, placed and fixed only by three prolene stitches. ***The first stitch is made in the periosteum of pubic tubercle. The second stitch is taken in the inguinal ligament (1.5 cms lateral to pubic tubercle) and the third stitch is from the medial most part of the conjoint tendon*** i.e. the mesh is fixed in the medial

aspect alone. Haemostasis is achieved. Cord structures placed over the mesh. External oblique aponeurosis sutured with polyglactin (vicryl) in continuous stitches. Wound closed in layers. Scrotal support given. Postoperatively the patients were treated with antibiotics and analgesics, and were discharged on second postoperative day.

The patients were followed up intervals of 1 week, 1 month, 3 months, 6 months and 1 year. In the follow up, the patient was assessed for development of any seroma, hematoma, wound infection, chronic groin pain, recurrence, foreign body sinus and their early return to work.

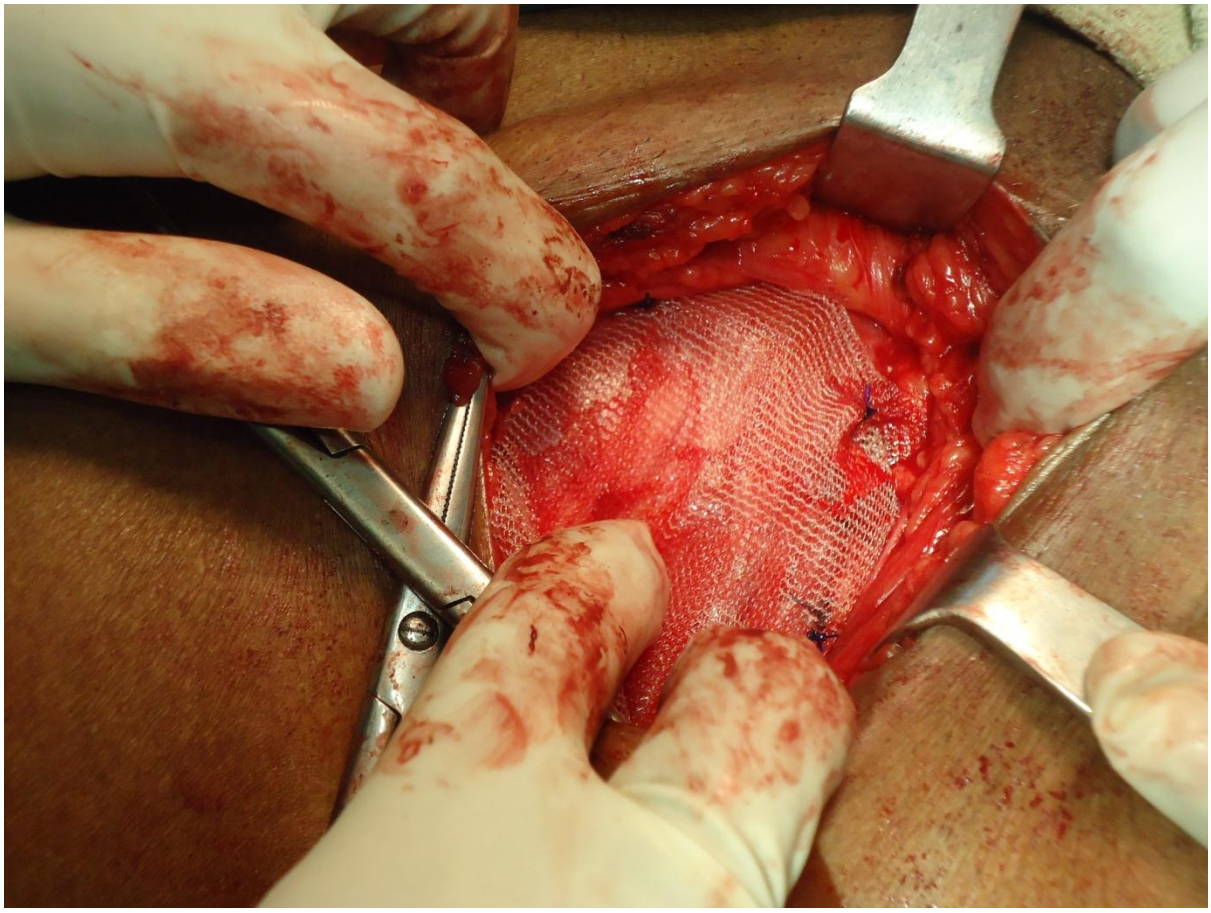

FIG 5. THREE STITCH HERNIOPLASTY

OBSERVATION & RESULTS :

1. **Age incidence** :

All the cases included in this study were in the age group 21 – 60 years.

