

**A COMPARISON STUDY ON LAPAROSCOPIC INGUINAL HERNIA
REPAIR WITH MESH FIXATION VERSUS WITHOUT MESH
FIXATION IN TERTIARY CARE CENTRE**

*Dissertation submitted in partial fulfilment of the
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GENERAL SURGERY

REGISTER NO : 221811061



STANLEY MEDICAL COLLEGE

THE TAMILNADU Dr.MGR MEDICAL UNIVERSITY

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MAY 2021

CERTIFICATE

This is to certify that, the dissertation titled “**A COMPARISON STUDY ON LAPAROSCOPIC INGUINAL HERNIA REPAIR WITH MESH FIXATION VERSUS WITHOUT MESH FIXATION IN TERTIARY CARE CENTRE**” is the bonafide work done by **Dr.P.KISHORE** Postgraduate student under my guidance and supervision, in partial fulfillment of the requirements of M.S.Degree General Surgery Examination.

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DECLARATION

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ETHICAL COMMITTEE APPROVAL LETTER



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CONTENTS

SL NO.	CONTENTS	PAGE NO.
1	ABSTRACT	1
2	INTRODUCTION	3
3	AIMS AND OBJECTIVES	5
4	REVIEW OF LITERATURE	6
5	MATERIALS AND METHODS	45
6	RESULTS	49
7	DISCUSSION	67
8	COLOUR PLATES	71
9	CONCLUSION	75
10	ANNEXURE PROFORMA BIBLIOGRAPHY CONSENT MASTER CHART	76

ABSTRACT

Two major problems in using laparoscopic inguinal hernia (IH) repair are recurrences and chronic groin pain (CGP). The procedure uses fixing of the mesh with the tackers which is considered to increase the rate of CGP because of nerve injuries. Thus, mesh without fixation is being proposed but concerns remain regarding increased recurrences. We sought to look at our outcomes after we started using non-fixation of mesh method in totally extraperitoneal repair (TEP). Retrospective review of prospectively maintained database of 100 repairs were done (fixation 50 and non-fixation 50) endeavor to complete a minimum of 6 months of clinical follow-up. The primary objectives were to assess the recurrence rates and CGP and the secondary objectives were to assess operative times, immediate post-op pain, duration of hospital stay, wound seroma and cost. The mean operative times for the fixation and non-fixation groups were 65.74 ± 8.6 and 80.18 ± 6.39 min, respectively ($p < 0.001$). The mean pain score was 3.02 ± 0.38 and 5.02 ± 0.31 ; ($p < 0.001$) in the two groups, respectively. At a mean

follow-up of 6 months the incidence of CGP was 01 (2%) and 2 (4%) ($p = 1.000$) and recurrences were 03 (6%) and 2(4%) in the two groups, respectively ($p = 0.646$). Non-fixation of mesh in TEP though it does not decrease the incidence of chronic groin pain, it does not lead to increased recurrence. Added benefits would be decreased operative times, reduced post-operative pain and decreased costs.

INTRODUCTION

Laparoscopic inguinal hernia surgery abbreviated as LIHS has now emerged as the procedure of choice for the management of complicated hernias like recurrent and bilateral inguinal hernia. While considered as one the options in the management of unilateral inguinal hernia (IH), LIHS has the advantage of short hospital stay in addition to an earlier return to daily activities. This can be attributed to the change in strategies in the management of the different intra-abdominal surgical pathologies through laparoscope in comparison to conventional techniques. From its introduction in 1980s to current day technical variations have constantly arisen in LIHS. However, only totally extra-peritoneal repair (TEP) and trans-abdominal preperitoneal repair (TAPP) are being used predominantly, of which the favoured technique is TEP. From the inception, recurrence after surgery has been the predominant concern, but with evolving techniques its rate has reduced considerably and concern has shifted to other complications like chronic groin pain (CGP) and quality of life (QOL). Literature reports varying incidences of CGP following IH between 0.03 and 31%. CGP singularly significantly alters the QOL following IH surgery and has gained light to work upon. The major cause for CGP is nerve damage during LIHS which happens either during dissection or mesh fixation. The process of mesh fixation is by using laparoscopic tackers using multiple tacks. In an effort to reduce the incidence of CGP over a period of time,

the number of tacks has been gradually reduced to only two – first medially over cooper’s ligament and another at the level of ASIS (anterior superior iliac spine) laterally. Some surgeons have advocated non-fixation of mesh as an alternative for reducing CGP but the risk of IH recurrence due to migration of the mesh post surgery has limited its practice. With ongoing research in this area, results of three meta-analyses has shown that non-fixation of mesh does not lead to increased recurrences. Going with this body of evidence, we started non-fixation of mesh in TEP and this study reviews our experience with non-fixation of mesh and its results.

AIMS AND OBJECTIVES

The purpose of the study is

1. To avoid the post operative pain caused by fixators.
2. To reduce the cost of the procedure by avoiding the fixators used in routine laparoscopic inguinal surgery.
3. To minimize the intra operative duration taken for mesh fixation.
4. To find the early post operative recurrence percentage.
5. To find the incidence of chronic groin pain.

REVIEW OF LITERATURE

Historical Background:

Historical Timeline for Hernia Repair Procedures

1887-1890 Bassini inguinal hernia repair

1903 Silver mesh utilized in ventral hernia repair

1942-1949 McVay (Cooper ligament) repair

1950-1953 Shouldice inguinal hernia repair

1958 Polypropylene used for inguinal hernia repair

1959 Solid PTFE used for inguinal hernia repair

1970 Mesh plug inguinal hernia repair

1975 Stoppa preperitoneal repair

1986 Lichtenstein repair

1992 Laparoscopic inguinal hernia repair

1993 Plug and patch inguinal hernia repair

1998 Prolene hernia system for inguinal hernia repair

2000-2011 Biologic prosthetics

2006 Watchful waiting approach for asymptomatic inguinal hernias

Descriptions about Inguinal hernias and their repair have been recorded from the reign of Egyptians around 1500BC. Yet, the laparoscopic approach to hernias have not been recorded until early 1990s. Considered as pioneer in the arena, RALPHGER performed the first LIHS by the technique of high ligation of hernia sac without using mesh. Following him various transabdominal approaches were advocated and put into wider use, notable among being trans-abdominal preperitoneal and intra-peritoneal onlay mesh repair. However, disadvantaged by high recurrence rates, the intraperitoneal onlay mesh technique was disregarded out of practice. In 1993, McKernan and Laws introduced the Totally Extraperitoneal (TEP) approach for groin hernias to overcome shortcomings associated with opening of peritoneal cavity in trans-abdominal approach as it negates the need for peritoneal incision. Various techniques are in use for accessing pre-peritoneal space including, but not limited to, blunt dissection, using dissecting balloon, a laparoscope and/or dissection with carbon dioxide. The mesh is placed in the pre-peritoneal space and either fixed using staples, fibrin glue or tackers or left unfixed. Laparoscopic approach is favoured for its less post-operative pain and earlier return to activities of daily living in comparison to conventional open techniques. However, LIHS is associated with more postoperative groin pain compared to open surgeries, almost approximately in one fifth of the patients. The implicated cause being fixation of mesh to the groin using metal staples or tacks to fixate mesh to the groin supported by factors like localized pain corresponding to location of fixation and ameliorated

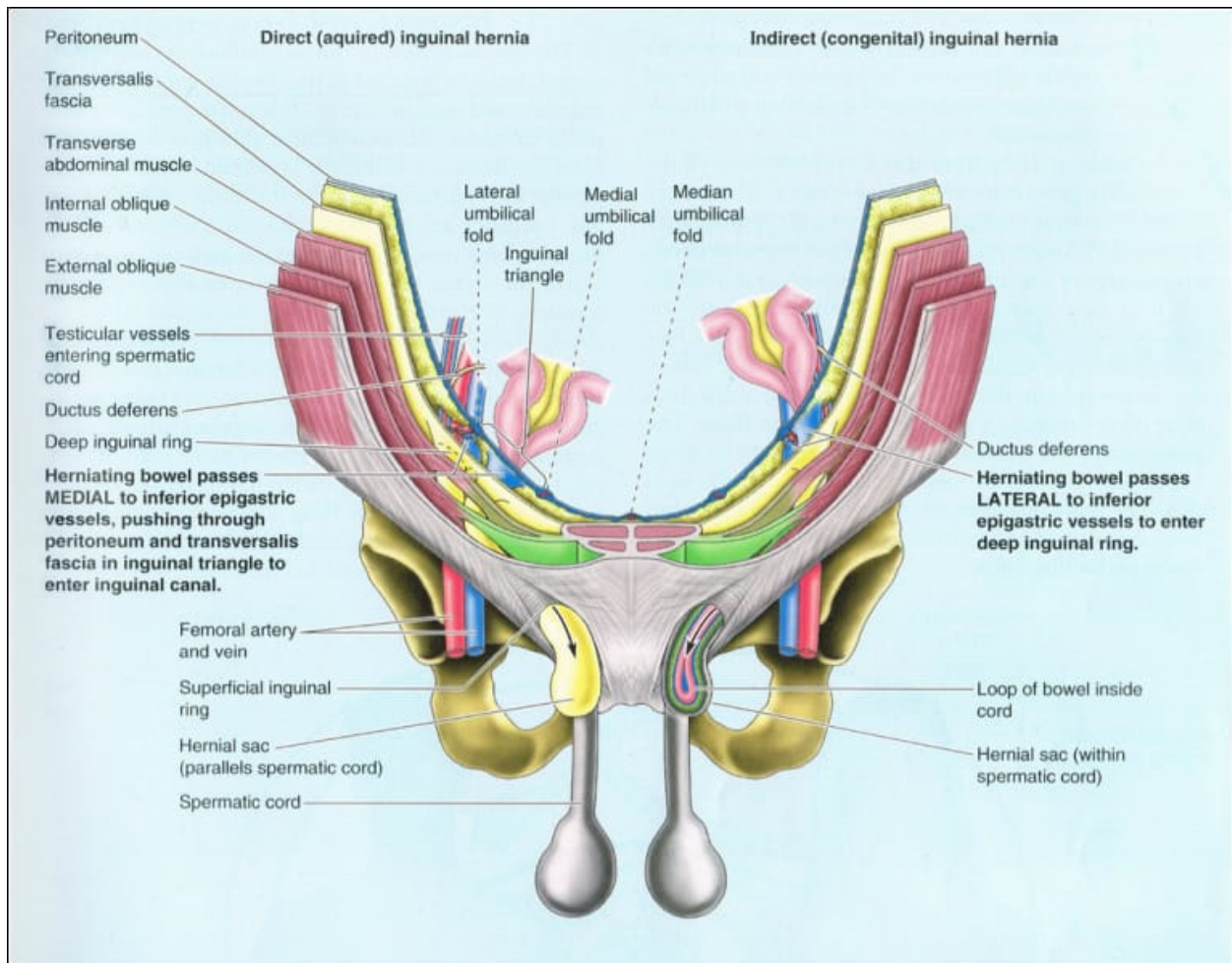
by its removal. This has encouraged the development and use of methods and techniques such as glues, absorbable sutures and acrylate adhesives avoiding the use of such tacks for lesser postoperative pain. However, limited by high cost, technical difficulty and/or longer learning curve stapled fixation is in continued use. While a school of teaching questions the need for fixation of a large preperitoneal placed mesh, contradicting belief by wider surgical community believes mesh fixation to be a vital step in IH repair as it reduces the risk of mesh folding or migration that could potentiate early recurrence, at least theoretically.

INGUINAL HERNIA

The term inguinal hernia originates from the greek word 'hernios' meaning budding.

ANATOMY OF INGUINAL REGION :

Figure 1 : Anatomy of inguinal region

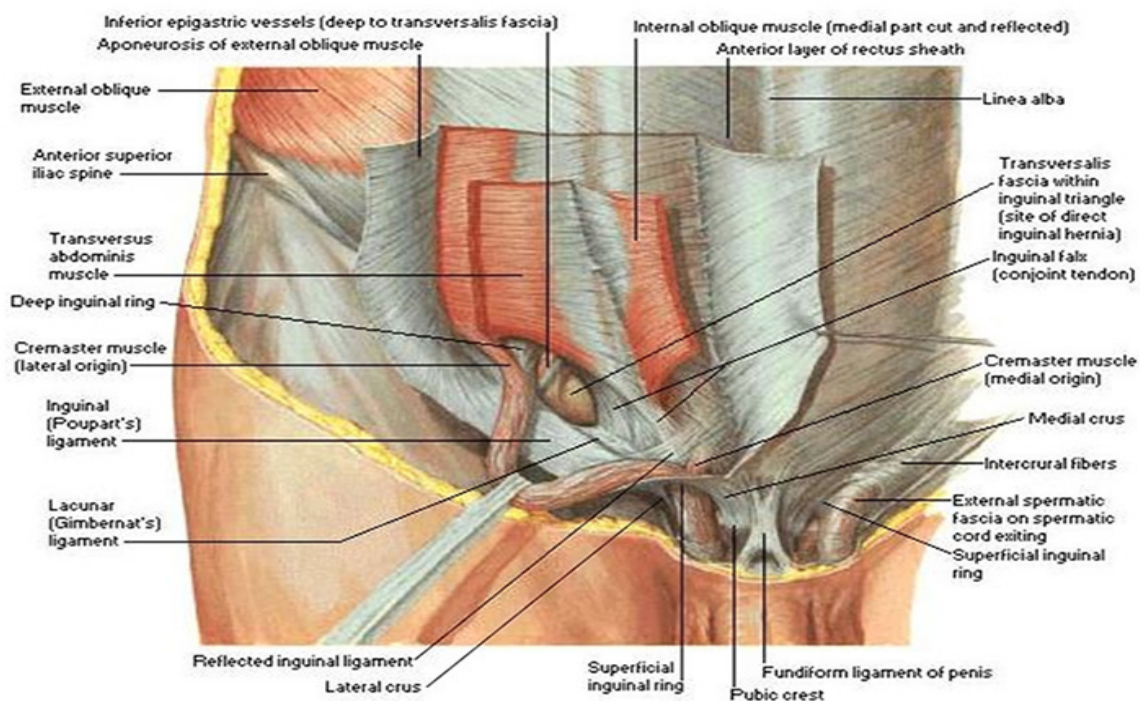


EXTERNAL OBLIQUE MUSCLE AND ASSOCIATED LIGAMENTS

Anterior abdominal wall is formed by predominantly by 4 muscles namely, External oblique, internal oblique, transverses abdominis and rectus abdominis. The external oblique muscle takes its origin from lower eight ribs on their posterior aspect. Then, the muscle fibres are oriented downwards and medially with the upper portion being nearly horizontal middle and lower portions being obliquely oriented. The fibres insert in a fanned out manner onto the xiphoid process, linear alba, pubic Crest and iliac crest. Along the course the direction of the fibres vary as being nearly horizontal in the upper portion to being oblique in middle and lower portions. The anterior inferior fibres fold onto itself and form the inguinal ligament which extend from pubic tuberosity to anterior superior iliac spine (ASIS). The posterior most are nearly vertical extending from the iliac crest to costal margin, which along with the anterior most fibres of latissimus dorsi form the lumbar triangle of Petit. The EOA on reaching the pubic crest divide into two crus - medial and lateral making up a ring named the superficial inguinal ring through which structures such as spermatic cord(round ligament in female), the ilioinguinal nerve and genital branch of genitofemoral nerve pass. After forming the superficial ring, the crural margins continue as the external spermatic fascia. The inguinal ligament besides being an important landmark, also form an important part for anchoring of groin hernia repair supports. The inguinal

ligament is formed by the incurved free edge of the external oblique aponeurosis on its lower border. Due to its connection to the fascia lata of thigh on its lateral margin, the ligament has a caudally directed convexity. The muscles and neurovascular bundles leaving the abdomen to reach the thigh are guarded by the inguinal ligament. Another important landmark at thigh for groin hernia repair is the myopectinal orifice guarded by the superior pubic ligament, lacunar ligament (Gimbernat) along the superior pubic ramus and Coopers ligament (Pectineal ligament) along the perineal line.

