

**“COMPARATIVE STUDY ON INGUINODYNIA IN
LICHTENSTEIN (OPEN) VERSUS TAPP (LAPROSCOPIC)
HERNIOPLASTY” IN GMKMCH, SALEM**

DISSERTATION SUBMITTED TO

THE TAMIL NADU DR.MGR MEDICAL UNIVERSITY, TAMILNADU

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF

MASTER OF SURGERY

IN

GENERAL SURGERY



**DEPARTMENT OF GENERAL SURGERY
GOVERNMENT MOHAN KUMARAMANGALAM MEDICAL
COLLEGE HOSPITAL, SALEM**

Year : 2017-2020

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ACKNOWLEDGEMENT

I am extremely thankful to **Prof.Dr. K THIRUMAL BABU,M.D,DM.,** Dean , Govt Mohan Kumaramangalam Medical College and Hospital, for allowing me to utilize the hospital facilities for doing this work.

I am also thankful to **Prof.Dr P.V.DHANAPAL, M.S,** Medical Superintendent ,Govt Mohan Kumaramangalam Medical College and Hospital, for his whole hearted support and encouragement for the completion of this dissertation.

I express deep thanks to **Prof.Dr.C.RAJASEKARAN.M.S,** Head of the Department of Surgery, for his esteemed guidance and valuable suggestions from the very beginning of this study.

I express my deep sense of gratitude and indebtedness to my unit chief **Prof.Dr.M.RAJASEKAR.M.S.,** for giving me inspiration , valuable guidance and his unstinting help in completing the course and preparing this dissertation.

I thank all surgical unit chiefs **Prof.Dr.VIJAYKUMAR.M.S,**
Prof.Dr.KESAVALINGAM.M.S, **Prof.Dr.RAJASHOK.M.S,**
Prof.Dr.SUMATHI.M.S. for their advice and kind help.

It is my privileged duty to profusely thank my assistant professors

Dr.C.SURESHBABU.M.S.

Dr.M.SURENDAR,M.S.

Dr.P.KANNAN.M.S, who helped and guided me in many aspects of this study.

I sincerely thank The Professor and Assistant Professors in the Department of General Surgery for their encouragement and guidance in various aspects of this study.

I take this opportunity to thank all my family, Post Graduate colleagues and friends who helped me a lot in completing this dissertation successfully.

I am deeply obliged to my patients, without whose help the present study would not have been possible



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Guide/Principal Investigator	DR. M. RAJASEKAR, MS., Associate Professor of General Surgery, GMKMC, Salem-30.
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Date of review (D/M/Y)	17.11.2017
Date of previous review, if revised application:	Nil
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ABSTRACT

Inguinal hernia is one of the common surgical diseases in today's population treatment is surgical while earlier hernia surgery was done mostly by open methods, in recent years the role of laparoscopic hernioplasty plays a major role in terms of post operative pain, morbidity ,complications and analgesia usage .

Aim of the study:

To compare inguinodynia in lichtenstein (open) versus TAPP (laparoscopic) hernioplasty” in relation with analgesia usage, post operative pain , complications, ambulation and hospital stay

MATERIALS AND METHODS:

This propective study of 50 cases of unilateral inguinal hernia admitted in Government Mohan Kumaramangalam Medical College Hospital , Salem was done in the period from DECEMBER 2017 to SEPTEMBER 2019.

The cases were evaluated through proper history taking , clinical examination, operative procedure and post operative follow ups.

DISCUSSION :

In the prospective study that I have conducted I have divided them into two groups . Group A – underwent Lichtenstein’s hernioplasty (open) and Group B – underwent TAPP (laparoscopic hernioplasty)

The mean age in group A is 40.44 and in group B is 48.28. The incidence of Indirect inguinal hernia in Group A is 56% and in Group B is 60%, thus Indirect hernia is more common.

Incidence of duration of post operative pain was more in Group A with a mean of 31.20 and in Group B , the mean is 18.72 , thus mean pain was significantly less in Group B.

While comparing the post operative complications of hernioplasty, 64% in Group A did not develop any complications whereas in Group B 92% did not develop, thereby proving that post operative complications were significantly less in Group B.

On comparing the anesthesia dosage in Group A the mean value is 3.44 with a standard deviation of 1.58 whereas in Group B is 1.96 and standard deviation of 0.98. Here the p value is less than 0.05, indicating it to be statistically significant.

While comparing the visual analogue scale, the post hernioplasty pain was more in Group A with a mean of 3.08 and in Group B 1.88, thus the incidence of Inguinodynia is more in Group A.

CONCLUSION :

Lichtenstein tension free hernioplasty under local anaesthesia is an extremely safe day care operation .It is inexpensive and effective procedure and the benefits are low morbidity , low recurrence rate and early return to normal activities. It results in faster recovery speedy discharge and less anaesthesia related complications.

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LIST OF ABBREVIATIONS USED

Yrs-years

No of-number of

DOA-date of admission

DOS-date of surgery

DOD-date of discharge

DM-diabetes mellitus

RR-respiratory rate

BP-blood pressure

P/R-per rectum

Hb-hemoglobin

ECG-electrocardiogram

USG-ultrasound

SA-spinal anesthesia

GA-General anesthesia

INTRODUCTION

The meaning of hernia in Greek is bulge or budding and Latin it means rupture or tear. The treatment of hernia has evolved since the beginning of surgical history through different stages through the times of Greek , Romans and Egyptians. As the saying goes the history of hernia surgery is the history of surgery . It is defined as an abnormal protrusion of the part or whole of a viscous through the wall of its containing cavity.

Inguinal hernia repair done electively is one of the most commonly performed surgeries in general surgery. There are many techniques of performing hernioplasty. Post operative pain, patient morbidity, analgesic usage post operative complications and early ambulation of patients are to be considered while selecting a method of performing hernioplasty . Inguinodynia is pain or discomfort after hernioplasty that can last for more than three months. It can present as hypoaesthesia ,neuralgia, paraesthesia, hyperesthesia limiting physical and social activities . nerve injury during open repairs are very common . Chances of surgical site infection are common in open hernioplasty. These are less common in laparoscopic hernioplasty .Hence by comparing post operative pain, operative time analgesia usage ,post operative complications and patient mobilization we can come to a conclusion that for uncomplicated hernias

laparoscopic hernioplasty causes less chances of inguinodynia than open Lichtenstein hernioplasty .

REVIEW OF LITERATURE

HISTORY

- Since the history of surgical procedures hernia has always been a subject of interest. The surgeries related to hernia have evolved through time, hence goes the quote “ history of hernia is ,the history of surgery “
- The earliest recorded references was in the Greco- roman era and in the Egyptian papyrus (circa 1552 B.C)
- In India details of hernia surgery are available in the Vedas
- The first hernia surgery was performed by Heliodorus where he separated the sac from the cord ligated the vessels and the testes was not involved in the surgery.
- In the middle ages Paul of Aegina (Alexandria, Egypt) performed double ligation of hernia sac and excision of cord ,sac and testicle. He introduced the terms enterocoel - for sac containing intestines , if it contains omentum he named – epiplocele , if the contents were intestine ,omentum and fluid – “ Hydroenteroepiplocele”.
- Operation of strangulated hernia was first performed by – franco
- Differentiation of hernia into direct and indirect was done by – heister
- The term congenital hernia was introduced by Von haller
- Surgical anatomy of inguinal hernia was described by – Campter

- Hesselbachs triangle was described first by Frank .K. Hesselbach
- Eldardo Bassini ¹ described hernia as a mechanical disease due to abnormal placement and mobility of the bowel. He performed approximation of internal oblique, transverse abdominus and transversalis fascia to the inguinal ligament . The cord structures were left below the external oblique aponeurosis . he published a study on 262 cases of hernia .there were low mortality and few recurrences. This was the original Bassini ‘ s repair
- Shouldice in the 1950 made a modification in the operative methodology of Bassini technique by applying two continuous sutures. One consists of conjoint tendon , fascia transversalis and inguinal ligament and the other consists of Iliopubic tract and fascia transversalis.
- Henry .O. Marcy – reconstruction of inguinal ring
- Myopectineal orifice was described by Fruchard . It can be divided into femoral, lateral and medial.
- The prosthetic mesh was introduced in the twentieth century
- Lichtenstein¹ in 1984 introduced the term tension free hernioplasty by popularizing the use of prosthetic mesh
- Recently it has become an era of minimal access surgery. Laparoscopic hernioplasty ^{18,19,23} has been on the rise .
- Ger – repaired an indirect inguinal hernia laparoscopically in 1982. Arregui introduced TAPP in 1991 ^{19,23} .

ANATOMY

The anterior abdominal wall includes the anterior and lateral walls of the abdomen and hence it is also known as anterolateral abdominal wall. Surgeries of the anterolateral abdominal wall are the most commonly performed surgical procedures. Thus a detailed knowledge of the layers of the abdominal wall helps in the safe entry into the peritoneal cavity.

Layers of the anterior abdominal wall ²

- Skin
- Campers's fascia - superficial subcutaneous tissue
- Scarpa's fascia – deep superficial fascia
- External oblique muscle and aponeurosis
- Internal oblique muscle
- Transverse abdominis muscle
- Transversalis fascia
- Pre peritoneal fat and areolar tissue
- Peritoneum

- Blood vessels, lymphatics and nerves are present in all the layers of the abdomen

The integrity of the anterolateral abdominal wall is dependent mainly on the muscles of abdominal wall and their tendons

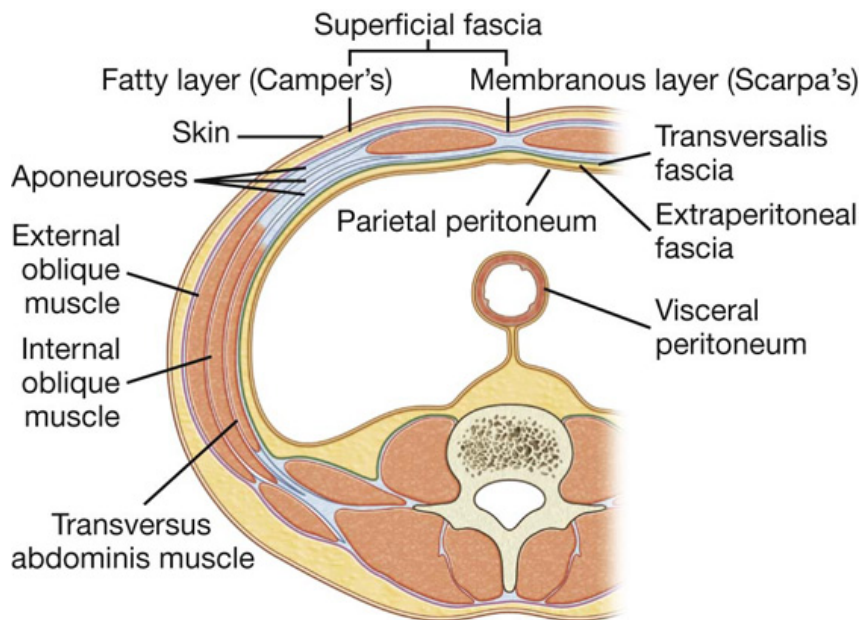


Figure 1 : the arrangements of muscles of the anterior abdominal wall

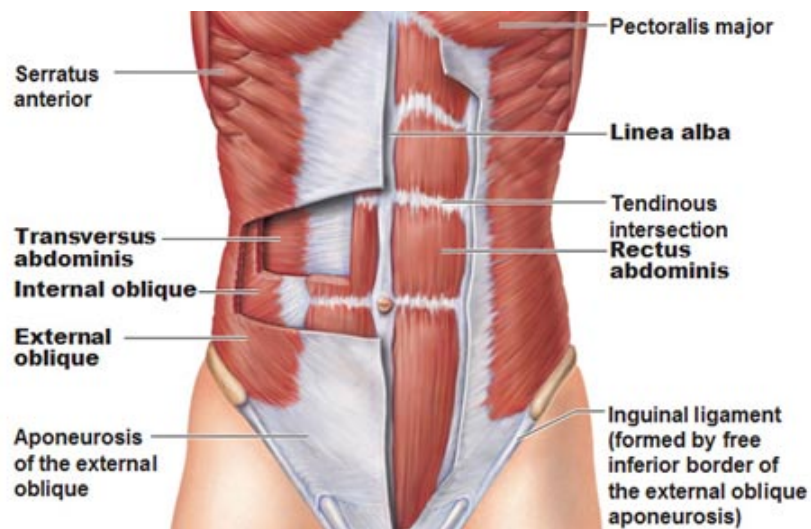


Figure 2 : Anterior abdominal wall muscles

SUPERFICIAL FASCIA : SKIN AND SUBCUTANEOUS TISSUE

The superficial fascia is made up of two layers 1) Camper, 2) Scarpa. Camper's -superficial fatty layer, Scarpa's - deep membranous layers. Scarpa's fascia on tracing upwards fuses with the fatty layer of Camper and on tracing downwards it passes across the penis at the pubic symphysis and in the scrotum it continues as Colle's fascia and as fascia Lata laterally in thigh². This layer ends below the inguinal canal by fusing with the deep fascia along a line from the pubic tubercle and this line of fusion is also known as "Holden's line".