AGE	PERCENTAGE
21 – 30 years	18 %
31 – 40 years	10 %
41 – 50 years	24 %
51 – 60 years	48 %

2. **Sex incidence :**

All the patients in this study were males only.

	NUMBER	PERCENTAGE
MALES	100	100 %
FEMALES	0	0

3. Side :

Of the 100 cases, 50 cases had right sided hernias and 25 cases had left sided hernias and 25 cases had bilateral inguinal hernias

RIGHT	50 %
LEFT	25 %
BILATERAL	25 %

4. Common presentation :

- Swelling in the inguinoscrotal or inguinal region – 58%
- Pain in the inguinal region/inguinoscrotal region – 16%
- Swelling and pain in the inguinoscrotal region – 26%

5. Time of presentation :

All the cases included in this study were of elective admission only. Emergency cases like obstructed or strangulated inguinal hernia were not included in this study.

6. Postoperative complications :

The patients were examined at regular intervals of 1 week, 1 month, 3 months, 6 months and 1 year for evaluation of postoperative complications and the following observations were made.

1. Seroma –

Among 100 patients followed up in this study, 12 patients developed seroma.

2. Haematoma –

Four patients developed hematoma, out of 100 patients, operated for inguinal hernia by three stitch hernioplasty method**.**

3. **Wound infections –**

Two patients developed wound infection, among the 100 patients operated. The patients were given one preoperative dose and three postoperative doses of parenteral antibiotics. The drug used for this was cefotaxime. The two patients were diabetic and they required additional antibiotics with glycaemic control.

4. **Chronic groin pain –**

Two patients in our study developed chronic groin pain. Chronic groin pain is defined as, the post operative pain which lasts for more than 3 months and contributes to significant morbidity. Pain assessment was carried out by VAS (VISUAL ANALOG SCALE) score with a score of less than 1 as mild, between 1 to 5 as moderate and greater than 5 as severe pain.

As per Lichtenstein et al, in a study performed in 1988 the incidence of chronic groin pain is 1 to 2 per cent. In another study conducted in 104 patients treated by laparoscopic hernia repair, by Panton & Panton in 1994, the incidence of the chronic groin pain is only 1%. In this study the incidence of chronic groin pain is 2%.

In a study conducted in Armed Force Medical College in 2010 by S.S. Jaiswal, R. Chaudhry, A. Agarwal concluded that meticulous identification and preservation of the nerves, using absorbable suture for fixation and ***minimum number of sutures to fix a mesh contributed to low incidence of CGP.***

5. **Recurrence –** Only one patient in our study developed recurrence following three stitch hernioplasty. The patients were followed up at regular intervals of 1week, 1 month, 3 months, 6 months, 1 year and some patients' upto 2 years. Long term follow up was not possible as this is only a prospective study conducted for a period of 2 years Recurrence rate in any meticulously done tension free mesh repair or Shouldice method of hernia repair is less than 2 percent. The recurrence rate in this study is 1 percent, but the study was conducted only for 2 years. Only 50 percent of recurrence will occur in the first 2 years and hence a minimum of 5 years of study is necessary to know the efficacy of the type of hernioplasty done in our study. The patient who developed recurrence in our study had a large defect with thinned out fascio-aponeurotic fibres and he also had postoperative wound infection. Moreover he was also a diabetic. The patient developed recurrence after 1 year and 5 months of hernia surgery.

6. **Foreign body sinus –**

None of the patients in our study developed foreign body sinus as a complication in the follow up.

7. **Early return to work –**

Almost all the patients returned early to their work except two. This was assessed after 4 to 6 weeks of surgery i.e. three stitch hernioplasty. Those who resumed to work before this period were considered to have returned to work early. The two patients had chronic inguinal pain because of which they were disabled from resuming their work.

DISCUSSION

We have come a long way since Bassini first described hernia repair hundred years ago. Now many newer procedures are available for the repair of hernia being practised in various institutions with latest technologies, but the older techniques have not been totally abandoned. Even though there are various laparoscopic procedures for inguinal hernia repair, they are effective only in experienced hands. But for the beginners or learners the experience in open hernia surgery is mandatory.

The aim of our study is to know the efficacy of three stitch hernia repair which when done, with care and precision in selected patients, with careful dissection and proper repair is as effective as any other tension free/laparoscopic procedures.