Figure 2: Anatomy of inguinal canal



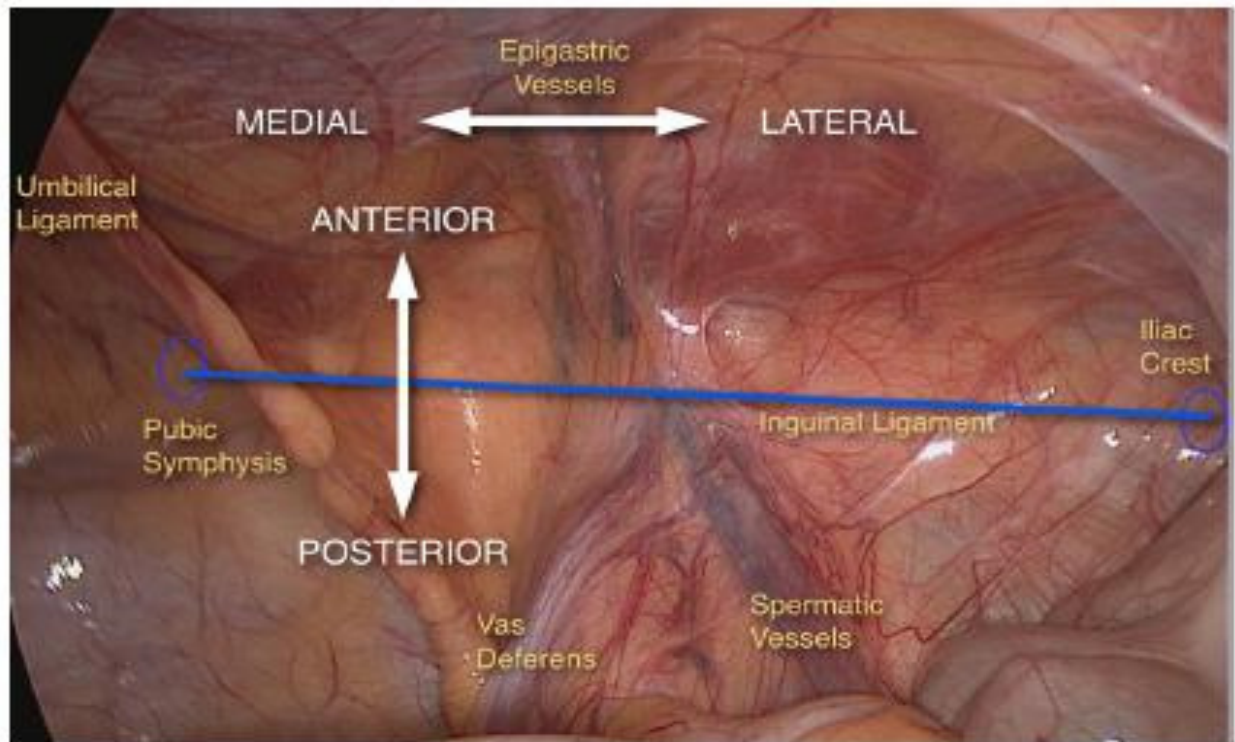
INTERNAL OBLIQUE AND TRANSVERSUS MUSCLES AND APONEUROSIS

Lying immediately below the external oblique, the internal oblique muscle is a broad, thin, muscular sheet arising from the lateral part of inguinal ligament, anterior 2/3rd of iliac crest and lumbar fascia. The muscle is inserted into lower 3 ribs and their costal margins, midline along the lines alba and pubic symphysis. The trans transversus abdominis muscle lies deep to the internal oblique muscle. Arising from the posterior aspect of lower six ribs and costal cartilages, the aponeurotic fibres on the medial aspect contribute to the rectus sheath and partly inserting onto the pectin pubis forming falx inguinalis contributed infrequently by internal oblique aponeurosis. The combined fibres of internal oblique and transversus abdominis form the conjoint tendon or the conjoint arch contraction of which closes the superficial inguinal ring in a shutter like fashion reinforcing the weakest area of groin.

LAPAROSCOPIC ANATOMY OF THE INGUINAL REGION

For surgeons acclimated to open inguinal hernia repairs, laparoscopic hernia repair becomes quite challenging as the entire surgery is approached from a preperitoneal perspective. However, few consistent anatomical variations and their respective viewpoints can be used for better orientation of the plane.

Figure 3: Laparoscopic view of inguinal region



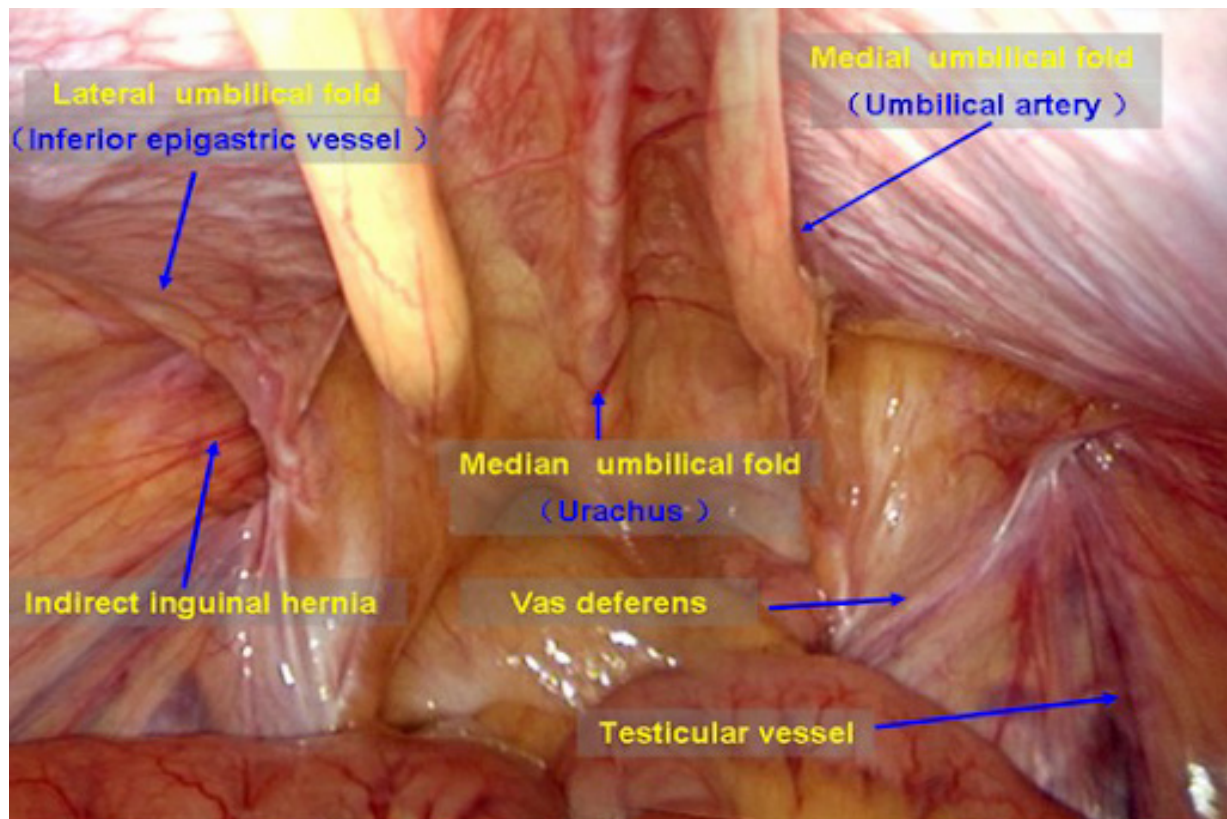
**DEEP ASPECTS OF THE ANTERIOR ABDOMINAL WALL,
PERITONEAL FOLDS, AND ASSOCIATED STRUCTURES**

After pneumatically distending the peritoneal cavity, the anatomical landmarks become easily identifiable. The median, medial and lateral umbilical folds help in identification of various landmarks. The median umbilicus to urinary bladder enclosing the urachus which is the fibrous remnant of allantois. The allantois may not completely obliterate and may form a cystic swelling remnant. The medial umbilical ligament lies on either side of median umbilical ligament and represents

the obliterated portion of umbilical artery which is a branch of internal iliac artery. The superior medical artery supplying the urinary bladder is present in the proximal portion of medial umbilical ligament. The lateral umbilical folds lying on either side of median umbilical folds encases the inferior epigastric vessels, as they course through the posterior rectus sheath and enter the anterior abdominal wall at the level of arcuate line. The suprapubic fossa formed between the median and medial umbilical fold is a potential defect through which suprapubic hernia may develop. The space between medial and lateral ligaments is called the medial which marks the site of direct inguinal hernia. The lateral fossa formed between the lateral umbilical ligament and rectus abdominis on the medial aspect without any well delineated lateral border is the site for congenital or indirect inguinal hernia. Persistent postoperative pain attributable to injury to nerves during laparoscopic procedures may include nerves such as iliohypogastric, genitofemoral, lateral femoral cutaneous and femoral nerve. Nerve injury during laparoscopic hernia repair may cause considerable and often persistent postoperative pain. The iliohypogastric, ilioinguinal, genitofemoral, lateral femoral cutaneous and femoral .The triangle of doom formed by gonadal vessels laterally, vas deferens medially and apex towards the deep ring. The arbitrarily formed inferior border is an interface between the dissected and undirected peritoneum. The external iliac vessels, genital branch of genitofemoral

nerve, femoral nerve and deep circumflex iliac vein lie within this triangle. The triangle if pain, also known as the electrical hazard zone is formed medially by the internal spermatic vessels. Lateral and inferior borders are less well defined and consists of important nerves and vessels including the lateral femoral cutaneous nerve, femoral branch of genitofemoral nerve and the femoral nerve. Identification of avoidance of undue manipulation of the structures in these triangles are important as damage or injury may cause severe postoperative pain.

Figure 4: Laparoscopic view of indirect inguinal hernia



HESSELBACH TRIANGLE AND THE SPERMATIC CORD

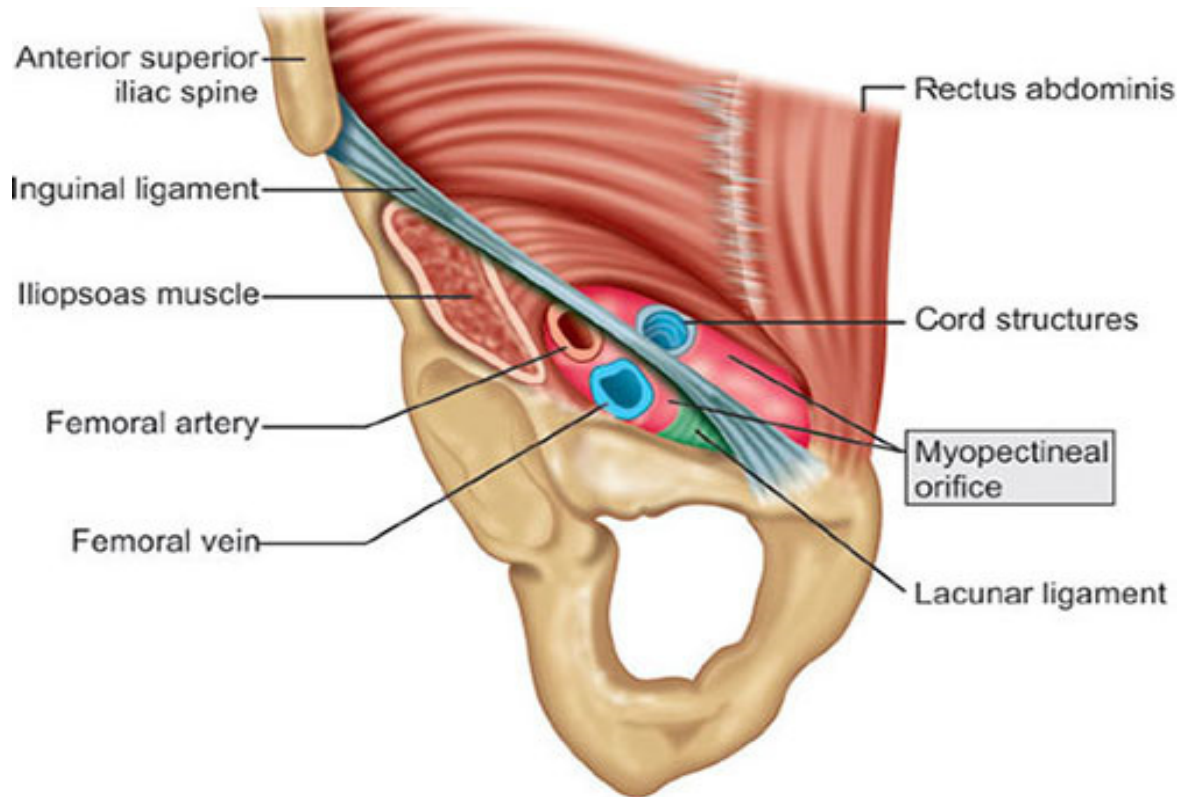
Hasselbach triangle, also known as the inguinal triangle, bounded by rectus abdominis medially, suprolaterally by inferior epigastric vessels and inguinal ligament at the base. The area is deficient anteriorly as it is not covered by any muscle layer and bounded by peritoneum and transversalis fascia. However when one strains, the aponeurotic arch formed by few fibres of transversus abdominis crosses the apex of triangle and reinforces the deficient area. Anatomical variations such as a high arch may predispose to increased weakness and hernia formation.

INGUINAL CANAL:

Inguinal canal is an obliquely oriented tunnel in the anterior abdominal wall between muscle planes. It measures about 4cm situated 2-4cm above the inguinal ligament. It extends from the deep(internal) ring to the superficial(external) inguinal ring. The anterior wall of the canal is constituted by medially by the aponeurosis of external oblique and laterally by internal oblique muscle. The posterior wall or floor is made of transversus abdominis and transversalis fascia contributed medially in addition by the internal oblique aponeurosis. Superior wall or roof is contributed by the arching fibres of internal oblique or transversus abdominis. The inguinal and lacunar ligaments form the floor of inguinal canal.