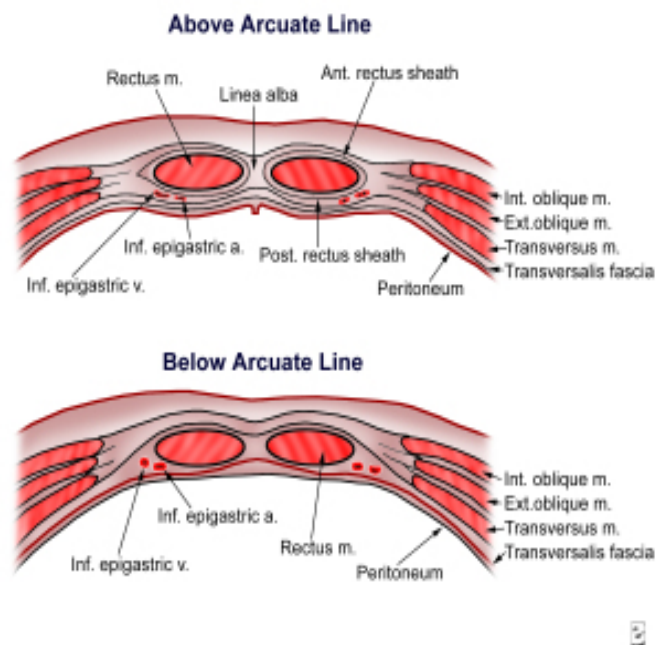


Figure 3 : The various arrangement of muscles of the anterolateral abdominal wall in relation with the arcuate line

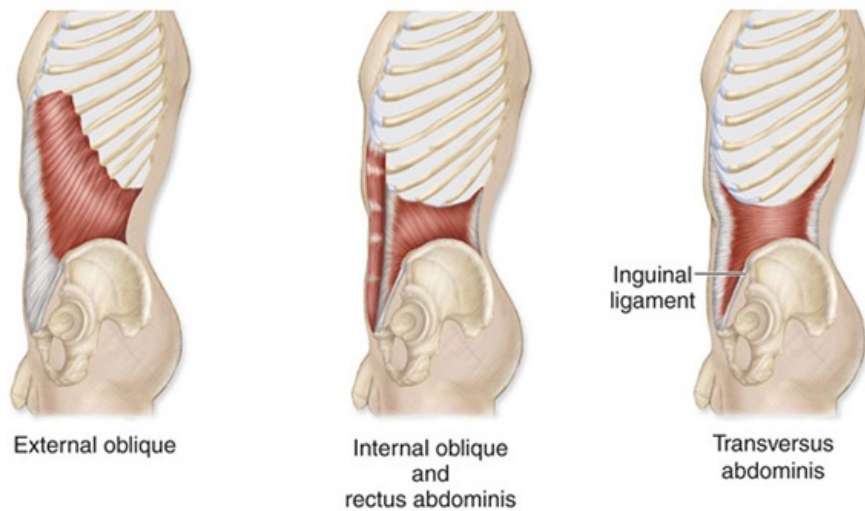


Figure 4 : origin and insertion of muscles of anterolateral abdominal wall

EXTERNAL OBLIQUE MUSCLE

It is the most superficial of the muscles of the anterolateral abdominal wall. It is the longest abdominal wall muscle. It is directed downwards, forwards and medially

Origin:

Eight fleshy slips from the middle, lower and external border of eight lower ribs

The lower fleshy slip- attached to latissimus dorsi.

Upper slip – interdigitates along with serratus anterior.

Insertion:

Most of the fibres of external oblique end in a broad aponeurosis.

They run downwards, medially and are inserted into xiphoid process , the linea alba, pubic symphysis , pubic crest and the pectineal line of pubis..

Lower fibres are inserted into outer lip of iliac crest in the anterior two third

Nerve supply

lower six thoracic nerves.

INTERNAL OBLIQUE:

.It runs upwards , forwards and medially and it crosses the external oblique fibres muscles at right angles. It runs below the external oblique muscle

Origin:

Lateral 2/3rd of inguinal ligament,

Anterior 2/3 of intermittent area of iliac crest.

Thoracolumbar fascia,

Insertion:

Uppermost fibres are inserted directly into the lower third/ fourth ribs and corresponding costal cartilages.

Most part of the muscle fibres end in an aponeurosis and inserted into linea alba,

Seventh , eighth and ninth costal cartilages, pectineal line of pubis and the pubic crest .

Nerve supply

- lower six thoracic nerves and the first lumbar nerve

TRANSVERSUS ABDOMINIS MUSCLE.

Origin:

It has a fleshy origin

Thoracolumbar fascia

Lateral 1/3rd of inguinal ligament

Anterior two thirds of the inner lip of iliac crest

Inner surface of lower 6 costal cartilages.

Fibres run horizontally forwards.

Insertion:

The muscle fibres run horizontally forwards and end in a broad aponeurosis along the

- Xiphoid process
- Line alba
- Pectineal line of pubis
- Pubic crest

Lowest fibres of the transversus abdominus fuse with internal oblique muscle to form the conjoint tendon.

Nerve supply:

- Lower six thoracic nerves ,
- first lumbar nerve

RECTUS ABDOMINIS

Origin:

The muscle arises as two tendinous heads .

- Lateral head from the lateral part of pubic crest
- Medial head from the anterior pubic ligament
- Fibres run vertically upwards

Insertion

It inserts along the front wall of the thorax , along a horizontal line laterally passing along

- the xiphoid process
- along the seventh, sixth and fifth costal cartilages

Nerve supply:

Lower six / seven thoracic nerves

TENDINOUS INTERSECTION of rectus abdominis:

These are three tendinous transverse fibrous bands .

These divide the muscle into smaller compartments.

1. around the level of the umbilicus
2. around the level of lower free end of the xiphoid process
3. third in between these two

They represent different myotomes embryologically.

But functionally they make the muscle more stronger , by increasing the number of muscle fibres .

PYRAMIDALIS

- A small triangular muscle
- It is rudimentary in humans
- Origin - anteriorly to body of pubis
- Fibres pass upwards
- Insertion – linea alba

Nerve supply- T 12 ,the subcostal nerve

RECTUS SHEATH

Rectus sheath covers the rectus abdominis. It is an aponeurotic sheath. It has two walls, anterior and posterior.^{2,5}

Formed by :

Above the costal line :

Posterior wall :

- It is deficient. It rests on the fifth, sixth, and seventh costal cartilages.

Anterior wall: It is made by the aponeurosis of External oblique.

Between the costal margin and arcuate line :

Anterior:

- Aponeurosis of the External oblique
- anterior lamina of the internal oblique aponeurosis

Posterior:

- Posterior lamina of the aponeurosis of the internal oblique.
- Aponeurosis of the transversus muscle.

In between the pubic symphysis and the umbilicus

- Ends in a concave line arcuate line or fold of Douglas or linea semi circularis.

Below the arcuate line:

Anterior wall: - fusion of the Aponeurosis of three flat muscles of anterolateral abdomen wall

Posterior wall:

- rectus sheath rests on the fascia transversalis .
- It is deficient posteriorly.

LINEA ALBA :

- It is a band of dense fibres in the midline
- It joins both rectus muscles

PERITONEUM AND PREPERITONEAL SPACE

Pre peritoneal space : it is a space that lies between the parietal peritoneum and fascia transversalis .

Space of Bogros – It lies posterior to the posterior lamina of the transversalis fascia.

Space of Retzius - it is present posterior to pubis . It is a prevesical space

FRUCHARD'S MYOPECTINEAL ORIFICE :

All groin hernia emerge through this orifice.

It is an osseomyo-aponeurotic tunnel .

Boundaries are :

Superior boundary : by the arched fibres of transversus abdominus and the internal oblique .

Inferior boundary : pecten pubis and its fascia and the coopers ligament

Medial boundary : by the lateral border of the rectus sheath

Lateral boundary : the iliopsoas muscle

GROIN HERNIA

Various groin hernias are: Indirect , direct and femoral hernia .

BOUNDARIES OF THE INGUINAL CANAL

ANTERIOR BOUNDARY :

1) In its whole extent

- A) skin ,
 - B) superficial fascia ,
 - C) Aponeurosis of external oblique muscle ,
- 2) In its lateral one third : internal oblique .

POSTERIOR BOUNDARY :

- 1) Whole extent :
- Parital peritoneum ,
 - Extraperitoneal tissue ,
 - Fascia transversalis .
- 2) In its medial two third –
- The conjoint tendon ,
 - Medial end the reflected part of inguinal ligament ,
 - Lateral one third ,the interfoveolar ligament .

SUPERIOR BOUNDARY (ROOF) :

- arched fibres of internal oblique muscle ,
- transversus abdominis muscle and its aponeurosis

INFERIORLY:

- Grooved upper surface of the inguinal ligament ,
- Medial end by the lacunar ligament.

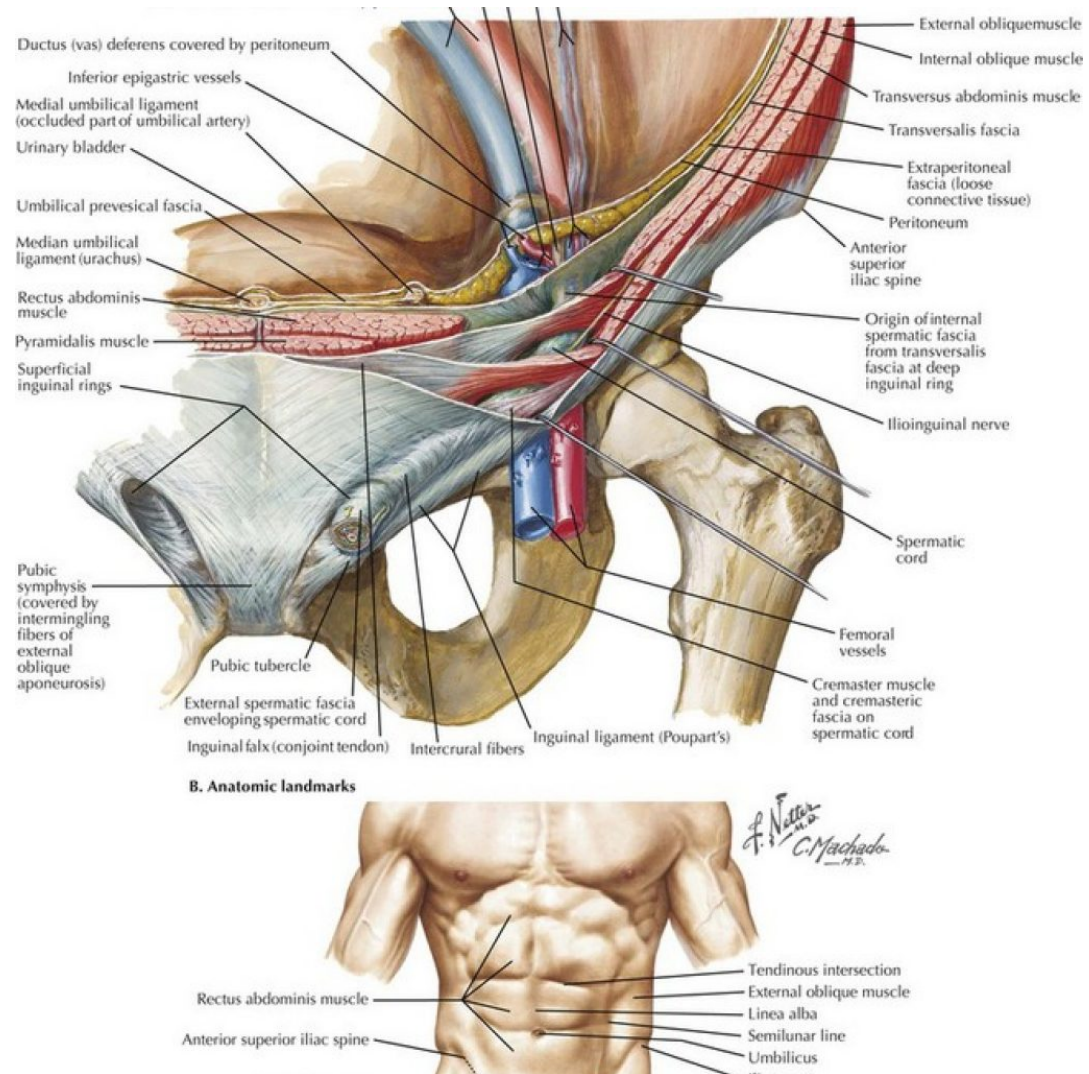


Figure 5 : various relations of inguinal canal

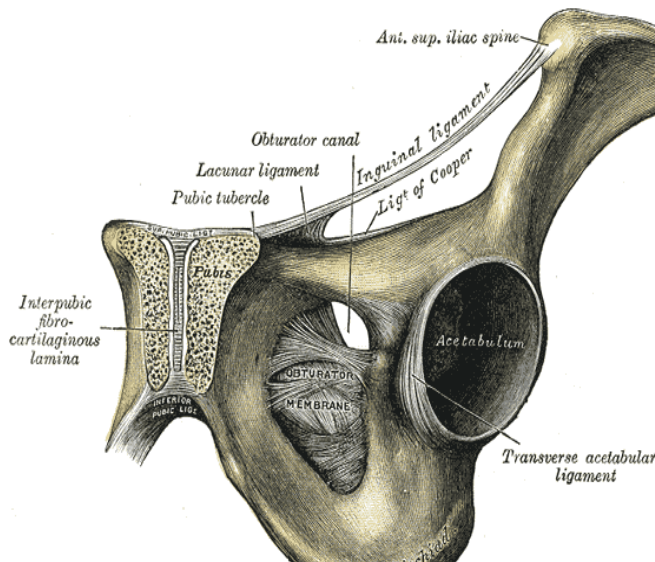


Figure 6 : inguinal ligament

INGUINAL LIGAMENT

It is also called groin ligament or Poupart's ligament . It extends from the anterior superior iliac spine to the pubic tubercle^{2,1,5}

The floor of the inguinal canal is formed by the rolled up lower end of the inguinal ligament.

