COMPARATIVE STUDY OF POST OPERATIVE COMPLICATIONS IN LIGATION VERSUS NON LIGATION WITH EXCISION OF THE HERNIA SAC IN INDIRECT INGUNIAL HERNIA

By

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Dissertation Submitted to SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR, Karnataka, in partial fulfilment of the requirements for the degree of

M. S. (GENERAL SURGERY)

Under the guidance of

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DEPARTMENT OF GENERAL SURGERY

SRI DEVARAJ URS MEDICAL COLLEGE, R.L.JALAPPA HOSPITAL & RESEARCH CENTRE, KOLAR.

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LIST OF ABBREVIATIONS USED

BT: Bleeding time

CT: Clotting time

COPD: Chronic Obstructive Pulmonary Disease

DLC: Differential Leucocyte Count

ECG: Electrocardiogram

ESR: Erythrocyte Sedimentation rate

Hb: Haemoglobin

TB: Tuberculosis

TLC: Total Leucocyte Count

ABSTRACT

NEED FOR THE STUDY

Various methods of management of hernia sac have different advantages and disadvantages. Routinely performed method is excision & ligation of the sac, but, it is associated with more post- operative pain & other complications.

Here in our study the two methods-high ligation and excision of the sac will be compared with excision without ligation of the sac with respect to their early post operative complications in rural adult population of Kolar.

METHODOLOGY

A study on 40 patients undergoing hernioplasty satisfying the inclusion and exclusion criteria will be included for evaluation. The cases will be divided randomly in two groups and evaluated postoperatively (immediate within 1 week and for 1 month).

The hernioplasty will be done under general /spinal anaesthesia. The repair will be done using a tension-free polypropylene mesh technique, randomized to induce high hernia sac ligation or division of the sac. The decision to ligate or not will be made randomly. In 1st group the standard technique of high ligation of the sac before excision will be performed. Hernia sac will be ligated with absorbable suture and transfixation stitch will be used. In the 2nd group the hernia sac will be dissected to the neck of the sac and shall be left open after excision at the level of the internal ring.

The patients will be assessed within 1week and followed for 1 month. Early complications will be defined as that occurring within one month of surgery, as direct result of the surgical procedure. The main endpoint will be to detect any difference in immediate postoperative complications between the two groups.

Chi square test and Fisher exact test are applied to the observations and odds ratio computed to determine the significance of the same and to compare the two procedures with respect to various complications.

RESULTS AND INFERENCES

- Postoperative morbidity was significantly less in case of hernioplasty with only excision of the sac.
- Duration of hospital stay was less in case of hernioplasty with excision of the sac (without ligation).

CONCLUSION

According to the results of the current study, hernioplasty with non ligation of the sac is an equally efficient alternative to hernioplasty with high ligation and excision of the sac, in terms of efficiency of repair while it was found to be better than the latter in terms of postoperative morbidity and complications profile.

Keywords

Inguinal hernia; Young adults; Herniotomy; Herniorrhaphy; Hospital stay; Postoperative morbidity; Complications; Recurrence; Comparison.

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INTRODUCTION

For more than 5000 years, hernia represented an enigma to surgeons. Even to date, in the entire history of surgery, no subject has been as controversial as the repair of groin hernia, as Watson said.

Since, it is curable condition and if left untreated, some of the complications may prove lethal, it is generally accepted that surgery should be performed in all cases unless there is a genuine contra-indication. With advent of newer and safer anaesthetic techniques, and a wide array of antibiotics, the mortality and morbidity has drastically come down, even in the elderly and in the presence of systemic illness. Hence, it can be said that it is criminal to expose the patient to the unnecessary risk of lethal complications of hernia by ill-advised conservative methods.

The aim of radical cure of inguinal hernias is the removal of pathology, i.e, management of the sac and repair of internal ring and posterior wall of inguinal canal. The success of the surgical treatment can be gauged by the rate of recurrence.

Of all the numerous procedures available for hernia repair, no single method answers all situations.

Depending on the operative findings, the approach, type of repair, material used, etc have to be suitably modified.

"There is no perfect surgeon and no perfect surgical procedure in this respect." - *Charles Mayo 1949.*

Though the present day procedure of choice for hernia repair is laparoscopic, it can be done only in a few institutions for reasons of cost and maintenance. Even when laparoscopy is not available, the trend is towards open hernioplasty.

The current study intends to compare cases undergoing hernioplasty with excision and ligation of the sac to those undergoing hernioplasty with non-ligation of the sac and to test whether former procedure has any definite advantage over latter, or whether the latter is better in terms of lesser post operative morbidity.

Information available from studies conducted so far, shows the following observations :

- Morbidity was high following repair of inguinal hernia.[1]
- Pain following herniotomy was of lesser degree and duration.[2]
- Recurrence rates were very similar.[3]
- Patients undergoing herniotomy alone, had a shorter stay in the hospital.[4]

AIMS & OBJECTIVES

1. To study early post-op complications following sac ligation with excision in indirect inguinal hernioplasty.
2. To study early post-op complications following excision of sac without ligation in indirect inguinal hernioplasty.
3. To compare the early (within 1 month) post op complications (pain, fever, infection, seroma / hematoma, scrotal swelling) between the two types of hernia sac management.

REVIEW OF LITERATURE

The word hernia, was derived from "Herons", Greek word for a branch or protrusion, and was recognized thousands of years ago.

Earliest mention of inguinal hernia is found in Eber's Papyrus (1550 BC), in which it is clear that the pre-Homeric physicians treated hernia by conservative methods.

The first description of surgery for inguinal hernia (Kelotomy) is attributed to Roman encyclopaedist Celsus (25BC-50AD). Later Roman surgeons in the period of Paul Aegina (7AD) followed double ligation with excision en masse of cord, sac and testis. This persisted till the period of renaissance.

For the most part, universities of middle ages neglected the science of surgery, but thanks to few dynamic men like Hugh of Lucca (1160-1257 AD), Bruno of Longobury, Theodoric (1205-1290 AD) and William of Salicet (1210-1277 AD), surgical practice was blended into medical education, though hernia surgeries in middle ages were carried out by itinerant cutters and quacks and barbers, whose ignorant and fraudulent methods resulted in failures and the surgical science saw a decay.

However, Pierre Franco (1550-1661 AD) was one of these cutters, who had high ethical standards and had the daring and courage to operate on strangulated hernia. It was only in 1800 AD, that a greater knowledge of the anatomy of inguinal canal and description of several types of hernia were obtained.

Postt, William Hunter, John Hunter, Brodie, Abernathy and Cooper were not only surgeons involved in hernia repair but also anatomists. Sir Astley Cooper was a genius who not only described the ligament/that now bears his name but also emulated -

- Situation of two inguinal rings relative to each other
- Obliquity of inguinal canal
- Transversalis fascia and formation of femoral sheath
- Causation of hernia as a result of defect at the internal ring rather than at external ring.

Hasselbach, Camper, Gimbernat, Scarpa, Richter, Clozuat, Lawrence and many others published numerous books and articles on hernia.

With the introduction of anaesthesia, kelotomy was gradually replaced by herniotomy, where the sac was identified and ligated at the external ring or at various levels in the canal. The basic operation for inguinal hernia was developed by Sir William Mac Ewen in 1880. Though the

advantages of high ligation were realized, failure was almost the rule, because in those days any transgression of tissue planes invariably resulted in infection.

The struggle continued till the introduction of concepts of antisepsis by Joseph Lister and asepsis by Koch. The concepts of asepsis and anaesthesia imparted remarkable impetus to hernia surgery, which extended from only strangulated hernias, to reducible hernias also.

In 1869, Mac Ewen first recognized the importance of transversalis fascia in hernia repair.

In 1881, Lucas – Championniere incised the external aponeurosis for the first time, thereby facilitating high ligation.

In 1890, Billroth and Bull separately reviewed the literature of herniotomy and published papers noting that though the mortality rates were very low compared to pre-Listernian era, recurrence rates were still very high, almost 100% within 4 years.

In the same year, Bassini of Italy, published his epoch making report on 206 cases of hernia operations with very low mortality and recurrence rates. In principle, his surgery involved high ligation of sac and strengthening of posterior wall by suturing the conjoined tendon to the Poupart's ligament beneath the cord.

At about the same time, Halsted was independently developing a similar procedure with few variations. Operations developed by Bassini and Halstead remarkably reduced recurrence rates and were accepted by many European's American Surgeons. But not all of them could reproduce the excellent results originally produced by the two stalwarts. Therefore hundreds of modifications were tried out.

Various other methods were tried out to strengthen the defect in the Hasselbach's triangle or elsewhere. Paul W. Harrison (1883-1962) was one of the strongest proponents of repair of posterior inguinal wall, which was related to both the aetiology, and treatment of hernia.

Shouldice technique, also based on the same principle, consisted of overlapping of the two layers of transversalis fascia and showed very good results.

Today, re-inforcement of the posterior wall of the inguinal canal is a strengthening procedure and a variety of synthetic materials have been tried in this regard.

As Sir Ashley Cooper rightly put it "No disease of the human body belonging to the province of the surgeon, requires in its treatment, a greater consideration of accurate anatomical knowledge, with surgical skill, than hernia in all its variations".

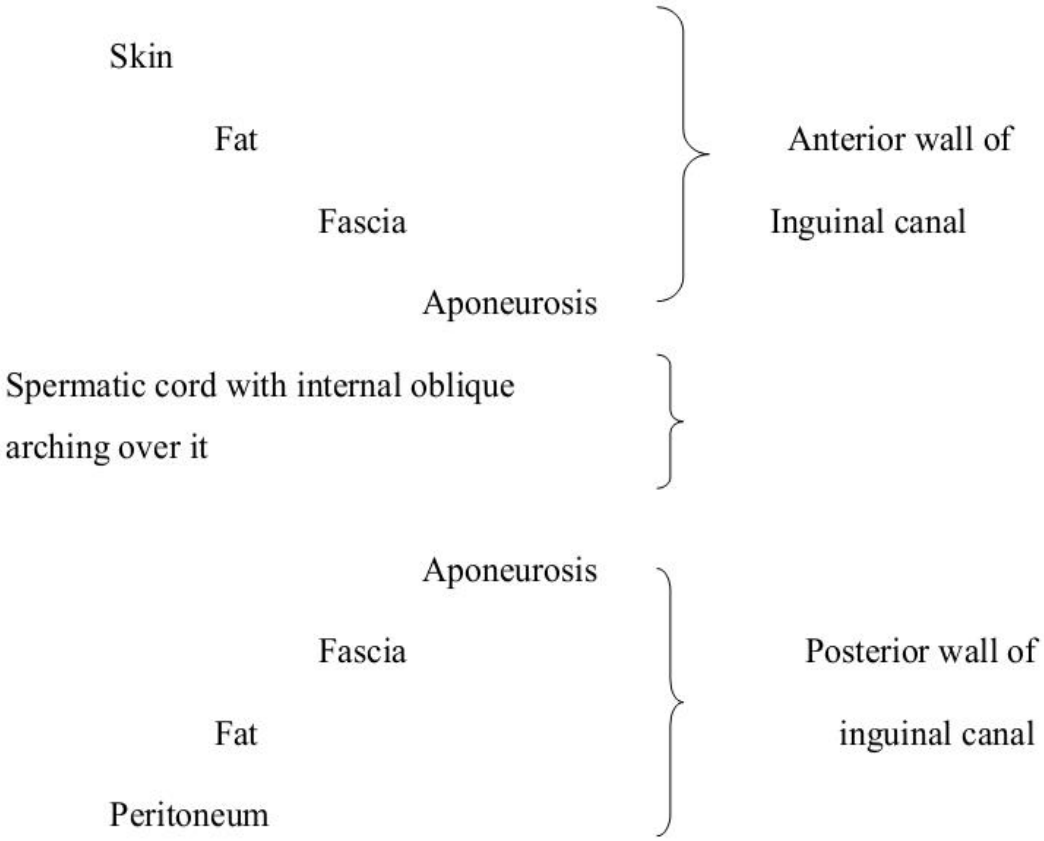
It is found that of all the numerous procedures available for hernia repair; no single method answers all situations. Depending on the operative findings, the approach, type of repair, materials used etc have to be suitably modified. For this ideal approach, a thorough knowledge of anatomy is an absolute prerequisite.

ANATOMY OF THE GROIN

Groin or inguinal region is an area bounded by the

- Anterior superior iliac spine
- Inguinal ligament, pubic tubercle and crest upto the symphysis and
- Linea alba, upto a perpendicular line drawn to it from the ASIS.

General architecture of the groin



LAYERS OF THE ANTERIOR ABDOMINAL WALL

I. Skin

Langer's lines are transverse in the groin with a subtle convexity in pedal direction.

II. Subcutaneous tissues

Can be divided into 2 strata; superficial fatty layer called **Camper's fascia**. Deep fibrous layer called **Scarpa's fascia**.

Innominate fascia: Well-developed layer[5] that intimately covers external oblique aponeurosis and inguinal ligament.

III. Musculo – aponeurotic structures

a. **External oblique**

The most superficial muscle of anterior abdominal wall. It is totally aponeurotic in the groin area.

b. **Internal oblique**

Most fleshy in the inguinal area, becomes aponeurotic just lateral to semilunar line. Bears triple relation to inguinal canal, forming its anterior wall, roof and posterior wall.

c. **Transversus abdominis**

The key layer[6],because of its role in hernia repair, fleshy laterally and aponeurotic medially.

The medial portion thickens to form the "**Falx inguinalis**".

Falx inguinalis and internal oblique aponeurosis together form the **"Conjoined tendon"**[7].

d. **Transversalis fascia**

That layer of endoabdominal fascia, which closely invests transversus abdominis muscle and its aponeurosis.