MYOPECTINEAL ORIFICE OF FRUCHAUD:

Figure 5: Shows myopectineal orifice of fruchard



Fruchard's model of inguinal hernias lie on the belief that groin hernias are formed due to failure of transversalis fascia to retain its power in holding abdominal contents. This common etiology and the weak area which he labelled as 'myopectineal orifice' encompasses direct, indirect inguinal and femoral hernias. It is bounded superiorly by the arching fibres of internal oblique and transversus

abdominis muscles, laterally by iliacus and psoas muscle, medially by rectus muscle along with its anterior lamina and inferiorly by coopers ligament.

Exploration of the above area led to the identification of various preperitoneal hernias, repair of it by placing a mesh between peritoneum and transversalis reinforces weak area of groin hernias.

SYMPTOMS AND DIAGNOSIS

Symptoms of groin hernias include a spectrum between asymptomatic cases to severe pain induced by strangulation or incarceration which may be life threatening. Routine physical examine for any groin swelling may detect asymptomatic cases. Indirect inguinal hernias come to medical attention earlier in view of dragging sensation. Pain may be localised, radiating to testis and may become worse with progression of the day. However, groin strain may present similar to strangulated hernia and distinguishing it may be difficult. Hernia is a clinical diagnosis and any differential may be ruled out by careful physical examination. Finger invagination test may identify hernias that are not clinically obvious. Indirect hernias come out of deep inguinal ring may produce a palpable cough impulse at the tip of finger whereas direct inguinal hernias may produce an impulse at the pulp of finger. Another test helping in differentiating the two is the ring occlusion test. Pressure over the mid-inguinal point may occlude the deep ring and may prevent indirect inguinal hernia but may not prevent direct inguinal hernia

as it originates medial to the occluding finger. Direct inguinal hernias are rare in females as strong transversalis fascia as a result of childbirth reinforce the weak spot. Hence, inguinal hernias in females are invariably indirect or femoral. The indirect inguinal sac in females known as the canal of Nuck represents the unobliterated portion of prenatal peritoneal evagination which covers the round ligament. In females the sac is ligated after cutting the round ligament at the level of deep ring and anchoring of its stump to the internal oblique for support. Femoral hernias appear as swelling 4cm below and lateral to the pubic tubercle. A condition called femoral pseudo-hernia, represent prominent femoral fat, must be distinguished from true hernias. Femoral hernias are relatively rare and account only about 10% of all groin hernias but out of it 40% present at emergency in terms of incarceration or strangulation occurring at increased frequency in men undergoing inguinal hernia repair. Femoral hernias occur at almost equal frequency in men and women but due to relatively less frequency of overall groin hernias in females (men:women :: 7:1), femoral hernias appear to occur at increased frequency in females. Koch et al. reported higher incidence of emergency surgeries in women (16.8%) than men (5%) leading to bowel resection in 16.6% and 5.6% respectively after studying 6895 women. In his study he reported a higher incidence for need for resurgery in women than men. He also reported an increased incidence of post-operative complications in men with recurrence.

Exploration of such hernias led to the identification of femoral hernias in 41.6% of women. Lichtenstein's hernia repair is associated with increased identification of femoral hernias at reoperations as the defect here is failed to be addressed by it. This was addressed by TAPP(Transabdominal preperitoneal mesh repair as the procedure covers the entire myopectineal orifice.The risk of reoperation for recurrence in women was reduced when transabdominal preperitoneal (TAPP) laparoscopic repair was performed that does include Sliding hernia, common among the elder age group with prolonged history of groin swelling, constitute about 1.5% of all inguinal hernias. In such cases, bowel or bladder may form one wall of the hernial sac mostly posterior or lateral. Bowel found is usually sigmoid colon on left side and cecum on right side which might be mistakenly opened for sac producing iatrogenic injury. These sliding hernias characteristically have partial reducibility preoperative. In such cases, a preperitoneal approach, open or laparoscopic may be easier in reducing the hernial sac. Irreducibility or incarceration may be a potential complication in chronic long standing hernias. These incarcerations are due to adhesions developing between the contents and the sac, recent onset of which has a higher incidence of bowel obstruction or strangulation. Bowel obstruction developing in incarcerated hernias are common in recurrent, indirect and femoral hernias. The closed loop between the afferent and efferent limb is more susceptible for gangrene as the pressure inside the lumen,

vessels and lymphatic cannot be dissipated and lead to gangrene and perforation. Xrays are usually diagnostic and taxis helps in reducing the contents in the absence if signs of strangulation. This is achieved by sedating the patient and holding the neck of the sac with one hand and other hand holding the most distal part of hernial sac. The sac is elongated and contents a reduced in a rocking movement. Taxis should be performed only under supervision of a surgeon as during manipulation, contents may perforate, gangrenous bowel may get entangled and or en masse reduction might occur. En masse reduction is reduction of bowel without fibrous ring which may worsen ongoing strangulation. Strangulation, if not managed efficiently is an threatening condition. Patient is clinically toxic, febrile and swelling becomes tense and tender with a bluish tinge to the overlying skin. Laboratory parameters may be deranged with leukocytosis and shift to left along with metabolic acidosis.

Differential Diagnosis for Groin Swelling

1. Groin hernias
2. Malignancies
3. Retroperitoneal sarcomas
4. Metastasis
5. Testicular tumor
6. Ectopic and undescended testicles
7. Varicocele
8. Testicular torsion
9. Psoas abscess
10. Epididymitis
11. Hydrocele
12. Enlarged lymph nodes
13. Hidradenitis
14. Cyst of canal of Nuck (females)
15. Hematoma
16. Saphena varix
17. Femoral aneurysms

Differential Diagnosis for Groin Pain

1. Groin hernias
2. Adductor tendinitis
3. Pubic osteitis
4. Hip arthrosis
5. Bursitis iliopectinea
6. Irradiating low back pain
7. Femoral hernia
8. Endometriosis (females)

RADIOLOGIC INVESTIGATIONS

Although hernia is a clinical diagnosis, radiological investigations may prevent unnecessary exploration of groin. Herniography which is injection of contrast in the intraperitoneal cavity and radiographs of both groins taken in supine and standing position with and without straining of the patient. USG may be used to distinguish obstructed bowel from other causes of groin swellings such as acute lymphadenitis. Dynamic imaging, performed by patient in supine and standing position is useful at times.

Though of limited value in groin pathologies, imaging studies such as CT and MRI are increasingly being used. On cross-sectional imaging hernias appear as bulgings or ballooning of fat or omentum through the inguinal canal. Van den berg et al. compared the efficacy of physical examination, USG and MRI in identifying groin pathologies. By using Laparoscopy as end point, he reported a sensitivity and specificity of 74.5% 96.3% for clinical examination, 92.7% and 81.5% for USG, and 94.5% and 96.3% for MRI. With the development of fast imaging. With the addition of intraperitoneal dyes and dynamic imaging techniques MRI could easily become the investigation of choice in groin pathologies.

CLASSIFICATION OF INGUINAL HERNIA

Inguinal hernias have long been classified as direct and indirect hernias. However, the term groin hernias cover both inguinal and femoral hernias. Currently, most surgeons consider it to be interchangeable and collectively use the terms to describe direct, indirect and femoral hernias. Cooper identified and devised the term direct and indirect inguinal hernia while Hesselbach used inferior epigastric vessels as delineating line between the two. With scientific advancements post 1950s various terminologies and classification systems came into existence. Harcounting his grading system classified groin hernias into 4 grades. Grade 1 consists of indirect infant hernia, grade 2 encompasses simple indirect hernias in older children and healthy young adults, Grade 3 hernia represents "intermediate" types of hernia (larger indirect hernia, inguinal hernias in young adults or small hernias in older patients with strong tissue; direct inguinal hernias in older patients with strong tissue or narrow necks while grade 4 hernias include special types such as recurrent, femoral, direct, and indirect hernias that do not necessarily fit into other categories. The main aim of any classification system is to stratify according to severity so that comparisons can be made with other systems. However, the shortfall of such classification system is that they are reliable mainly on subjective clinical diagnosis has long been an important factor in the development of an universally acceptable classification system. Hence bollinger came with other

properties of an ideal classification. He was of the view that such classification system must be applicable to all approaches such as and posterior and should be based on anatomic location. He also stressed the importance of anatomic function including competency of the internal ring, integrity of the floor, defect size and descent of the sac.

Table 1: various classification of hernia

Modified	Traditional	Nyhus- Stoppa	Modified Gilbert	Schumpelick/ Aachen
IA	Indirect small	I	1	L1
IB	Indirect medium	II	2	L2
IC	Indirect large	IIIB	3	L3
IIA	Direct small	IIIA	5	M1
IIB	Direct medium	IIIA	—	M2
IIC	Direct large	—	4	M3
III	Combined	IIIB	6	Mc
IV	Femoral	IIIC	7	F
0	Other	—	—	—
R	Recurrent	IV A, B, C, D	—	—

Table 2: Properties in classification of hernia

Nyhus	Most commonly used system in the United States, not easy to remember
Gilbert	Lack of description of femoral hernias (has been added in the modification) or combined hernias
Bendavid TDS	Type, staging, and dimension described, but very complex
Aachen	Simple, easy to remember, differentiates between anatomic localization, objective measurement of size of hernia orifice defect
European Hernia Society	Newer system, has objective description of hernia orifice

Table 3: EHS classification of hernia

EHS Classification*	Primary			Recurrent	
Size	0	1: ≤1 finger	2: 1-2 fingers	3: ≥ 3 fingers	X- diffuse defect of transversalis fascia where imbrication is not possible
L: lateral					
M: medial—direct hernia where repair by imbrication of transversalis fascia is possible					
F: femoral					

SURGERY

INDICATION AND ALTERNATIVES

Absolute indications of hernia surgery are bowel accidents including, but not limited to, strangulation and bowel obstruction. Unlike adhesive colic where obstruction might be partial, those caused by hernia are usually complete. Initial resuscitation measures include ryles tube decompression, fluid resuscitation in view to maintain electrolyte balance, prevent dehydration. Conservative line of management is opted only in cases of asymptomatic and mildly symptomatic cases and all Overtly symptomatic cases must be operated. This approach has been proved in two randomised controlled trials as viable options. Patients are usually counselled about the complications of hernia and to return as soon as possible once those symptoms develop. However in infants and young adults immediate surgery is warranted as the clinical course is highly unpredictable. During early weeks of gestation, hernia may be addressed whereas during term, hernia surgery is dealt after recovery. Other indication for hernia surgery is persons undergoing peritoneal dialysis as they become more symptomatic on initiating of treatment and hence prophylactic herniorrhaphy is indicated. If clinical suspicion arises, care must be taken to rule out underlying conditions such as ascites due to liver disease and

colon cancer. After manual reduction of hernia, a mechanical truss is worn to maintain the reduced contents in place and prevents enlargement of contents. However, studies are lacking to definitely ascertain the usage of truss and its effectiveness. However, truss are cumbersome and difficult to use and associated complications include atrophy to cord. Pneumoperitoneum being a surgical alternative to mesh repair has been extensively studied. The object of pneumoperitoneum which is gradually increased with successive sessions increases the room of peritoneal cavity. Many techniques such as daily needle puncture, placement of an indwelling catheter by a percutaneous system or mini laparotomy, or a completely implanted system may be used. Room air is inflated into gradually into the abdomen at a frequency of once or twice daily until the patient complaints of abdominal discomfort which usually measures about 1-2L. Erect Xrays may be useful in determining the amount of pneumoperitoneum.

Table 4: Properties of a ideal prosthetic material

The ideal prosthetic material should:

1. Possess acceptable handling characteristics in the operating room
2. Invoke a favorable host response
3. Be strong enough to prevent recurrence
4. Place no restrictions on postimplantation function
5. Perform well in the presence of infection
6. Resist shrinkage or degradation over time
7. Make no restrictions on future access
8. Block transmission of infectious disease
9. Be inexpensive
10. Be easy to manufacture

Table 5: Criteria in selection of mesh

Type	Example	Notes
Noncomposite heavy-weight plastic meshes	Polypropylene, polyester	Synthetic, nonabsorbable, more data available, most commonly used, scar tissue and adhesions can cause chronic pain and discomfort, direct contact with abdominal viscera can cause bowel obstruction or fistula formation
Noncomposite heavy-weight membranes	Expanded polytetrafluoroethylene (ePTFE)	Has the longest safety history when placed in contact with intraabdominal viscera
Noncomposite light-weight plastic meshes	Polypropylene, Polyester	Better abdominal wall compliance and decreased chronic pain. Long-term results are not available.
Composite prosthesis	Heavy weight 1. ePTFE + heavy-weight polypropylene 2. ePTFE +light-weight polypropylene + PDS memory ring Light weight ePTFE+ light-weight polypropylene	Retains the advantages of the plastic mesh but can be placed intraabdominally because the ePTFE side faces the viscera
Coated prosthesis	a. Light weight or midweight b. Absorbable or nonabsorbable coating Materials for coating: 1. Omega-3 fatty acid 2. Absorbable complex carbohydrate- oat beta glucan 3. Carboxymethylcellulose-sodium hyaluronate-polyethylene glycol 4. Oxidized regenerated cellulose 5. Titanium	Reduced chronic pain and recurrence, no need to close peritoneum in laparoscopic inguinal hernia repair, coating decreases the adherence of protein coagulum and inhibits partially the initiation of the inflammatory cascade
Biological prosthesis	Types: Human dermis, porcine dermis, porcine small intestine submucosa, fetal bovine dermis, bovine pericardium	Used in contaminated fields, acutely incarcerated groin hernias associated with tissue necrosis and/or infection. Concept: possess the strength to withstand the physiological and anatomic stresses of the abdominal wall, while simultaneously acting as a scaffold to support tissue regeneration by providing a matrix for native cells to populate. Theoretically, this latter property makes it more physiological than synthetic prostheses, which heal by scar formation, and may influence the incidence of long-term complications, such as postherniorrhaphy groin pain that affects quality of life. Higher cost, higher recurrence risk.

