

## Comparative Efficacy of Prophylactic Ilioinguinal Neurectomy and Ilioinguinal Nerve Preservation in Open Inguinal Hernia Repair - A Randomized Controlled Trial

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Conflict of interest: Nil

### Abstract:

**Background:** Inguinal hernia is one of the most common male diseases world-wide. Chronic groin pain is a significant clinical problem in patients undergoing open hernia repair which interferes with daily activities. This study aims at evaluating the long-term outcomes of neuralgia and paraesthesia following Prophylactic Ilioinguinal Neurectomy, compared to Ilioinguinal Nerve Preservation when performing Lichtenstein's tension free inguinal hernia repair.

**Methods:** A total of Eighty male patients ( $\geq 18$  years to  $\geq 70$  years) undergoing hernioplasty for inguinal hernia were divided into two groups. In group A (Prophylactic Ilioinguinal Neurectomy, PINE), there were 40 patients who were subjected to prophylactic ilioinguinal neurectomy and in group B (Ilioinguinal Nerve Preservation, INPE) there were 40 patients in whom preservation of ilioinguinal nerve was done during the hernia repair. Patients were followed up at 1 month, 3 and 6-months following surgery to assess the incidence of chronic groin pain and pain during daily activities.

**Result:** At one month follow up there was no significant difference between the two groups regarding incidence of chronic groin pain or pain during daily activities. However, the incidence of chronic groin pain was significantly lower in Group A compared to Group B at 6 months follow up. During vigorous activities, more group B (INPE) patients had pain compared to group A (PINE) patients at 3-month [18 (45%) vs. Seven (17.5%);  $p=0.005$ ; Chisquare test] and 6-month follow-up [16 (40%) vs. five (12.5%);  $p=0.006$ ; Chi-square test].

**Conclusion:** Prophylactic ilioinguinal nerve neurectomy offered some advantages concerning pain in the first 6th month postoperative period. Nowadays, prudent surgeons should discuss with patients and their families the uncertain benefits and the potential risks of neurectomy before performing the hernioplasty.

**Keywords:** Inguinal Hernia, Open Inguinal Hernia Repair, Chronic Groin Pain, Ilioinguinal Neurectomy.

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### Introduction

An abdominal wall hernia consists of a protrusion of intra-abdominal tissue through a fascial defect in the abdominal wall. Inguinal hernias are very common (approximately 75% of abdominal wall hernias) with other types of hernias occurring at weak areas of abdominal wall fascia [1]. Typically a hernia consists of visceral contents, a peritoneal sac, and overlying tissue (e.g., skin, subcutaneous tissue). Hernias may be reducible where the

protruding contents can be replaced into the abdominal cavity either spontaneously or with manual pressure. Hernias may also be irreducible where the protruding contents are unable to be reduced. There are two classifications of irreducible hernias, incarcerated and strangulated. An incarcerated hernia is irreducible protruding content that is usually due to a small hernia neck [2]. The tissue or contents protruding remain viable

and are not causing an obstruction or inflammation. A strangulated hernia is an irreducible hernia in which the blood supply has been compromised. Ischemia, often progressing to necrosis of the protruding tissue or contents, is considered a surgical emergency [3].

Inguinal hernias occur when part of the membrane lining the abdominal cavity (omentum) or intestine protrudes through a weak spot in the abdomen — often along the inguinal canal, which carries the spermatic cord in men. Inguinal hernia repair is surgery to repair a hernia in your groin. There are a few risks for anesthesia and surgery as reactions to medicines, Breathing problems, Bleeding, blood clots, infection, Damage to other blood vessels or organs, Damage to the nerves, Damage to the testicles if a blood vessel connected to them is harmed, Long-term pain in the cut area and return of the hernia[4].

**Anatomy and Physiology:** Inguinal anatomy is essential knowledge for the general surgeon. The canal exists between two openings within the abdominal wall known as the internal (deep) inguinal ring and the external (superficial) inguinal ring [5]. The internal inguinal ring is a lateral hiatus within the transversalis fascia, where the external inguinal ring is a medial hiatus within the external oblique fascia. The canal can range from 4 cm to 6 cm in length and is typically cone-shaped in adults. However, in younger children, both the superficial and deep inguinal rings overlap each other.