Superficial inguinal ring

A triangular aperture in the lower part of the external oblique aponeurosis, located immediately above and lateral to pubic tubercle.

Deep inguinal ring

An oval opening in the aponeurotic fibres of transversus abdominis. Situated above the mid inguinal point.

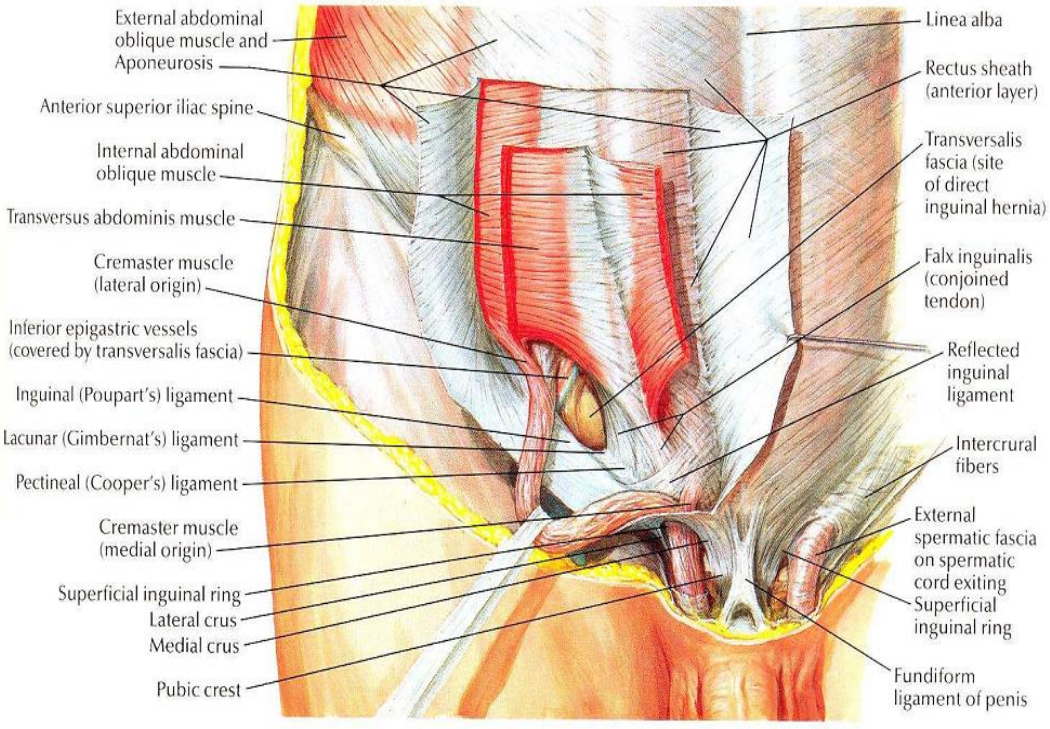


Fig 1: Inguinal region - dissection

Inguinal canal

It begins at the site of emergence of the spermatic cord through the transverses aponeurosis (internal ring) and ends at the pubic tubercle. It is oblique and 4 cm long slanting downwards and medially parallel with and a little above the inguinal ligament. It extends from the deep to the superficial inguinal ring. The boundaries are:

Anteriorly- Throughout by the skin, superficial fascia, external oblique aponeurosis in its lateral one third also by the muscular fibres of the internal oblique.

Posteriorly-The transversalis fascia, reinforced medially by the Falx inguinalis.

Above - The arched fibres of internal oblique and transversus aponeurosis.

Below- The inguinal ligaments and its continuation, lacunar ligament

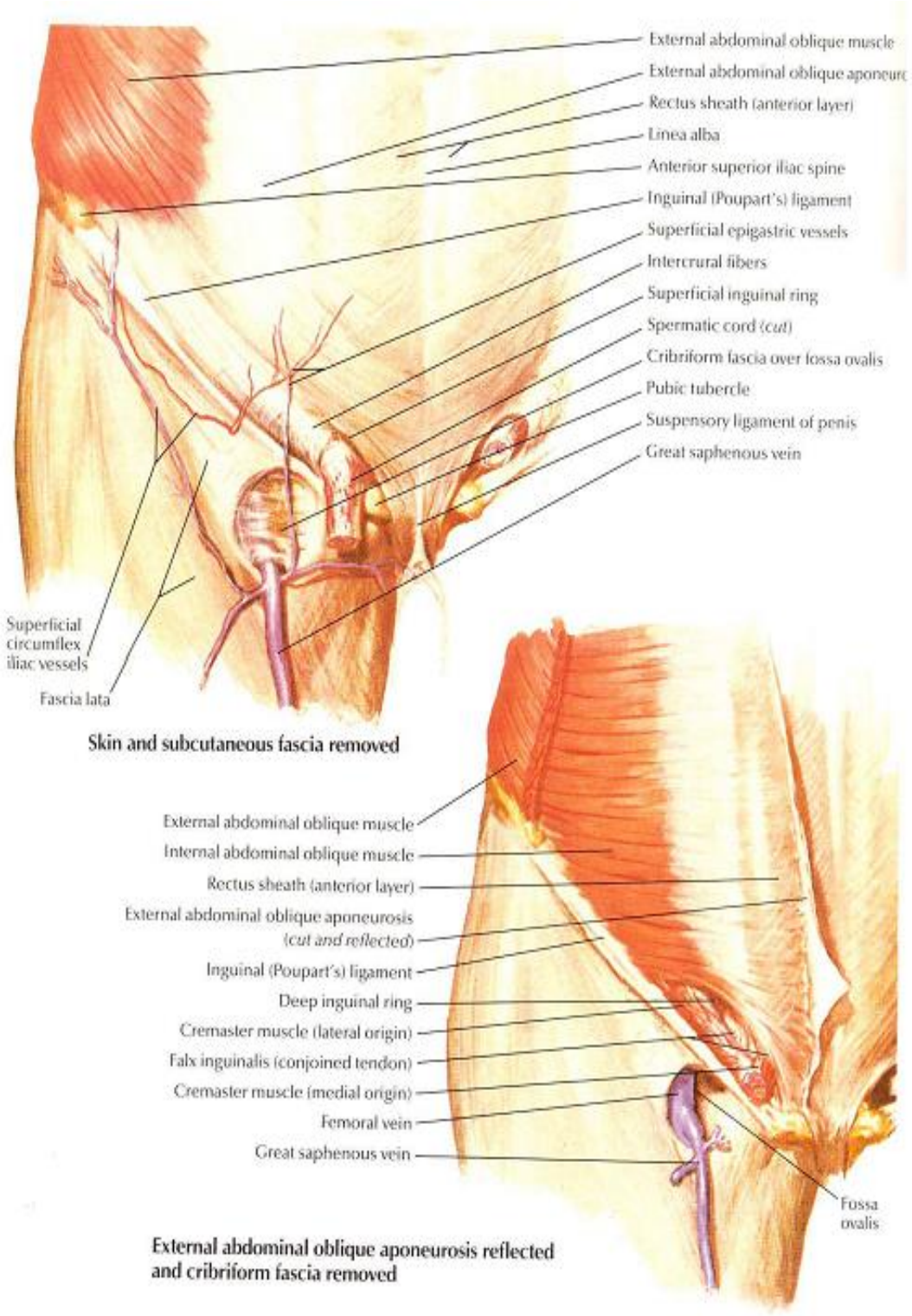


Fig 2: Dissection showing superficial and deep inguinal rings

Hasselbach's triangle

It is bounded medially by the lateral border of the rectus sheet, laterally by the inferior epigastric vessels and below by the inguinal ligament.

Now these boundaries have to be redefined to include only those structures that are in contact with the posterior inguinal wall in the same plane. Redefined boundaries are rectus sheath with or without falx inguinalis, inferior epigastric vessels and ilio pubic tract and Cooper's ligament.

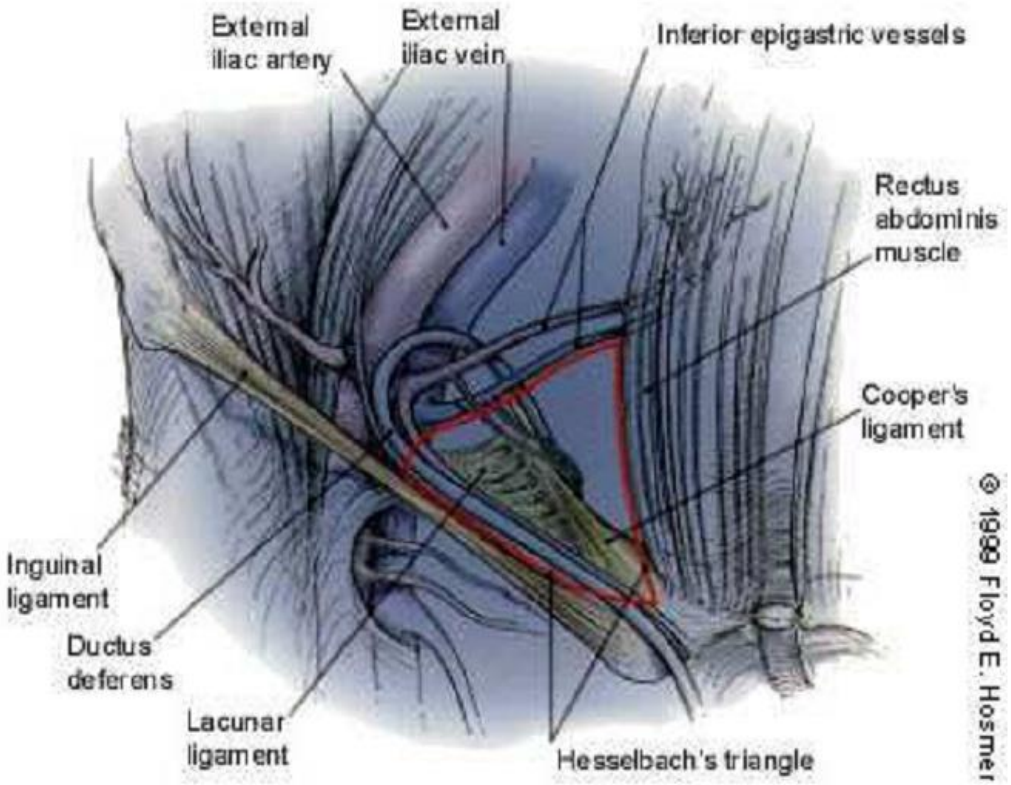


Fig 3: Hasselbach's triangle

Structures passing through inguinal canal are -

Spermatic cord

Originates at the deep ring and consists of

1. Arteries – testicular, cremasteric, artery to vas.
2. Veins – corresponding veins mainly testicular (pampiniform plexus)
3. Nerves – genital branch of genitofemoral nerve, cremasteric nerve, sympathetic plexus derived from paraaortic and pelvic plexus.
4. Lymphatics of the testes.
5. Vas deferens and areolar connective tissue.

Covering of the spermatic cord from within are processes vaginalis, internal spermatic fascia (Transversalis fascia), cremasteric fascia (Internal oblique muscle and fascia), External spermatic fascia (External oblique muscle and fascia).

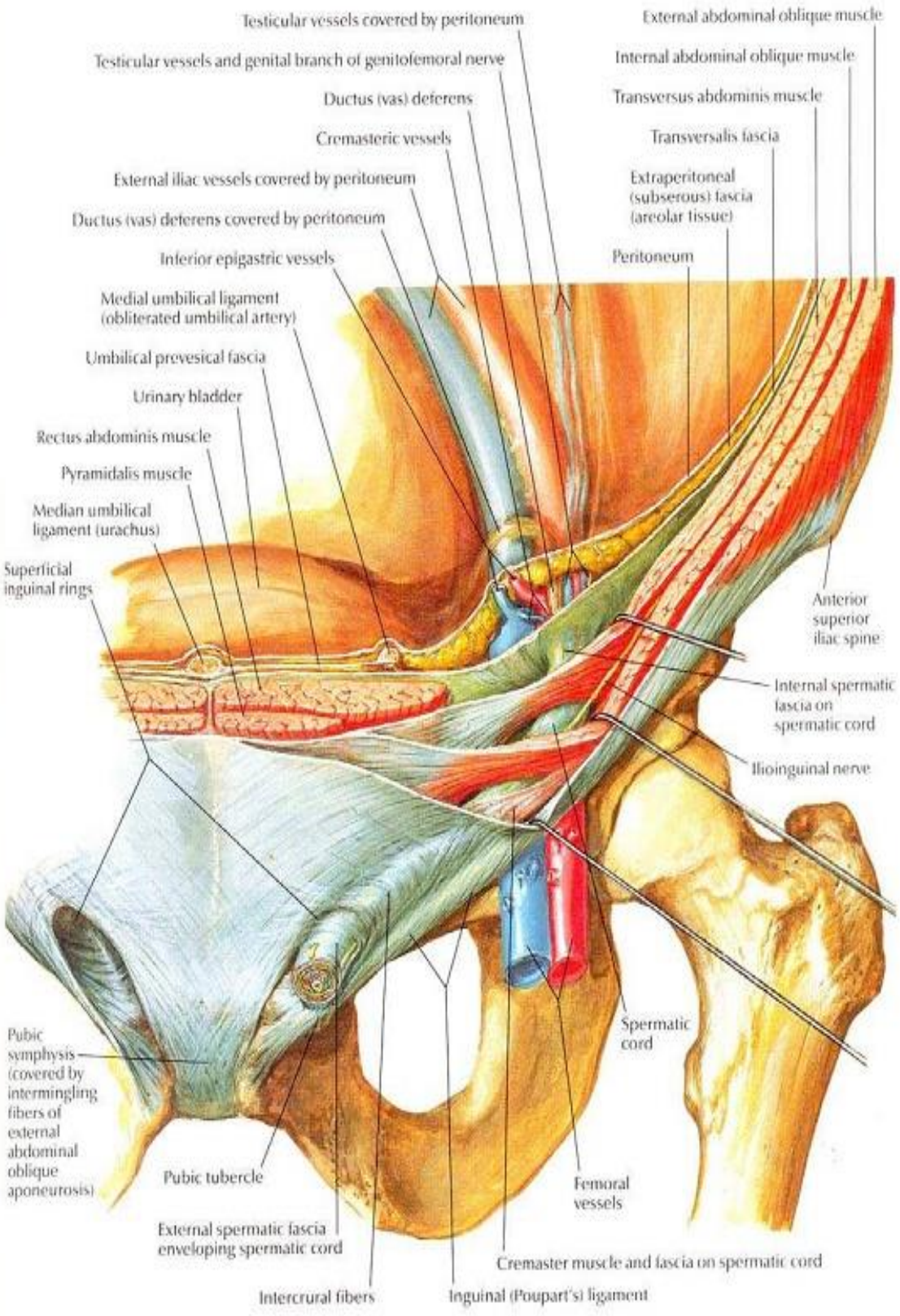


Fig 4: Inguinal canal and spermatic cord

Mechanism of inguinal canal[8]

The presence of the inguinal canal is a cause of weakness in the lower part of anterior abdominal wall. This weakness is compensated for, by the following factors.