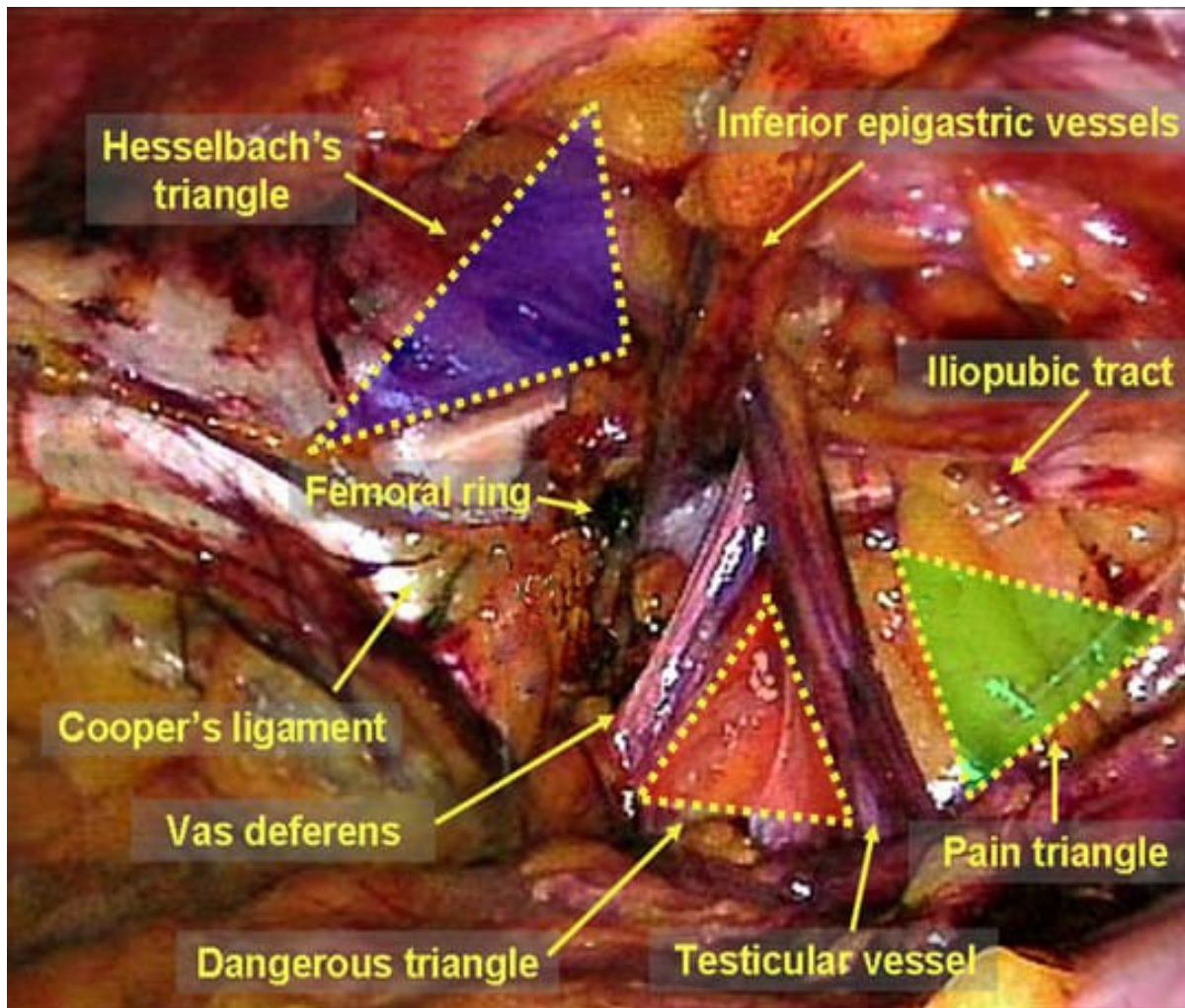
Table 6 : Properties of a mesh

Variable	Consideration
Location	Should not place polypropylene or polyester in contact with abdominal viscera. Long-term results with these materials when coated with an antiadhesion barrier are not available. ePTFE has a lengthy safety record but is less resistant to infection.
Density (g/m ³)	Lightweight prosthetics have been shown to result in better abdominal wall mechanics with less discomfort.
Porosity	Meshes with large pore sizes (1000–3000 μm) have been shown to result in better abdominal wall mechanics with less discomfort.
Density vs. Porosity	Not clear whether the improved abdominal wall mechanics and ↓ discomfort is related to weight or pore size. Most likely a combination of both.
Strength	The improvement in abdominal wall mechanics and ↓ discomfort with light weight, large-pore mesh may be at the cost of an ↑ recurrence rate.
Microporosity	A pore size of 500-600 μm or greater is required to support tissue ingrowth. The pore size of ePTFE, which ranges from 0.5 to 30 μm, prevents the migration of elements required for tissue regeneration. Therefore, when implanted it becomes encapsulated rather than incorporated, which is why it does not erode into surrounding structures. Unfortunately, bacterial migration is still possible at the small pore size, making ePTFE less resistant to infection.*
Contaminated wound, e.g. enterotomy	Best indication for a biologic prosthesis
Infected wound	Best to avoid any prosthetic material. Even biologics perform poorly because of high collagenase concentration

LAPAROSCOPIC INGUINAL HERNIA SURGERY

IMPORTANT NERVES AND VESSELS

Figure 6 : Triangles of inguinal region



Knowing the important landmarks at the myopectineal orifice is important to avoid undue nuisance during laparoscopic repairs. Major nerves of the myopectineal orifice are located lateral to the deep ring and vessels are located medially. Cutaneous innervation from the lumbar plexus are in the form of 5 branches which from lateral to medial are arranged in the following order - lateral femoral cutaneous nerve, anterior femoral cutaneous nerve, femoral nerve, femoral branch of the genitofemoral nerve and genital branch of the genitofemoral nerve. The lateral femoral cutaneous nerve can be traced just medial to the iliac fossa in the iliac fossa. The femoral nerve usually escapes from injuring during dissection as it lies in a trough formed by iliacus and psoas muscle. The external iliac vessels serve as a landmark to differentiate the branches of genitofemoral nerve. The genital branch lies superficial whereas femoral branch lies lateral. The branches are found in the "electrical hazard". 'Triangle of pain' boundaries of which are gonadal vessels medially, anteriorly and inferiorly by the iliopubic tract and laterally by the iliac crest. Use of electrocautery is contraindicated in this area as injury to major neurovascular structures at the myopectineal orifice may cause serious damage. These structures are found inferomedial to the inguinal ligament and include the following - Venous circle, Inferior epigastric vessels, Internal and external iliac vessels, Muscular vessels, Suprapubic vessels, Retropubic vessels, Aberrant obturator artery and/or vein (present in 30% to 40% of cases). The inferior

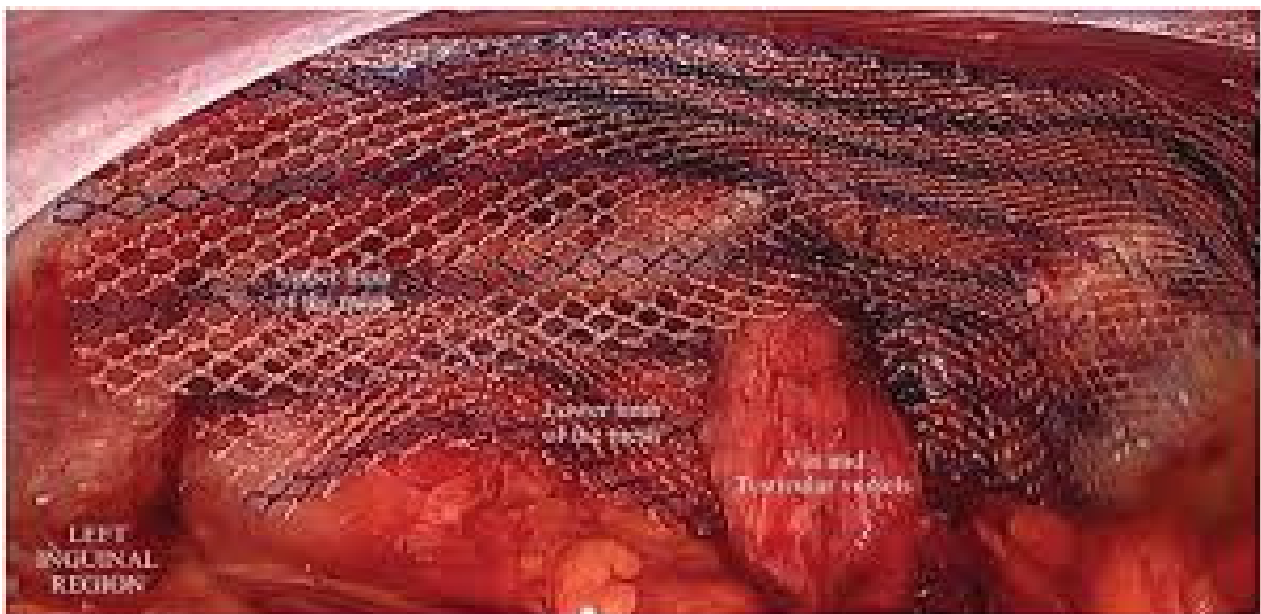
epigastric artery, taking its origin from external iliac vessels, supplies most of the deep anterior abdominal wall muscles. Sometimes, “aberrant” vessels arise from the inferior epigastric system, after arching over the Cooper ligament join the usual obturator vessels to complete a vascular ring. Meticulous dissection in this area is needed as any discrepancy can damage the vessels causing undue bleeding and following death, hence termed “corona mortis” or the circle of death. The torrential bleed could arise either from the arterial or venous system, which could be identified by tracing the inferior epigastric vessels. Care should be taken not to injure the gonadal vessels to prevent ischemic orchitis. The apex of triangle of doom is formed by internal spermatic vessels and ductus deferens which approach the ring from different directions. The triangle is so named because of underlying notorious external iliac vessels, deep circumflex iliac vessels and genital branch of genitofemoral nerve. However, ductus deferens remains difficult to identify in some cases, thus rendering it vulnerable during mesh fixation. Another vessel of importance in this region is the deep circumflex artery which after piercing the transversalis fascia course along the iliopubic tract by running across the iliac fossa. Fixing of mesh to the iliopubic tract may injure this vessel.

OPERATIVE STRATEGIES :

The basic two methods used for laparoscopic inguinal hernia surgeries are TAPP and TEP. The Transabdominal preperitoneal mesh repair aka TAPP initially reaches the intraabdominal cavity like a standard laparoscope and later reaches the preperitoneal space where a mesh is placed. Totally extraperitoneal repair aka TEP, is classically not a laparoscopic surgery as the peritoneum is not breached. Onlay mesh repair, also known as IPOM repair is the placement of mesh in the extraperitoneal space.

TRANSABDOMINAL PREPERITONEAL REPAIR

Figure 7: TAPP approach in inguinal hernia repair



The umbilical port using the Hassons cannula under direct vision. Side ports are placed on either side of umbilical port just at the end of rectus sheath. A diagnostic laparoscopy is initially performed and intra-abdominal contents inspected. Bilateral myopectineal orifice inspected and underlying hernias are noted. Surgery is started with a transverse incision on the medial umbilical ligament on its lateral aspect. The ligament can be completely cut if needed, and any hemorrhage can be controlled with electrocautery. Peritoneum is opened after palpating the anterior superior iliac spine and incising 2cm above it. The preperitoneal space is defined by blunt dissection. Pubic tubercle is identified and dissected upto the contralateral side as ill defined exposure can lead to improper fixation and recurrence at this site. The inferior epigastric vessels, pubic tubercles are well defined. Cord structures are well delineated and mobilized and dissection is carried upto the bifurcation of vas deferens and internal spermatic vessels. Inadequate dissection at the inferior peritoneal flap may cause it to roll up during peritoneal re - approximation which has shown to increase recurrence. During dissection, direct hernial sac easily reduces while small indirect sac can be easily dissected off cord structures. However, the management of larger sacs remain controversial. While some surgeons prefer to entirely reduce the cord structures with contents, some dissect only the proximal portion and dissect the sac at a suitable distance from the deep ring. Undue dissection at the distal sac may lead to disruption of the testicular

vessels which may lead to disruption of testicular vessels leading to ischemic orchitis. A large mesh of size (15×10cm) is used to adequately cover the entire myopectineal orifice. Some surgeon prefer splitting of the mesh laterally to create a new deep ring but no conclusive advantage for the same has been established. However, splitting of the mesh must be adequately repaired as improper repair may lead to recurrence. The controversy regarding the need for mesh fixation is still under debate as fixation methods have been vary by employed in the post-operative pain. Larger mesh avoids the need for mesh fixation which avoids nerve and vascular damage. Larger mesh is started by fixing at the contralateral pubic tubercle extending onto the anterior abdominal wall 2cm above the hernial defect to the anterior superior iliac spine. It is prudent to avoid placement of tacks or staplers below the iliopubic tract, when lateral to the iliopubic tract to avoid nerve injury. Meticulous peritoneal coverage achieved by lowering the pneumoperitoneum and further undermining the inferior peritoneal flap may be necessary. The goal is to make the prosthesis does not come into direct contact with viscera by reapproximating superior and inferior flaps. If this is not possible, the inferior flap must be attached to the transversalis fascia after ensuring complete coverage. Similar dissection is carried out for bilateral inguinal hernias and all structures are dissected except median umbilical ligament to avoid damage to patent urachus. Because both preperitoneal spaces communicate with each other

above the pubic symphysis, it would be prudent to use a single large mesh to cover both spaces. However, placement of two separate mesh do not significantly improve the risk of recurrence.

TOTALLY EXTRAPERITONEAL REPAIR

TEP is-performed using the 3-trocar technique where a 10mm infra-umbilical is first created. The anterior rectus sheath is entered either ipsilaterally or contralaterally. The rectus muscle is retracted and posterior rectus sheath is visualized. Blunt dissection is made between rectus and posterior rectus sheath using laparoscope. Hasson's cannula is inserted in the dissected space and space is created. Using this potential space, plane is created between umbilicus and pubic symphysis. Two more ports are inserted- one 5cm above the pubic symphysis and other between umbilicus and pubic symphysis. Some surgeons use air or fluid filled balloon dissector which has the advantage of direct visualization of the dissecting space as the balloon is transparent. However, the technique has the disadvantage of raising the flap anterior to inferior epigastric vessels which may impair exposure. Thus, dissection of preperitoneal space is complete and dissection proceeds as in TAPP repair.

COMPLICATIONS OF LAPAROSCOPIC INGUINAL HERNIA REPAIR

POST OPERATIVE PAIN

Pain as defined by Taxonomy Committee of International Association for study of Pain (IASP) as "The unpleasant sensory and emotional experience associated with an actual or potential tissue damage or described in terms of such damage".

Postoperative pain is considered a combination of various sensory, mental and trauma which is exacerbated by surgical trauma. The inflammation associated with endocrine, metabolic and physiological responses contribute to pain.