The inguinal canal is bordered anteriorly by the skin, superficial fascia, and the external oblique aponeurosis in its entire extent. Additionally, the fibers of the internal oblique muscle are present on the lateral one-third of the canal. The posterior wall is bounded by the fascia transversalis, extraperitoneal tissue, and parietal peritoneum in its entire extent. Additionally, conjoint tendon (made from transversus abdominis and internal oblique) is located on the medial two-thirds of the posterior wall. The roof is formed by the arching fibers of the internal oblique and transversus abdominis, while the floor is formed by the grooved surface of the inguinal ligament and lacunar ligament. The spermatic cord (males) and round ligament (females) pass through the inguinal canal.

The spermatic cord consists of the vas deferens, three arteries/veins, the genital branch of the genitofemoral nerve, lymph vessels, and the pampiniform plexus. The ilioinguinal nerve, which is a content of the inguinal canal, enters the inguinal between the external and internal oblique muscles distal to the deep ring but comes out of the superficial ring along with other structures [6].

Several additional structures are important to identify during open inguinal hernia repair. The iliopubic tract is an aponeurotic band that begins at

the anterior superior iliac spine and courses medially before inserting on the superior aspect of the Cooper's ligament. The shelving edge of the inguinal ligament is the superior attachment of the inguinal ligament to the iliopubic tract. The iliopubic tract forms the inferior border of the internal inguinal ring as it courses medially before becoming part of the femoral canal. Additionally, the lacunar ligament in the medial aspect of the inguinal ligament as it fans out and inserts on the pubic tubercle. Lastly, the conjoint tendon inserts on the pubic tubercle as the culmination of the internal oblique and transversus abdominis fibers. Two types of inguinal hernias may occur.

These are classified as direct and indirect hernia. An indirect hernia passes through the deep (internal) inguinal ring and is located lateral to the inferior epigastric vessels. A direct hernia passes through a weakened area of transversalis fascia in Hesselbach's triangle (lateral edge of rectus abdominis, the inferior edge of the inguinal ligament, and medial to inferior epigastric vessels). A Pantaloon hernia is a combination of a direct and indirect hernia [6,7].

**Classification:** There are several classifications for inguinal hernias. Currently, there is no universal classification system for inguinal hernias. One simple and widely used classification is the Nyhus classification which categories hernia defects by size, location, and type.

#### Nyhus Classification System

##### Type I

- An indirect hernia; normal size internal ring; typically, in infants, children and small adults

##### Type II

- An indirect hernia; enlarged internal ring without impingement on the floor of the inguinal canal; does not extend to the scrotum.

##### Type IIIA

- A direct hernia; size not taken into account

##### Type IIIB

- An indirect hernia that has grown enough to infringe upon the posterior inguinal wall; indirect sliding or scrotal hernias are regularly assigned to this category because they are often associated with the extension to direct space. This type also includes pantaloon hernias.

##### TYPE IIIC

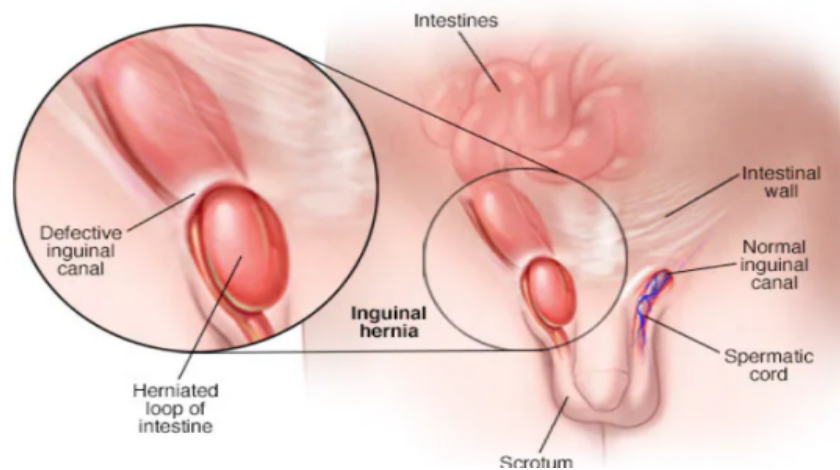
- A femoral hernia

##### Type IV

- A recurrent hernia; modifiers A to D are sometimes added that correspond with direct, indi-

rect, femoral or mixed respectively. Figure-1

&2, details of inguinal hernia [6].



**Figure 1: Anatomy of Inguinal Hernia [6]**



**Figure 2: Bilateral direct inguinal hernia [6]**

If the Inguinal hernia is not treated in time, the hernia will gradually increase and affect the work and life of patients. If the contents of the hernia are incarcerated, it will even endanger the life of patients [8]. Surgical treatment is the first choice for the treatment of adult inguinal hernia [9]. With the progress of surgical technology, the development of various hernia repair materials and the continuous accumulation of surgical experience, the recurrence rate of inguinal hernia has been significantly reduced.