It actually is the reflected part of aponeurosis of the external oblique muscle .

DEEP RING:

- It is oval in shape.
- Opening in the fascia transversalis (defect) .
- 1.2 cm above the mid inguinal point.
- Anterior and posterior borders – thickening of the fascia transversalis .
- Inferior border – ilio- pubic tract .
- Also known as internal ring .

SUPERFICIAL RING :

- Triangular in shape.
- Gap (defect) in the external oblique aponeurosis .
- Superior crus (lateral) – external oblique aponeurosis.
- Inferior crus (medial) – inguinal ligament.
- Base – pubic crest
- Also known as external ring.

PHYSIOLOGY

MECHANISMS OF INGUINAL CANAL :

Inguinal canal is a weakness in the anterior abdominal wall. It is compensated by different mechanisms.

1) BALL VALVE MECHANISM :

Superficial ring is plugged by the spermatic cord due to the contraction of the cremaster.

2) SHUTTER MECHANISM :

- Triple relationship of the internal oblique in the inguinal canal.
- On contraction roof is approximated to the floor .

3) FLAP VALVE MECHANISM :

- Obliquity of the inguinal canal .
- Increase in intra abdominal pressure cause anterior and posterior walls to approximate .

4) SLIT VALVE MECHANISM :

- contraction of external oblique causes approximation of the two crura like a slit .

5) deep ring is protected by internal oblique' s fleshy fibres in the front .

6) external ring is protected by the conjoint tendon posteriorly .

7) hormones

HERNIA PARTS:

Contents of the sac,

Coverings of the sac,

Hernia sac

Parts of hernia sac are :

- it's a diverticulum of the peritoneal cavity,

1) Mouth - that opens into the peritoneal cavity

2) Neck - constricted part of the sac, it continues beyond the mouth ,

3) Body

4) Fundus - most distal closed part of the hernia sac.

COVERINGS :

layers of the abdominal wall through which the sac passes

contents :

- omentum- it is named omentocele ,

- intestine – it is named enterocele

- urinary bladder – cystocele

- ovary , fallopian tube

- meckel's diverticulum – Littre 's hernia
- appendix – Amyand's hernia
- richter's hernia
- fluids

INDIRECT INGUINAL HERNIA :

- lateral to the inferior epigastric artery
- contents pass through the internal ring following the spermatic cord .

DIRECT INGUINAL HERNIA:

- occurs through the posterior wall of inguinal canal.
- Medial to inferior epigastric artery.

COVERINGS OF INGUINAL HERNIA:

INDIRECT HERNIA:

- Skin
- External oblique – external spermatic fascia
- Internal oblique – cremasteric fascia
- Fascia transversalis – internal spermatic fascia

- Extraperitoneal tissue
- peritoneum

DIRECT HERNIA :

- skin
- external spermatic fascia – external oblique aponeurosis
- conjoined tendon
- fascia transversalis
- extraperitoneal tissue
- peritoneum

CONTENTS OF INGUINAL CANAL

- Spermatic cord in male
- Round ligament in female
- Ilioinguinal nerve

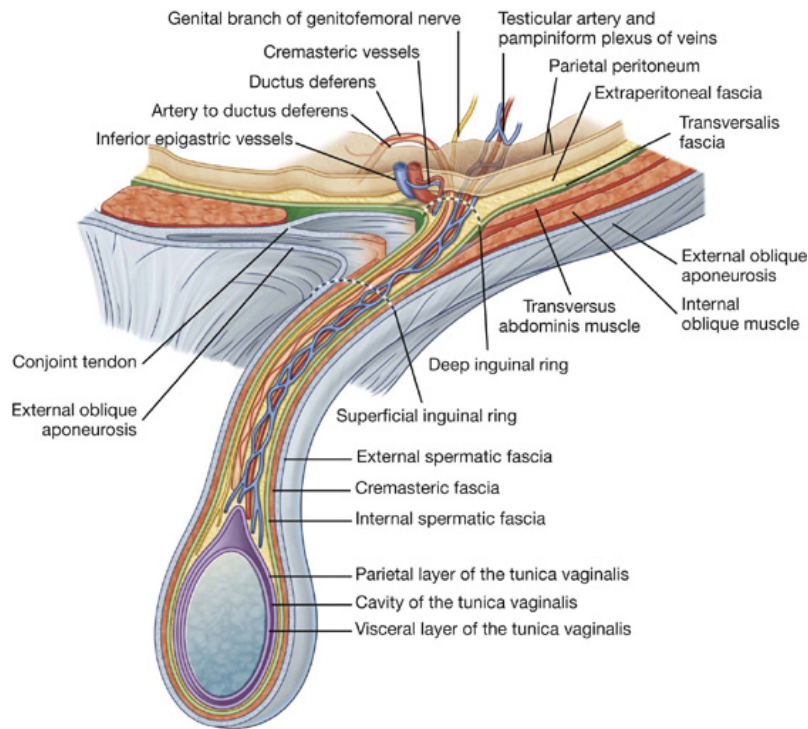


Figure 7 : layers of the spermatic cord

CONTENTS OF SPERMATIC CORD :

- Vas deferens
- Pampniform plexus of veins
- Cremastric artery,
- Artery to vas
- Testicular artery,
- Genital branch of genitofemoral nerve,
- Lymphatics,
- Sympathetic plexus around artery to vas,
- Remains of processus vaginalis .

BLOOD SUPPLY :

- Lumbar artery ,
- Lower six intercostals arteries,
- Superior epigastric arteries,
- Inferior epigastric arteries ,
- Deep circumflex iliac arteries.

VENOUS DRAINAGE :

A) Upper abdomen (above the umbilicus) :

- Superior vena cava through the Internal mammary artery,
- Intercostals veins,
- Long thoracic veins.

B)lower abdomen (below the umbilicus) :

- Superficial epigastric, circumflex iliac and superficial external pudental veins.
- These drain into saphenous and into the inferior vena cava.

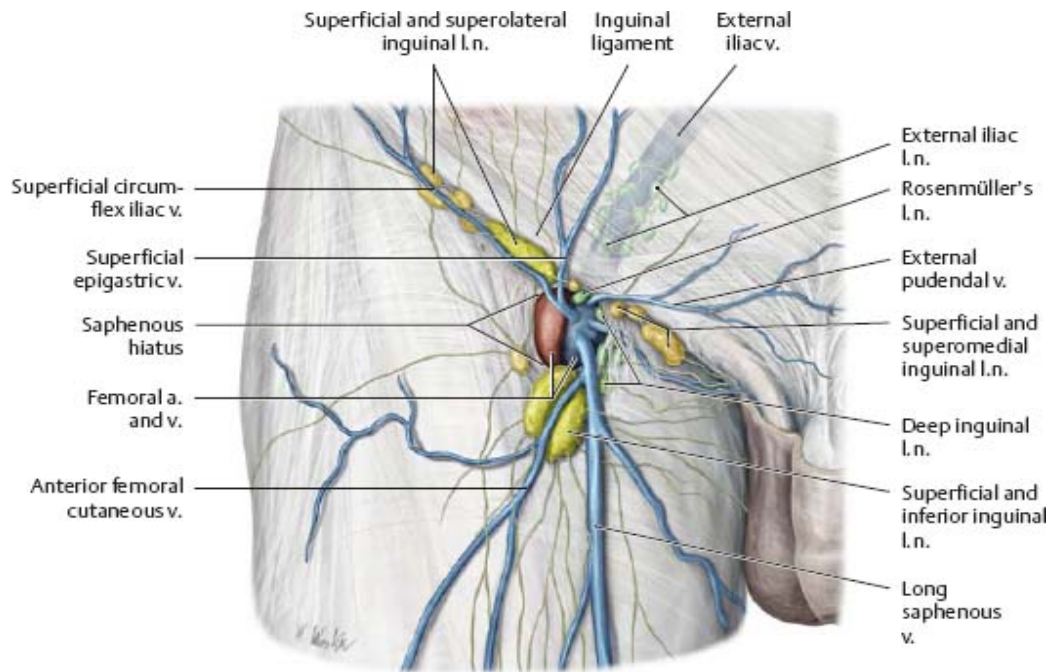


Figure 8 : Venous drainage of the anterior abdominal wall

LYMPHATIC SUPPLY

A) Abdominal wall above the umbilicus level - the axillary group of lymph nodes.

B) Abdominal wall below the umbilicus level - superficial inguinal nodes.

NERVE SUPPLY : NEURO – ANATOMY

- The Neurovascular innervations of the anterolateral abdominal wall is different.
- it passes between external oblique, internal oblique and transverse abdominus muscle^{10,1}.
- LUMBAR PLEXUS
- ILIOHYPOGASTRIC NERVE
- ILIOINGUINAL NERVE
- GENITAL BRANCH OF GENITOFEMORAL NERVE
- LATERAL FEMORAL CUTANEOUS NERVE
- OBTURATOR NERVE

LUMBAR PLEXUS :

- Nerve supply to inguinal, pelvic and lower extremities
- 4 parts – sacral ,lumbar, pudental and coccygeal
- T12 to L4 are the major supplies
- Less chances of injury during hernia repair

ILIOHYPOGASTRIC NERVE :

- Mixed sensorimotor nerve,
- L1 mostly, rarely branch from T12
- It enters through the posterior part of transversus abdominus muscle then runs between transversus abdominus and internal oblique and divides into branches,
- 2 cm medial to anterior superior iliac spine exits and passes inferomedially to external oblique muscle
- Ultimately supplies the suprapubic skin
- This nerve shows significant variation
- Highly susceptible to injuries during hernia surgery

ILIOINGUINAL NERVE :

- Mixed sensorimotor nerve,
- Ventral rami of L1,
- Pierces the posterior wall of the inguinal canal and runs along the inferior aspect of the spermatic cord
- Exits via the superficial ring
- Content of inguinal canal,
- Multiple variations present,
- Ultimately supplies the suprapubic skin,
- Most common nerve to be injured in hernioplasty

GENITAL BRANCH OF GENITO FEMORAL NERVE

- Mixed sensorimotor nerve
- Arises from Genitofemoral nerve,
- Ventral rami of L1 and L 2,
- Passes behind psoas muscle
- Enters the deep ring and passes along the spermatic cord,
- Exits through the superficial ring,
- Content of spermatic cords,
- Supplies the cremaster and medial thigh
- Subjected to variations
- More prone to injury in the preperitoneal space in laproscopic hernioplasty
- Third most common nerve to be injured in hernioplasty.

Nerves rarely damaged in hernioplasty ^{8,14} :

- Femoral nerve – mixed sensorimotor
- Obturator nerve - mixed sensorimotor
- Femoral branch of genitofemoral nerve - mixed sensorimotor
- Lateral femoral cutaneous nerve – pure sensory

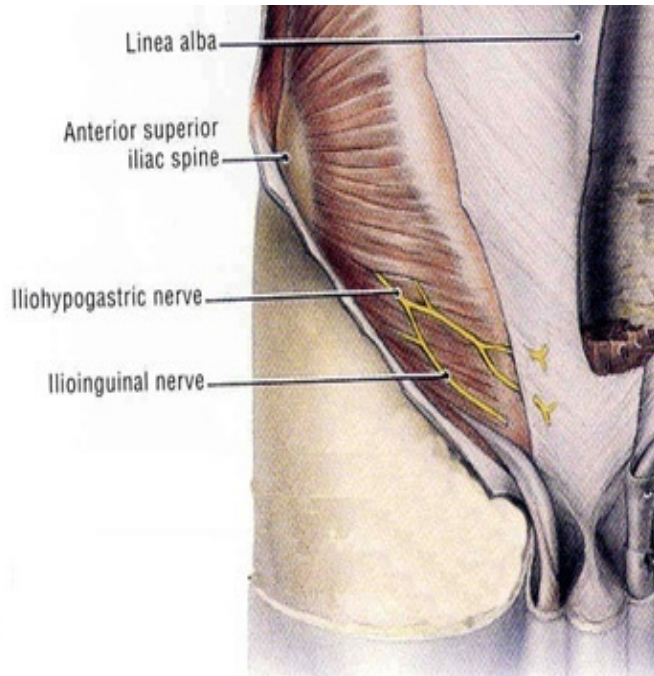


Figure 9 : Ilioinguinal nerve and iliohypogastric nerve

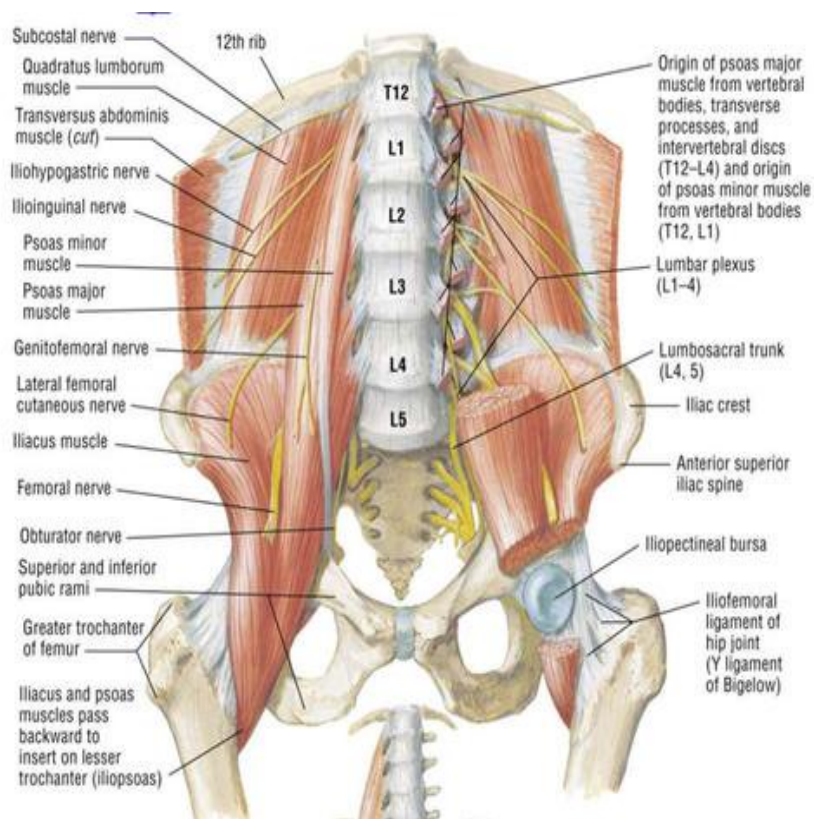


Figure 10 : the lumbosacral plexus of nerves

HASSELBACH 'S TRIANGLE :