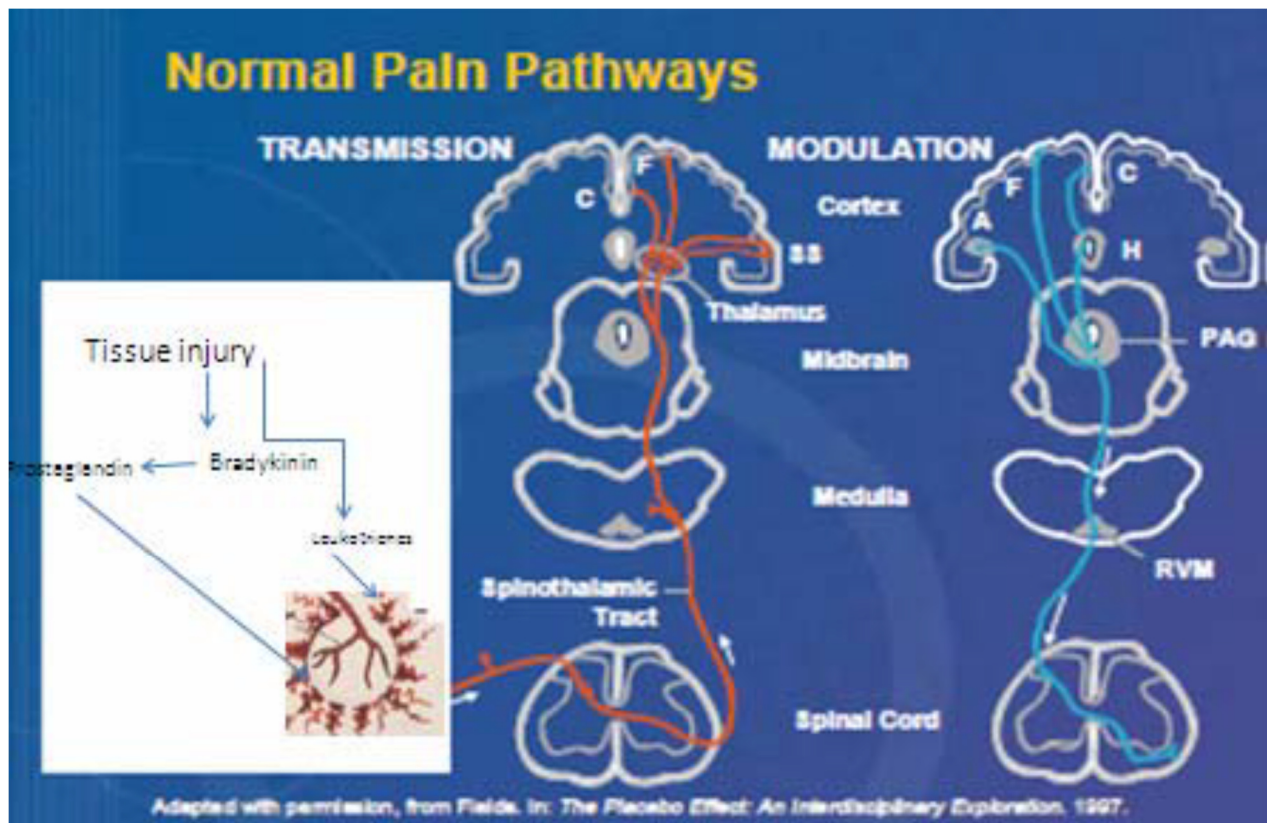
Table 7: Complications of laparoscopic inguinal hernia repair

Associated With Laparoscopy	Associated With Patient	Associated With Hernia Repair	Associated With Prosthesis
Major vascular injury (I)	Ileus (E)	Recurrence (D)	Contraction (D)
Retroperitoneal	Urinary retention (E)	Trocar site problems	Erosion (D)
Intraabdominal	DVT (E)	Hematoma (E)	Folding (E)
Abdominal wall	Cardiopulmonary	Infection (E)	Infection (E, D)
Bowel injury (I, E)	complications (I, E)	Hernia (D)	Rejection (D)
Bladder injury (I, E)		Keloid (D)	Pain (E, D)
Gas embolism (I)		Seroma (E)	
Bowel obstruction (E, D)		Hematoma (I, E)	
Shoulder pain (E)		Groin	
Subcutaneous/preperitoneal		Scrotal	
emphysema (I, E)		Retroperitoneal	
Diaphragmatic dysfunction (E)		Hydrocele (E, D)	
Arrhythmias (I)		Orchitis (E)	
		Infertility (D)	
		Neurologic (D)	
		Groin pain	
		Anesthesia	
		Paresthesias	
		Dysejaculation (D)	

Pathways of pain:

The pathway of pain can be traced via three neuronal pathways. The first order neurons take their origin from the skin receptors and end in the dorsal horn neurons. Cell bodies of those first order neurons lie in the dorsal root ganglion. The axons of the second order neurons cross the midline and ascend in the spinothalamic tract to end in the thalamus. The axons of third order neurons originate from the thalamus, travel via internal capsule and project into post central gyrus.

Figure 8 :



Pain originating after major surgery can be classified based on the duration within which it is experienced. Acute pain starts immediately after surgery and lasts not more than 7 days, while chronic pain is typically for more than 3 months. The receptors for both pains are located in skin, deep structures and hollow viscus. Hence, based on the receptors acute pain can be classified into either somatic pain or visceral pain. Somatic pain can be further classified into:

- a. Superficial somatic pain - sharp pricking pain that can be localized to superficial structures such as skin, mucosa or subcutaneous layer.
- b. Deep somatic pain - dull aching pain that cannot be well localized arising from deep structures like bones and tendons.

2. Visceral Pain:

It is the pain arising from internal organs or its covering. It is usually poorly localized and the character can be described as either colicky or cramping.

Causes of post-operative pain following laparoscopic inguinal hernia repair are multiple including but not limited to damage of free nerve endings during incision and dissection, distention of parietal peritoneum, peritoneal reaction to exogenous

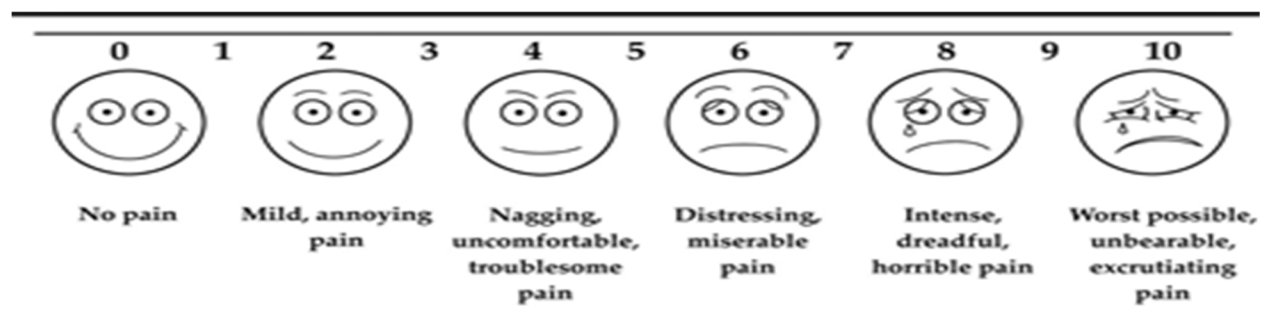
fluids or blood, peritoneal mesh fixators, nerve entrapment in fixed mesh and psychogenic.

ASSESSMENT OF PAIN

In order to assess the response to pain, proper pain assessment scores are needed. Subjective report of pain quantification serves as important tool if the patient is mentally stable enough to comment about the nature of pain.

Visual analogue scale (VAS) :

Though described in 1966, it still serves as the most common tool because of its simplicity. The patient is asked to mark on a 10cm long strip with the extremities named as 'worst pain imaginable' and 'no pain'. The position of mark quantifies pain.



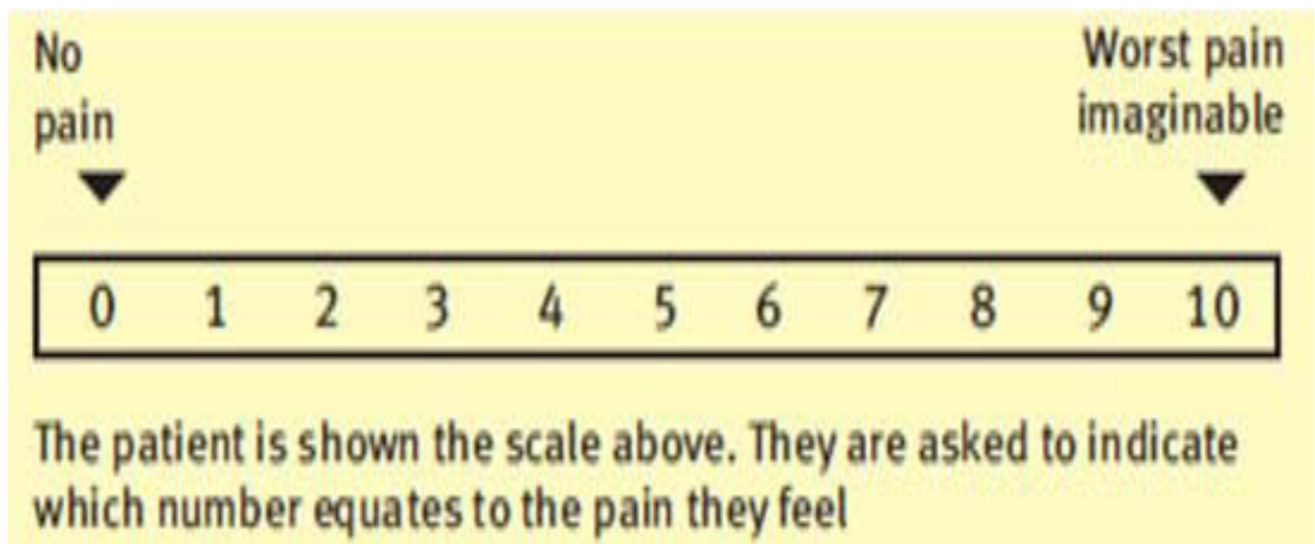
Wong-Baker Faces Pain Rating Scale and Visual Analogue Scale

Facial expressions:

It consists of a pictogram of 6 faces depicting various expressions from happy to tearful. Used generally in patients with communication difficulties such as elderly and children.

Numerical rating scale (NRS):

Similar to visual analogue scale, the range of this scale varies from 'no pain' to 'worst pain' but includes a numerical value of zero. Hence this makes up a 11-point scale.



Verbal rating scale (VRS):

This is four point grading system noting the severity of pain from no pain to severe pain extending through mild and moderate pain. This is an easy tool and hence can be comfortably used even in cognitive impaired patients. Preoperative personality assessment can be used to assess the preoperative psychological status of the patient and expected reaction to surgery. In clinical practice, VRS and NRS are widely used while VAS serves as only a research tool.

MATERIALS AND METHODS

Source (study population)

- The patients admitted in Govt. Stanley Medical College Hospital, Chennai at Department of General Surgery who are having INGUINAL HERNIA.

Duration

- 2 YEARS

Sample size:

- 100 (50 each group)

STUDY DESIGN

- Prospective randomised controlled study

PATIENT SELECTION:

Inclusion criteria:

- Patients giving informed consent for the procedure.
- Only those patients for whom 6 MONTHS follow-up results will be available
- Patients aged more than 18 years of both the genders.

- Patients with/ without any comorbidities.
- Patients with INGUINAL HERNIA
[MEDIAL/LATERAL/COMBINED/RECURRENT]

Exclusion criteria

- Denial of consent
- Patients less than 18 years of age
- Patients who are unfit for general anaesthesia
- Patients having large midline scar

METHODOLOGY

- Study is conducted in Government Stanley hospital after getting institutional

Ethical committee clearance.

- Patients are selected based on inclusion and exclusion criteria.
- Detailed history, physical examination will be done and after doing all

appropriate investigations, Written informed consent will be obtained from all subjects before enrolment in the study.

- Patients enrolled in the study are randomised into Group A and B.

- The patients will be operated on under regional or general anaesthesia.
- In GROUP A, patients will be operated for inguinal hernia by either TEP or

TAPP laparoscopic approach and the mesh will be placed in pre-peritoneal space and mesh fixation will not be done.

- for GROUP B patients mesh fixation will be done using fixators.
- Patients will be blinded regarding the intervention.
- Patients in both groups will be administered intravenous third generation

cephalosporins just before the induction.

- Post operatively both group patients will be given intravenous paracetamol

1g during the day of surgery.

- Post operatively both group patients will be assessed for pain, recurrence

and wound seroma on 24 hours after surgery, on tenth day, at third month follow up and sixth month follow up.

- The severity of postoperative pain will be assessed on a scale of 0 to 10 with help of the visual analogue scale (VAS).

- The wound seroma is defined as soft fluctuant swelling in the inguinal

region post operatively which is a clear serous fluid collection in the plane of dissection.

- Operative duration is defined as the time period from skin incision for ports to the time of port site skin closure.

- Post operative pain and recurrence will be the primary outcome whereas operative duration, cost and wound site seroma will be the secondary outcomes.

- Strict confidentiality of the personal details and information of the patients related to the study will be maintained at all level through out the study.

- Data was entered in Microsoft Excel and analysis was done by appropriate statistical tests.

DATA ANALYSIS

- Statistical data analysis was performed using the SPSS version 17.0
- Qualitative data from the two groups were compared using the Chi-square test or Fischer's exact test while quantitative data compared using the Mann-Whitney U test.

RESULTS AND ANALYSIS

During this study 100 hernia patients were chosen and randomly they are categorised as group A and group B .For both groups TEP procedure was performed without mesh fixation in group A and with mesh fixation in group B.Due to intra operative difficulty 3 cases and 2 cases in group A and B respectively were converted to TAPP procedure and even for those converted cases mesh fixation was not done in group A and mesh fixation done in group B.

Table 8: Descriptive analysis of group in study population (N=100)

Group	Frequency	Percentage
Group A (Mesh without fixation)	50	50%
Group B (Mesh fixation)	50	50%
Total	100	100%

PATIENT DEMOGRAPHICS

Table 9: Comparison of mean age between two groups (N=100)

Parameter	Group		P value
	Group A	Group B	
Age	43.22 ± 13.47	35.74 ± 11.60	<0.001

The mean age groups of patients involved in the study were 43.22+/13.47 and 35.74+/-11.60 in group A(without mesh fixation) and group B(with mesh fixation) respectively. And expectedly, vast number of patients involved in the study were male patients.