Therefore, pain after inguinal hernia repair has become the most common and prominent sequelae. Chronic pain after tension-free repair of inguinal hernia often affects patients to varying degrees. Mild symptoms have little impact on life, but those individuals with severe symptoms lose their ability to work. A small number of patients may suffer from depression, anxiety and other psychological problems [10]. Therefore, postoperative pain, related to inguinal hernia repair, has gradually been consistently considered by surgeons over the past

many years [11]. To date, the causes of chronic pain after tension-free repair of inguinal hernia are not clear. Neuropathological injury is widely considered to be the cause of chronic pain after surgery, such as injury during separation, neuroma after neurotomy, and pain caused by ligation or scar compression [12].

Many studies have proposed routine ilioinguinal neurectomy to reduce the incidence of inguinal pain, but there is a risk of numbness and hypoesthesia after this procedure. Therefore, there is still controversy surrounding routine ilioinguinal neurectomy [13,14].

Hence, this study carried out the comparative effect of prophylactic ilioinguinal neurectomy and Ilioinguinal nerve preservation, on the incidence and the severity of chronic groin pain after Lichtenstein repair in a prospective randomized controlled trial. The associated neurosensory disturbances and the quality of life were also investigated.

### Materials and Methods:

**Study site:** The study was conducted in the Department of General Surgery, HIMS, Sitapur, and Lucknow. UP. India.

**Study Design:** Prospective and Randomized controlled trial.

**Study Period:** 18 months, from March, 2022 to September 2023, after obtaining HIMS-IHEC clearance.

**Study Group:** Two Groups; group A (Prophylactic Ilioinguinal Neurectomy, PINE) , and group B (Ilioinguinal Nerve Preservation, INPE ).

**Sample Size:** 80 males (40 in each group), Age,  $\geq 18$  years to  $\geq 70$  years.

#### Inclusion Criteria:

1. Male patients with unilateral inguinal hernia above 18 years to above 70 years.
2. Patients undergoing open hernioplasty.
3. Patient who had given informed consent.

#### Exclusion Criteria:

1. Female inguinal hernia patients.
2. Bilateral inguinal hernia, complicated hernias like obstruction, strangulation.
3. History of previous abdominal surgery.
4. History of peripheral neuropathy.
5. Patient unfit for surgery.

A total number of 80 Patients were divided into two groups of 40 each based on odd and even admissions. Informed consent was received from all participants before procedure. Once the ilioinguinal nerve was identified, it was randomized through our Research Centre where a research assistant would randomly allocate the patient to either prophylactic ilioinguinal neurectomy (group A) or ilioinguinal nerve preservation (group B) by opening sealed envelopes containing computer-generated code in blocks of 10. All surgeries were performed in a single surgical unit. As per CDC guidelines, all patients received 1gm intravenous Ceftriaxone as prophylaxis at the time of anaesthetic induction[15,16]. All patients were blinded from the treatment assignment throughout and were followed up by the designated occupational therapist who was not involved in the randomization process or the clinical management of the patient. All the patients were discharged when fit and were asked to come for regular follow up at one month, three months, six months, and later if required. All patients were followed-up for post-operative pain, paraesthesia, interference with activities of daily living, use of analgesics and visits to a general practitioner for pain. At the end of follow up, patients were evaluated using the modified SF-36 questionnaire. The pain was evaluated using Visual Analogue Scale (VAS) (Figure-2, in details) [5].

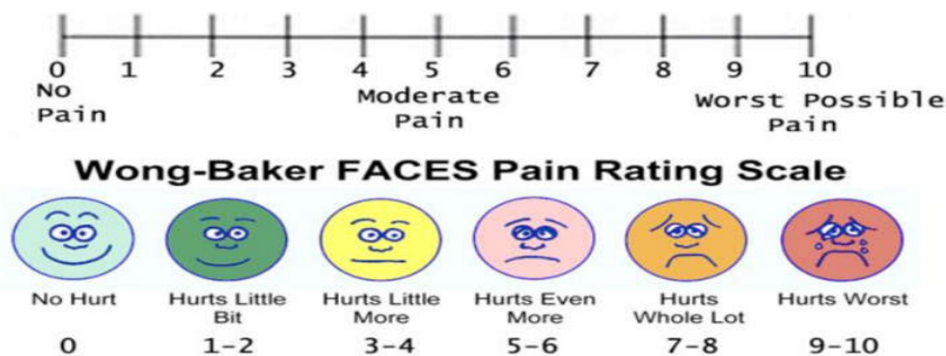


Figure 2: Visual Analogue Scale (VAS) [5]

The pain scale was represented by a 10cm long straight line, with no pain at one end and intolerable pain at the other end.