Our study includes 100 cases of uncomplicated inguinal hernia, for which three stitch hernioplasty was done.

The incidence of immediate postoperative complications like wound seroma, hematoma and wound infections were studied along with long term complications like recurrence, chronic groin pain and fistula formation.

Due to the short period of our cohort study, long term follow up could not be undertaken. In our study, the following results were obtained.

Seroma	12 %
Haematoma	04 %
Wound infection	02 %
Chronic groin pain	02 %
Recurrence	01 %
Foreign body fistula formation	00 %

CONCLUSION & SUMMARY

The incidence of long term complications of three stitch hernioplasty are comparable to that of other standard tension free open hernia repair as well other laparoscopic procedures. But the only limitation we have in our study is the duration. We still need to follow up the cases for a minimum 5 years period to get a standard and reliable result. Moreover the three stitch hernioplasty method is a ***simple method, easy for the beginners to adopt, has less foreign body reaction, less time consuming, causes less tissue trauma, and lesser chance for vascular injury***.

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THANJAVUR MEDICAL COLLEGE

DEPARTMENT OF GENERAL SURGERY

PROFORMA

Name age sex ip no

History

Chief complaints with duration

Predisposing factors

1. Chronic respiratory illness
2. Obstructive uropathy
3. Chronic constipation
4. Trauma

Past history

1. Treatment history
2. History of surgery

Co-morbid illness

1. Diabetes
2. Hypertension
3. CAHD
4. Epilepsy
5. Others

Family history Yes/no

Personal history

1. Smoking
2. Alcohol
3. Betel nut chewing
4. Veg/non veg diet

Examination

Per rectal examination

Prostatic enlargement yes/no

Diagnosis -

Investigations :

Hb TC DC ESR

Blood sugar

Blood urea

Serum creatinine

Chest x ray

ECG ECHO

USG

Pre op preparation

- Pre op medications

Per op findings

Procedure

Post op

1. Post op antibiotics & duration
2. Seroma
3. Hematoma
4. Wound infection
   Pus C&S Organism : Sensitivity:
5. Suture removed on ----- POD

Follow up : 1 week/1 month/3 months/6 months/1 year

1. Pain
2. Foreign body sinus
3. Recurrence
4. Bowel & micturition
5. Resuming work at 6-8 weeks
6. Post-op analgesics duration
7. Any complaints

MASTER CHART

S.NO	NAME	AGE	SEX	IP NO	DIAG	SER	HEM	WI	FB	CGP	REC	ERW
1	KARUPPAIAH	60	M	1350383	RIIH	N	N	N	N	N	N	Y
2	PALANIVEL	45	M	1350371	RIIH	N	N	N	N	N	N	Y
3	SELVARAJ	36	M	1339408	RIIH	N	N	N	N	N	N	Y
4	THANGARAJ	52	M	1323266	RIIH	Y	N	N	N	N	N	Y
5	KANNA	21	M	1322779	RIIH	N	N	N	N	N	N	Y
6	DAKSINAMURTHI	55	M	1345654	RIIH	N	N	N	N	N	N	Y
7	DHARANI	36	M	1345640	RDIH	Y	N	N	N	N	N	Y
8	SAMBANTHAM	58	M	1346902	BDIH	N	N	N	N	N	N	Y
9	KANNAN	35	M	1325121	RIIH	N	N	N	N	N	N	Y
10	MURUGAN	47	M	1340542	BDIH	N	N	N	N	N	N	Y
11	PERIYASAMY	54	M	1340549	RIIH	N	N	N	N	N	N	Y
12	BALU	48	M	1330782	RIIH	N	N	N	N	N	N	Y
13	RAJEEV	26	M	1351954	RIIH	N	N	N	N	N	N	Y
14	ULAGANATHAN	21	M	1356243	RIIH	N	N	N	N	N	N	Y
15	MAHENDRAN	45	M	1335849	LIIH	N	N	N	N	N	N	Y
16	ELANGOVAN	46	M	1340936	RIIH	Y	N	N	N	Y	N	N
17	ISMAIL	57	M	1361637	BDIH	N	N	N	N	N	N	Y
18	MARUTHAN	60	M	1364084	RIIH	N	N	N	N	N	N	Y
19	KARUPPAIYAN	55	M	1364087	RIIH	N	N	N	N	N	N	Y
20	SEKAR	53	M	1366743	BDIH	N	N	N	N	N	N	Y
21	SATISH	27	M	1365299	RIIH	Y	N	N	N	N	N	Y
22	MOHANRAJ	43	M	1365306	BDIH	N	N	N	N	N	N	Y