Figure 8: Bar chart of comparison of mean age between two groups

(N=100)

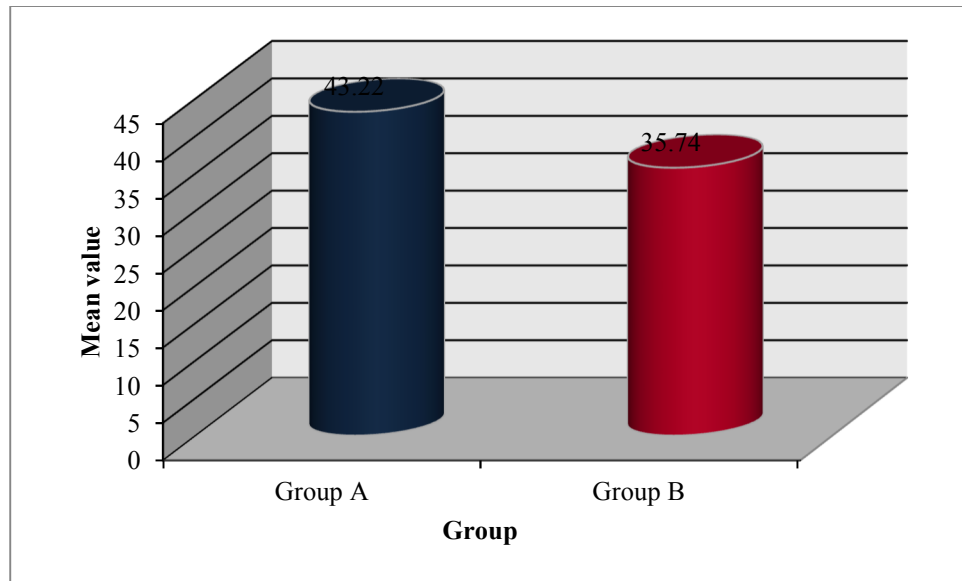
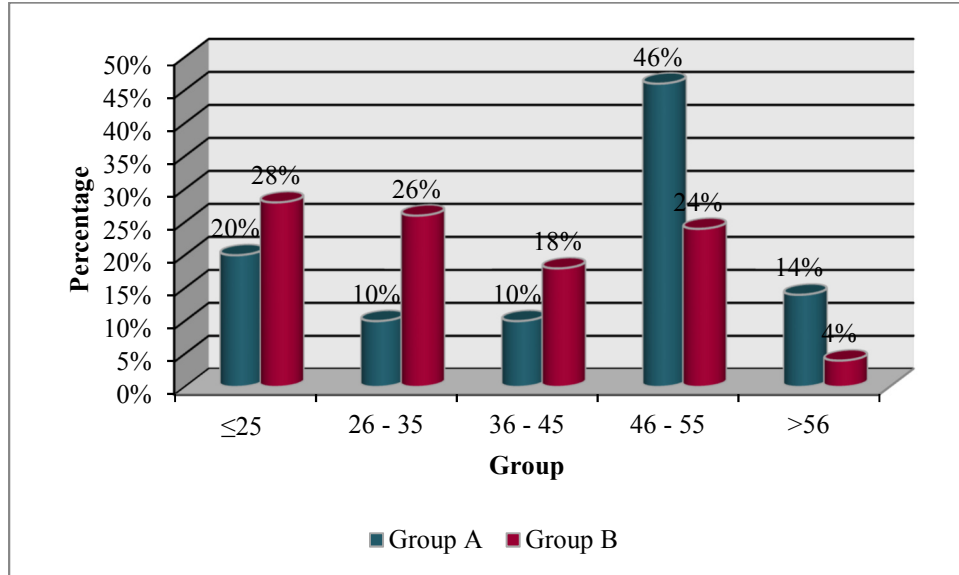


Table 10: Comparison of age group between two groups (N=100)

Age group	Group		Total	Chi square	P value
	Group A	Group B			
≤25	10 (20%)	14 (28%)	24 (24%)	11.60	0.021
26 – 35	5 (10%)	13 (26%)	18 (18%)		
36 – 45	5 (10%)	9 (18%)	14 (14%)		
46 – 55	23 (46%)	12 (24%)	35 (35%)		
>56	7 (14%)	2 (4%)	9 (9%)		
Total	50 (100%)	5 (100%)	100 (100%)		

Figure 9: Cluster bar chart of comparison of age between two groups

(N=100)



HERNIA CHARACTERISTICS

Table 11: Comparison of diagnosis between two groups (N=100)

Diagnosis	Group		Total	Chi square	P value
	Group A	Group B			
Bilateral direct inguinal hernia	3 (6%)	3 (6%)	6 (6%)	17.33	0.008
Left direct inguinal hernia	15 (30%)	10 (20%)	25 (25%)		
Right direct inguinal hernia	12 (24%)	2 (4%)	14 (14%)		
Left indirect inguinal hernia	10 (20%)	12 (24%)	22 (22%)		
Right indirect inguinal hernia	7 (14%)	21 (42%)	28 (28%)		
Left recurrent inguinal hernia	0 (0%)	1 (2%)	1 (1%)		
Right recurrent inguinal hernia	3 (6%)	1 (2%)	4 (4%)		
Total	50 (100%)	50 (100%)	100 (100%)		

In this study bilateral inguinal hernia patients were 3 and 3 in group A and group B respectively . Direct inguinal hernias were 17 and 12 in group A and group B respectively. Indirect inguinal hernia cases were 17 and 33 in group A and group B respectively. Recurrent inguinal hernia cases were 3 and 2 in group A and group B respectively.

SIDE OF HERNIA

In our study, P-value was not significant. Literature suggests that delayed descent of the right testis is responsible for the higher incidence of right sided indirect hernias. Right sided direct hernias can occur following surgeries like appendectomy and injury to ilioinguinal nerve is explained as the reason behind the muscle weakness. So, based on results derived from our study and similar other studies and the existing literature, we arrive at the conclusion that hernia has right sided predominance.

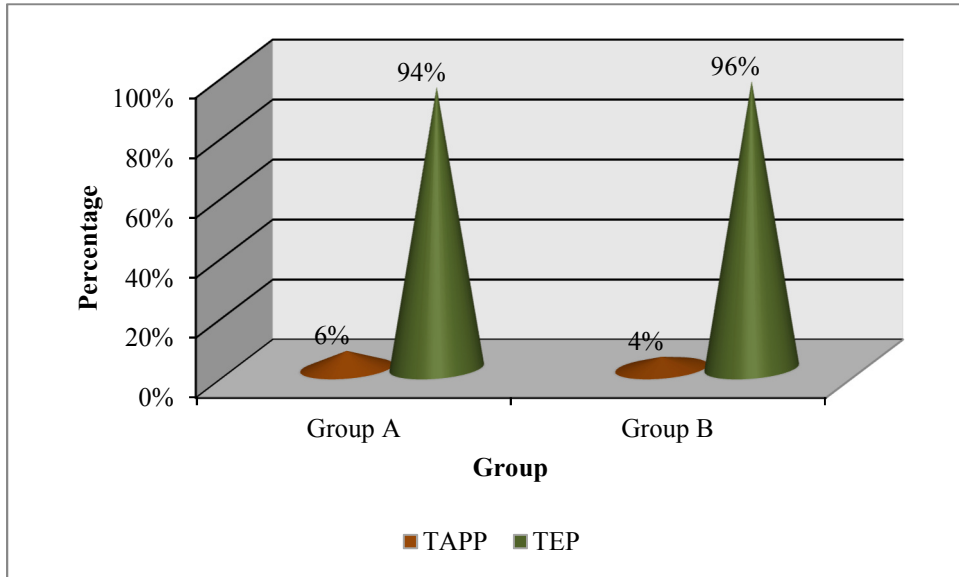
PROCEDURE DONE

Table 12: Comparison of procedure between two groups (N=100)

Procedure	Group		Total	Chi square	P value
	Group A	Group B			
TAPP	3 (6%)	2 (4%)	5 (5%)	0.211	0.646
TEP	47 (94%)	48 (96%)	95 (95%)		
Total	50 (100%)	50 (100%)	100 (100%)		

In this study totally extra peritoneal repair(TEP) was done in all the cases in both group A and group B. Due to intra operative difficulty 3 cases and 2 cases in group A and B respectively were converted from TEP to TAPP(trans abdominal pre peritoneal) procedure was done.

Figure 10: Procedure between two groups (N=100)



POST OPERATIVE PAIN

Table 13: Comparison of mean pain by VAS between two groups (N=100)

Pain by VAS	Group		P value
	Group A	Group B	
Pain by vas after 24 hours	3.02 ± 0.38	5.02 ± 0.31	<0.001
On 10 th day(day of suture removal)	1 ± 0	1.25 ± 0.46	0.170
On 3 rd month followup	1 ± -	1 ± 0	-
6th month followup	1 ± -	1 ± 0	-

Pain intensity had been assessed by a visual analogue scale -VAS (0 (no pain) to 10 (worst pain)). In our study, post-operative pain was studied on 24 hours after surgery, on tenth day, at third month follow up and sixth month follow up.

PAIN AFTER 24 HOURS

Table 14: Comparison of mean pain by VAS between two groups (N=100)

Pain by VAS	Group		P value
	Group A	Group B	
Pain by vas after 24 hours	3.02 ± 0.38	5.02 ± 0.31	<0.001

On analysis of this study, the post operative pain after 24 hours was found to be a score of 3 (mild pain according to VAS) by majority of patients in group A and a score of 5 (moderate pain according to VAS) in group B while few patients in group A were found to have a score of 2 and 4 (according to VAS) and few patients in group B had a pain score of 4 and 6 (according to VAS) with a mean pain score of 3.02±/ 0.38 and 5.02±/ 0.31 in group A and group B respectively which was found to be statistically significant (P value <0.001).

PAIN ON TENTH DAY

On follow up , the mean pain on tenth day follow up was found to be 1 ± 0 and 1.25 ± 0.46 in group A and group B respectively . Though it was higher in fixation group (group B), it was statistically insignificant (P value 0.170).

Table 15:Comparison of mean pain by VAS between two groups (N=100)

Pain by VAS	Group		P value
	Group A	Group B	
On 10 th day(day of suture removal)	1 ± 0	1.25 ± 0.46	0.170

PAIN ON THIRD MONTH FOLLOW UP

Table 16:Comparison of mean pain by VAS between two groups (N=100)

Pain by VAS	Group		P value
	Group A	Group B	
On 3 rd month follow up	$1 \pm -$	1 ± 0	-

PAIN ON SIXTH MONTH FOLLOW UP

Table 17: Comparison of mean pain by VAS between two groups (N=100)

Pain by VAS	Group		P value
	Group A	Group B	
6th month followup	1 ± -	1 ± 0	-

Thus on complete analysis of post operative pain according to VAS , the pain difference after 24 hours of surgery between group A and group B was significantly higher in the mesh fixation group. On tenth day , third month and sixth month follow up the pain difference between group A and B was insignificant. Pain with fixation was thought to be due to nerve irritation or entrapment with fixation devices, foreign body sensation to mesh or fibrosis in inguinal region. We managed the pain with analgesics, requirement of which was significantly more in fixation group, both with suture or tacker fixation.

CHRONIC GROIN PAIN

Chronic groin pain (CGP) in inguinal hernia surgery which is defined as persisting pain for more than three months. In this study the CGP incidence was found to be insignificant in both groups A and B.

HERNIA REOCURRENCE

Table 18: Comparison of recurrence on 6 months follow up between two groups (N=100)

Recurrence on 6 months follow up	Group		Total	Chi square	P value
	Group A	Group B			
Negative	47 (94%)	48 (96%)	95 (95%)	0.211	0.646
Positive	3 (6%)	2 (4%)	5 (5%)		
Total	50 (100%)	50 (100%)	100 (100%)		

Recurrence occurred in 3(6%) patients and 2(4%) patients in non-fixation and fixation groups respectively and on comparison which was statistically insignificant (P value 0.646).

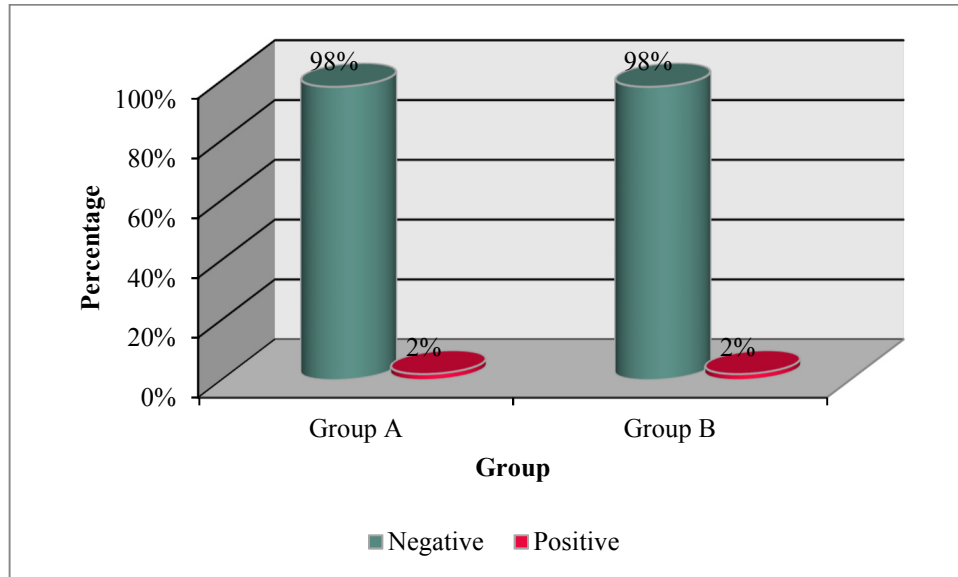
WOUND SEROMA

Wound seroma collection (sterile serous fluid collection) occurred post operatively in one patient (2%) in both groups A and B which was found to be statistically insignificant (P value 1.000)

Table 19:Comparison of wound site seroma between two groups (N=100)

Wound site seroma	Group		Total	Chi square	P value
	Group A	Group B			
Negative	49 (98%)	49 (98%)	98 (98%)	0.00	1.000
Positive	1 (2%)	1 (2%)	2 (2%)		
Total	50 (100%)	50 (100%)	100 (100%)		

Figure 11: Cluster bar chart of comparison of wound site seroma between two groups (N=100)



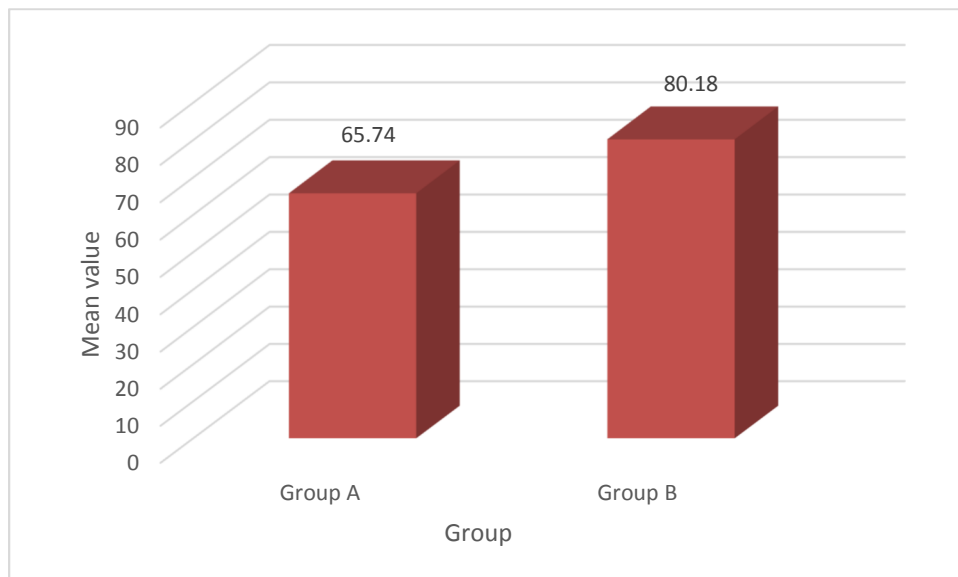
OPERATIVE DURATION

Table 20: Comparison of mean operative duration (mins) between two groups (N=100)

Parameter	Group		P value
	Group A	Group B	
Operative duration (mins)	65.74 ± 8.62	80.18 ± 6.39	<0.001

The intra operative duration which is the time from skin incision for the ports to the time of port site skin closure on analysis was found to be having the mean duration of 65.74 +/- 8.62 minutes and 80.18 +/- 6.39 minutes for the group A and group B respectively . On comparison the mean operative duration higher in mesh fixation group which was statistically significant (P value < 0,001).

Figure 12:Bar chart of comparison of mean operative duration (mins) between two groups (N=100)



HOSPITAL STAY AND RETURN TO NORMAL ACTIVITY

The hospital stay and days taken to return to normal activity were similar in both the groups.