All patients received intramuscular diclofenac as analgesic every eight hours for two days post-operatively and sos later. Paraesthesia was assessed by the Semmes-Weinstein Monofilament test and evaluated after comparison with the opposite side.

#### Types of Intervention

1. Prophylactic ilioinguinal neurectomy.
2. Preservation of ilioinguinal nerve.

#### Outcome Measure

- Immediate post-operative pain.
- Wound infection.
- Haematoma.
- Retention of urine.
- Inguinal pain after 1 month and its impact in daily activity.
- Inguinal pain after 3 and 6 months and its impact in daily activity.

All patients received the standard flat mesh repair according to the technique previously described [17]. In group A, the whole ilioinguinal nerve was

excised as far lateral to the deep ring as possible and medially to where it entered the rectus muscles. The cut ends were left alone without implantation into muscle or ligation. Histologic examination of the nerve was performed to confirm complete excision. Any small cutaneous nerves that interfere with mesh placement were excised as well. In group B, the ilioinguinal nerve was carefully protected throughout the operation.

The rest of the procedure was performed in a standardized manner. A monofilament polypropylene mesh was anchored with polypropylene sutures to the reflected part of inguinal ligament and the floor of the inguinal canal. Extreme care was used during surgery to avoid inclusion of nerve tissue during suturing and mesh placement. The patients were managed in a standard clinical pathway postoperatively and were followed up by the designated occupational therapist at 1, 3 and 6 months after operation.

**Statistical Analysis:** Statistical analysis was based on intention to treat analysis and was performed with statistical software Statistical Package for

Social Science (version 11.0 for Windows, SPSS, Inc., Chicago IL.). Analysis of our study was done by standard 't' test, chi - square method. A p-value less than 0.05 were considered significant.

### Results

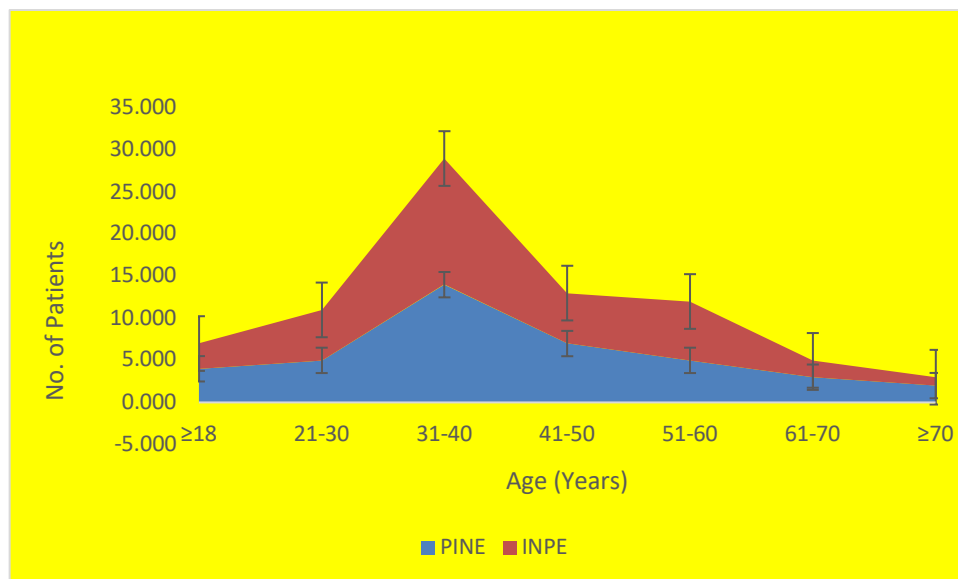
A total of Eighty male patients ( $\geq 18$  years to  $\geq 70$  years) undergoing hernioplasty for inguinal hernia were divided into two groups. In group A (Prophylactic Ilioinguinal Neurectomy, PINE), there were 40 patients who were subjected to prophylactic ilioinguinal neurectomy and in group B (Ilioinguinal Nerve Preservation, INPE) there were 40 patients in whom preservation of ilioinguinal nerve was done during the hernia repair. The mean age of the study subject was  $43.2 \pm 5.43$  years in Group A and  $42.9 \pm 7.54$  years in Group B. Both groups were comparable with regard to type of anaesthesia, hernia side, baseline pain measurements during various activities. Table 1 & 2 and figure-3, shown the mean age and its distribution and other baseline characteristics between two groups. (Table-1 & 2 and figure-3 for details).