- Obliquity of the inguinal canal -The two rings do not lie opposite to each other. Hence, when there is increase in intraabdominal pressure, the anterior and posterior wall approximate and the passage is obliterated. This is called the **"Flap valve mechanism"**.
- The superficial inguinal ring is guarded from behind by the conjoint tendon and by the reflected part of the inguinal ligament.
- The deep inguinal ring is guarded from front by the fleshy fibres of the internal oblique.
- **Shutter mechanism** of the internal oblique-This muscle has a tripe relation to the inguinal canal, forming the anterior wall, roof and the posterior wall of the canal. When it contracts, the roof is approximated to the floor, like a shutter. The arching fibres of transversus also take part in the shutter mechanism.
- Contraction of the cremaster helps the spermatic cord to plug the superficial inguinal ring (**Ball valve mechanism**).

- Contraction of the external oblique results in approximation of the two crura of the superficial inguinal ring (**slit valve mechanism**). The integrity of the superficial ring is greatly increased by the inter crural fibres.
- Hormones may play a role in maintaining the tone of the inguinal musculature.

Whenever there is rise in the intra abdominal pressure as coughing, sneezing or lifting heavy weights, all these mechanisms come into play, so that the inguinal canal is obliterated, its openings are closed and herniation of abdominal viscera is prevented.

DEFINITION AND PATHOLOGICAL ANATOMY

The term hernia is meant, the protrusion of some viscus or part of viscus from its normal situation through an opening or weak area in the walls of the cavity within which it is contained. An external abdominal hernia is the protrusion of a viscus, usually within the peritoneal sac through a weak areas in the abdominal wall. The most common situations at which hernias occur are those spots where parieties are weakened by the transmission of such structure as spermatic cord or round ligament of the uterus as in inguinal hernia which is situated partly or wholly in the inguinal region.

Pathological anatomy :

Hernia consists of three parts

- The sac
- The content of the sac
- The coverings of the sac

The Sac - consists of a diverticulum of peritoneum, which is divided into a mouth, neck, body and fundus.

The content- most commonly are:

1. Intestine – **enterocele** – usually small intestine but in some cases large intestine and appendix will also be seen.
2. Omentum – **Omentocele (Epiplocele)** but
3. A portion of the circumference of the intestine (Richter's hernia) may also be seen.
4. A portion of the bladder or a diverticulum of the bladder is sometimes present in addition to other contents in a direct inguinal or sliding inguinal hernia.
5. Ovary with or without the corresponding fallopian tube.
6. A Meckel's diverticulum (Littre's hernia).
7. Fluid as a part of the ascites
8. Loose bodies from appendicular epiploicae.

Any viscus in the abdomen may be found in the sac of hernia; however (as a rule) the contents are small intestine or omentum.

Coverings- of an indirect inguinal hernia from without are:

- Skin
- Fascia of camper
- Fascia of scarpa
- Deep fascia
- External oblique aponeurosis
- Arching fibres of internal oblique
- Cremasteric fascia
- Internal spermatic fascia, and
- Extraperitoneal fat

Coverings of a direct inguinal hernia from without are

- Skin
- Fascia of camper
- Fascia of Scarpa
- Deep fascia
- External oblique aponeurosis
- Spermatic cord
- Fascia transversalis and
- Extra peritoneal fat.

PRINCIPAL ETIOLOGIC FACTORS IN INGUINAL HERNIA

I. Congenital factors

a. Sex

b. Descent of testis

c. Anatomical factors

i. Subtle variants in the attachment and arrangement of abdominal muscles

ii. Obliquity of inguinal canal

iii. Patent processus vaginalis[9]

d. Biological factors

i. Biophysical and biochemical factors

ii. Patho-physiological factors

II. Contributing factors

a. Aging

b. Obesity

c. Cardiac diseases (Congestive heart failure)

d. Pulmonary disease (C.O. P. D)

e. Prostatism

f. Chronic constipation, diverticular disease

g. Genito-urinary (Cystitis, cystocele, urethrocele, stricture urethra)

a. **Aging**

Due to atrophy of the tissues, there will be weakening of inguinal floor and internal ring leading to inguinal hernias.

b**. Obesity**

Predispose to hernia formation due to increase in the intra-abdominal pressure, and infiltration of fat in the muscles, thus leading to weakness of abdominal musculature.

c**. Cardiac diseases**

Dyspnoea and ascites associated with cardiac diseases increase the intra-abdominal pressure leading to formation of inguinal hernias.

d. **Pulmonary diseases**

Like bronchitis, bronchiectasis, emphysema, cause increase in the intra-abdominal pressure.

e. **Prostatic Hypertrophy**

In an attempt to overcome obstruction, the patient must strain which leads to increase in the intra - abdominal pressure.

f. **Constipation, diverticular disease and colo-rectal carcinomas**

Repeated straining of stools leading to increase intra-abdominal pressure leads to the appearance of inguinal hernia.

g. **Genito – Urinary diseases**

Like cystitis, urethral stricture, etc

h. **Intra abdominal tumours**

i. **Surgical trauma to the ilio-inguinal nerve**[10]

III. Precipitating (or) exciting causes

a. Sudden increase in intra-abdominal pressure[11];straining, lifting heavy weight, violent cough.
b. Trauma to muscle and aponeurosis

CLASSIFICATION OF INGUINAL HERNIAS

A. Anatomical types

1. According to the **extent of hernia**
   a. Bubunocele: When the hernia does not come out of the superficial ring.
   b. Incomplete hernia: When it comes out through the superficial ring but fails to reach the bottom of the scrotum
   c. Complete hernia: When it reaches the bottom of the scrotum

2. According to its **site of exit**

   a. **Oblique (Indirect) hernia**-When it comes out through the deep ring i.e., lateral to the inferior epigastric artery

   b. **Direct hernia**-When it comes out through the Hasselbach's triangle i.e, neck of the sac lies medial to the inferior epigastric artery.

3. According to the **contents of the hernia**

   a. **Enterocele** - When it contains the intestine.

   b. **Epiplocele or omentocoele** - When it contains omentum.

   c. **Cystocele** when it contains urinary bladder.

B. Clinical types

1. **Reducible hernia** - Normally an uncomplicated hernia is reducible, the contents can be returned into the abdominal cavity. But the sac remains in its position.
2. **Irreducible hernia** – In this the contents cannot be returned to the abdomen but it does not suggest any other complication what so ever.
3. **Obstructed or Incarcerated hernia** (Irreducibility + Intestinal obstruction) – Here the hernia is associated with intestinal obstruction due to occlusion of the lumen of the bowel and there is no interference with the blood supply of the intestine.

4. **Strangulated hernia** (Irreducibility + Obstruction + arrest of blood supply to the contents) – Here the contents are so constricted as to interfere with the blood supply.
5. **Inflamed hernia** – This is a very rare condition and mimics in many respects of a strangulated hernia. This hernia may occur when its contents such as appendix, salpinx or a Meckel's diverticulum becomes inflamed.

C. Rare varieties[12]

1. Hernia – en – glissade or sliding hernia - In this type the caecum on the right side or the pelvic colon on the left side of the urinary bladder on either side, slides down outside the hernia sac forming a part of its wall, being covered by peritoneum on the hernia aspect only.

2. Richter's Hernia **-** In this only a portion of the circumference of the bowel becomes strangulated. This condition is particularly dangerous as operation is frequently delayed because of the clinical features resembling gasteroenteritis.

3. Littre's hernia **-** When it contains Meckel's diverticulum.

4. Maydl's hernia (Hernia - en-W) - In this two loops of bowels remain in the sac and the connecting loop remains within the abdomen and become strangulated. The loops of the hernia look like W.

5. Dual (Syn: Saddle bag, Pantaloon) Hernia - Here there are two sacs, which straddle the inferior epigastric artery, one sac being medial and other lateral to the vessel.

NYHUS CLASSIFICATION OF HERNIAS[13]

Type I Indirect hernia, Internal ring normal; typically in infants, children, young adults.

Type II Indirect hernia, internal ring enlarged without impingement on floor of inguinal canal, does not extend to scrotum.

Type III

A. Direct hernia

B. Indirect hernia encroaching upon posterior inguinal wall, indirect sliding or scrotal hernias, pantaloon hernias.

C. Femoral hernia

Type IV Recurrent hernia

DIFFERENTIAL DIAGNOSIS

Other conditions producing a swelling in the inguino-scrotal region must be kept in mind and excluded by examination:

1. A congenital hydrocele
2. Encysted hydrocele of the cord
3. Spermatocele

4. Femoral hernia
5. Incompletely descended testis occupying the inguinal canal
6. Hydrocele of canal of Nuck (An inguinal hernia is often associated with this condition)
7. Lipoma of the cord
8. Varicocele
9. Inguinal adenitis
10. Cold abscess
11. New growth of the cord

PRINCIPLES OF HERNIA REPAIR[14]

A. Preoperative

i. Adequate knowledge of the following is very essential for an ideal mode of treatment -

1. Normal and abnormal anatomy
2. Surgical Principles
    - Asepsis by antiseptics
    - Art of dissection and handling tissues
    - Hemostasis, use of ligatures
    - Use of sutures and drains
    - Wound closure without tension

3. Type of patient

- Healing capacity
- Bleeding tendencies
- Age, sex and associated disorders

4. Type of hernia

- Primary or recurrent
- Uncomplicated or complicated
- Small, medium or large
- Indirect, direct or combined

5. Causative factors :

- Predisposing causes
- Initiating causes
- Aggravating causes

6. Types of repairs

- Pros & Cons of each technique

7. Anaesthesia

- Advantages and disadvantages of various types of anaesthesia.

8. Recent advances

i. Preparation of the patients for elective / emergency surgery

ii. Preparation of the operative area

B. Intra-operative

1. Approach
2. Judgement
3. Technique

C. Postoperative

1. Record operative findings
2. Antibiotics, analgesics, activity, rest
3. Hospital stay, suture removal and follow up

TREATMENT

Treatment of inguinal hernias may be divided into

1. Palliative :

a. Injection treatment

b. Using the truss

The first method has long been abandoned while the second, is still sometimes (though rarely) used, either when the patient is unfit for surgery or when surgery has to be postponed on account of some other ailment.

2. Operative :

Based on the operative intent and approach, many different hernia repair techniques can be grouped into 4 main categories.

Group I Open anterior (non prosthetic)

Group II Open posterior (non prosthetic)

Group III Tension free repair with mesh (Prosthetic)

Group IV Laparoscopic procedure

Depending on the extent and mode of repair undertaken, the surgery can be:

a. Herniotomy-

High ligation and excision of the sac only.

b. Herniorrhaphy-

After herniotomy, the abdominal wall defect margins are approximated by one of the various methods.

c. Hernioplasty-

Use of prosthetics to strengthen the defect site.

a. Herniotomy

Incision **–** An oblique incision is made parallel to and approximately 1.5 cm, above the inguinal ligament, deepened to expose external oblique aponeurosis.

Mobilization of cord structures **-** External oblique aponeurosis divided upto external ring. Cord structures freed by blunt dissection, from the inferior flap.

Division of cremaster **–** Especially in indirect hernia repair, cremasteric box is commonly opened to expose the sac.

High ligation and excision of sac - The sac is freed upto deep ring, after ensuring it is empty of contents, it is ligated and excised.

Recently, some surgeons advocate that mere reduction of sac into pre-peritoneal space works equally well as excision, and is associated with less post-op pain.[15]

Wound closure **-** External oblique aponeurosis, fascia and skin are closed in layers.