23	KARUPPAIYAN	55	M	1364087	RIIH	N	N	N	N	N	N	Y
24	MATHIALAGAN	45	M	1367886	RIIH	N	N	Y	N	N	Y	Y
25	KARUPPAIYAN	60	M	1367360	BIIH	N	N	N	N	N	N	N
26	KANTHASAMY	45	M	1371217	BDIH	N	N	N	N	N	N	Y
27	KALIYAN	60	M	1369907	LIIH	N	N	N	N	N	N	Y
28	BALAKRISHNAN	42	M	1372753	RDIH	Y	N	N	N	N	N	Y
29	MANI	40	M	1374004	BDIH	N	N	N	N	N	N	Y
30	SENNASI	55	M	1372746	LDIH	N	N	N	N	N	N	Y
31	KALIYAN	60	M	1369948	RIIH	N	N	N	N	N	N	Y
32	RAJAGOPAL	55	M	1369930	RIIH	N	N	N	N	N	N	Y
33	KARUNANIDHI	42	M	1378791	RIIH	N	N	N	N	N	N	Y
34	THANGAVELU	50	M	1377547	BDIH	N	N	N	N	N	N	Y
35	SUBRAMANIAN	25	M	1378443	RIIH	N	N	N	N	N	N	Y
36	PARAMASIVAM	58	M	1381485	RIIH	N	N	N	N	N	N	Y
37	NAGARAJAN	60	M	1381438	RIIH	N	N	N	N	N	N	Y
38	JERALD	24	M	1382654	LIIH	N	N	N	N	N	N	Y
39	BALASUBRAMANI	60	M	1334721	LIIH	N	N	N	N	N	N	Y
40	MANIMARAN	28	M	1335829	LIIH	N	N	N	N	N	N	Y
41	BALASUBRAMANI	47	M	1334707	BDIH	N	N	N	N	N	N	Y
42	MARUDHU	60	M	1326896	RIIH	N	Y	N	N	N	N	Y
43	GANAPATHY	60	M	1322784	RIIH	N	N	N	N	N	N	Y
44	BALAKRISHNAN	52	M	1337056	LIIH	Y	N	N	N	N	N	Y
45	GOVINDRAJ	55	M	1328494	BDIH	N	N	N	N	N	N	Y
46	ASOKAN	31	M	1328598	LDIH	N	N	N	N	N	N	Y
47	RAJARAM	54	M	1339357	LIIH	N	N	N	N	N	N	Y

48	RAGUPATHI	21	M	1339384	RIIH	N	N	N	N	N	N	Y
49	UTHIRAPATHI	60	M	1326352	RIIH	N	N	N	N	N	N	Y
50	THANGARAJ	58	M	1326349	RIIH	N	N	N	N	N	N	Y
51	BALASUBRAMANI	60	M	1355399	BDIH	N	N	N	N	N	N	Y
52	YESURAJ	27	M	1357349	RDIH	N	N	N	N	N	N	Y
53	MARIYASUSAI	59	M	1340545	RDIH	Y	N	N	N	N	N	Y
54	KAMALUDIN	57	M	1347994	RIIH	N	N	N	N	N	N	Y
55	THANGARASU	50	M	1342606	LIIH	N	N	N	N	N	N	Y
56	MANI	50	M	1341824	LIIH	Y	N	N	N	N	N	Y
57	SUBRAMANIYAN	52	M	1356724	BDIH	N	N	N	N	N	N	Y
58	SIVANANTHAM	24	M	1383824	RIIH	N	N	N	N	N	N	Y
59	VEERAPANDIYAN	28	M	1383862	RIIH	N	N	N	N	N	N	Y
60	GUNASEKAR	48	M	1353301	RIIH	N	N	N	N	N	N	Y
61	CHINNAPPAN	60	M	1381429	BDIH	N	Y	N	N	N	N	Y
62	SARAN	35	M	1385290	LIIH	N	N	N	N	N	N	Y
63	MUNIYARAJ	45	M	1358039	BDIH	N	N	N	N	N	N	Y
64	SENTHILKUMAR	44	M	1348219	BDIH	N	N	N	N	N	N	Y
65	SRINIVASAN	60	M	1385080	BDIH	N	N	y	N	N	N	Y
66	MICHAEL	51	M	1383926	LIIH	N	N	N	N	Y	N	N
67	ANNASAMY	50	M	1383856	RIIH	N	N	N	N	N	N	Y
68	RAFIQ	44	M	1358472	RIIH	N	N	N	N	N	N	Y
69	SOMU	60	M	1354126	BDIH	N	N	N	N	N	N	Y
70	RAMALINGAM	58	M	1343839	LIIH	N	N	N	N	N	N	Y
71	RAMU	55	M	1340609	BDIH	N	Y	N	N	N	N	Y
72	NAGARAJ	56	M	1387761	RIIH	N	N	N	N	N	N	Y