**Table 1: Age and Base Characteristics of two groups (Group-A, Prophylactic Ilioinguinal Neurectomy, PINE, N=40; Group-B, Ilioinguinal Nerve Preservation, INPE, N=40)**

Variables	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value
Age (years) Mean $\pm$ SD	43.2 $\pm$ 5.43	42.9 $\pm$ 7.54	0.41
Type of Anaesthesia: Spinal: General	24: 16	22:18	0.061
Hernia Side: Right: Left	27:13	29:11	0.27
Pain at Rest: No pain: Mild Pain	33:7	36:4	0.62
Pain While Straining: No pain: Mild Pain	30:10	32:8	0.71
Pain While Cycling/ Heavy Activities: No Pain: Mild Pain	28:12	31:9	0.69

**Table 2: Age Distribution of Patients in two groups (Group-A, Prophylactic Ilioinguinal Neurectomy, PINE, N=40; Group-B, Ilioinguinal Nerve Preservation, INPE, N=40)**

Age (Years)	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40, %	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40, %	P value
$\geq 18$	4 (10%)	3 (7.5%)	0.82
21-30	5 (12.5%)	6 (15%)	
31-40	14 (35%)	15 (37.5%)	
41-50	7 (17.5%)	6 (15%)	
51-60	5 (12.5%)	7 (17.5%)	
61-70	3 (7.5%)	2 (5%)	
$\geq 70$	2 (5%)	1 (2.5%)	
Total	40 (100%)	40 (100%)	

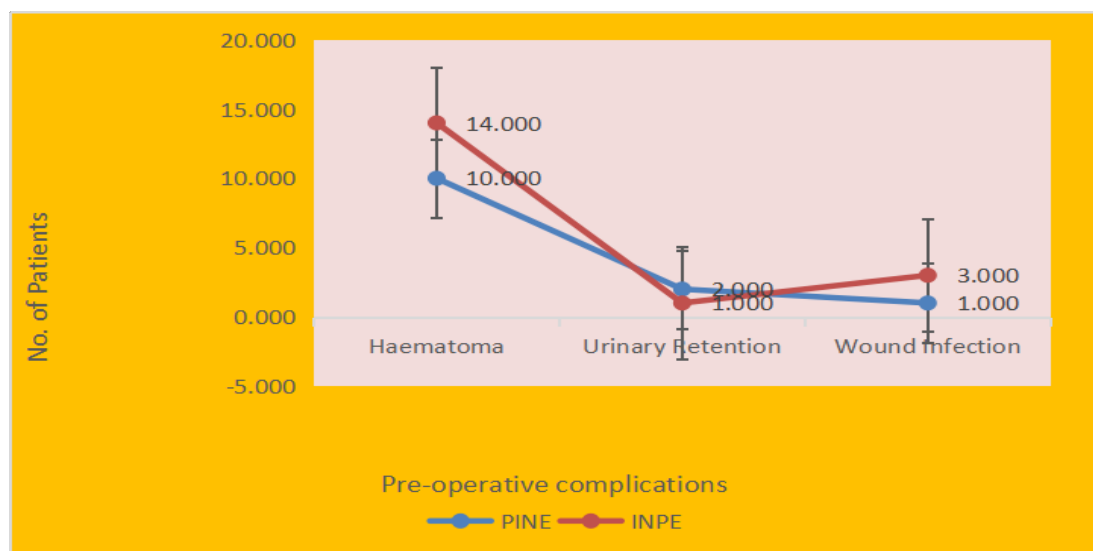


**Figure 3: Age Distribution of Patients in two groups (Group-A, Prophylactic Ilioinguinal Neurectomy, PINE, N=40; Group-B, Ilioinguinal Nerve Preservation, INPE, N=40)**

Figure-3 and Table-1 &2, illustrated that the 35% patients were in the age group of 31-40 Years in group A whereas it was 37.5 in group B. Above 70 years, 5% patients were in group A and only 2.5% I group B. It was also found the minimum age of the patient presenting with inguinal hernia was 19 years in the neurectomy group and 20 years in the nerve preservation group, while the oldest being 76 years in the neurectomy group and 73 years in the nerve preservation group. The age distribution was not found significant,  $P=0.82$ .