Boundaries

Laterally : inferior epigastric artery

Medially : lateral border of the rectus sheath ,

Inferiorly : inguinal ligament and lacunar ligament

Direct inguinal hernia – arise medial to the inferior epigastric artery within the hasselbach's triangle.

Indirect inguinal hernia – appear laterally to the inferior epigastric artery, outside the Hasselbach 's triangle .

Classification of groin hernia:

NYHUS CLASSIFICATION

Classification is based on the anatomical defects of the anterolateral abdominal wall :

Type 1 – indirect hernia , deep ring is normal .

Type 2 - indirect inguinal hernia , deep ring is dilated .

Type 3 – posterior wall defect

- a) Direct hernia
- b) Pantaloon hernia
- c) Femoral hernia

Type 4 - hernia is recurrent .

GILBERTS CLASSIFICATION

Type 1 – hernia with snug internal ring, indirect sac .

Type 2 – moderately enlarged deep ring , admits one finger , indirect sac comes out on straining .

Type 3 – large internal ring , admits more than 2 fingers, indirect sac, swelling appears spontaneously.

Type 4 – direct hernia with blow out of the posterior wall,

Type 5 – direct hernia protruding through a punched out opening in the transversalis fascia .

Type 6 – pantaloon hernia , direct and indirect hernia

Type 7 – femoral hernia

OGILVIE HERNIA

- Indirect hernias - be acquired or congenital
- Direct hernias are mostly acquired
- Ogilvie hernia is congenitally occurring direct hernias

Ogilvie hernia occurs through a small and circular defect which lies in the conjoint tendon ,

INGUINAL HERNIA TYPES

Complete hernia :

- Sac of the hernia reaches until bottom of the scrotum ,
- the testes usually is not felt separately.

Incomplete hernia :

- Here the sac of the does not reach the bottom of the scrotum,
- Types funicular and bubonocele

Funicular type

- Crosses the superficial inguinal ring ,
- does not reach bottom of scrotum ,
- reaches till the upper part of the testes ,
- testes is usually separately palpable .

Bubonocele incomplete inguinal hernia :

- Hernia sac is confined to inguinal canal
- Near the root of the scrotum

Pantaloon hernia :

- Also known as double hernia or dual hernia or saddle bag hernia
- Here both direct and indirect hernia occur ,
- Occur on either sides of inferior Epigastric artery .

COMPLICATED HERNIAS

Early untreated hernias .They are :

Irreducible hernias

- When we are not able to reduce the hernia swelling manually.
- Obstruction need not be present at that time.

Obstructed hernias :-

- Here hernia content is usually bowel.
- Presents with colicky abdominal pain, vomiting, abdominal distension and obstipation.
- Tenderness over the swelling is present
- Here neck of the sac is narrow

INCARCERATED HERNIA :

- irreducible always ,
- Mostly obstruction is present,
- No strangulation
- Sac and contents are densely adherent to each other,
- Lumen is blocked by feces, putty in consistency .

Strangulated hernias :

- Delay in the treatment of obstructed inguinal hernia at the right time ,
- Impairment of blood supply,
- Ischemic necrosis and gangrene of hernia contents
- If the content is omentum , symptoms are mild.
- Long standing cases can lead to ischemic necrosis and later abscess formation .
- If content is bowel signs of peritonitis develop.

PATHOPHYSIOLOGY :

- Inguinal hernia are classified as acquired or congenital . Studies were conducted to find out the cause of inguinal hernias, weakness of abdominal wall muscles was the most important cause for acquired hernias,
- Whereas congenital hernias was due to a delay in the normal development , than acquired weakness .
- The normal development of testis , it descends from the intra abdominal space , gradually into the scrotum .
- In the third trimester it is preceded by the descent of gubernaculum a diverticulum of peritoneum in the third trimester, which gradually protrudes through inguinal canal to ultimately become the processus vaginalis .
- Processus vaginalis closes in the third trimester
- It separates the peritoneal opening at the internal inguinal ring.
- If it fails it results in patent processus vaginalis .
- This proves high incidence of indirect inguinal hernias among preterm babies.
- In acquired inguinal hernias there is usually a predisposing cause .
- Most common is strenuous physical activity.
- Repeated physical exertion increases the intra abdominal pressure.

- This raise in the intra abdominal pressure along with patent processus vaginalis or weak anterior abdominal wall due to age related changes leads to hernia .
- Family history of inguinal hernia increases the incidence of hernia 8 folds.
- COPD there is a raise of intra abdominal pressure, this causes inguinal hernia

CAUSES OF INGUINAL HERNIA

- **COPD**
- Constipation
- Prostatism
- Family history
- Birth weight less than 1.5 kg
- Previous surgeries like appendicectomy
- Alcohol consumption
- Ascites
- Smoking
- Morbid obesity
- Collagen vascular disorders
- Connective tissue disorders like marfans syndrome, ehlers danlos syndrome, osteogenesis imperfect .

- Weight lifting
- Microscopic studies of the skin of hernia patients indicated in many cases lesser ratio of type 1 to type 3 collagen.
- Collagen type 3 contributes less significantly to tensile strength
- Studies showed disaggregated collagen fibres with reduced collagen density.
- Thus hernia has a multi-factorial etiology with both hereditary and environmental influences.

PRINCIPLES OF HERNIA SURGERY:

The important principles while performing hernia surgery are :

- Prophylactic antibiotic administration,
- Appropriate incision to be made ,
- In strangulated hernia generous incision to be made
- Fluid in the hernia sac like in strangulated hernia is toxic and hence adequate mopping is to be done to prevent its entry into peritoneal cavity,
- If content of the hernia sac is bowel adequate inspection of the viability of the bowel is to be inspected like peristalsis , color change to pink and arterial pulsations.
- While reducing the contents of hernia sac ,gentle squeezing with head down position is to be done to avoid injuries to the bowel.

- En mass reduction should be avoided because the strangulation and constriction ring will persist though the swelling disappears.

OPEN APPROACH :

- There are several techniques of repair of inguinal hernia.
- Anatomical repair and repair using prosthetic material are the two basic type of open hernia surgery^{7,1} .
- In obstructed and strangulated hernia when the chance of infection is more than anatomical tissue repair is preferred over prosthetic mesh.

RECURRENT HERNIA

- Early recurrence is due to faulty techniques.
- Late recurrence is due to infection or failure of tissue

Recurrent hernia are caused due to as :

- Smoking,
- Alcohol,
- Infection ,
- Poor technique,
- Absorbable suture material applied
- Wound hematoma
- Repair under tension
- Large sized hernias

- Pantaloon hernia where a hernia is missed
- Chronic cough / constipation/ prostatism,
- Increase in the intra abdominal pressure .

TISSUE REPAIRS :

- First hernia surgeries were tissue repair
- Anatomical knowledge of the inguinal canal is necessary
- It is used when prosthetic materials cannot be placed as in obstruction or strangulation as there is high chance of contamination and infection .

HERNIOTOMY :

- Done in young patients mostly children
- There is a high recurrence rate in adults
- Patent processus vaginalis,
- In adults usually herniorraphy or hernioplasty is done

BASSINI REPAIR :

- The first herniorraphy technique
- It was introduced by Bassini ¹
- Has high recurrence rate
- The cord structures and the hernia sac are separated

- Hernia sac is ligated high
- Transversalis fascia is dissected from the pre peritoneal fat from deep ring to pubic tubercle ,
- Transversalis fascia , internal oblique and transversus abdominus are sutured to reflected part of inguinal ligament .
- Posterior wall is thus strengthened

MODIFIED BASSINI :

- Modification of original basini 's repair
- Fascia transversalis is not splayed open
- Fascia transversalis is sutured to inguinal ligament – continuous interlocking sutures using prolene .
- Conjoint tendon sutured to inguinal ligament
- Nowadays this technique is not used

SHOULDICE REPAIR :

- It is a multilayered herniorraphy technique.
- Fascia tranversalis is a thin and tough layer. Double breasting of fascia transversalis is done,
- Cremastic muscle and vessels are separated to reveal the posterior abdominal wall properly,

- After doing herniotomy 4 suture lines are closed
- First suture – lower flap of fascia transversalis is sutured to the posterior deep part of the upper flap, from pubic tubercle to internal ring
- Second suture – using same suture continuous suture is applied from upper flap to the inguinal ligament
- Third suture line – from internal ring to pubic tubercle suturing of the conjoint tendon to inguinal ligament
- Fourth suture – third suture is continued from pubic tubercle to internal ring
- External oblique aponeurosis is also sutured as a double breasting technique

Mc Vay REPAIR :

- Cooper ‘ s ligament repair ,
- Type of herniorraphy where all three groin hernias (direct, indirect and femoral)can be repaired
- Conjoint tendon attached to cooper’s ligament
- Relaxing incision made,
- Conjoint tendon attached to iliopubic tract and inguinal ligament

LYTLE'S REPAIR :

- Technique where the medial side of the internal ring is sutured to transversus fascialis,
- Interrupted sutures is applied
- Narrowing of the deep ring

KOONTZ OPERATION :

- Done in elderly people,
- After taking consent we do orchidectomy,
- Full cord with testis is removed
- Posterior wall strengthening is done .

HAMILTON BAILEY :

- Spermatic cord is ligated at the deep and superficial rings
- Cord is then cut and removed from the inguinal canal
- Testis is retained
- More for psychological reasons
- Testis gets blood supply from cremastic and scrotal vessels
- Posterior wall strengthening is done.

PROSTHETIC REPAIR :

- Using prosthetic meshes was a big milestone in the history of hernia surgery
- prosthetic repair is nowadays one of the commonest procedures

PROSTHESIS :

The following are the ideal features of a mesh or prosthesis

- inexpensive
- good tensile strength
- easily foldable and flexible
- has memory and thus contraction resistant
- inert immunologically
- resists infection

BIOLOGICAL MESH :

- not as effective as synthetic meshes,
- not used routinely
- only cross linked biological meshes are effective ,
- also known as biomesh,
- porcine dermis and intestinal submucosa
- bovine dermis or pericardium
- human cadaveric dermis or fascia lata

SYNTHETIC MESH MATERIAL :

- Polypropylene – most commonly used synthetic mesh
- Vipro mesh
- Polyester mesh
- Dacron mesh
- Polytetrafluoroethylene (PTFE) mesh
- Polyglycolic acid mesh(Vicryl mesh)

These synthetic meshes are :

- Hydrophobic
- Permanent
- Create fibrosis and hence increase the tensile strength
- Minimal chance of infection
- Little scarring

Factors to select a mesh :

- Weight
- Thickness
- Material
- Porosity
- Strength
- Weight
- Absorbability

HERNIOPLASTY TECHNIQUES :

- Lichtenstein tension free onlay hernioplasty
- Nyhus pre peritoneal mesh repair
- Stoppa 's giant prosthesis reinforcement of visceral sac (GPRVS)
- Gilbert mesh repair
- Gilberts prolene hernia system
- Laparoscopic hernioplasty –
 - a) trans abdominal pre peritoneal mesh repair
 - b) totally extra peritoneal laparoscopic mesh repair

GILBERT MESH REPAIR :

- plug and patch technique,
- after herniotomy ,cone shaped (umbrella) prolene mesh is used to close or plug the internal ring,
- later onlay or inlay mesh repair and strengthening of the posterior wall is done
- it's a modified version of Lichtenstein hernioplasty

GILBERT'S PROLENE HERNIA SYSTEM :

- it is an onlay and sublay hernioplasty
- also known as sandwich technique,

- specially devised mesh which has a round deeper part (sublay) and a modified quadrangular part connected placed as an(onlay) mesh repair
- both are connected by a connecting stiff which prevents displacement and keeps the mesh system stiff.