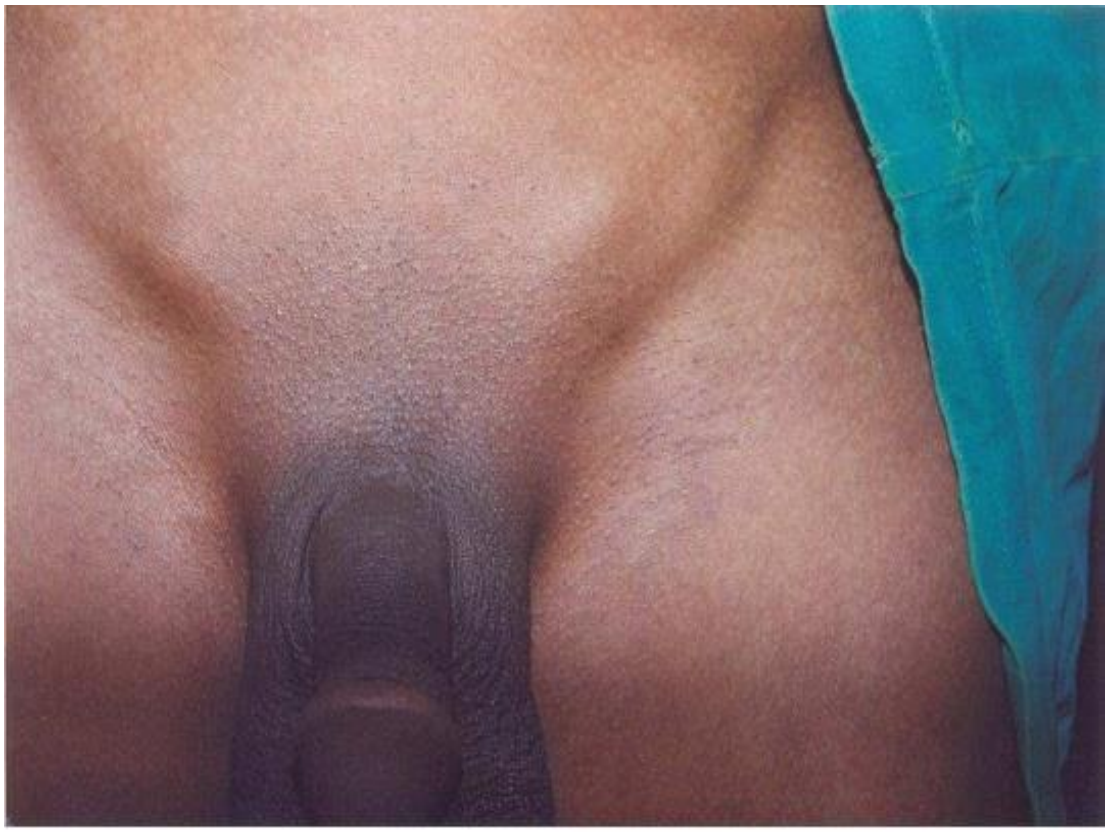


Fig 5: Bilateral bubunocele in 26-year old male

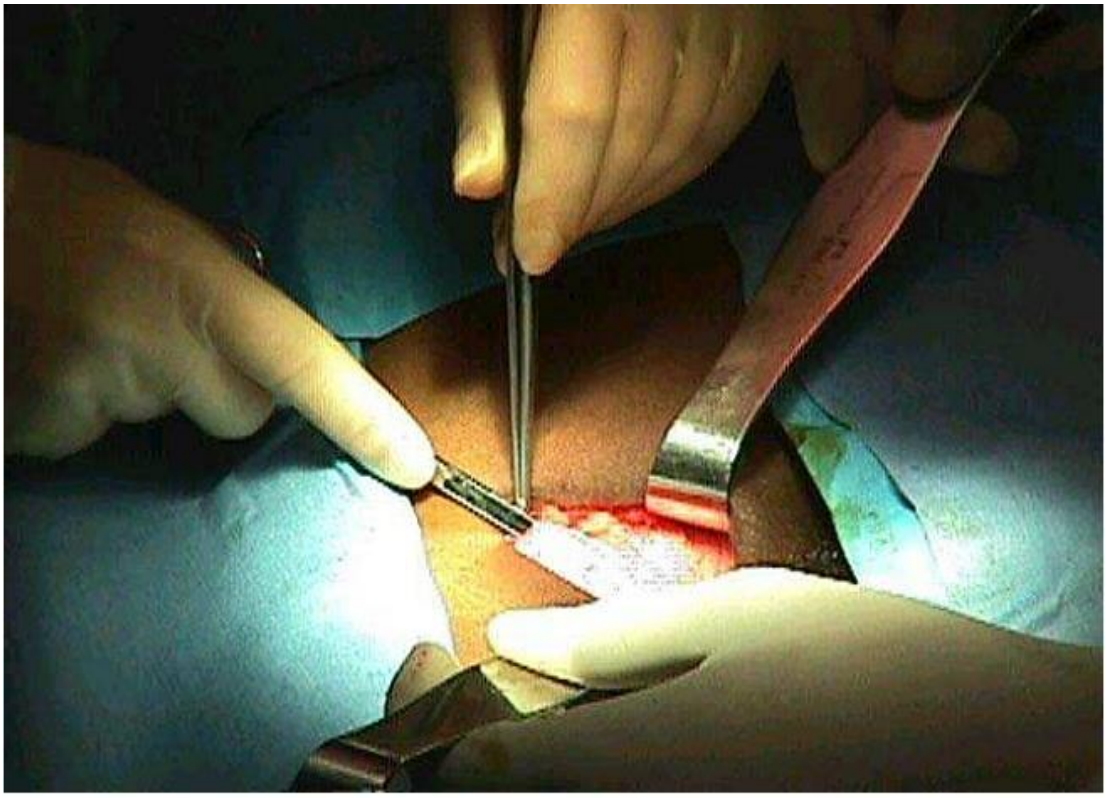


Fig 6: Inguinal skin crease incision

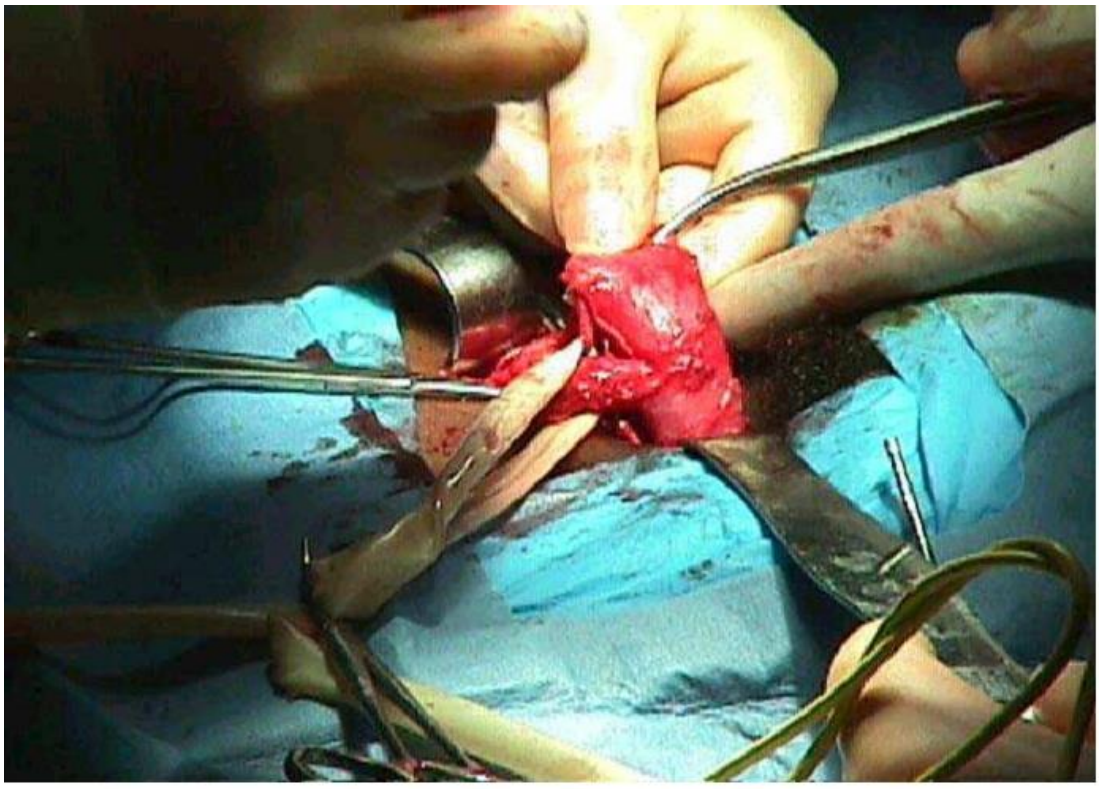


Fig 7 and 8: Dissection of sac from surrounding structures

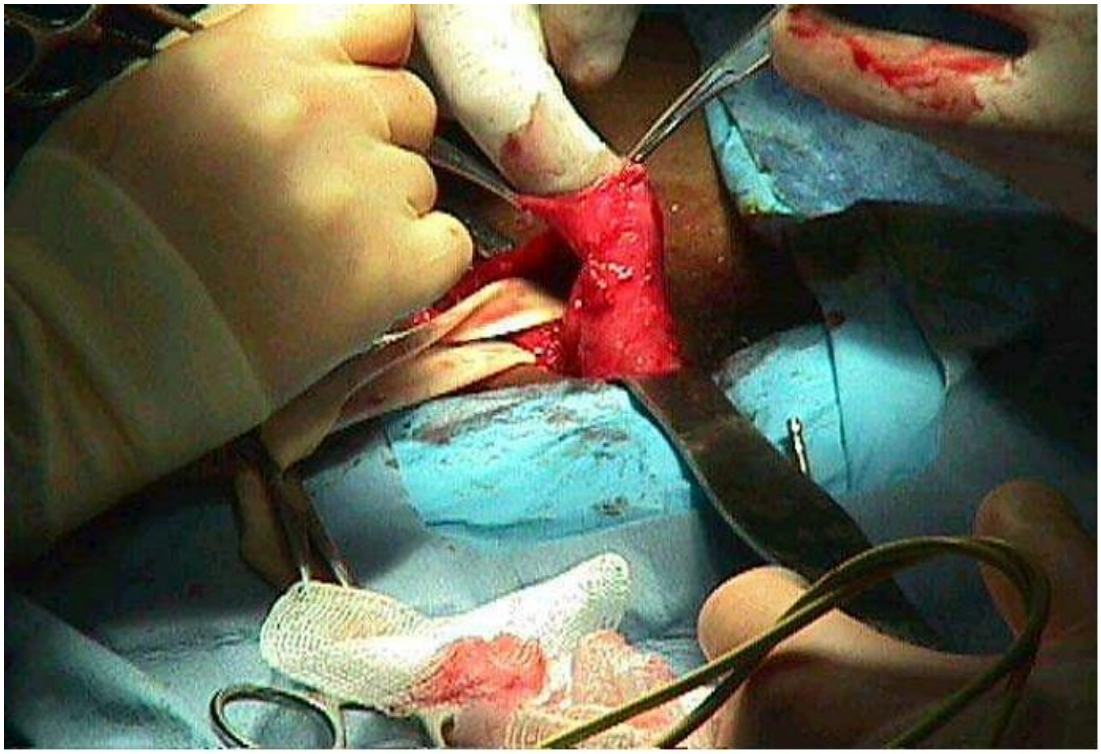


Fig 9: Reduction of sac contents

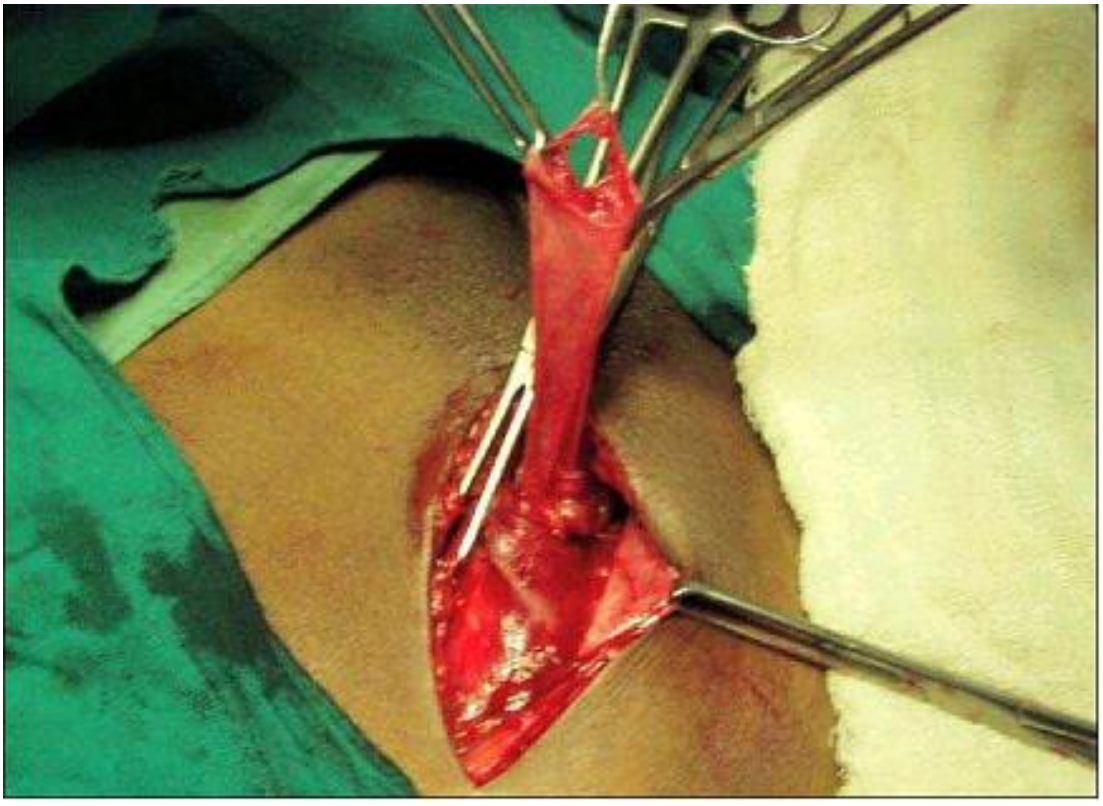


Fig 10: The hernia sac dissected free, emptied of contents and cut open

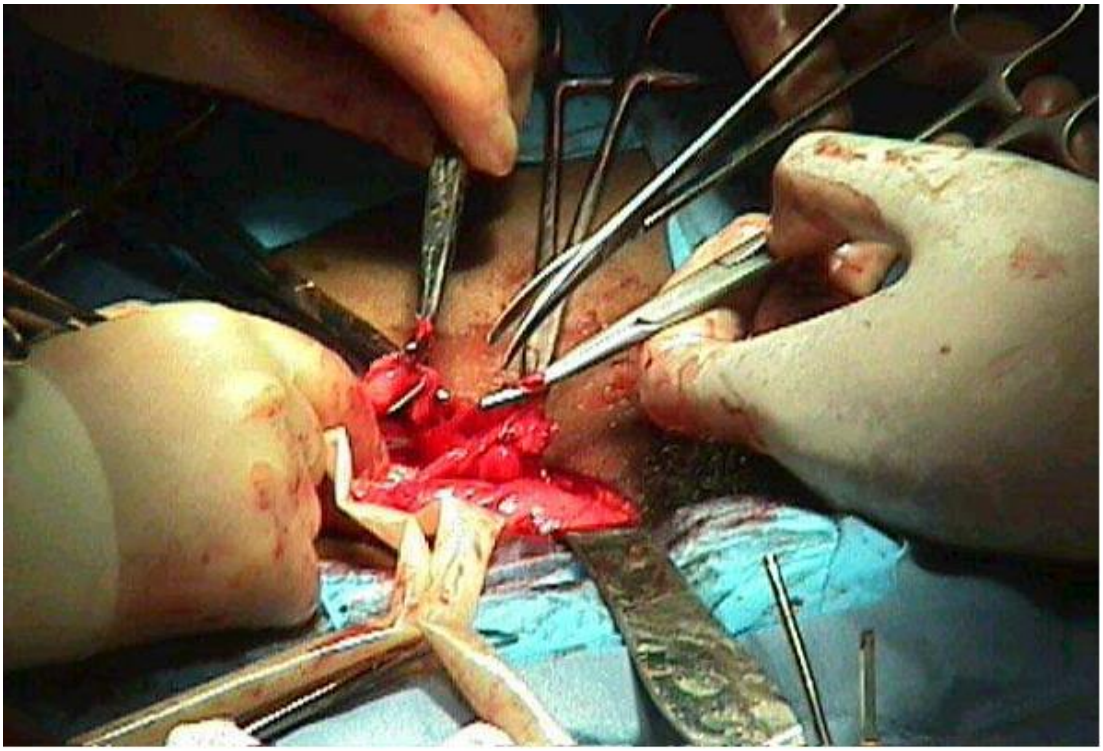


Fig. 11: Transfixation of the sac

The cord has been retracted away

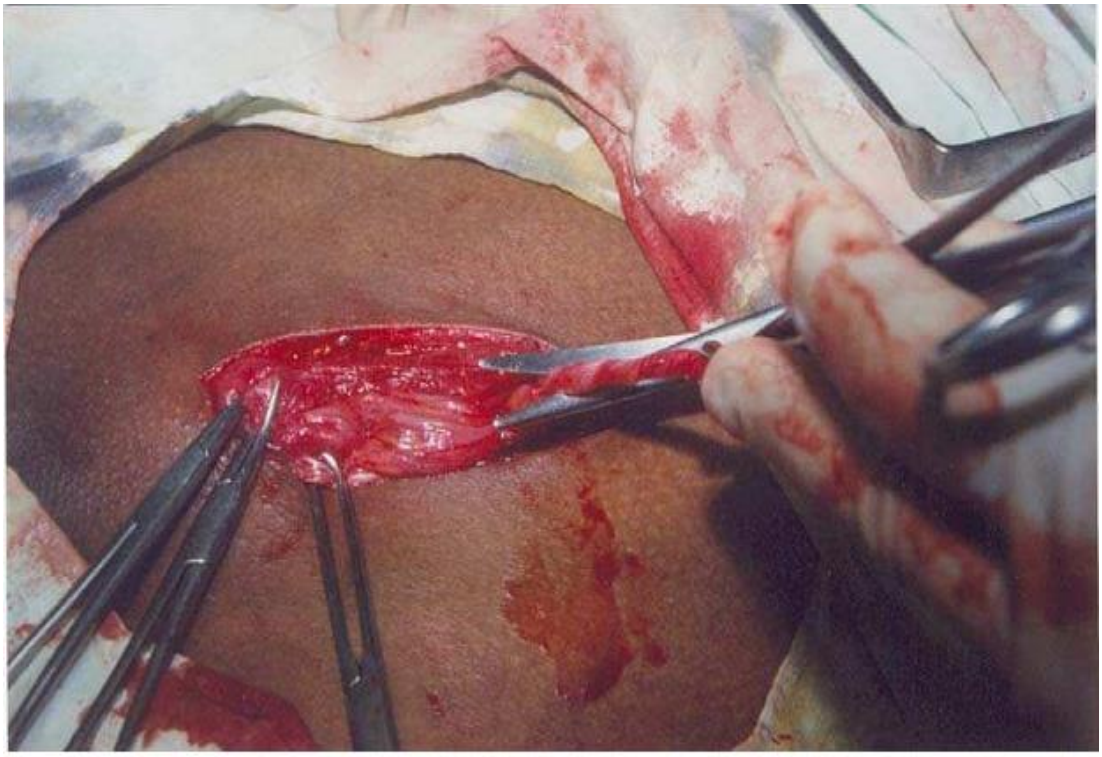


Fig 12: Excision of sac after high ligation

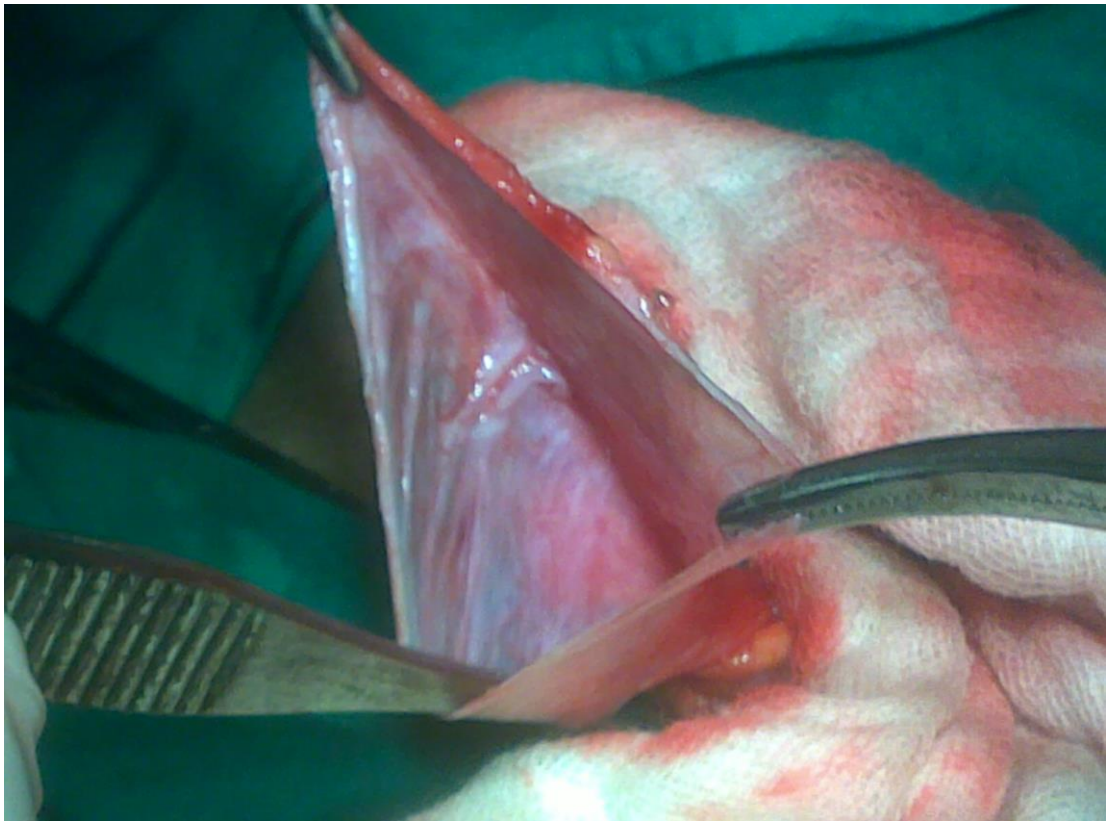


Fig. 12(a) Non ligation & excision of the sac

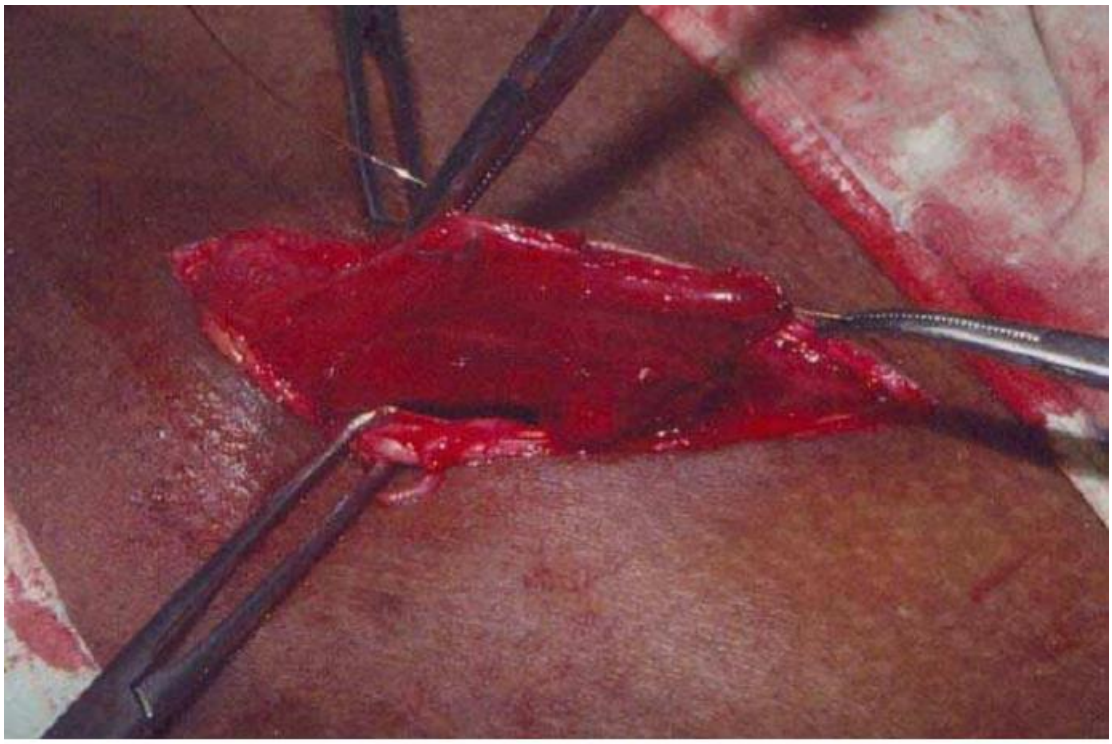


Fig. 13: Closure of cremasteric box (for reconstruction of anatomical layers)

b. Herniorrhaphy