73	BAGYARAJ	24	M	1387717	LIIH	N	N	N	N	N	N	Y
74	DEENADAYALAN	23	M	1389839	LIIH	N	N	N	N	N	N	Y
75	PALANIYAPPAN	39	M	1390571	RIIH	Y	N	N	N	N	N	Y
76	PAPAIYAN	60	M	1391513	LIIH	N	N	N	N	N	N	Y
77	NAMPERUMAL	52	M	1391808	RIIH	N	N	N	N	N	N	Y
78	BHARATHI RAJA	28	M	1395321	RIIH	N	N	N	N	N	N	Y
79	KANDASAMY	42	M	1392850	RIIH	N	N	N	N	N	N	Y
80	GOVINDARAJ	60	M	1395203	BDIH	N	N	N	N	N	N	Y
81	KAMARAJ	28	M	1396352	RIIH	N	N	N	N	N	N	Y
82	MURUGESAN	60	M	1396401	RIIH	N	N	N	N	N	N	Y
83	YOGESH PRABHU	25	M	1397536	RIIH	Y	N	N	N	N	N	Y
84	LOGANATHAN	46	M	1399494	BDIH	N	N	N	N	N	N	Y
85	JAMAL MOHD	59	M	1399920	BDIH	N	Y	N	N	N	N	Y
86	RAVI	40	M	1399891	RIIH	N	N	N	N	N	N	Y
87	ARUL RAJA	22	M	1401248	RIIH	N	N	N	N	N	N	Y
88	MAHALINGAM	56	M	1401122	LIIH	N	N	N	N	N	N	Y
89	PALANI	60	M	1401088	LIIH	N	N	N	N	N	N	Y
90	CHELLADURAI	49	M	1401089	BDIH	N	N	N	N	N	N	Y
91	MANIKKAM	35	M	1403546	BDIH	N	N	N	N	N	N	Y
92	KANNAPPAN	58	M	1402825	LIIH	N	N	N	N	N	N	Y
93	RAJA	29	M	1406936	BDIH	Y	N	N	N	N	N	Y

94	PARAMASIVAM	60	M	1406567	LIIH	Y	N	N	N	N	N	Y
95	KASIRAJAN	36	M	1407995	LIIH	N	N	N	N	N	N	Y
96	KARUPPAIAH	59	M	1407807	LDIH	N	N	N	N	N	N	Y
97	NAGARAJAN	60	M	1412208	LIIH	N	N	N	N	N	N	Y
98	PITCHAI	52	M	1414674	RIIH	N	N	N	N	N	N	Y
99	BALAKRISHNAN	58	M	1417134	LDIH	N	N	N	N	N	N	Y
100	SIVASANMUGAM	44	M	1421340	RIIH	N	N	N	N	N	N	Y

ABBREVIATIONS :