DISCUSSION :

Inguinal hernias being the most common hernia contribute significantly to general surgeons workload. However, CGP and recurrence are significant downsides of hernia surgery. Mesh fixation by tackers or staplers during Laparoscopic inguinal hernia surgery(LIHS) is routinely done to prevent migration of mesh which may contribute to hernia recurrence. However, such fixation in itself has been shown to be the initiator of acute and chronic groin pain. After fixation of mesh, cellular ingrowth occurs within a period of 2 weeks which collagen deposition leading to permanent fixation of mesh occurs in a period of 2 months. Hence, opposition for mesh fixation to reduce the incidence of groin hernias has grown in the recent years. Three meta analysis show that recurrence rates are not significantly increased by non-fixation of mesh. The long term recurrence rate following TEP has been estimated to be 1% by the end of 5years. However the current study aims at establishing the early recurrence of hernia following LHIS. This is based on the fact that mesh nonfixation can lead to mesh migration and uncovering of hernia defect before significant tissue ingrowth could occur. Hence, a followup period of 6months had been fixed for this study. The preperitoneal space easily seals up and hence significant mesh migration do not occur due to its intrinsic stability. Choy et al. confirmed such intrinsic stability by observing mobility of mesh by re-laparoscopy and on table cycles of hip flexion.

This was supported by Irving et.al who used postoperative xrays for confirmation. This is based on the sandwiching of mesh between the peritoneal layer and anterior abdominal wall. Mesh migration can be further decreased by limiting the lateral dissection of anterior abdominal wall. Pioneers such as Ferzli and Stoppas also supported that nonfixation of mesh. They were of the view that long term success of LHM depends on adequate covering of all potential hernial space and using adequate sized mesh. In our study, statistically significant difference was appreciated between Group A (without fixation of mesh) and Group B(with mesh fixation). Post operative pain after 24 hours was found to be with a mean pain score of 3.02 ± 0.38 and 5.02 ± 0.31 in group A and group B respectively. The mean pain on tenth day follow up was found to be 1 ± 0 and 1.25 ± 0.46 in group A and group B respectively but was statistically insignificant (P value 0.170). Chronic groin pain (CGP) following LHM is the pain that lasts more than 3 months. Our present study showed insignificant difference in incidence of CGP among both groups consistent with previous studies by Buyukasik et al. Girish et al. Moreno-Egea et al. and Muthukumar et al. where patients in both groups did not experience any pain at all. Tam et al. compared the incidence of neuralgia in both groups and found that throughout the followup period only 3 patients showed pain postoperatively. However study by Raghu et al. showed that postoperative pain in mesh fixation group was significantly higher in mesh fixation group when

rated postoperatively. Buyukasik et al. showed similar results and attributed the pain to damage to nerves due to fibrous ingrowth around tacks which could go on to involve nerves, with increased incidence with the number of tacks. Hence, it has been postulated that placement of tacks at ASIS and Coopers ligament could decrease the nerve damage and to place any additional tack, if necessary, above the iliopubic tract as nerves lie below this level. However, anatomical variations may be seen in about 15% of the cases where the nerves may course above the tract. This study also compared the recurrence rate among both groups and showed statistically insignificant difference among both groups with incidence of 6% and 4% in non-fixation and fixation groups respectively. In a 5-year followup study by Ayyaz et al. on 63 patients, only one recurrence was noted in mesh nonfixation group. Sajid et al. compared 691 patients with fixation and non-fixation of mesh and found four and three recurrences in either group respectively. In contrast, zero recurrence rate was reported by various studies done by Buyukasil et al., Messaris et al., Girish et al and Chauhan and Chheda. Another significant outcome of this study is the operative duration between non fixation and fixation groups with mean duration of 65.74 +/- 8.62 minutes and 80.18 +/- 6.39 minutes respectively . As expected, the mean operative duration was significantly (P value <0.001) higher in mesh fixation. This is similar to a study by Garg et al. who after studying 104 patients showed significantly higher operative duration in mesh fixation group

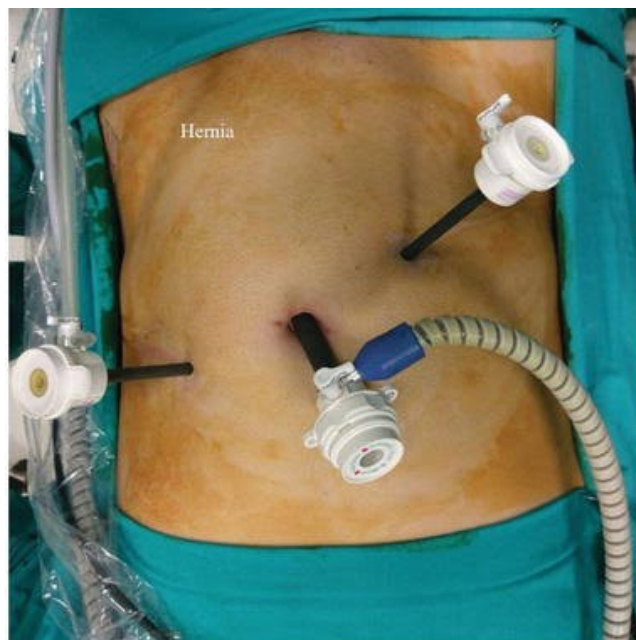
(37.7±4.3 min) than nonfixation (35.9 ±3.6 min) (P=0.022). Similar results was shown by Tam et al. Tackers in addition to bearing extra time to fix also has the disadvantage of being costlier. One randomized trial reported that the difference in the two groups was \$120 . Ours is a government-funded hospital and as such estimating costs to the patient is difficult to assess accurately. An endoscopic tacker costs around rupees 20,000. Since the procedure remains the same except for the use of tacker, we can assume that this would be the difference in the cost. Also, in this study wound seroma occurred post operatively in one patient in both the groups which was statistically insignificant. The hospital stay and days taken to return to normal activity were similar in both the groups.

COLOUR PLATE

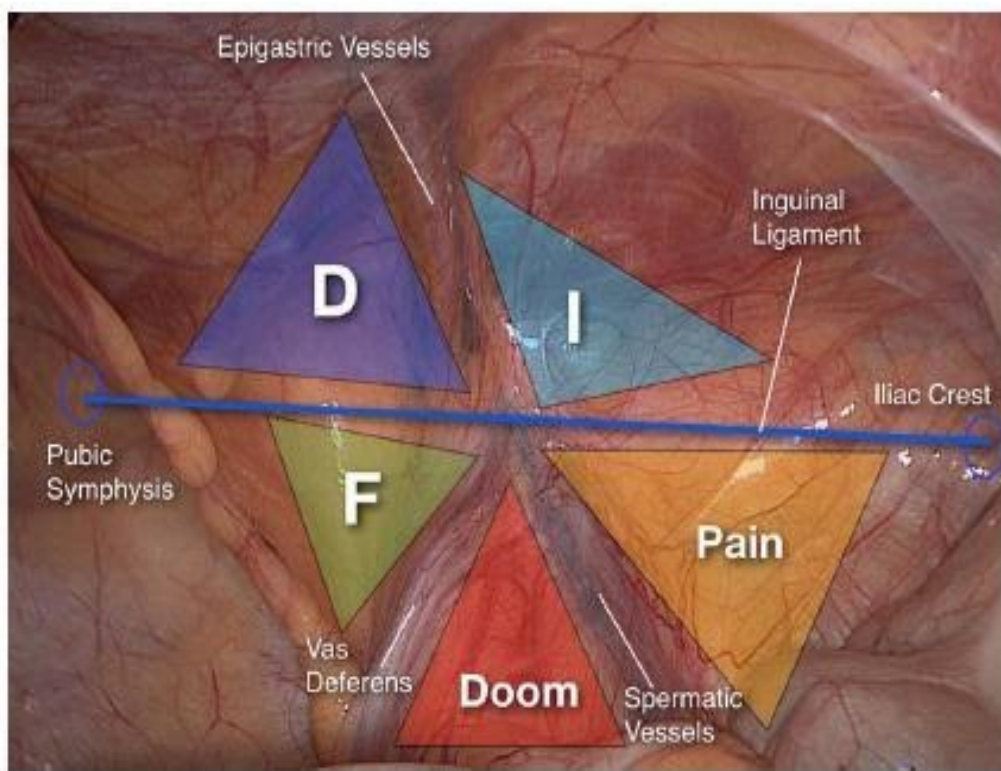
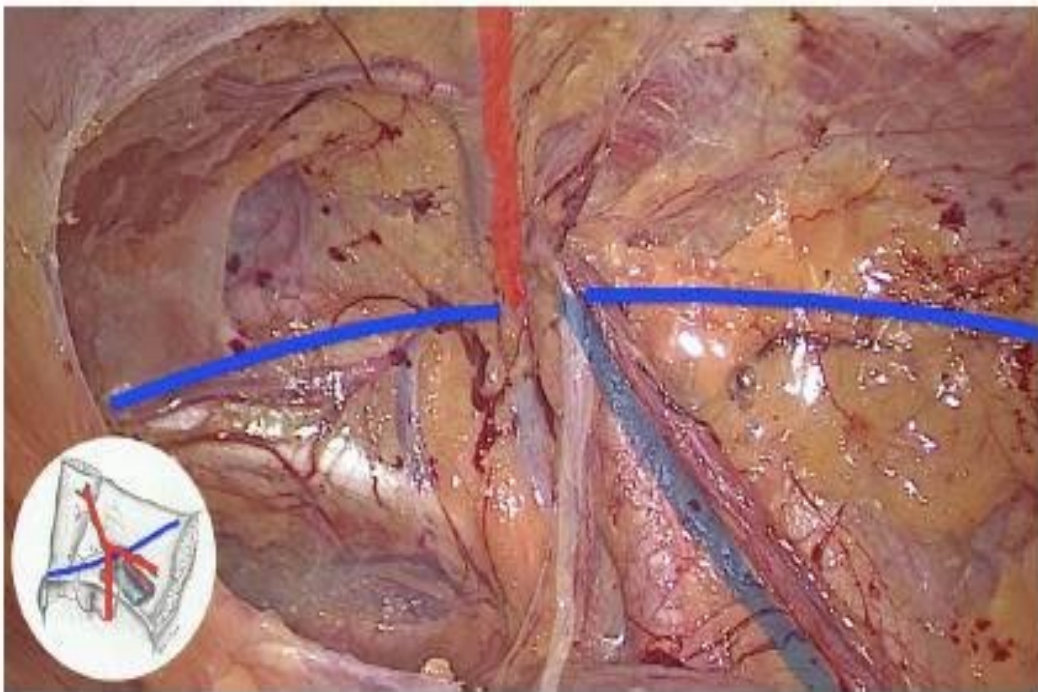
PORT PLACEMENT IN TEP