Following the initial steps of herniotomy, the weakened posterior inguinal wall can be repaired by one of the following methods:

A. Suture of the musculo-aponeurotic arch to the inguinal ligament

B. Completed repair of posterior wall of the inguinal canal and snug closure of the internal ring.

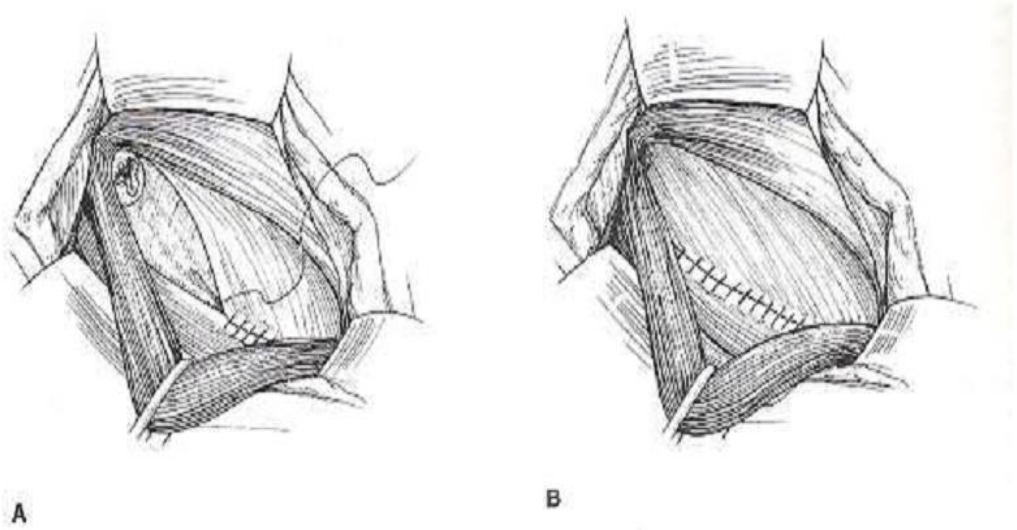


Fig 14: Herniorrhaphy

A. Suture of the musculoaponeurotic arch to the inguinal ligament

B. Completed repair of posterior wall of the inguinal canal and snug closure of the internal ring.

Marcy[16]

Simplest procedure suited for Nyhus I hernia especially in children and young adults. Here, following excision of sac, internal ring is narrowed by suture.

Bassini[17]

Reconstruction of posterior wall by suturing transversalis fascia, transversus abdominis muscle and internal oblique muscle (Bassini's "Triple layer") to the inguinal ligament.