**Table 3: Early Complications in two groups**

Variables	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Preservation, INPE) N=40	Nerve	P value
Haematoma	10 (25%)	14 (35%)		0.71
Urinary Retention	2 (5%)	1 (2.5)		0.51
Wound Infection	1 (2.5%)	3 (7.5%)		0.37



**Figure 4: Early Complications in two groups**

Haematoma was found 25% patients in Group A, whereas 35% in Group B. Urinary retention was observed in 5% patients of Gr.A and 2.5% patients of Gr.B. it was not significant.

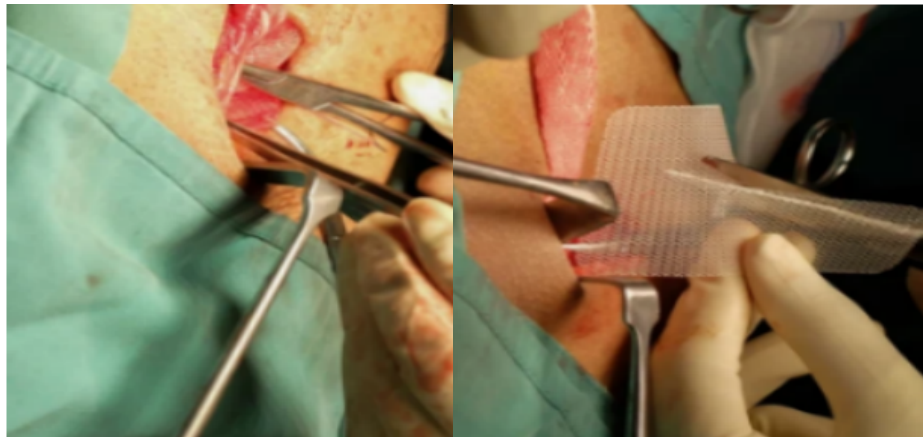


Figure 3 A: Inguinal Hernia operation:

Table 4: Diagnosis; type of Inguinal Hernia

Inguinal Hernia	Surgery, N (%)	
	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE )N=40
Right Direct	8 (20%)	5 (12.5%)
Left Direct	9 (22.5%)	7 (17.5%)
Right Indirect	16 (40%)	20 (50%)
Left Indirect	7 (17.5%)	8 (20%)
Total	40 (100%)	40 (100%)

In the present study, the incidence of right indirect hernia was the highest, being 40% in neurectomy group A and 50% in nerve preservation group B. The least was of left Indirect hernia, 17.5% and 20% respectively.

Table 5: Pain at rest in two groups

Pain	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
1 month	2(5%)	5 (12.5%)	1
3 months	0(0%)	4(10%)	0.2
6 Months	0 (0%)	4 (10%)	0.2

Table 6: Pain during normal daily activities in two groups

Pain	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
1 month	3(7.5%)	5 (12.5%)	1
3 months	0(0%)	4(10%)	0.2
6 Months	0 (0%)	4 (10%)	0.2

Table-5 & 6, Illustrated that the none of the patients in Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) had pain at rest and during normal daily activities while four (10%) Group-B (Ilioinguinal Nerve Preservation, INPE) patients had pain at rest during 3-month and 6- month post-surgery but there was no statistical significance.

Table 7: Pain after moderate activities in two groups

Pain	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
1 month	6 (15%)	9 (22.5%)	0.5
3 months	1(2.5%)	4(10%)	0.2
6 Months	0 (0%)	3 (7.5%)	0.02

Table-7, revealed that the four (10%) and three (7.5%) patients in group B, subsequently one (2.5%) and Zero % of the group A patients had pain during moderate activities during 3- month and 6-month post-surgery respectively.

**Table 8: Pain after vigorous activities in two groups**

Pain	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE )N=40	P value (Chi-square Test)
1 month	17 (42.5%)	21 (52.5%)	0.5
3 months	5(12.5%)	14(35%)	0.005
6 Months	3 (7.5%)	9 (22.5%)	0.05

**Table 9: Postoperative Hyperesthesia in two study groups:**

Postoperative Hyperesthesia	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
1 month	9 (22.5%)	13 (32.5%)	0.3
3 months	4 (10%)	6 (15%)	0.5
6 Months	1(2.5%)	2 (5%)	0.5

Table-8 & 9, revealed that during vigorous activities, more group B patients had pain compared to group A patients at 3 month [14(35%) vs. five (12.5%); p=0.005; Chi-square test] and 6 month follow-up [9(22.5%) vs. three (7.5 %); p=0.005; Chi-square test]. At 6-month post-surgery, one of group A (2.5%) and two (5%) patient in group B had hyperesthesia.