STOPPAS REPAIR :

- **GPRVS-** giant prosthetic reinforcement of visceral sac
- done in :
 - large hernias
 - bilateral hernias,
 - hernias in collagen vascular disorders
 - hernias in large lax abdomen
 - recurrent hernias
 - if it is an unilateral hernia ,horizontal incision is made (pfannensteil incision) , 8 to 10 cm in size
- Preperitoneal space is entered and dissection is continued from the umbilicus to the pubic symphysis and laterally 1cm medial to the anterior superior iliac spine
- In case of bilateral hernias dissection is done 1 cm medial to both anterior superior iliac spine and both the inguinal canals are opened.

- Transversalis fascia is sutured to Cooper's ligament, thus strengthening the posterior wall of the inguinal canal.
- An adequate sized mesh is to be taken and the mesh is selected such that it covers the entire area from the anterior superior iliac spine, pubic symphysis and below the umbilicus.
- Suturing of the mesh is done laterally in the iliac fossa and medially in the Space of Retzius
- Mesh is placed above the spermatic cord

LICHTENSTEIN HERNIOPLASTY^{1,2} :

ANAESTHESIA : regional anaesthesia, spinal anaesthesia or local anaesthesia

position : supine

Incision :

- Incision in the inguinal region, starting from medially at pubic tubercle, upto laterally 2cm above and parallel to the inguinal ligament extending beyond the deep inguinal ring.
- Camper (Superficial fatty layer) and Scarpa (deep membranous) layer incised
- Superficial epigastric vessels are identified coagulated to produce hemostasis and cut.

- Laterally lying superficial circumflex iliac artery and superficial external pudendal artery which lie medially are coagulated and divided.
- External oblique aponeurosis are identified by the direction of its fibres downwards and medially
- A nick is placed on external oblique aponeurosis and its extended till beyond the deep ring.
- Superficial ring is incised and flaps of external oblique are raised .
- Upper flap till conjoint tendon is exposed lower flap till inguinal ligament is exposed .
- Hernia sac and spermatic cord structures are identified and dissected.
- In indirect hernia ,sac lies anterolateral to cord and in direct hernia, sac lies posteromedial to cord.
- Sac of the hernia is opened at the fundus and extended to the neck
- Contents identified as bowel or omentum
- Contents reduced ,sac excised and transfixation of the sac is don.
- Posterior wall strengthening is done in direct hernias.
- Reinforcement of posterior wall is done by placing a prosthetic mesh.
- Usually polypropelene mesh are placed 15 *7.5 cm.
- Medial end fixed to the pubic tubercle and continuous sutures applied along the inguinal ligament.

- Fishtailing is done to hold the cord structures
- Intermittent sutures applied to the conjoint tendon using prolene
- External oblique is closed using vicryl.
- A new superficial ring is created.
- Subcutaneous tissue and skin is sutured
- Sterile dressing is done.
- Scrotal bandage is applied

LICHTENSTEIN METHOD

Figure 11: INCISION IS MARKED IN THE INGUINAL REGION



Figure 12 : EXTERNAL OBLIQUE IS SEPERATED :



Figure 13 : CORD STRUCTURES SEPERATED

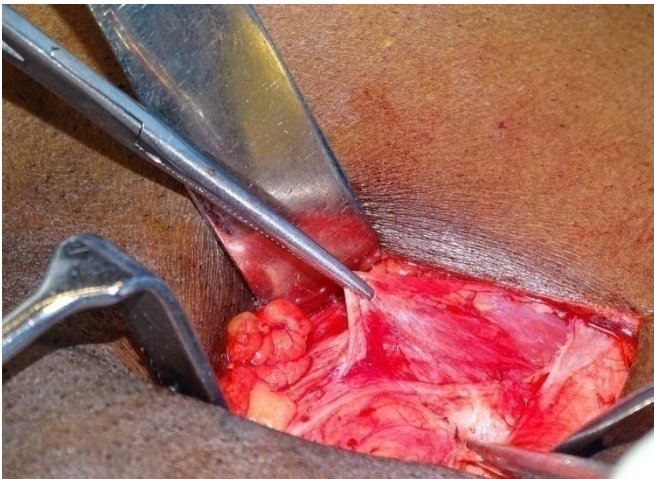


Figure 14 : CONTENT OF THE HERNIA SAC

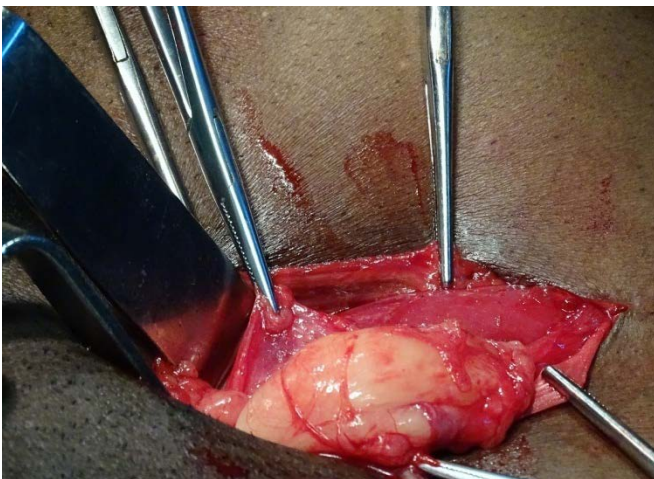


Figure 15 : CONTENTS OF THE SAC REDUCED



Figure 16 : MESH FIXED TO THE PUBIC TUBERCLE AND CONTINUOUS SUTURES APPLIED TO THE INGUINAL LIGAMENT

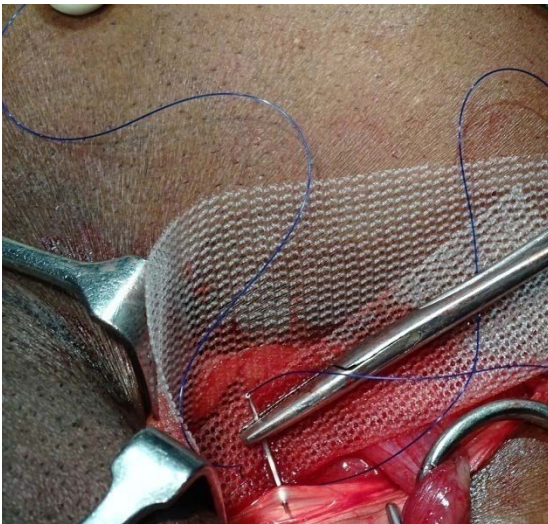


Figure 17 : MESH FIXED TO CONJOINT TENDON

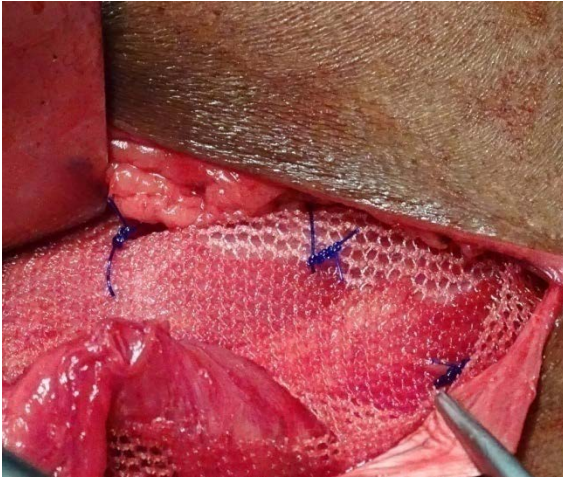


Figure 18 : SUTURING OF EXTERNAL OBLIQUE APONEUROSIS

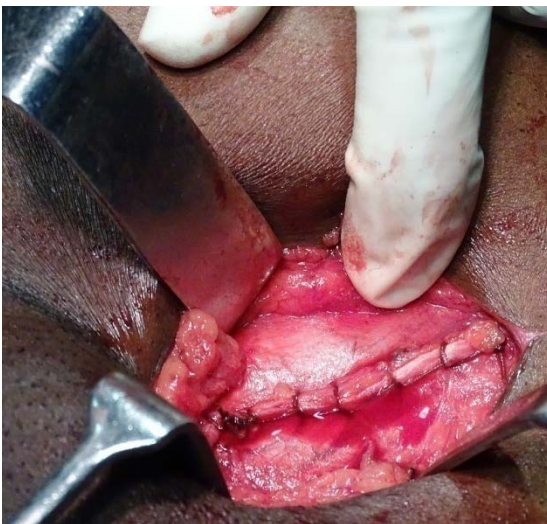


Figure 19 : SKIN SUTURED



TAPP:

Position : supine

Anaesthesia : general (ETGA)

PROCEDURE :

-First trochar (10 mm) is inserted at the umbilical region followed by two 5 mm side port inserted lateral to the rectus sheath ^{18,19}

- The following structures are to be identified

a) median umbilical ligament – remnant of urachus

b) Lateral umbilical fold – peritoneal reflection over the inferior epigastric artery

c) medial umbilical ligament- remnant of umbilical artery.

- Peritoneum is reflected along a line 2 cm above the upper edge of the hernia defect from median umbilical ligament to anterior superior iliac spine.

- Peritoneal flaps are raised downwards to identify the pubic symphysis, lower part of rectus abdominus and ilio pubic tract.

- Dissection to be continued inferiorly with care to prevent injury to genitofemoral nerve and lateral femoral cutaneous nerve.cord structures to be skeletonised.

- In direct hernia ,reduce the sac and peritoneal fat by gentle traction.

- In indirect hernia if the sac is small separation of the sac from cord structures and it is reduced into the peritoneal cavity. If it is a large sac due to chronicity its has adhesions and hence trauma can occur on attempting separation of hernia sac, so sac is divided distal to the internal ring and distal sac is left in situ and proximal sac can be separated.
- A large prosthetic mesh is placed on the myopectineal orifice covering the hernia spaces and it is fixed by staples or tacks .
- Begin stapling/ tacking horizontally along the superior border of the mesh , two cm above the hernia defect medially above the contralateral pubic bone to ipsilateral anterior superior iliac spine. Below the tack/ staple is applied along the cooper's ligament.
- Medial and lateral border tacks/ staples are applied vertically along the direction of the genitofemoral and lateral femoral cutaneous nerve. Excess mesh is excised. Pneumo peritoneum is released, ports removed and port sites sutured. Sterile dressing applied.

INGUINODYNIA :

- Inguinodynia is known as Post herniorrhaphy pain syndrome^{8,20}.
- It is the pain present after the hernioplasty which can continue till 3 months.
- The pain can present as a) Neuropathic b) Visceral c) Nociceptive pain.

NEUROPATHIC PAIN

- Chronic groin pain can present as a) Paraesthesia b) Neuralgia c) Hypoaesthesia d) Hyperaesthesia

VISCERAL PAIN

- Testicular and ejaculatory pain
- Due to mesh in-growth into spermatic cord

NOCICEPTIVE PAIN

- Somatic pain due to chronic inflammation
- Tenderness and stabbing pain present.

PREVENTION

- Avoid nerve entrapment
- Avoid nerve injury
- Avoid transection of nerves during surgery¹⁰.
- Appropriate method of mesh fixation
- Improper excision and ligation of hernial sac

TREATMENT ^{10,7,14}

- **NON SURGICAL**
- Analgesics
- Opioids
- Anti inflammatory
- Nerve block
- Neuromodulators
- **SURGICAL**
- Triple neurectomy
- Mesh removal is the last resort

Most common nerves that get damaged in inguinodynia are :

- Ilioinguinal nerve most common
- Iliohypogastric nerve,
- Genital branch of Genitofemoral nerve,
- Lateral cutaneous nerve of the thigh
- Femoral nerve

AIMS AND OBJECTIVES

1. To compare inguinodynia in Lichtenstein (open) and TAPP (laparoscopic hernioplasty)
2. To evaluate the inguinodynia on the basis of visual analogue scale between the two procedures
3. Cost effectiveness of the procedure
4. Usage of analgesics
5. Patient s cooperation with regards to pain, if it affects his daily routine
6. Immediate post operative pain and its effect on inguinodynia
7. Complications of hernioplasty in open versus laproscopic and its effect on inguinodynia
8. Complications of hernioplasty :
 - Hematoma
 - Reactionary haemorrhage
 - Spinal headache
 - Urinary retention
 - Wound infection
 - Scrotal edema
 - inguinodynia
 - Testicular pain
 - Recurrence

MATERIALS AND METHODS USED IN THE STUDY:

TITLE :

“COMPARATIVE STUDY ON INGUINODYNIA IN LICHTENSTEIN (OPEN)VERSUS TAPP (LAPROSCOPIC) HERNIOPLASTY”

OBJECTIVE OF THE STUDY

To compare effectiveness and safety of hernioplasty done by open lichtenstein repair versus TAPP (laproscopic) in relation to inguinodynia using various parameters like visual analogue scale, analgesic dosage, duration of surgery, post operative pain and other complications .

SOURCES OF DATA :

- This is a prospective study
- Conducted in Mohan Kumaramanagalam Medical College Hospital Salem
- Duration - for a period of two years from January 2017 to December 2019.

METHODS AND COLLECTION OF DATA

- 50 cases of inguinal hernia were taken up for surgery .