Moloney Darn

A long nylon suture is repeatedly passed between the tissues to create a weave that might be considered similar to a mesh.

Shouldice

Initial steps being similar to Bassini's, a continuous nonabsorbable suture is used to repair the floor. Repair is effected by multiple tier suturing (usually 4 suture lines)

Mc. Vay Cooper ligament repair

Similar to Bassini's except that Cooper's ligament instead of inguinal ligament used in the medial part. Ilio-pubic tract repair[18]. Approximation of ilio-pubic tract, to transversus abdominis above and cremaster below.

c. Hernioplasty

The use of synthetic mesh screen is a simple means of reinforcement of all direct recurrent and huge hernias. Liechtenstein tension free hernioplasty is the simplest method.[19]

There are potential complications related to mesh implantation, such as chronic pain, foreign body feeling and mesh infection. The biological response to surgically implanted prosthetic materials has been extensively studied. The initial reaction, characterized by acute inflammatory cell infiltration, is gradually replaced by fibroblasts and a variable number of giant cells. As happens with all inflammatory tissue, mesh is frequently prone to bacterial attachment, and rejection is more likely to occur. Chronic pain following mesh repair is usually due to nerve ilioinguinal entrapment- pain in the groin and scrotum; extension of the hip frequently exacerbates the pain. Furthermore, injury to the genital branch of the genitofemoral nerve can cause hypersensitivity of the groin, scrotum and upper thigh, and can be associated with ejaculatory dysfunction.

Other approaches are those propounded by

Read Rives

Watnz /Stoppa /Rives

Nyhus / Condon

Kugel / Ugahary

Classification of reinforcing materials

1. Autografts
    a. Fascia lata – free, pedicle
    b. Tendon
    c. Cutis graft
    d. Whole skin

2. Homografts
    a. Fascia lata
    b. Aorta

3. Heterografts
    a. Fascia
    b. Tendon

4. Metallic
    a. Stainless steel
    b. Tantalum
    c. Silver

5. Synthetic - Plastic
    a. Marlex mesh (high density polyethelene)
    b. Mersilens (Dacron polyester)
    c. Nylon (Polyamide)
    d. Prolene
    e. Teflon

Laparoscopic hernia repair

Indications[20]

a. A recurrent hernia after open repair

c. Bilateral hernias

d. Presence of inguinal hernia in a patient who required laparoscopy for another procedure (cholecystectomy)

Absolute Contraindications

- Signs of intra-abdominal infection or coagulopathy.

Relative Contraindications

- Intra – abdominal adhesions due to previous surgery.[21]
- Ascites
- Medical illness
- Incarcerated Sliding scrotal hernia

Two commonly performed laparoscopic herniorrhaphy are

a. Trans-abdominal preperitoneal procedure (TAPP)

b. Totally Extraperitoneal (TEP) procedure

COMPLICATIONS OF HERNIA SURGERY[22]

I. Intraoperative

a. Haemorrhage

b. Injury to pampiniform plexus of veins

c. Injury to nerves – ilio-inguinal, ilio-hypogastric and genito-femoral.

d. Damage to testicular artery

e. Injury to vas deferens

f. Injury to bowel loops that form the hernia contents

g. Injury to urinary bladder

h. Femoral vein constriction

II. Postoperative

A. Early complications

a. Ecchymosis

b. Wound infection

c. Seroma and haematoma

d. Peritonitis and sepsis

e. GIT complications; postoperative ileus, faecal fistulas

f. Scrotal and testicular haematoma

g. Urinary retention

h. Cardio-respiratory complications

Fig 15 : Wound site infection

Fig 16: Post operative seroma formation

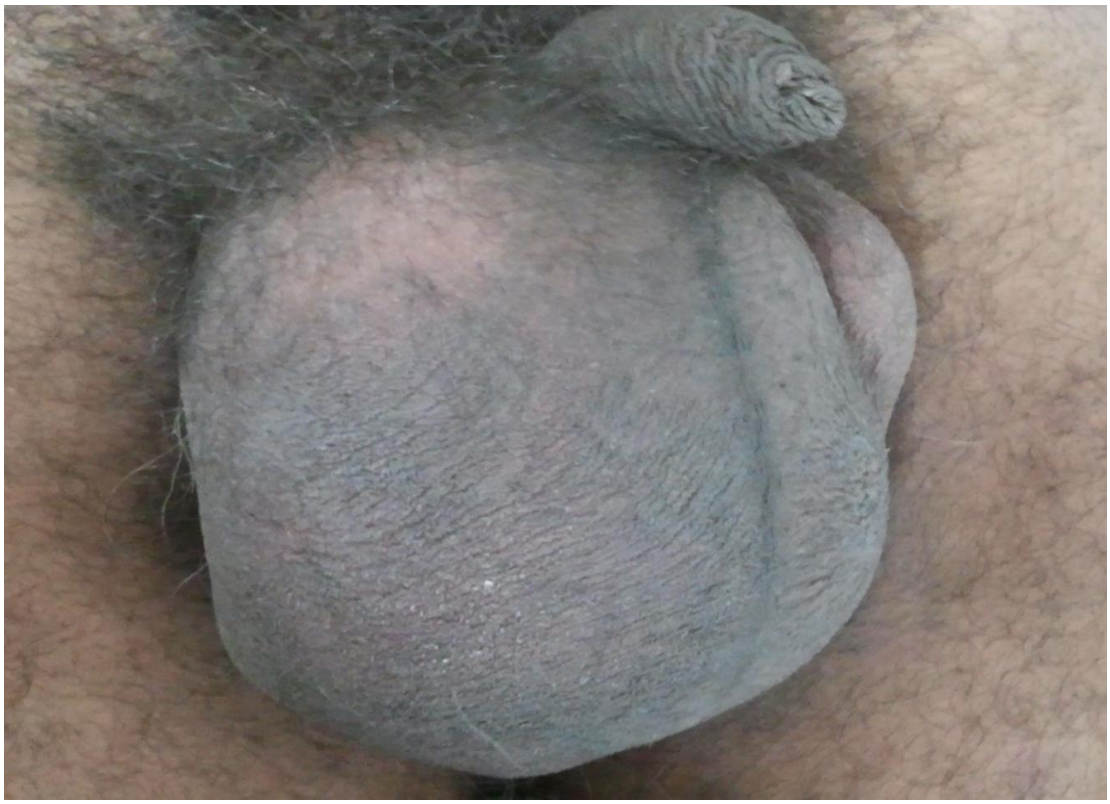


Fig 17: Post op scrotal swelling

B. Delayed complications

a. Chronic pain

b. Granuloma, sinus, abscess of operated site

c. Hydrocele and hematocele formation

d. Low riding testicle

e. Ischaemic orchitis and testicular atrophy[23]

f. Infertility

g. Recurrence of hernia

RECURRENT INGUINAL HERNIA

Recurrent Indirect inguinal hernia **-** In a study of 101 case of recurrent indirect inguinal hernias by Joseph L, Ponka at Henry Ford Hospital during 1962-68, it was found that only 1% of recurrent indirect hernias are found in patients below 50 years of age. Only 5% of the patients were females in this study.

Aetiological features attributable to the recurrence of hernia in 101 cases studies were

1. Failure of repair of internal ring - 97 times
2. Failure to achieve high ligation of sac - 58 times
3. Failure to excise cremaster - 31 times
4. Failure to manage sliding component- 14 times
5. Failure to excise lipoma - 13 times
6. Tissue atrophy- 4 times
7. Overlooked hernia - 2 times

About 57% of the recurrence occurred within 5 years of the primary repair.

Causes of recurrent indirect inguinal hernia are

1. Failure to make accurate preoperative diagnosis
2. Failure to locate the sac

3. Incomplete dissection of the sac
4. Low ligation of the sac
5. Failure to excise cremaster muscle
6. Failure to manage sliding component
7. Failure to excise lipomas
8. Strangulation of tissues by tying ligatures too tightly

Recurrent direct inguinal hernia **-** Rydell (1963) noted that recurrence rate for direct inguinal hernia varied with the technique of the repair. But the overall recurrence rate reported in the literature is around 10%.

Ross (1975), in a repair of 92 cases of direct inguinal hernia, reported a recurrence rate of 7.6%.

Thiess (1971) stated the following in a paper on recurrent inguinal hernia –"Lacking of patient profile from which recurrence can be predicted and so receive more individualized treatment, we are forced to conclude that surgical skill is the dominant factor in the success of repair in a recurrent hernia".

Types of recurrent direct inguinal hernia

Type 1 - Small direct recurrence near the pubic tubercle.

Type 2 - Small direct protrusion through the floor of Hasselbach's triangle.

Type 3 – Large direct recurrent hernia in which most of the floor of the inguinal canal has been disrupted.

Causes of recurrence in direct inguinal hernia-

1. Undue tension upon the suture line – In a study of 104 cases of recurrent direct inguinal hernia this was found to be the factor in 80 cases.
2. Poor technical execution – This was found in 64 cases of recurrent hernia repairs of 104 patients.
3. The sutures were either too tight or inadequate.
4. Failure to provide needed strength in repairs.
5. Failure to provide the margin of weakness.
6. Failure to recognize and treat a concomitant indirect hernia.
7. Miscellaneous causes like postoperative wound infection and persistence of precipitating causes.

METHODOLOGY

DESIGN

A prospective comparative study.

SOURCE OF DATA

1. The study was conducted in R.L. Jalappa Hospital and Research Centre & SNR Hospital on 40 patients from December 2010 to October 2012.
2. The population for the study being from surgical units in R.L. Jalappa Hospital and Research Centre,Tamaka and SNR hospital, Kolar.

METHODS OF COLLECTION OF DATA

Patients presenting to Department of General Surgery with primary indirect inguinal hernia, planned for hernioplasty were enrolled into the study.

- 40 patients undergoing hernioplasty satisfying the inclusion and exclusion criteria were included for evaluation. A written informed consent in words best understood by the patient was taken. A detailed medical history related to hernia, and associated medical disorders were elicited and recorded. A detailed physical examination was conducted and other findings elicited.

- The cases were divided randomly in two groups and evaluated postoperatively (immediate within 1 week and for 1 month).
- The hernia repair (meshplasty) was done under general /spinal anaesthesia. All patients underwent tension-free polypropylene mesh technique and randomized to include high ligation/ non ligation, with excision of the sac.
- In **1st group(A)** the standard technique of high ligation of the sac before excision was performed. Hernia sacs were ligated with absorbable suture and transfixation stitch was used.
- In the **2nd group (B)** the hernia sac was dissected to the neck, and contents were reduced. Sac was excised and left open.
- The patients were assessed within 1week and followed for 1month.
- Skin closure done after closing cremasteric box and external oblique aponeurosis in both the groups with same suture materials (vicryl 2-0 for ext oblique & ethilon 2-0 for skin).
- Early complications were defined as that occurring within one month of surgery, as direct result of the surgical procedure.
- The main endpoint was to detect any difference in immediate postoperative complications between the two groups.

Inclusion criteria

- Patients undergoing elective hernia surgeries for uncomplicated indirect inguinal hernia.

Exclusion criteria

- Patients presenting with complications of hernia (obstruction, strangulation, recurrence).
- Presence of dual pathology (e.g. hernia with hydrocele, pantaloon hernias).
- Paediatric hernia cases.
- Cases with very wide neck.

1. The individuals were further subjected to the following investigations

- Routine preoperative work up to ensure fitness for surgery

    1. Complete blood counts: Hb, TLC, DLC
    2. Erythrocyte sedimentation rate
    3. Random blood sugars
    4. Bleeding time
    5. Clotting time
    6. Urine for Albumin, Sugar, Microscopic exam
    7. HIV
    8. HBsAg
    9. ECG

- Chest radiography to exclude any pulmonary pathology like TB, COPD etc resulting in persistent cough.
- Ultrasound abdomen and pelvis, to exclude presence of mass or any pathology that may result in increased intra-abdominal pressure.

2. After ascertaining exclusion of confounding factors (including on table exclusion of cases with patulous deep ring) a study sample of 40 individuals was chosen.
3. The individuals were randomly assigned to one of the two procedures, thereby forming 2 groups of 20 individuals each.
4. After the individuals underwent the assigned procedure, a record was made, of the same. In each case, the duration of hospital stay and cause of prolongation of the same, if any, were recorded.
5. Immediate postoperative morbidity if any, was also recorded.
6. All the cases were followed up for a period of 1 year.

The mode of follow up was by frequent OPD visit, interview and clinical examination. During the follow up period, each case (in both the groups) was interviewed and examined to look for the occurrence of one or more of the following complications:

Pain, fever, infection, seroma / hematoma formation & scrotal swelling

The occurrence of any of the above complications when detected was recorded in the follow up notes of the particular case. At the end of the study duration, the various parameters like age, sex, duration of hospital stay in each case, and the incidence and pattern of complications were tabulated and the following results obtained.

STATISTICAL METHODS

Chi-Square and Fisher Exact test [24] has been used to find the significance of proportions of complications between both groups of patients. The Odds Ratio (OR), a summary statistic has been computed to find the strength of relationship between the two procedures[25] with respect to various postoperative complications. Student t test has been used to find the significance of mean values of hospital stay in days between the two methods.

STATISTICAL SOFTWARE

The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

OBSERVATIONS

STUDY DESIGN

A Comparative cohort study consisting of 40 patients with inguinal hernia is undertaken to investigate the magnitude and pattern of complications of the two methods treating hernia. The subjects were randomly assigned to each procedure and the various parameters namely, age, side of hernia etc and complications were recorded.