RIIH – RIGHT INDIRECT INGUINAL HERNIA

LIIH – LEFT INDIRECT INGUINAL HERNIA

RDIH – RIGHT DIRECT INGUINAL HERNIA

LDIH – LEFT INDIRECT INGUINAL HERNIA

SER – SEROMA

HEM – HEMATOMA

WI – WOUND INFECTION

CGP – CHRONIC GROIN PAIN

REC – RECCURENCE

ERW – EARLY RETURN TO WORK

FB – FOREIGN BODY FISTULA

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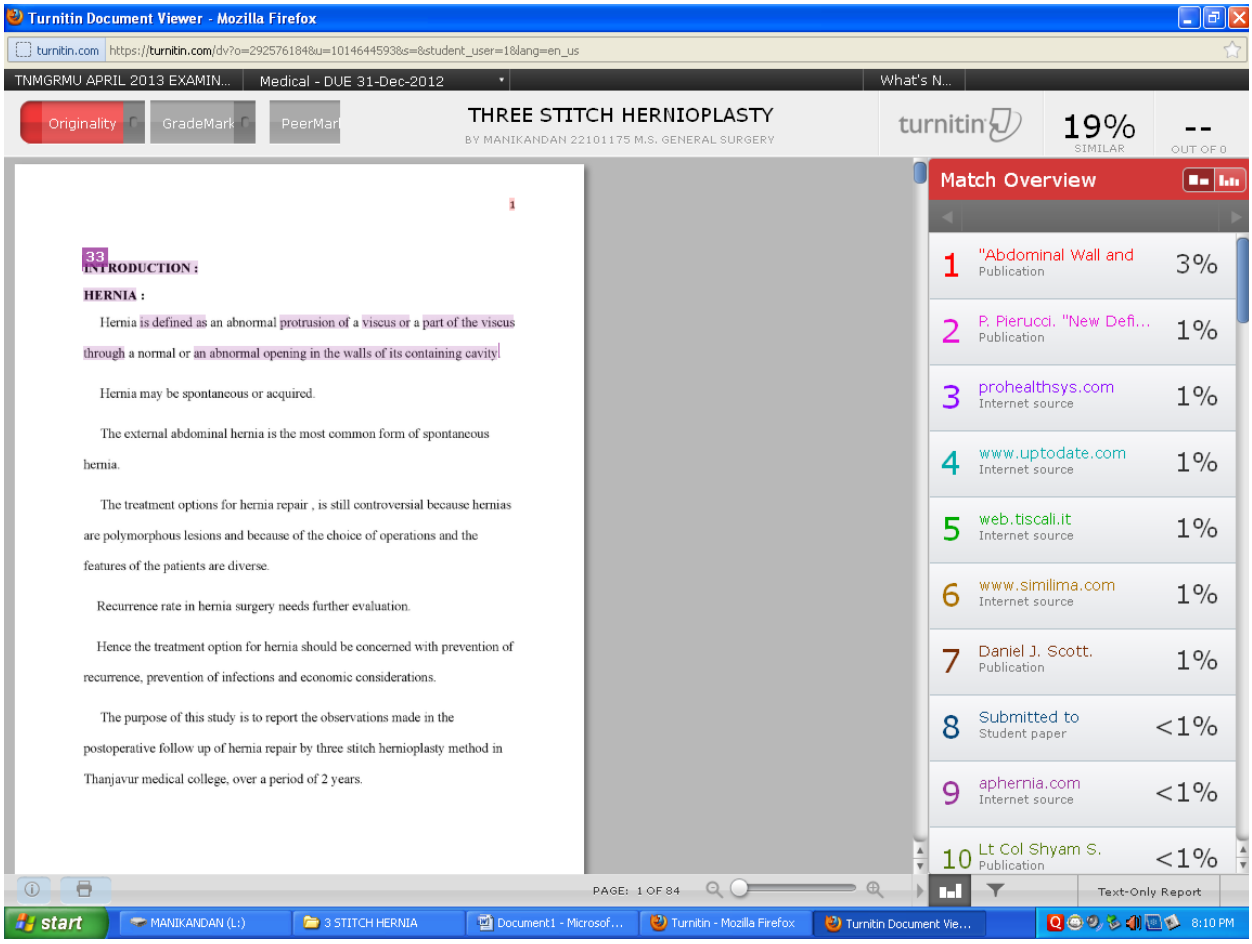
1 INTRODUCTION : HERNIA : Hernia is defined as an abnormal protrusion of a viscus or a part of the viscus through a normal or an abnormal opening in the walls of its containing cavity. Hernia may be spontaneous or acquired. The external abdominal hernia is the most common form of spontaneous hernia. The treatment options for hernia repair , is still controversial because hernias are polymorphous lesions and because of the choice of operations and the features of the patients are diverse. Recurrence rate in hernia surgery needs further evaluation. Hence the treatment option for hernia should be concerned with prevention of recurrence, prevention of infections and economic considerations. The...



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INTRODUCTION :

HERNIA :

Hernia is defined as an abnormal protrusion of a viscus or a part of the viscus through a normal or an abnormal opening in the walls of its containing cavity.

Hernia may be spontaneous or acquired.

The external abdominal hernia is the most common form of spontaneous hernia.

The treatment options for hernia repair , is still controversial because hernias are polymorphous lesions and because of the choice of operations and the features of the patients are diverse.

Recurrence rate in hernia surgery needs further evaluation.

Hence the treatment option for hernia should be concerned with prevention of recurrence, prevention of infections and economic considerations.

The purpose of this study is to report the observations made in the postoperative follow up of hernia repair by three stitch hernioplasty method in Thanjavur medical college, over a period of 2 years.