- 25 cases were separated into two groups,
- Detailed history of each patient was taken after admission
- Clinical examination of each patient was done ,
- Routine investigations :
 - Haemoglobin (Hb)
 - Total count of leucocytes
 - Platelet count
 - Differential count
 - Renal function test (urea and creatinine)
 - Blood sugar levels
 - Bleeding time clotting time
 - Blood grouping
 - Chest x ray
 - Ecg
 - X – ray abdomen
 - Ultrasound of abdomen and scrotum is done

Detailed consent was taken. The patients were split into two groups.

Group a 25 patients where Lichtenstein hernioplasty was done, 25 patients where TAPP (laparoscopic) hernioplasty was done

STUDY DESIGN : Prospective study

STUDY PERIOD

December 2017 to september 2019.

PLACE OF STUDY

Govt Mohan Kumaramangalam Medical College Hospital , Salem

SAMPLE SIZE

50 cases split into two groups

ETHICAL CLEARANCE :

- Obtained from institutional ethical committee

INCLUSION CRITERIA :

- Patients with unilateral hernia
- Patients with inguinal hernia , not associated with any complications,
- Above 20 years of age

EXCLUSION CRITERIA

- Patients with preoperative chronic pain problems
- Patients with bilateral hernia , femoral hernia
- Patients with complicated hernias like – irreducibility , obstruction , strangulation , incarceration
- Patients below 20 years
- Patients with recurrent hernia
- Patients with psychiatry illness , pregnancy , diabetes mellitus

- Patient with associated hydrocele
- Patient with bleeding disorders and those patients on anticoagulant treatment.

STUDY METHODOLOGY

- Written informed consent was obtained.
- Patients who satisfy the inclusion and exclusion criteria were divided into two groups
- History, clinical examination and routine investigations

In proforma , history , clinical examination are noted.

Routine investigations like

- 25 patients in group A underwent open Lichtenstein's hernioplasty
- 25 patients underwent TAPP (laparoscopic) hernioplasty

POST OPERATIVE EVENTS :

- After the surgical procedures patients were shifted to the postoperative ward
- Analgesics ,iv antibiotics and iv fluids were administered
- Patients were started on oral fluids and diet gradually

- Patients were observed for post operative complications
- If there were no complaints and the patients were hemodynamically stable then the patients were discharged
- They were asked to review in case of any complaints,
- regular follow up was done

PER OPERATIVE

- Per op time
- Per op pain

POST OPERATIVE COMPLICATIONS

Pain

- Immediate post operative pain
- It is due to sharp and blunt dissection and adequate analgesics were given

Headache

- Post spinal headache;
- Proper posture and consumption of water

Testicular pain

- Edema
- Hematoma
- infection

Wound hematoma

- Due to improper hemostasis
- Should be evacuated
- If left untreated might form abscess and can progress to mesh infection
- Mesh rejection

Wound sepsis

Adequate dressing done everyday and culture sensitive antibiotics prescribed

Urinary retention :

- One of the most common complications
- Mobilization of patient
- Hot fomentation
- Temporary red catheter
- If not successful Foley's catheter inserted

Respiratory complication :

- chest physiotherapy
- nebulisation
- incentive spirometry

Thromboembolism

Treated based on severity

Hospital stay

The number of days of stay in hospital is compared between the two groups.

AMBULATION : is compared between both the groups

INGUINODYNIA : based on these we can come to a conclusion on which causes lesser inguinodynia

OBSERVATION AND RESULTS

1) AGE

The youngest patient in the group A was 22 years old and in group B was 24 years old. The oldest patient in group A was 67 years old and in group B was 70 years old. The mean age was 40.44+/-10.18 in group A and in group B was 48.28+/-13.64.

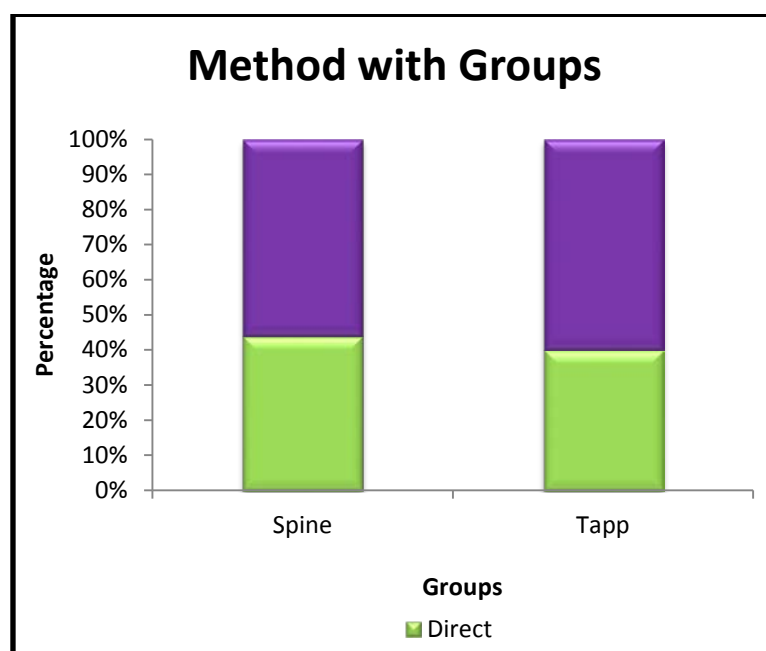


CHART 1 :incidence of direct and indirect hernia

Comparison between type of hernia with Groups					
			Groups		Total
			Spinal	TAPP	
METHOD	DIRECT	Count	11	10	21
		%	44.0%	40.0%	42.0%
	INDIRECT	Count	14	15	29
		%	56.0%	60.0%	58.0%
Total		Count	25	25	50
		%	100.0%	100.0%	100.0%

TABLE 1 : Incidence of direct and indirect hernia

2) SIDE

In group A indirect inguinal hernia is 14 (56 %), direct inguinal hernia is 11 (44%) and in group B indirect inguinal hernia is 15 (60 %) and direct inguinal hernia is 10 (40 %). Thus in both groups the incidence of indirect hernia is more than direct hernia.

			Groups		Total
			Spinal	TAPP	
SIDE	LEFT	1Count	a	7	16
		%	36.0%	28.0%	32.0%
	RIGHT	Count	16	18	34
		%	64.0%	72.0%	68.0%
Total		Count	25	25	50
		%	100.0%	100.0%	100.0%

TABLE 2 : comparison of left and right hernias

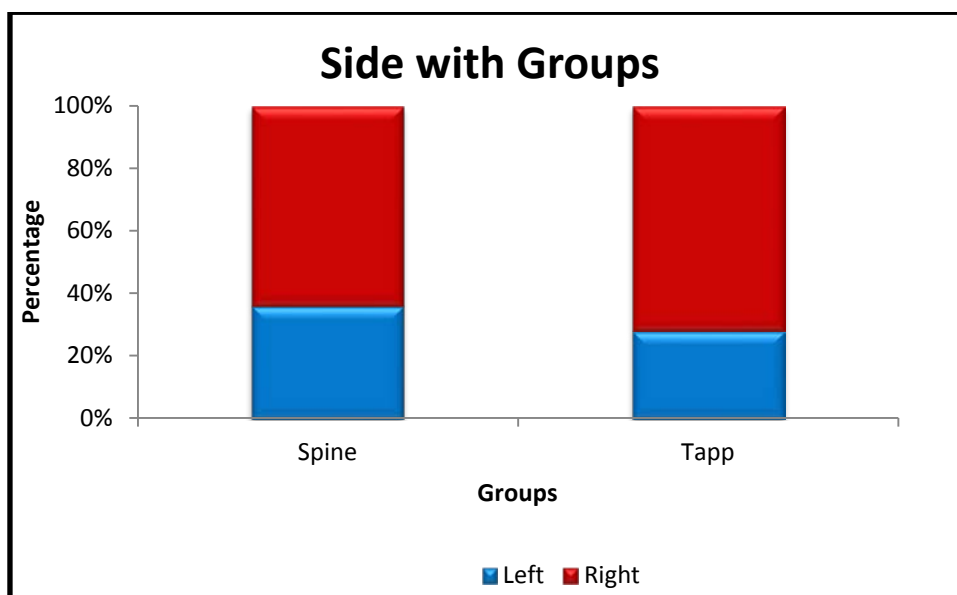


CHART 2 : comparison of left and right sided hernias

- In group A , right sided inguinal hernia – 16 (64 %), left sided inguinal hernia – 9 (64 %)
- In group B , right sided inguinal hernia – 18 (72 %) and left sided inguinal hernia – 7 (28%)

3) TIME TAKEN FOR SURGERY

- Time taken for both groups was calculated from the time of administration of anesthesia until the sterile dressing was done.

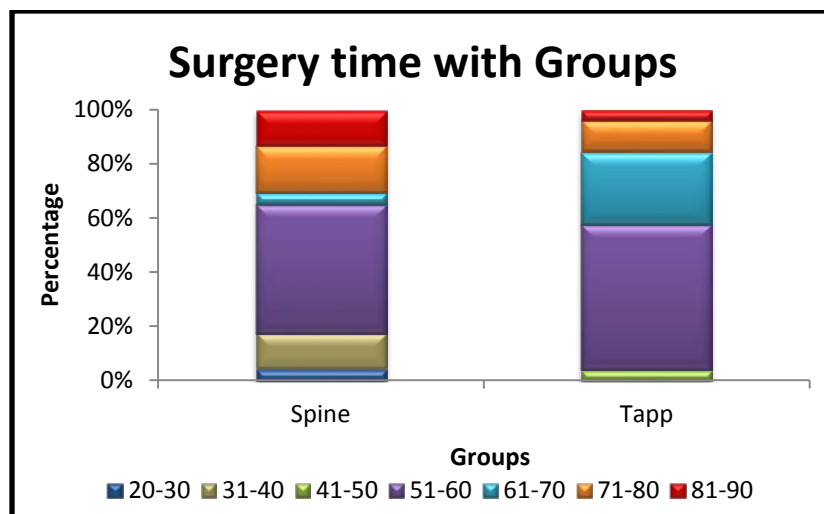


CHART 3 : Operative time of hernia in Lichtenstein and TAPP hernioplasty

			Groups		Total
			SPINAL	TAPP	
SURGERY TIME	20-30	Count	1	0	1
		% within Groups	4.0%	0.0%	2.0%
	31-40	Count	3	0	3
		% within Groups	12.0%	0.0%	6.0%
	41-50	Count	2	0	2
		% within Groups	8.0%	0.0%	4.0%
	51-60	Count	11	14	25
		% within Groups	44.0%	56.0%	50.0%
61-70	Count	1	7	8	
	% within Groups	4.0%	28.0%	16.0%	
71-80	Count	4	3	7	
	% within Groups	16.0%	12.0%	14.0%	
81-90	Count	3	1	4	
	% within Groups	12.0%	4.0%	8.0%	
Total		Count	25	25	50
		% within Groups	100.0%	100.0%	100.0%

TABLE 3 : Time taken for Lichtenstein and TAPP hernioplasty

- The time taken to do hernioplasty in open(Lichtenstein) technique under spinal anaesthesia was from 40 minutes to 90 minutes ,
- The time taken to do TAPP laparoscopic hernioplasty was ranging from 50 minutes to 90 minutes .

4) POST OPERATIVE PAIN DURATION :

Comparison of Post OP Pain by Independent sample t-test						
Groups		N	Mean	S.D	t-value	P-value
POST OP PAIN	SPINAL	25	31.20	18.00	2.881	0.006**
	TAPP	25	18.72	12.04		
** Highly Significant at P < 0.01 level						

TABLE 4 : Duration of post operative pain

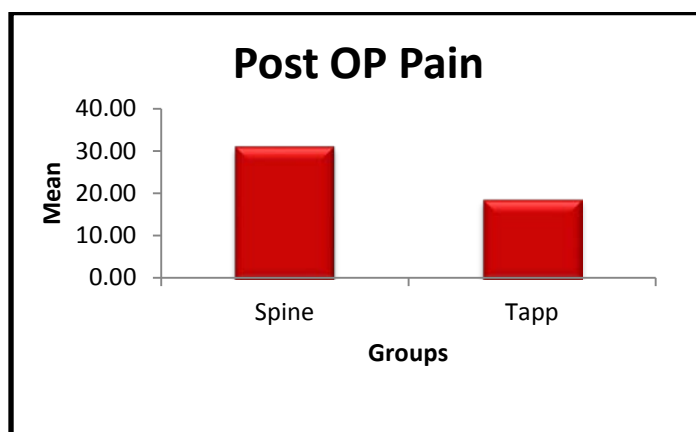


CHART 4 : duration of postoperative pain in two groups

- Post operative pain is one of the most common complications that occur after hernioplasty. Here the pain duration is assessed at 12 hours , 24 hours and 48 hours. While comparing both the groups ,the mean in group A is 31.2 and the mean in group B is 12.04.
- Thus statistically in group B there is a significant lesser post operative pain duration when compared with group A

5) POST OPERATIVE COMPLICATIONS :

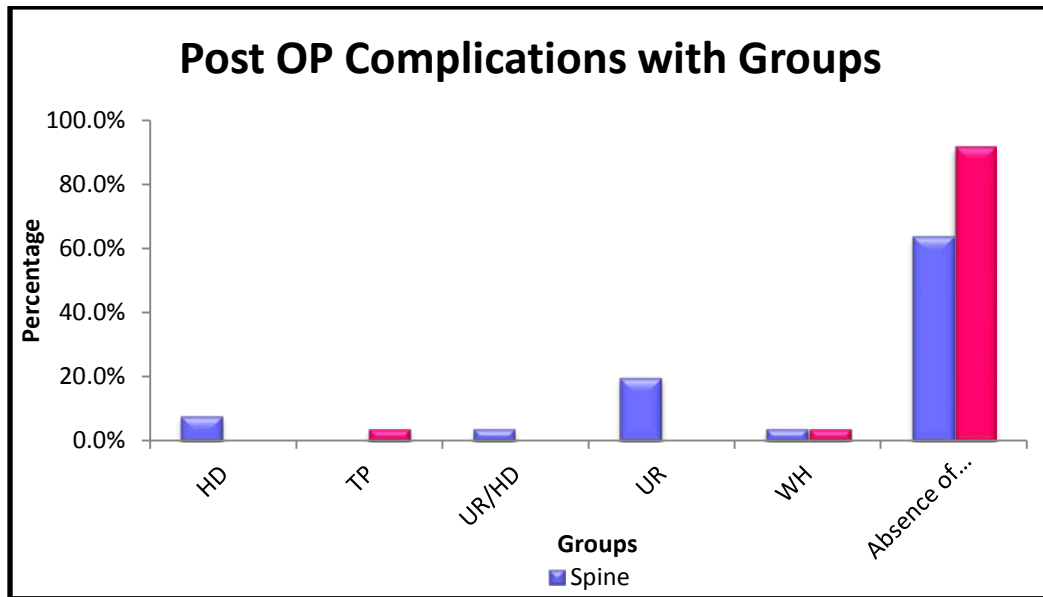


CHART 5 : Comparison of presence or absence of individual post operative complications between both the groups.