Table 1

Age Distribution

Age in yrs	Group A	%	Group B	%	Total	%
20-39	7	35	5	25	12	30
40-59	7	35	11	55	18	45
60-79	6	30	4	20	10	25
	20		20		40	

Figure 1

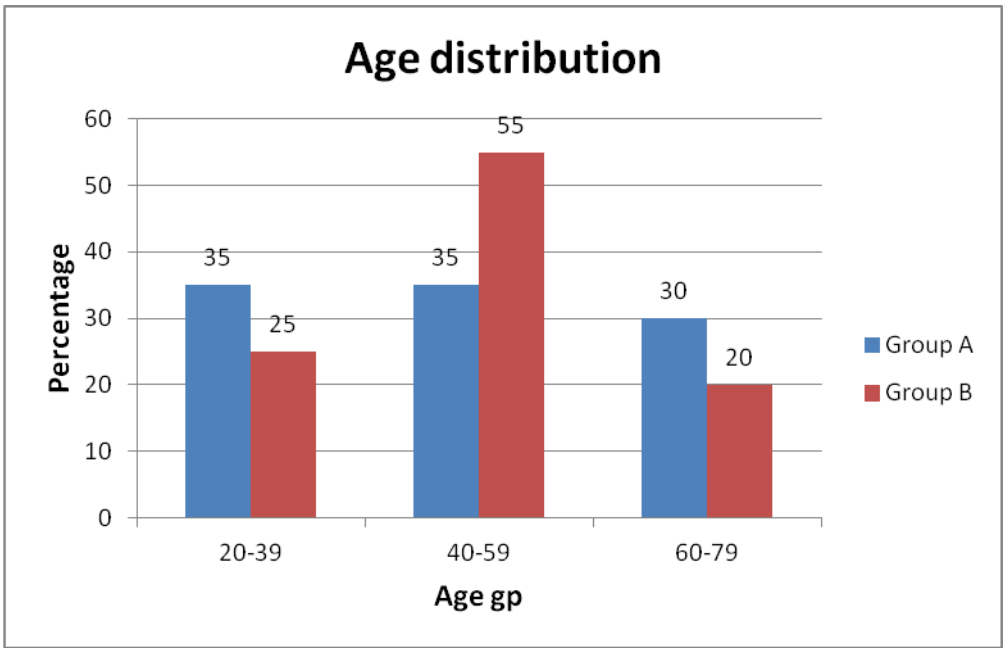


Table 2

Side of hernia

Side of hernia	Group A	%	Group B	%	Total	%
Right	14	70	10	50	24	60
Left	6	30	7	35	13	32.5
Bilateral	0	0	3	15	3	7.5
	20		20		40	

Figure 2

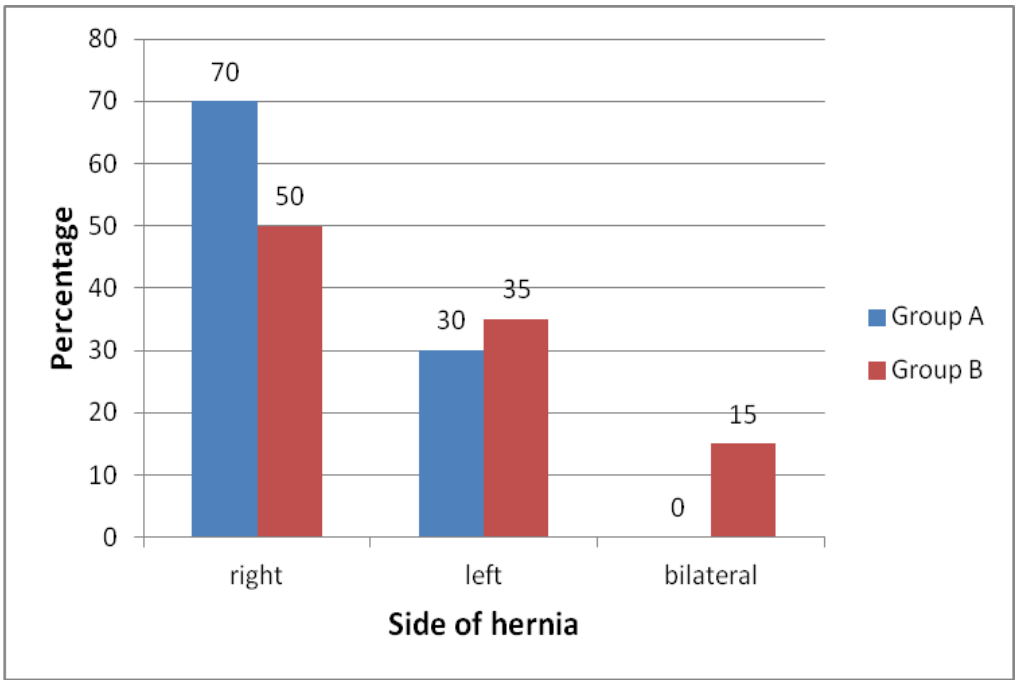


Table 3

Postoperative morbidity between the two methods

Complications	Group A	%	Group B	%
Present	16	80	8	40
Absent	4	20	12	60
	20		20	

Odds ratio is 6, the patients of group A are more prone for developing complications, Fischer exact test, p value - 0.022

Figure 3

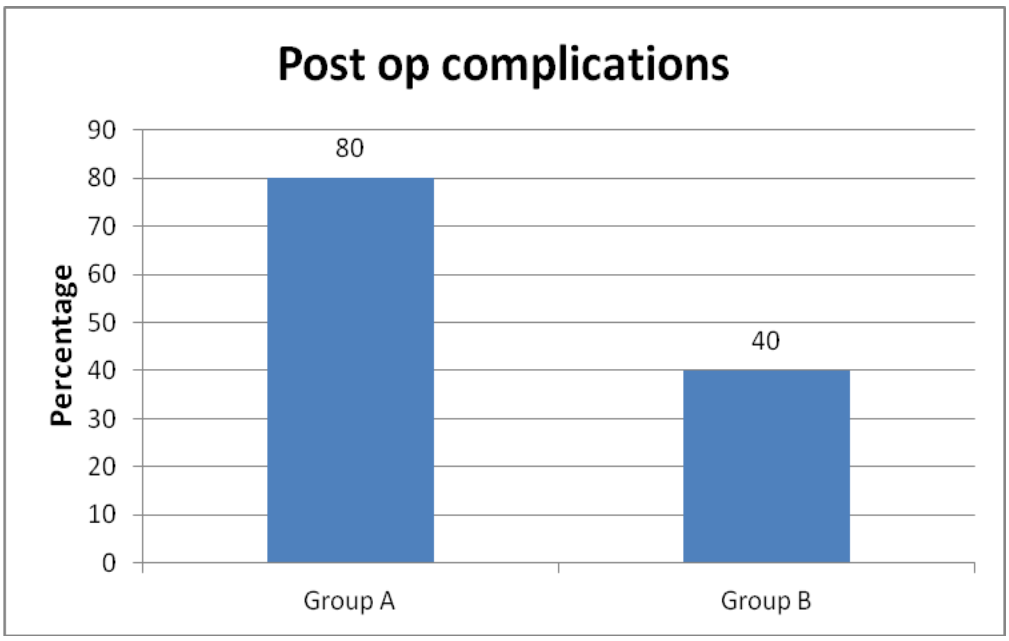


Table 4

Wound Infection among both groups

Infection	Group A	%	Group B	%	Total	%
Present	4	20	1	5	5	12.5
Absent	16	80	19	95	35	87.5
	20		20		40	

Odds Ratio-4.75, Fischer exact p value-0.342

Group A is more prone for wound infections

Table 5

Fever among both groups

Fever	Group A	%	Group B	%	Total	%
Present	5	25	2	10	7	17.5
Absent	15	75	18	90	33	82.5
	20		20		40	

Odds Ratio-2, Fischer exact p value-0.407,

Group A is more prone to have fever.

Table 5

Seroma among both groups

Seroma	Group A	%	Group B	%	Total	%
Present	5	25	3	15	8	20
Absent	15	75	17	85	32	80
	20		20		40	

Odds Ratio-1.88, p value-0.695, Group A more prone to develop seroma.

Table 6

Hematoma among both groups

Haematoma	Group A	%	Group B	%	Total	%
Present	3	15	0	0	3	7.5
Absent	17	85	20	100	37	92.5
	20		20		40	

Fisher exact p value = 0.231

Table 7

Scrotal swelling among both groups

scrotal swelling	Group A	%	Group B	%	Total	%
Present	2	10	1	5	3	7.5
Absent	18	90	19	95	37	92.5
	20		20		40	

Odds ratio is 2.11 . P value-1.

Group A is more prone for scrotal swelling.

Table 8

Pain among both groups

Pain	Group A	%	Group B	%	total	%
Present	14	70	2	10	16	40
Absent	6	30	18	90	24	60
	20		20		40	

Odds ratio is 21. Group A is more prone for scrotal swelling. Fischer exact p value <0.001

Figure 4

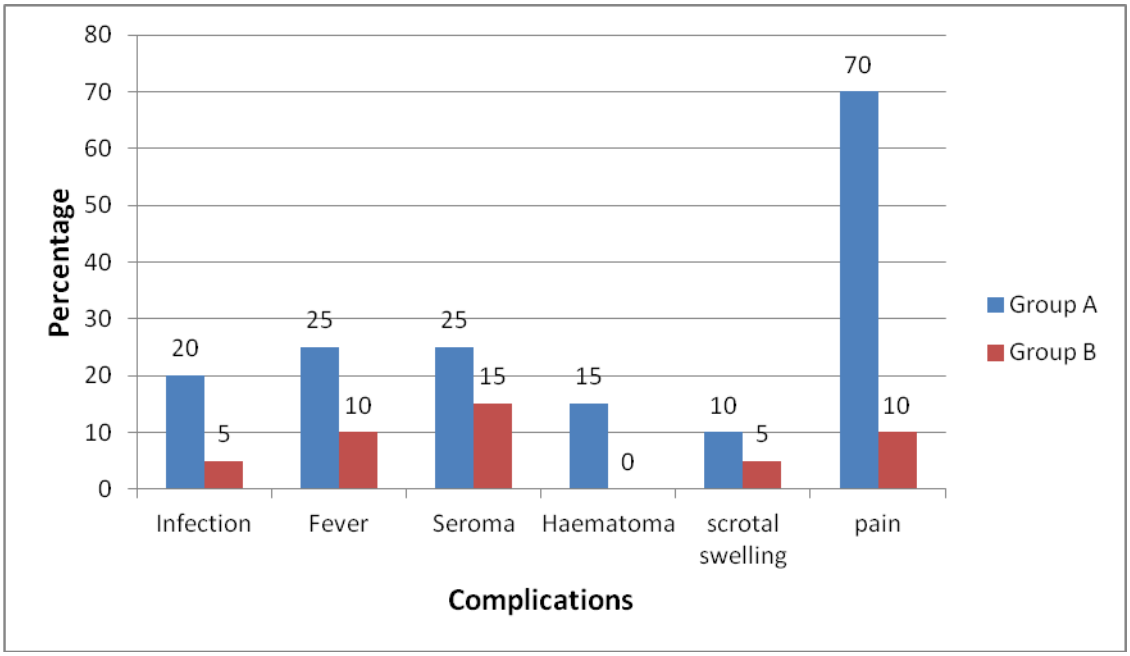
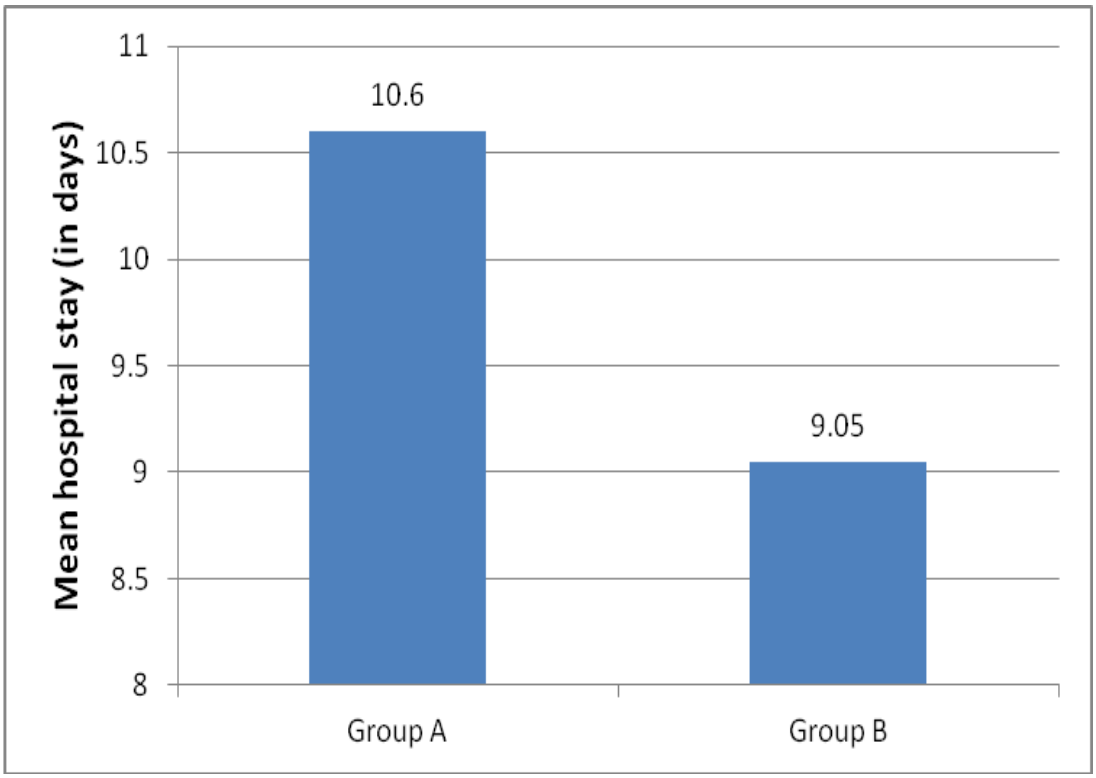


Table 9

Number of days in hospital

Hospital stay(in days)	**Group A**	**Group B**		
Range	8-15	8-12		
Mean	10.6	9.05		
S.D.	2.14	0.9		
Significance	t value=2.94		(independent t test)	
	p value= 0.007			
	degree of freedom= 26			

Figure 5


Mean hospital stay (in days)
11
10.5
10
9.5
9
8.5
8
10.6
9.05
Group A
Group B

RESULTS

STUDY DESIGN

A comparative cohort study consisting of 40 patients with inguinal hernia, randomly divided into two groups of 20 each, to one group undergoing standard technique of high ligation and excision of sac; and the other group undergoing sac dissection to the neck, reduction of the hernia contents & dividing the distal part of sac.