**Table 10: Type of hernia and post-operative pain**

Type of Hernia	Pain	1 Month		3 Month		6 Month	
		Gr.A	Gr.B	Gr.A	Gr.B	Gr.A	Gr. B
Direct	Present	3	2	3	2	0	2
	Absent	14	9	14	12	14	10
Indirect In-complete	Present	7	9	3	6	3	6
	Absent	5	7	11	12	13	12
Indirect Complete	Present	9	11	4	5	2	4
	Absent	2	2	5	3	8	6
Total		40	40	40	40	40	40

Table-10, showed the comparison in between type of hernia and post-operative pain. There was no significant difference of incidence of pain in any type of hernias in both the groups.

**Table 11: Quality of life- Physical Functioning in two groups**

Quality of Life	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
No Limitation of Activities	37 (92.5 %)	33 (82.5 %)	0.01
Mild Limitation of Activities	0(0%)	1(2.5 %)	0.4
Severe Limitation of Activities	2(5%)	4 (10 %)	0.6

**Table 12: Quality of life- Social Health in two groups**

Quality of Life	Group-A:(Prophylactic Ilioinguinal Neurectomy, PINE) N=40	Group-B:(Ilioinguinal Nerve Preservation, INPE) N=40	P value (Fischer's Exact Test)
No Limitation of Activities	36 (90%)	34 (85%)	0.5
Mild Limitation of Activities	1 (2.5%)	6 (15%)	0.2
Severe Limitation of Activities	0(0%)	4 (10 %)	0.1

Table-11 & 12,( Quality of life) , illustrated that the limitation of physical activities was severely affected in two (5%) of group A patients and four (10%) of group B patients.

Similarly four (10%) patients in group B and none of group A (0%) patients had limitation of social activities.

## Discussion

Repair of an inguinal hernia is one of the most common surgeries performed worldwide.

Like any other surgery, inguinal hernia repair is not without complications.

Repair of an inguinal hernia is associated with bleeding, hematoma, injury to vital structures, wound infection, secondary hydrocele, ischemic orchitis, urinary retention, seroma, recurrence, and



inguinal neuralgia. The inguinal neuralgia is one of the chronic devastating circumstances which affect the quality of life [17,18].

In the literature, there is keen debate about the correct management of the ilioinguinal nerve. Lichtenstein and his successor, Amid, recommend preservation of that nerve as well as of the iliohypogastric and the genital branch of the genitofemoral nerve, whenever possible, to prevent the loss of sensitivity and to reduce as much as possible the risk of chronic groin pain after surgery [19-23].

Conversely, it was also postulated that the INE would eliminate the possibility of postoperative inguinodynia connected to its entrapment, inflammation, stupor, neuroma formation, or fibrotic reaction around the mesh [24,25]. In addition, this neurectomy, along with the iliohypogastric and the genitofemoral nerve resection, is a well-known surgical procedure used to treat the chronic groin pain after open hernia repairs, although some patients with neurological examination suggesting involvement of the ilioinguinal nerve can have pain relief after nerve blockade and Nonsteroidal anti-inflammatory drugs [26].

It was reported in a recent paper in which 100 patients that underwent INE for nerve entrapment after inguinal hernia repair [27]. They showed that the effectiveness of this technique is real and that 72 percent of the patients had complete resolution of the pain syndrome and 10 per cent a marked decrease in the symptoms.

Chronic inguinal neuralgia is defined as "pain lasting for 3 months or more," as per the International Association for the study of pain. Post-operative pain has been shown to persist for over 5 years in 1.8% of patients and as many as 7.5% of cases may be in more pain than before the operation [28-29].

### Diagnosis of neuralgia

Neuropathic pain is characterized as an activity induced sharp pain, located in proximity to the inguinal scar.

The pain frequently radiates towards the scrotum, labium and/or upper inner thigh. Upper body stretching or twisting or stooping may cause pain from nerve traction or compression. Application of pressure where the nerve exits the inguinal canal may elicit tenderness in up to 75% of patients [18,19]. The neuropathic pain complex can also be reproduced by tapping the skin medial to the anterosuperior spine of the iliac bone or over an area of localized tenderness (Tinel's test). A distinct trigger point situated in or close to the scar may cause pain following stimulation, e.g., after palpation.

Signs of a disturbed neurophysiological equilibrium including hypoesthesia, hyperesthesia or allodynia in the region of the distribution of the nerve.

Symptoms usually increase with hip hyperextension (patients walk with the trunk in a forward-flexed posture).

Local infiltration of anesthetic, with or without steroid, should result in relief within 10 minutes [20].