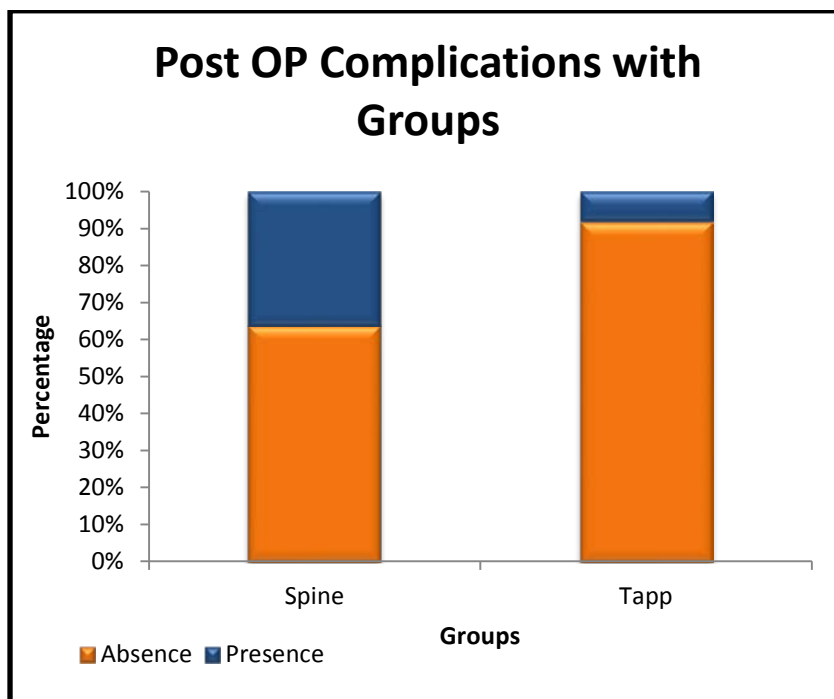


CHART 6 : Comparison of presence and absence of post operative complications

Comparison between Post OP Complications with Groups							
			Groups		Total	χ ² – value	P- value
			SPINAL	TAPP			
POST OP COMP	Absence	Count	16	23	39	5.711	0.017 *
		%	64.0%	92.0%	78.0%		
	Presence	Count	9	2	11		
		%	36.0%	8.0%	22.0%		
Total	Count	25	25	50			
	%	100.0%	100.0%	100.0%			

* Significant at P < 0.05 level

TABLE 5 : Comparison of post op complications .

- The post operative complications were studied in both the groups
- In group A , 9 patients developed complications like urinary retention, headache, wound hematoma while 16 patients didn't develop any complications
- In group B , 2 patients developed post operative complications while 23 patients didn't develop
- P value is less than 0.05 ,thus incidence of postoperative complications was significantly lesser in group B (TAPP) than in group A (Lichtenstein)

7 ANALGESIA DOSAGE

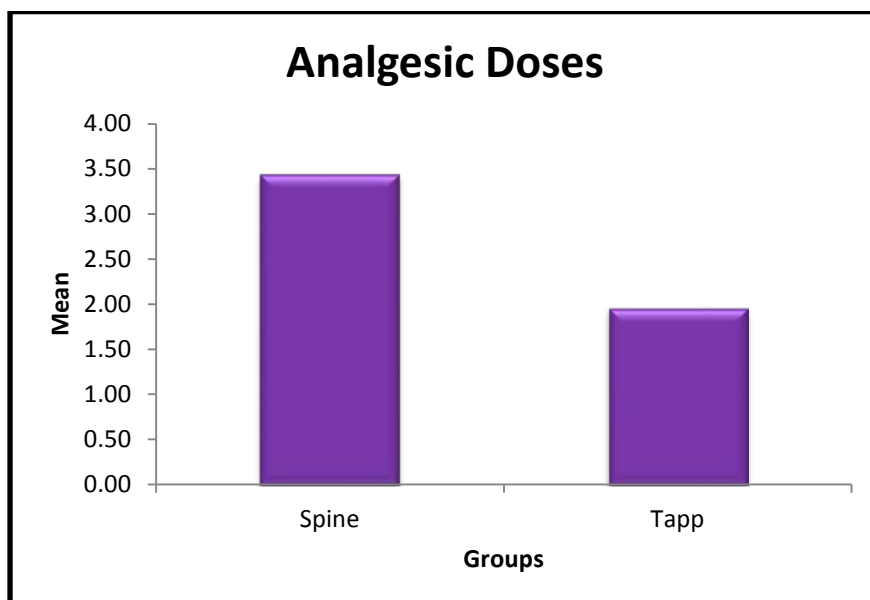


CHART 7 : Comparison of the dosage of analgesia

No of analgesic doses	Group A LICHTENSTEIN		Group B TAPP	
	No of cases	Percentage	N of cases	Percentage
0	-	-	-	-
1	2	8%	11	44%
2	5	20 %	5	20%
3	10	40%	8	32%
4	-	-	1	4 %
5	4	16	-	-
6	4	16 %	-	-
Mean+/-	3.44, +/-1.58		1.96 +/-	
S.D			0.98	

TABLE 6 : comparison of number of analgesic dosage

Comparison of Analgesic Doses by Independent sample t-test						
Groups		N	Mean	S.D	t-value	P-value
ANALGESIC DOSES	SPINAL	25	3.44	1.58	3.976	0.0005**
	TAPP	25	1.96	0.98		
** Highly Significant at P < 0.01 level						

TABLE 7 : Comparison of analgesia dosage and its significance

- In group A the mean was 3.44, +/- 1.58
- In group B the mean was 1.96, +/- 0.98
- Thus the requirement of analgesia was less in group B when compared with group A
- It is statistically significant as p value <0.05

8) Hospital stay

No of days of stay	Group A (Lichtenstein)		GroupB(TAPP)	
	No of cases	Percentage	No of cases	Percentage
1	3	12%	-	0%
2	3	12%	22	88%
3	5	20%	3	12%
4	12	48%	-	0%
5	2	8 %	-	0%

TABLE 8 : Comparison of the duration of hospital stay

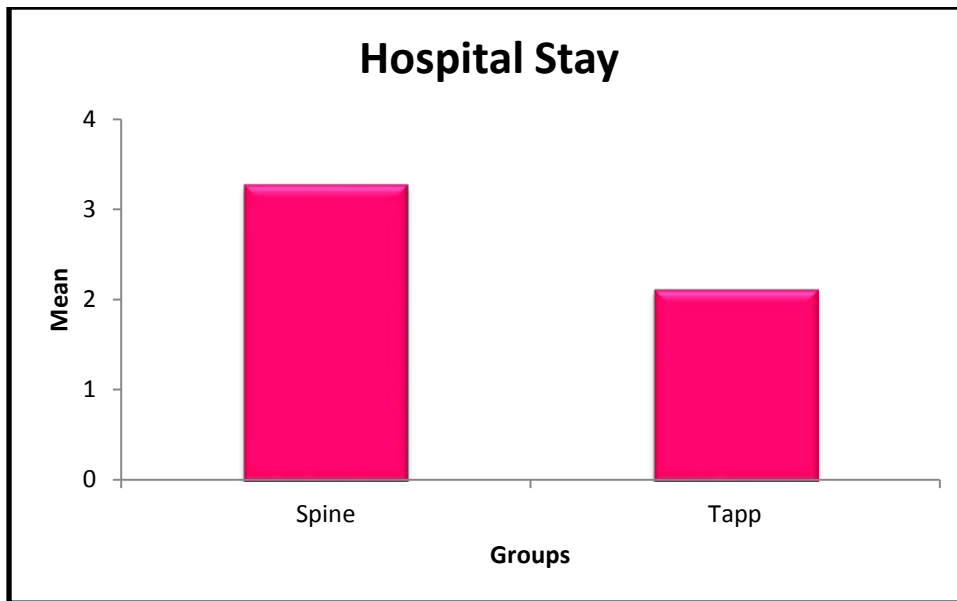


CHART 8 : Comparison of hospital stay between both the groups

Comparison of Hospital Stay by Independent sample t-test						
Groups		N	Mean	S.D	t-value	P-value
HOSPITAL STAY	SPINAL	25	3	1.2	4.757	0.0005 **
	TAPP	25	2	0.3		
** Highly Significant at P < 0.01 level						

TABLE 9 : significance of TAPP over LICHTENSTEIN method in regards to hospital stay

The number of hospital stay days was significantly less in group B when compared to group A ,p value < 0.05

9) CHRONIC POST OPERATIVE PAIN BASED ON VISUAL ANALOGUE SCALE

Comparison of VAS by Independent sample t-test						
Groups		N	Mean	S.D	t-value	P-value
VAS	SPINAL	25	3.08	1.04	5.006	0.0005 **
	TAPP	25	1.88	0.60		
** Highly Significant at P < 0.01 level						

TABLE 10 : Comparison of inguinodynia based on visual analogue scale

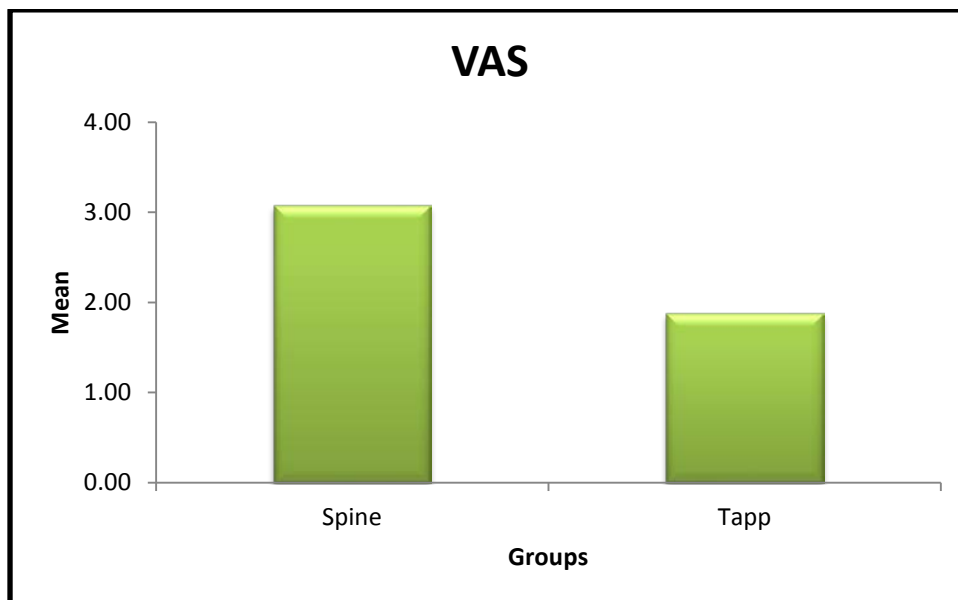


CHART 9 : Comparison of inguinodynia based on visual analogue scale

The post hernioplasty pain is also known as inguinodynia. It can persist for 3 months. In this study it is assessed by visual analogue scale

- The mean in group A (Lichtenstein) is 3.08, +/- 1.04 and the mean in group B (TAPP) is 1.88 , +/- 0.60
- Thus using visual analogue scale , in group B inguinodynia significantly lesser than in group A , p value < 0.05

DISCUSSION

I have conducted a prospective study on 50 patients having Inguinal Hernia. I have divided them into 2 groups. Group A underwent Lichensteins Open Hernioplasty and Group B underwent TAPP(Laparoscopic) Hernioplasty.

The youngest patient in group A is 22 years old and 24 years old in Group B while the oldest patient is 67 years in Group A and 70 years in Group B with a mean age of 40.44 in Group A and in Group B is 48.28.