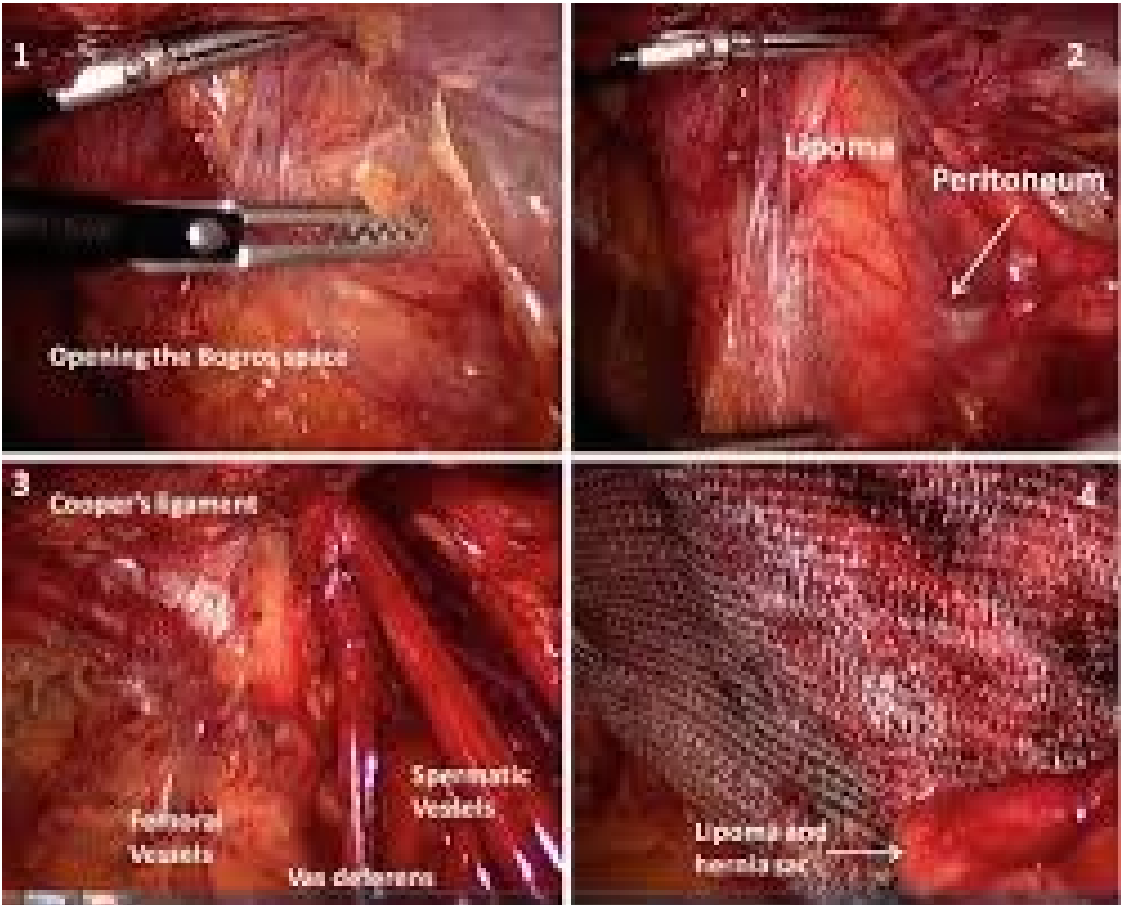
PORT PLACEMENT IN TAPP



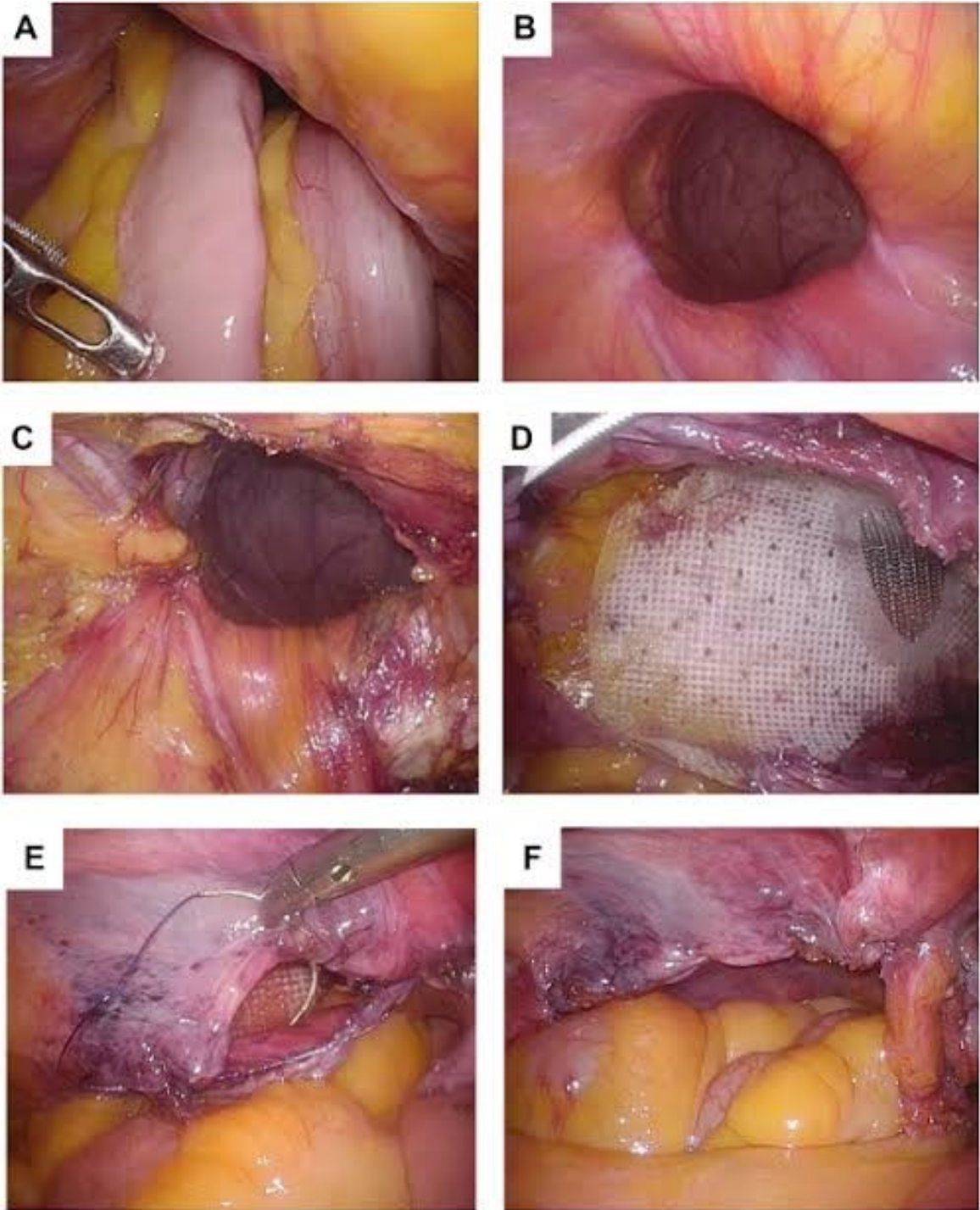
TRIANGLE OF PAIN AND DOOM



TEP PROCEDURE



TAPP PROCEDURE



CONCLUSION

This study reveals that avoidance of fixation of mesh during totally extra peritoneal repair of inguinal hernias is as safe as mesh fixation with certain advantages. It does not lead to increased recurrence though it does not decrease the incidence of chronic groin pain. Collateral advantage would be decreased operative times, lesser post-operative pain, and decreased costs.

ANNEXURE

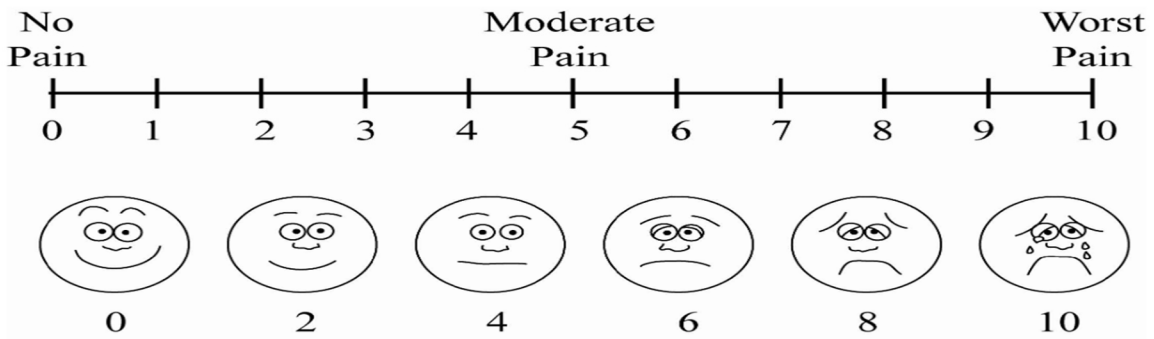
PRO FORMA

- NAME
- AGE/SEX
- IP.NO
- DIAGNOSIS
- CO-MORBIDITIES
- BLOOD INVESTIGATIONS
- CHEST XRAY
- USG ABDOMEN AND PELVIS
- DATE OF SURGERY
- DATE OF DISCHARGE
- PER OPERATIVE DIFFICULTIES
- POSTOPERATIVE PERIOD
- POST OPERATIVE COMPLICATIONS

- AT 24 HOURS AFTER SURGERY
- AT TENTH POST OP DAY(DAY OF SUTURE REMOVAL)
- AT 3 MONTHS FOLLOW UP
- AT 6 MONTHS FOLLOW UP

<u>VERBAL</u>	<u>MILD</u>	<u>MODERATE</u>	<u>SEVERE</u>
<u>SCORE</u>			
SCORE	1 to 3.	4 to 6.	7 to 10

Visual Analogue Scale



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GOVT.STANLEY MEDICAL COLLEGE, CHENNAI- 600 001

INFORMED CONSENT

**A COMPARISON STUDY ON LAPAROSCOPIC INGUINAL
HERNIA REPAIR WITH MESH FIXATION VERSUS WITHOUT MESH
FIXATION IN TERTIARY CARE CENTRE**

PLACE OF STUDY: GOVT. STANLEY MEDICAL COLLEGE, CHENNAI

- I, _____ have been informed about the details of the study in my own language.
- I have completely understood the details of the study.
- I am aware of the possible risks and benefits, while taking part in the study.
- I understand that I can withdraw from the study at any point of time and even then, I will continue to receive the medical treatment as usual.
- I understand that I will not get any payment for taking part in this study.
- I will not object if the results of this study are getting published in any medical journal, provided my personal identity is not revealed.
- I know what I am supposed to do by taking part in this study and I assure that I would extend my full co-operation for this study.

Name and Address of the Volunteer:

Signature/Thumb impression of the Volunteer

Date:

Witnesses:(Signature, Name & Address)

Name&signature of investigator

GOVT.STANLEY MEDICAL COLLEGE, CHENNAI- 600 001

INFORMED CONSENT

A COMPARISON STUDY ON LAPAROSCOPIC INGUINAL HERNIA

REPAIR WITH MESH FIXATION VERSUS WITHOUT MESH

FIXATION IN TERTIARY CARE CENTRE

PLACE OF STUDY: GOVT. STANLEY MEDICAL COLLEGE, CHENNAI

- _____ஆகியஎனக்கு,
எனதுசொந்தமொழியில்ஆய்வுவிவரங்கள்பற்றிதெரிவிக்கப்பட்ட
து .நான்ஆய்வுவிவரங்கள்பற்றிமுற்றிலும்அறிந்துகொண்டேன்.
- ஆய்வில்பங்கெடுத்துள்ளநான், சாத்தியமானஅபாயங்களையும்,
பயன்களையும்நன்குஅறிந்திருக்கிறேன்
- நான்எந்தநேரத்திலும்இந்தஆய்விலிருந்துவெளிவரமுடியும்என்று
ம்அதன்பின்னர்,
நான்வழக்கம்போல்மருத்துவசிகிச்சைபெறலாம்என்றும்புரிந்து
கொண்டேன் .
- நான்இந்தஆய்வில்பங்குகொள்வதால்எந்தபணமும்பெறமுடியா
துஎன்பதையும்அறிந்தேன் .
- இந்தஆய்வின்முடிவுஎந்தமருத்துவஇதழிலும்வெளியிடப்படலாம்
என்றும்,

எனினும்எனதுதனிப்பட்டஅடையாளம்வெளியிடப்படாதுஎன்றும்
நன்குஉணர்ந்தேன் .

- நல்லெண்ணத்துடன்மேற்கொள்ளப்படும்இந்தஆய்வில்பங்குகொ
ள்வேன்என்றும்எனதுமுழுஒத்துழைப்பைநீட்டிப்பேன்என்றும்உறு
தியளிக்கிறேன் .
- பெயர்மற்றும்தொண்டர்முகவரி:
- தொண்டர்கையொப்பம் /பெருவிரல்ரேகை:
- நாள்:
- சாட்சிகள்) :கையொப்பம், பெயர்மற்றும்முகவரி(

பெயர் மற்றும் புலன் விசாரணையாளர் கையொப்பம்

Master Chart

GROUP A - MESH WITHOUT FIXATION

S.NO	NAME	AGE	SEX	DIAGNOSIS	PROCEDURE	PAIN BY VAS				RECURRENCE		OPERATIVE DURATION (MINS)	WOUND SITE SEROMA		
						AFTER 24 HOURS	ON TENTH DAY(DAY OF SUTURE REMOVAL)	ON 3 MONTHS FOLLOW UP	ON 6 MONTHS FOLLOW UP	ON 3 MONTHS FOLLOW UP	ON 6 MONTHS FOLLOW UP				
1	ABRAHAM	21	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	67	-		
2	ANANDHARAMAN	19	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	71	-		
3	ARUMUGAM	52	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	55	-		
4	ARUN	25	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	70	-		
5	BALAN	39	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	2	-	-	-	-	-	70	-		
6	CHANDRAN	20	M	LEFT INDIRECT INGUINAL HERNIA	TEP	4	1	-	-	-	-	75	-		
7	DHAMODHARAN	19	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	70	-		
8	DHAWOOTH	36	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	68	-		
9	DINESH KUMAR	49	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	65	-		
10	GANESH	27	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	72	-		
11	GIRI	24	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	71	-		
12	HARIKRISHNAN	56	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	65	+		
13	IYAPPAN	45	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	75	-		
14	JACOB	35	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	68	-		
15	KASTHURI RAJ	48	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	64	-		
16	KAVIN	60	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	59	-		
17	KUMARESAN	22	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	68	-		
18	LAKSHMANAN	51	M	RIGHT RECURRENT INGUINAL HERNIA	TAPP	3	-	-	-	-	-	90	-		

19	LINGASEN	59	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	+	54	-		
20	LOGANADHAN	50	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	60	-		
21	MADHAN	55	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	59	-		
22	MAHADEVAN	51	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	56	-		
23	MANI	31	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	65	-		
24	MANUSAMY	57	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	65	-		
25	MARY STEPHEN	58	M	LEFT DIRECT INGUINAL HERNIA	TEP	4		1	-	-	-	56	-		
26	MEERAN	52	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	61	-		
27	MURUGASEN	54	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	64	-		
28	NAGARAJ	35	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	70	-		
29	NALIN KUMAR	35	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	70	-		
30	PALANI	54	M	RIGHT DIRECT INGUINAL HERNIA	TEP	4		1	-	-	-	58	-		
31	PREMACHANDRAN	51	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	56	-		
32	RAJA	49	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	56	-		
33	RAJAN	25	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	69	-		
34	RAMACHANDRAN	50	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	58	-		
35	RAMAN	54	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	61	-		
36	RAMESH	46	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	74	-		
37	SATHISH KUMAR	54	M	RIGHT RECURRENT INGUINAL HERNIA	TAPP	2	-	-	-	-	-	90	-		
38	SHANTHAKUMAR	50	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	+	60	-		
39	SIGAMANI	48	M	LEFT DIRECT INGUINAL HERNIA	TEP	4	-	-	-	-	-	60	-		
40	SIVAKUMAR	36	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	60	-		
41	SRINIVASAN	62	M	LEFT DIRECT INGUINAL HERNIA	TEP	2	-	-	-	-	-	61	-		
42	SURESH	55	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	60	-		

43	THIRUVARUL	47	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	75	-		
44	THIYAGARAJAN	22	M	LEFT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	74	-		
45	VARATHARAJAN	19	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	68	-		
46	VEERAMUTHU	51	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	59	-		
47	VELARASAN	53	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	62	-		
48	VENKATESH	61	M	LEFT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	60	-		
49	VIJAY KUMAR	53	M	RIGHT DIRECT INGUINAL HERNIA	TEP	3	-	-	-	-	-	54	-		
50	VIMAL	36	M	RIGHT RECURRENT INGUINAL HERNIA	TAPP	3	-		1		1	89	-		

GROUP B WITH MESH FIXATION

	NAME	AGE	SEX	DIAGNOSIS	PROCEDURE	PAIN BY VAS					RECURRENCE	OPERATIVE DURATION (MINS)	WOUND SITE SEROMA		
						AFTER 24 H	ON TENTH DAY	ON 3 MONTHS FOLLOW UP	ON 6 MONTHS FOLLOW UP	ON 3 MONTHS FOLLOW UP					
1	Babu	23	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	80	-		
2	balaji	47	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	72	-		
3	Chellappan	30	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	80	-		
4	Ethiraj	44	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5		1	-	-	-	83	-		
5	Francis	34	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	84	-		
6	Guruswamy	43	M	RIGHT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	72	-		
7	hari	20	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	80	-		
8	Jambulingam	46	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	72	-		
9	jayachandar	35	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
10	Jayanth	19	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	81	-		
11	Jayaram	26	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	83	-		
12	jothi	49	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	70	-		
13	Kannan	53	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	+	80	-		

14	Karthik	38	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
15	Kishore	52	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	70	-		
16	Krishna	26	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	83	-		
17	kumaresan	30	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	84	-		
18	laxamana moorthy	30	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
19	malairaman	41	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	1	-	-	-	-	74	-		
20	Mariswamy	46	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	74	-		
21	Maya	25	M	LEFT INDIRECT INGUINAL HERNIA	TEP	4	-	-	-	-	-	82	-		
22	mohanraj	45	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	5	-	1	1	-	-	82	-		
23	Muthu	39	M	LEFT DIRECT INGUINAL HERNIA	TEP	6	2	-	-	-	-	73	-		
24	Nagarajan	25	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
25	Narendran	20	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	81	-		
26	Pandiyan	56	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	87	-		
27	Prabakar	20	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
28	Pranesh	49	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	+	81	-		
29	prasad	35	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	80	-		
30	praveen	28	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
31	Puliraja	25	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	84	+		
32	Ramegowda	25	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	4	-	-	-	-	-	83	-		
33	RamKumar	28	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	81	-		
34	rangan	48	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	72	-		
35	ranjith	37	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	81	-		
36	Safeeq	30	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	1	-	-	-	-	70	-		
37	Sambasivam	54	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	74	-		

38	shanmugam	29	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	84	-		
39	Shivkumar	30	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	1	-	-	-	-	83	-		
40	Siddaraju	50	M	LEFT RECURRENT INGUINAL HERNIA	TAPP	6	1	1	1	-	-	100	-		
41	sridhar	39	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
42	sriram	50	M	RIGHT RECURRENT INGUINAL HERNIA	TAPP	5	-	-	-	-	-	100	-		
43	suhail	23	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	6	2	-	-	-	-	81	-		
44	sukumar	19	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	82	-		
45	Suman	57	M	LEFT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	72	-		
46	Thammaiah	51	M	BILATERAL DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	88	-		
47	Victor	24	M	RIGHT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	84	-		
48	Vinodh	24	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	1	-	-	-	-	84	-		
49	Vishvanath	45	M	RIGHT DIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	73	-		
50	yuvraj	25	M	LEFT INDIRECT INGUINAL HERNIA	TEP	5	-	-	-	-	-	71	-		