Abdominal needle electromyography may be helpful in determining the severity of nerve injury, but electromyography is neither sensitive nor specific. After an appropriate review of available literature and current guidelines and norms, the term neurectomy was applied to the removal of the whole length of the ilioinguinal nerve in the inguinal canal and this procedure was followed in the neurectomy study group.

The present study is a comparative study between prophylactic ilioinguinal neurectomy and ilioinguinal nerve preservation in Lichtenstein inguinal hernia repair surgeries. The study was conducted with an intention to observe the effect of ilioinguinal neurectomy on the increase or decrease of the incidence of post hernioplasty chronic groin pain and paraesthesia, if any.

One of the early studies in the fields of elective neurectomy in inguinal hernia repair was a pilot study in which 20 patients with bilateral inguinal hernia underwent surgery with the ilioinguinal nerve being preserved on one side and divided on the other side, all of the differences in the post-surgical pain and numbness between the two sides were insignificant [30].

A Double blinded randomized controlled clinical trial was performed on 121 patients undergoing open anterior mesh repair of inguinal hernia. Of the 121 patients, 61 were nerve excision group and 60 were nerve preserving group. The chronic post-surgical inguinodynia was seen in 6% in nerve excision group and 21% in nerve preserved group ( $p=0.033$ ). Results were concluded that the neurectomy decreased the post-surgical pain after elective inguinal hernia repair [31].

A Retrospective review study was performed on 90 patients who underwent Lichtenstein inguinal hernia repair. The ilioinguinal nerve was excised in 66 patients and preserved in 24 patients. The investigators concluded that the incidence of neuralgia was significantly lower in the neurectomy group versus the nerve preservation group (3% vs 26%  $P<0.001$ ). At one year post operatively the neurectomy patient continued to have a significantly lower incidence of neuralgia (3% vs 25%  $p=0.003$ ). The incidence of paraesthesia in the distribution of the ilioinguinal nerve was not significantly higher in the neurectomy group (13% vs 5% ,  $p= 0.32$  ) at

1 year [32]. The Present study results were completely similar with the above mentioned studies. It has been observed that the both groups were comparable regard to the preoperative pain. The preoperative pain was due to pull on the mesentery or omentum. This pain was different from postoperative pain. Direct comparison of pain between our study and other studies was not possible because of the different available methods used to determine the severity of pain like the Visual Analogue Scale (VAS), Verbal Rating Scale (VRS), 10 point Likert scale, Mc Gill pain questionnaire etc. But our results were within range. In the present study, a validated questionnaire was used to evaluate the pain severity. In this, the patients were asked about the presence or absence of pain in the groin, at rest, pain experienced during normal daily activities, pain after moderate activities, and pain after vigorous activities. The questionnaire was updated at every followup, which was at one, three, and six months.

In study group A, pain at rest was present in 5% patients at one month which became 0% by six months, whereas in the group B, it was present in 12.5% patients at 1 month and persisted in 10% patients beyond six months postoperatively. A similar was advocated that the pain occurred in 5% and 6% of the studied patients in the neurectomy and non-neurectomy group, respectively, at one month. This subsided to 3% (neurectomy study group) and 2% (non-neurectomy group) of patients at one year [31]. Pain experienced during normal daily activities and moderate activities were found to be significant between both the study groups. The results were consistent with a previous study [33].

Significant differences were found in the incidence of pain after vigorous activity, between the neurectomy group A and the group B, at three and six months follow up (12.5% v/s 35%;  $p=0.05$  and 7.5% vs. 22.5%;  $p=0.05$ ; chi-square test). These findings were consistent with previous similar studies [33-35]. However, Picchio et al. reported an almost equal incidence of pain after one year [20].

In this study, no significant difference was found regarding hyperesthesia. These results were comparable with previous studies [34,36] There was no significant difference in the health-related quality of life between the two study groups. This was complimented with the findings previous study [14].

#### Conclusion:

In the present study, it was found that chronic groin pain was a significant and debilitating complication following hernia repair. The incidence of pain as well as the severity of pain was higher in the nerve

preservation study group B as compared to the neurectomy study group A.

Hypoesthesia was not a significant complication following ilioinguinal neurectomy and did not significantly add to the morbidity of the patient.

Thus showed the incidence of chronic groin pain was lower in ilioinguinal neurectomy (group A) compared to nerve preservation (group B).

Hence, prophylactic neurectomy could be an appropriate solution in the prevention of chronic groin pain following Lichtenstein inguinal hernia repair and could be considered as an ideal inclusion into the standard hernia repair procedures.

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