The number of Indirect Inguinal Hernia in Group A was 14(56%) and Group B was 15(60%). The number of Direct Inguinal Hernia in Group A is 11(44%) and Group B is 10(40%) , thus indicating statistically that Indirect Inguinal Hernia is more common than Direct Inguinal Hernia. Indirect Inguinal Hernia was found to be more common between 22-40 years of age and Direct Hernia between 40-70 years of age. As per the study, thus Direct Hernias are more commoner in the older age group and Indirect Hernia in younger age group.

The number of Right sided Inguinal Hernia in Group A is 16(64%) and Group B is 18(72%). The number of Left sided Inguinal Hernia in Group A is 9(36%) and Group B is 7(28%). Thus Right sided Inguinal Hernia are more common than Left according to the study.

- On the basis of the operating time in Group A, the time taken for hernioplasty was 20-30 minutes for 1 (4%) patient, 31-40 minutes for 3 patients(12%), 41-50 minutes for 2 patients(8%), 51-60 minutes for 11 patients (44%), 61- 70 minutes for 1 patient(4%), 71-80 minutes for 4 patients(16%), 81-90 minutes for 3 patients. In Group B the time taken for hernioplasty was 51-60 minutes for 14 patients(56%), 61-70 minutes for 7 patients(28%), 71-80 minutes for 3 patients(12%) and 81-90 minutes for 1 patient(4%).

- Post operative pain is one of the most common complications due to traction on tissues, tissue handling and infection. They were assessed in both the groups after 12 hours, 24 hours and 48 hours post surgery. In Group A , the incidence of -postoperative pain was more with the mean of 31.20 and in Group B (TAPP) the incidence of postoperative pain was less with a mean of 18.72. The p value was statistically calculated to be 0.006 which indicates that it is highly significant. Hence in our study the persistence of postoperative pain was significantly less in Group B when compared to Group A.

- Postoperative complications that occurs after hernioplasty are headache, testicular pain, wound hematoma, mesh infection, recurrence and urinary retention. In our study there was no case of mesh infection and recurrence. In Group A , 2 patients developed headache(85), 5

patients developed urinary retention(20%), 1 patient developed wound hematoma(4%) and 1 patient developed both headache an urinary retention. 16 patients out of 25 did not develop any post operative complications(64%). In Group B , 1 patient developed testicular pain(4%), 1 patient developed wound hematoma(4%) , 23 patients did not develop any post operative complications(92%). Thus in my study by comparing both groups for the presence and absence of complications, it is thus proved that post operative complications were significantly less in Group B when compared to Group A(p-0.017)

- The number of analgesic doses administered postoperatively was compared between both the groups. 2 patients(8%) received 1 analgesic dose, 5 patients received(20%) 2 analgesic doses, 10 patients (40%) received 3 analgesic doses, 4 patients (16%) received 5 analgesic doses, 4 patients(16%) received 6 analgesic doses. With a mean value of 3.44 with standard deviation of 1.58. In Group B, 11 patients (44%) received 1 analgesic dose, 5 patients(20%) received 2 analgesic doses, 8 patients(32%) received 3 analgesic doses , 1 patient(4%) received 4 analgesic doses with a mean of 1.96 and standard deviation of 0.98. Here p value is <0.05 indicating the statistical study is highly significant with more analgesic dosage being administered to Group A (Lichenstein) than Group B.

- While comparing the hospital stay of both the groups, in Group A 3 patients(12%) were discharged by 24 hours, 3 patients were discharged by 24-48 hours(12%), 3 and 19 patients were discharged after 48 hours(76%). They were more prone to infection and complications. In Group B, 22 patients (88%) were discharged by 24-48 hours. In Group A mean is 3 with standard deviation 1.2, in Group B mean is 2 with standard deviation 0.3. Thus by statistical methods in our study it was proven that Group B(TAPP) patients had a significantly lesser hospital stay than the patients who underwent Lichenstein Procedure in Group A.

- As post hernioplasty pain can persist for upto 3 months, the patients were followed up for review post operatively and assessed for Inguinodynia using visual analogue scale. The mean in group A(Open) was 3.08 with Standard deviation -1.04 and in Group B (laparoscopic) mean -1.88 with Standard deviation 0.60. Thus the incidence of Inguinodynia ,measured using Visual Analogue scale was significantly less in Group B(TAPP) when compared to Group A(Lichenstein)

Thus in my study which is a comparative study on Inguinodynia in Open (Lichenstein) Versus Laparoscopy(TAPP) ,by comparing the analgesia dosage, duration of hospital stay, post operative pain duration, post

operative complications and grading of pain of inguinodynia using visual analogue scale we can come to a conclusion that inguinodynia is significantly lesser in laparoscopy (TAPP) when compared to open (Lichtenstein) hernioplasty.

CONCLUSION :

Inguinodynia is now considered one of the most important complications after a hernia surgery. Hernia being one of the most common surgical diseases there has been a rise in the incidence of inguinodynia . Thus in my study by comparing grading of pain of inguinodynia , postoperative pain duration, the analgesia dosage, duration of hospital stay and various complications we can come to a conclusion that inguinodynia is significantly lesser in laparoscopy (TAPP) when compared to open (Lichtenstein) hernioplasty.

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PROFORMA

CASE OF INGUINAL HERNIA

Name:

Address:

Age/sex:

religion:

O.P No:

I.P No:

D.O.A:

D.O.S:

D.O.D:

B. CHIEF COMPLAINTS:

Duration of symptoms:

C.PAST HISTORY:

1. DM/HT/BA
2. TB
3. EPILEPSY

4. PREVIOUS SURGERY
5. JAUNDICE
6. CIRRHOSIS

D.PERSONAL HISTORY:

SMOKER

ALCOHOLIC

E.INITIAL ASSESSMENT OF PATIENT

1.Vitals:

PR :

BP :

RR :

Temperature :

2.GENERAL SIGNS:

Pallor

Tongue

Skin

Icterus

Cyanosis

Lymphadenopathy:

K.SYSTEMIC EXAMINATION:

CVS

RS

CNS

ABDOMEN:

INGUINO SCROTAL REGION :

EXTERNAL GENITALIA:

PER RECTAL EXAMINATION

CLINICAL DIAGNOSIS

INVESTIGATIONS

A. HB%

L.PULMONARY FUNCTION TEST:

PRE-OPERATIVE DIAGNOSIS:

OPERATIVE PROCEDURE:

ANESTHESIA:

INCISION:

SURGICAL PROCEDURE

PATIENT CONSENT FORM

STUDY TITLE: “COMPARATIVE STUDY ON INGUINODYNIA IN LICHTENSTEIN (OPEN) VERSUS TAPP (LAPROSCOPIC) HERNIOPLASTY”

STUDY CENTRE: DEPARTMENT OF GENERAL SURGERY
GMKMCH,SALEM

PARTICIPANT NAME : AGE : SEX:

I.P. NO :

I confirm that I have understood the purpose of surgical/invasive procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the possible complications that may occur during and after medical/ surgical procedure. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

I hereby consent to participate in this study for various surgical/invasive procedures and their outcomes.

Time :

Date : Signature / Thumb Impression Of Patient

Place :

Patient's name:

Signature of the investigator: _____

Name of the investigator : _____

MASTER CHART TAPP

S.No	NAME	AGE	IP NO	SIDE	DIRECT/INDIRECT	PAIN VISUAL ANALOGUE SCALE	SURGERY TIME	ANALGESIC DOSES	AMBULATION DAY	POST OP PAIN	POST OP COMPLICTIONS	HOSPITAL STAY
1	VENKATESAN	48	70852	RIGHT	INDIRECT	2	51-60	1	1	12hrs	nil	2
2	GOVINDHAN	61	68827	RIGHT	INDIRECT	2	51-50	2	1	12hrs	nil	2
3	PARTHIBAN	24	65903	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	2
4	CHELLAPAN	74	65578	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	2
5	KARUPUSAMY	36	62929	RIGHT	INDIRECT	1	71-80	3	2	12hrs	wh	2
6	SUBRAMANII	44	71307	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	2
7	SELVAN	65	42375	RIGHT	DIRECT	2	61-70	1	1	12hrs	nil	2
8	SAKTHI	70	66479	RIGHT	DIRECT	1	51-60	1	1	12hrs	nil	2
9	MUNUSWAMY	29	49833	RIGHT	INDIRECT	1	61-70	4	1	12hrs	tp	3
10	SHANMUGAM	41	58952	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	2
11	SELVARAJ	46	50663	RIGHT	DIRECT	2	51-60	1	1	12hrs	nil	2
12	ELUMALAI	35	56659	RIGHT	INDIRECT	1	51-60	1	1	12hrs	nil	2
13	SELVARAJ	27	79999	RIGHT	INDIRECT	1	51-60	1	1	12hrs	nil	2
14	RADHAKRISHNAN	52	44823	RIGHT	DIRECT	2	51-60	1	1	12hrs	nil	2
15	PACHAMUTHU	61	57754	RIGHT	DIRECT	2	51-60	1	1	12hrs	nil	2
16	NATESAN	65	23222	RIGHT	DIRECT	2	61-70	1	1	12hrs	nil	2
17	SELVAM	70	67238	RIGHT	DIRECT	1	61-70	1	1	12hrs	nil	2
18	VENKATESH	46	33186	RIGHT	DIRECT	2	51-60	1	1	24hrs	nil	2
19	SENTHIL	43	74821	LEFT	DIRECT	2	51-60	3	2	24hrs	nil	2
20	SURESH	45	64606	LEFT	INDIRECT	3	61-70	3	1	24hrs	nil	2
21	MARIMUTHU	51	45975	LEFT	DIRECT	2	61-70	3	2	24hrs	nil	2
22	RAJESH	42	48359	LEFT	INDIRECT	2	61-70	3	1	24hrs	nil	2
23	KATHIK	45	50231	LEFT	INDIRECT	2	81-90	3	1	48hrs	nil	3
24	BASHA	42	42363	LEFT	INDIRECT	3	71-80	3	2	48hrs	nil	3
25	PERIYASAMY	45	67687	LEFT	INDIRECT	3	71-80	3	2	48hrs	nil	2

S.No	NAME	AGE	IP NO	SIDE	DIRECT/INDIRECT	VISUAL ANALOGUE SCALE	SURGERY TIME	ANALGESIC DOSES	AMBULATION	POST OP PAIN	POST OP COMP	HOSPITAL STAY
1	AMEER	22	61840	RIGHT	INDIRECT	3	41-50	2	1	12hrs	nil	1
2	VINOTH	23	79132	RIGHT	INDIRECT	2	41-50	2	1	12hrs	nil	1
3	EZILARASAN	24	28724	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	1
4	ANBALAGAN	35	72534	RIGHT	INDIRECT	2	51-60	2	1	12hrs	nil	2
5	CHINNATHAMBI	46	53815	RIGHT	INDIRECT	2	51-60	2	2	12hrs	nil	2
6	ARUL	42	73856	LEFT	INDIRECT	3	20-30	1	1	12hrs	hd	4
7	ELANGO	43	67312	RIGHT	DIRECT	2	51-60	3	1	12hrs	nil	3
8	RANGA	41	316451	RIGHT	DIRECT	3	51-60	3	1	24hrs	ur/hd	4
9	MANIVANAN	40	26924	RIGHT	INDIRECT	2	51-60	3	2	24hrs	nil	3
10	DHANAPAL	47	45290	LEFT	INDIRECT	3	51-60	3	2	24hrs	nil	3
11	SINGARAM	39	47329	LEFT	DIRECT	3	31-40	3	2	24hrs	ur	4
12	RAMACHANDRAN	38	86253	LEFT	INDIRECT	2	51-60	3	2	24hrs	ur	4
13	PRIYADARSHAN	24	36134	LEFT	INDIRECT	3	51-60	3	2	24hrs	ur	4
14	SANNASI	41	15990	LEFT	DIRECT	2	51-60	3	2	24hrs	ur	2
15	ANBU	42	65308	RIGHT	DIRECT	4	31-40	3	1	24hrs	nil	4
16	ANNADURAJ	45	63650	RIGHT	DIRECT	3	31-40	3	1	24hrs	nil	3
17	NOUSHATH	46	36512	RIGHT	DIRECT	3	71-80	5	2	48hrs	nil	3
18	SENTHIL	52	47129	RIGHT	DIRECT	3	71-80	5	2	48hrs	ur	4
19	SHEKAR	47	3578	LEFT	DIRECT	4	71-80	5	2	48hrs	hd	4
20	SHANMUGAM	39	25167	LEFT	INDIRECT	3	51-60	1	1	48hrs	nil	4
21	MULLAIVENDAN	37	64289	LEFT	INDIRECT	4	71-80	5	1	48hrs	nil	4
22	RAJA	34	52760	RIGHT	INDIRECT	5	81-90	6	2	60hrs	nil	4
23	ARULKUMAR	43	63850	RIGHT	INDIRECT	6	61-70	6	2	60hrs	wh	5
24	LAKSHMAN	54	16131	RIGHT	DIRECT	4	81-90	6	2	60hrs	nil	5
25	IMRAN	67	64892	RIGHT	DIRECT	4	81-90	6	2	60hrs	nil	4

THE KEY TO MASTER CHART

M-male

Y-years

HD - headache

TP-testicular pain

WH- wound hematoma

UR-urinary retention