NATURE OF STUDY SAMPLE

- 40 individuals between age group 20-75 years.
- In both the groups, majority of patients belonged to age group of 40-59 years i.e, 35% in 1st group and 55% in 2nd group.
- All patients were male.
- Laterality of hernia – Majority of the cases were right sided (60% of total) 70% in the 1st group and 50% in 2nd group.

3 cases (15%) of group B had bilateral inguinal hernia. However, surgery was performed on one side only and the same has been taken into account for the study.

By statistical analysis of the results obtained, the following observations were made:

1. Average duration of hospital stay

Group A: 10.6 days average

Group B: 9.05 days average

On application of student t test, the difference was found to be significant i.e., patients in group B had significantly lesser duration of hospital stay.

2. Postoperative morbidity

80% of patients in group A and only 40% of patients in group B had one or the other complications in the postoperative period.

Odds ratio (OR) was 6, indicating that patients in group A were more likely to develop complications.

3. Incidence of early complications:

Postoperative pain

70% in group A

10% in group B

Odds ratio-2.11 Group A patients are more prone to develop & complain of postoperative pain.

Infections

20% in group A

5% in group B

Odds ratio (OR) was 4.75, indicating that patients in group A are more likely to develop infections.

Seroma

25% in group A

15% in group B

Odds ratio (OR) was 1.88, indicating that patients in group A are more likely to develop seroma.

Hematoma

15% in group A

0% in group B

Scrotal swelling

10% in group A

5% in group B

Odds ratio (OR) was 2.11, indicating that patients in group A are more likely to develop scrotal swelling.

As can be observed, the incidence of all the complications was lesser in group B patients. However, the overall incidence of the other complications being very less, one significant observation to be made is that postoperative pain was complained of by 10% patients of **group B** as against 70% of patients of group A. By Chi Square test, the odds ratio for herniotomy was found to be 2.11, meaning patients of group B were 2.11 times less likely to suffer from postoperative pain.

Recurrences were not reported at all in the period of 1year

DISCUSSION

Not many studies seem to have attempted a comparison between the two methods of management of indirect inguinal hernia repair, so far. However, many independent studies have been conducted, all over the world, each attempting to assess the advantages and disadvantages of one or the other of the two above procedure. The results observed in these multitudes of series are fairly within a close range in general, with few exceptions.

One documented Indian study, conducted in SMS Medical College, Jaipur[26], comprised of review of 1369 inguinal herniotomies in 1340 subjects over a decade. Different grades of surgeons were assigned work according to complexity of cases. Except for minor scrotal hematoma, other complications were hardly seen. Recurrence was seen in only 2 cases (i.e., 0.15%), which is insignificant. The results compare favourably to those of specialized surgical units in developed countries.

Most of the European studies in this regard, have produced concordant results.

- In a retrospective 5 year study by Harvey MH et al [27] , recurrence rate was found to be 2.5% and overall complications rate was reported to be 2.8%.

- In one series from Kalendbery General Hospital, Demark[28], cumulative recurrence rate was 2.4% in a median follow up period of 12 years.
- In another series reported from Sundby Hospital, Denmark[29] reviewed 496 patients. Early surgical complications were noted only in 1.5%. Recurrence rate was 3.7%.
- Another important study in this regard was reported from University of West Indies, Jamaica[30].It comprised of 271 cases of inguinal hernia treated over a period of 5 years. Complications were minor and infrequent. Recurrence seen only in 1 case.

It is worthwhile to note that most of the above series recommend herniotomy as a day care procedure, even in emergency set up, minimizing admission and hospital stay, thereby significantly reducing the burden on the Health care system.

Two series have reported considerable difference and interesting observations and are worth to mention.

- One study conducted by RW Technological University, Aachen, Germany[31], studied 2754 cases operated between 1966 and 1990. It concludes that high recurrence rates were proportional to the presence of complication and concomitant disease at the time of operation and

not related to age of the patient, technique of surgery or experience of the operating surgeon.

- Another study reported from Basel[32], comprised of retrospective analysis of late complications, for a mean follow up period of 13.2 years, in 537 interventions, including both herniotomy and Bassini's herniorrhaphy. Testicular atrophy was seen in 1.2% cases, chronic pain in 2.9% cases. A high recurrence rate of 23% was reported but independent of the age, sex, type of hernia or the technique of operation or experience of the surgeon. The study concludes that recurrences are only depicted by a clinical guided control after a sufficiently long follow up period. Though it is true that true incidence of recurrence can be assessed only after long term follow up, many studies reinforce that most of the cases are reported within first 4-5 years and recurrence after this is rare[33] .In this light, recurrence rates for most series are fairly concordant.

Herniotomy (ligation at the neck and excision of the sac) with posterior wall repair is considered the standard surgical procedure for the treatment of inguinal hernia, as this method has the least recurrence rate.[34] Mild or medium post operative pain in inguinal hernia repair is common. Hernia sac ligation and excision may be the cause of the pain.

In cases of meshplasty, the pain is usually due to ilioinguinal nerve entrapment or mesh fixation in the periosteum of the pubic tubercle.[35]

Smedberg et al in 1984, observed that men in whom the sac was ligated had more postoperative pain that was due to ligature pinching of the highly innervated peritoneum.[34]Ligation of the peritoneal stump maintains the integrity and continuity of the transversalis fascia and is the paramount cause for the significantly reduced recurrence rate. After sac excision without ligation, the regeneration of the mesothelium follows the contours of the denuded dilated deep ring resulting in a dimple which predisposes recurrence.[34,38]

According to recent studies, ligation of the hernia sac in inguinal hernia surgery is not only unnecessary and time consuming but also leads to increased post-op pain.

Recurrence rates are unaffected by not ligating the sac. However, it is important to dissect the sac right up to the neck after which it may be either excised or inverted.[36]

Studies done in 2002 have proved that ligation of the sac is not important to prevent recurrences [37], but high dissection of the sac (to free the sac from edges of internal inguinal ring) and good exposure of the ring to facilitate good repair prevents recurrences and reoperations. [36]

Non-ligation of the sac was beneficial as it did not increase the early complication rates nor encountered recurrences. **[37,39,40]**

The technique of non-ligation has many advantages:[37]

1. The technique of herniotomy becomes simpler and safer if non-ligation is practiced as there is less chance of injuring cord structures or vessels.
2. Higher excision of the sac is possible when contemplating non-ligation and there is no chance of leaving a stump of peritoneal sac.
3. The technique is very useful when the sac is very thin and flimsy as any attempt to stretch the peritoneal sac for ligation tends to tear it further.
4. The method is of special importance when dealing with sliding hernia. There is no need to re-peritonialize the abdominal contents after excising the hernia sac.
5. There is no increase in immediate post-operative complications.
6. There is no increase in recurrence rate due to non ligation of the sac.

During recent years surgeons have come to believe that high ligation of the indirect hernia sac, once thought required for the success of inguinal hernioplasty, is no longer an essential step. This view stems from the following triad: [34]

1) Adequate dissection of the sac from adjacent structures of the deep ring is more important than high ligation;
2) The analysis that new serosa develops quickly when the abdominal wall is stripped of peritoneum - as for example during a pelvic exenteration procedure;
3) The experience that peritoneal approximation is not important in the closure of midline abdominal incisions.

The excision of the sac is more complete and rapid when no ligature or suture is contemplated. [37]

It has been demonstrated that parietal peritoneal defects heal with less adhesions if left open than when closed with silk/catgut suggesting that peritoneal defects be left open after surgeries. [37]

Non ligation does not cause additional complications because the peritoneum heals immediately and completely. Postoperative pain should be less because less phlogosis of the parietal peritoneum occurs. [36]

Study in Greece **[35]** proved mesh repair to have considerable benefits: light immediate postoperative pain, rapid return to normal activities and low incidence of chronic postoperative groin pain.

There are potential complications related to mesh implantation, such as chronic pain, foreign body feeling and mesh infection.

Severe groin pain following primary tissue hernia repair was common in the past. Nowadays, tension-free techniques are quite painless operations, especially in the mesh repair era, if adequate care is taken.

CONCLUSIONS

By the observations and analysis of results of the current study, the following inferences were made:

- Postoperative morbidity was significantly less in case of hernioplasty withut ligation of the sac.
- Patients undergoing hernioplasty with non ligation of the sac had significantly shorter hospital stay as compared to those undergoing hernioplasty with high ligation of the sac.
- Complications like postoperative pain and infection/seroma were significantly higher in cases with ligation of the sac.
- Likelihood of recurrence between the two procedures was only comparable.

• It can be concluded that " hernioplasty with non ligation of the sac is an equally efficient alternative to hernioplasty with high ligation and excision of the sac, in terms of efficiency of repair while it was found to be better than the latter in terms of postoperative morbidity and complications profile.

SUMMARY

A comparative cohort study was undertaken to investigate the magnitude and pattern of complications among two methods of treating indirect inguinal hernia.

- Comparison was between 20 individuals undergoing sac ligation and 20 individuals undergoing non ligation with excision in cases of indirect inguinal hernioplasty.
- Postoperative events and long term complications were recorded, observations tabulated and statistically analyzed.
- It was found that non ligation group, as compared to, group who underwent ligation entailed shorter duration of hospital stay, lower incidence of complications, without any higher incidence of recurrence.

• It can be concluded that " hernioplasty with non ligation of the sac is an equally efficient alternative to hernioplasty with high ligation and excision of the sac, in terms of efficiency of repair while it was found to be better than the latter in terms of postoperative morbidity and complications.

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ANNEXURE

CONSENT FORM

I hereby give my consent to participate in the study entitled "COMPARATIVE STUDY OF POST OPERATIVE COMPLICATIONS IN LIGATION VERSUS NON LIGATION WITH EXCISION OF THE HERNIA SAC IN INDIRECT INGUNIAL HERNIA"conducted by Dr. Gaurav Prasad, under the guidance of Dr. Venkatakrishna B.R.,Associate Professor in the Department of General Surgery, Sri Devaraj Urs Medical College,Tamaka,Kolar. I have been explained in my own language about the pros and cons of the study and I have the freedom to withdraw from the study at any time.

Signature of patient :

Signature of witness :

Date :

Place :

PROFORMA

Name : DOA :

Age : DOO :

Sex : DOD :

IP No :

Address : Occupation:

CHIEF COMPLAINTS:

HISTORY OF PRESENTING COMPLAINTS

1. Swelling

- Duration
- Site first noted
- Onset: Sudden/gradual
- Progress: Stationary/ progressive
- Reducibility: Yes/NO
- If yes: Disappears spontaneously or to be reduced.
- Irreducibility: Yes/No
- If yes – Past/Present

2. Pain in swelling

- Duration
- Nature: Dragging / Colicky/ dull aching
- Site: Local /abdominal

• Intensity:

History of pain abdomen

History of constipation:

Vomiting:

History of chronic cough

Urinary symptoms

PAST HISTORY

- Trauma to anterior abdominal wall
- Complications following previous surgery

Nature of operation

Infection, disruption, abdominal distension postoperatively

- Any attack of irreducibility
- Chronic bronchitis, pulmonary tuberculosis, gonococcal urethritis, prostatism, diabetes mellitus

FAMILY HISTORY

PERSONAL HISTORY

- Diet
- Appetite
- Sleep
- Bowel

- Bladder
- Smoking
- Alcoholism

GENERAL PHYSICAL EXAMINATION

Vitals: Pulse rate:

Blood pressure:

Temperature:

Weight: in Kgs

Pallor Edema Cyanosis Icterus

Lymphnodes:

LOCAL EXAMINATION

Inspection

- Site
- Side
- Size
- Number
- Shape
- Margins
- Surface, Skin
- Impulse on coughing +/-
- Previous operative scar

Palpation

- Local rise of temperature
- Tenderness
- Consistency
- Impulse on coughing
- Reducibility: Spontaneous/ partial / complete
- Deep ring occlusion test
- Local lymph nodes
- Testis and scrotum
- External genitalia

Percussion

Dull/Resonant

Auscultation

Bowel sounds +/-

Per rectal exam

Tests for abdominal muscle tone

- Divarication of Recti +/-
- Leg raising test
- Shoulder raising test
- Malgaigne bulges +/-

SYSTEMIC EXAMINATION

Respiratory

Cardiovascular

Per abdomen

DIAGNOSIS

INVESTIGATIONS

- Hb%
- TC
- DC
- ESR
- BT
- CT
- RBS
- Blood grouping and typing, RBS
- Blood urea
- Serum creatinine
- Serum electrolytes
- HIV
- HBsAg
- Urine –Alb/Sugar/Micro
- Chest X-ray
- Ultrasound abdomen and pelvis

MANAGEMENT

Preoperative instructions

Surgery

Type of anaesthesia

Incision

Per operative findings

Procedure in detail

Closure

Postoperative instructions

Duration of hospital stay

Postoperative period