

# Prophylactic ilioinguinal neurectomy: Can it prevent chronic groin pain after Lichtenstein inguinal hernia repair?

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## Abstract

**Background:** Contrary to the previous belief, division of the ilioinguinal nerve prophylactically during mesh repair has been practiced to reduce the incidence and intensity of persistent postoperative pain after hernia repair.

**Objectives:** To evaluate whether prophylactic ilioinguinal neurectomy prevents chronic groin pain after primary Lichtenstein hernia repair.

**Methods:** Patients undergoing elective open mesh repair of inguinal hernia were randomized in two groups; nerve excision and nerve preservation group by opaque envelope method. Fifty cases were included in each group. A telephone interview was conducted after three months of the surgery. Pain scoring was done with Numeric Pain Intensity Scale and its effect in daily activities was measured with Patient Disability Index.

**Results:** Forty-four patients in excision group and 45 in preservation group satisfied the inclusion criteria. Nine (20%) in the previous group and 16 (34.78%) in the latter group had chronic pain ( $p=0.113$ ). Mean severity score in patients who had pain was significantly high in preservation group (2.22 versus 3.31,  $p=0.039$ ). The incidence of scrotal numbness was higher in excision group (20% versus 13.3%,  $p=0.370$ ).

**Conclusion:** Though insignificant reduction in incidence of chronic groin pain was observed after division of ilioinguinal nerve, significant reduction in the intensity of the chronic pain especially during activities related to home and during self care has been shown.

**Key words:** Chronic groin pain, Ilioinguinal neurectomy, Lichtenstein hernia surgery

## INTRODUCTION

Elective surgical repair of an inguinal hernia is one of the most common surgical procedures done in General Surgery. Chronic groin pain experienced after such repair of inguinal hernia remains an unexplored area, especially in the Asian population, who are more likely to continue usual physical work after the surgery.

The Lichtenstein hernia repair recommends that nerves encountered in the surgery especially ilioinguinal nerve be preserved to minimize the incidence of chronic groin pain<sup>1</sup>. But it can interfere with placement of the mesh and may be traumatized inadvertently during operation. Hence, contrary to the previous traditional belief, division of the ilioinguinal nerve prophylactically i.e. prophylactic ilioinguinal neurectomy has been practiced to reduce

the incidence and intensity of persistent postoperative pain after hernia repair<sup>2</sup>. The general objective was to evaluate whether prophylactic ilioinguinal neurectomy prevents chronic groin pain after primary Lichtenstein hernia repair. The specific objectives were to ascertain the incidence and severity of chronic groin pain in patients in which ilioinguinal nerve was preserved or excised and also to determine the various side effects such as wound infection and scrotal numbness when ilioinguinal neurectomy was practiced.

## METHODS

This is an interventional study (Randomized controlled trial) conducted in Bir Hospital, National Academy of Medical Sciences (NAMS) in the year 2010 /2011. All patients 18 years or older with primary inguinal hernia admitted to unit one of Surgery Department during the study period and candidate for non-emergency open mesh repair of inguinal hernia (Lichtenstein repair) irrespective of mode of anaesthesia were included for the study. Patients not willing to get enrolled, not having contact phone number for follow up and patients in which ilioinguinal nerve was not identified or was

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accidentally excised during the surgery were excluded. Informed consent was taken from patients meeting inclusion criteria.

Randomization was done by opaque envelope method. One hundred paper pieces (nerve excision written in 50 papers and nerve preservation in 50 papers) were kept in an opaque envelope. One cheat was extracted before each procedure. In nerve excision group patients, routine ilioinguinal neurectomy was performed at the level of deep inguinal ring during the surgery. In nerve preservation group, ilioinguinal nerve was preserved but care was taken not to impinge the nerve. All patients were contacted after three months by telephone and was interviewed based on the questionnaire from the proforma. Pain scoring was done with numeric pain intensity scale and disability was scored by Patient Disability Index<sup>3</sup>. Ethical clearance for the study was obtained from NAMS Institutional Review Committee before the study.

## RESULTS

One hundred patients admitted for Lichtenstein hernia repair were eligible for the study of which four patients (two in each group) were excluded because of inability to identify ilioinguinal nerve (figure 1) and other seven (four in nerve excision group and three in nerve preservation group) as they lost to follow up (figure 1).

Hence, forty four patients in nerve excision group and 45 in nerve preservation group satisfied the inclusion criteria. Nine (20%) in the previous group and 16 (34.78%) in the latter group had chronic pain ( $p=0.113$ ) (Table 2).

Mean severity score in patients who had pain was significantly high in preservation group (2.22 versus 3.31,  $p=0.039$ ) (Table 3). Whereas, the incidence of scrotal numbness was higher in excision group (20% versus 13.3%,  $p=0.370$ ) (Table 5).

**Table 1: Patient demographics**

	Nerve Excision Group	Nerve Preservation Group	P value
Male	44	44	
Female	0	1	
Mean age in years	49.1 +/- 15.1 (23-83)	53.2 +/- 15.7 (19-88)	0.604*

\* By Independent sample t-test

**Table 2: Incidence of chronic groin pain after 3 months\***

	Nerve Excision Group (n=44)	Nerve Preservation Group (n=45)	p value
Present	9 (20.5%)	16 (35.6%)	0.113**
Absent	35 (79.5%)	29 (64.4%)	
<b>Total</b>	<b>44 (100%)</b>	<b>45 (100%)</b>	

\*Data are given as number of patients

\*\* By Chi-square test

**Relative risk = 1.8 (95% CI 0.82-5.54)**

**Table 3: Mean severity score in patients with chronic pain**

	Nerve excision group (n=9)	Nerve preservation group (n=16)	p value
At 3 months	2.22 +/- 0.97	3.31 +/- 1.3	0.039**

\*\* By Independent t test

**Table 4: Median Numeric Pain Intensity Scale scores among the patient having chronic groin pain after 3 months (according to Patient Disability Index)**

	Nerve excision group (n=9)	Nerve preservation group (n=16)	p value*
Median Numeric Pain Intensity Scale score	4.00	2.00	0.038
During activities related to home and family	3.00	2.00	0.011
During sports and other leisure activities	2.00	2.00	0.526
During participation with friends and acquaintances	2.00	2.00	0.843
During sexual activities	2.00	0.00	0.237
During self care	2.00	2.00	0.064
During work including house work	4.00	2.00	0.063
During basic life supporting behaviours (breathing, eating, sleeping)	2.00	2.00	0.316

\*Mann Whitney U-test

**Table 5: Incidence of scrotal numbness after three months of surgery\***

	Nerve excision group (n=44)	Nerve preservation group (n=45)	p value
Present	9 (20.5%)	6 (13.3%)	0.370**
Absent	35 (79.5%)	39 (86.7%)	
<b>Total</b>	<b>44 (100%)</b>	<b>45 (100%)</b>	

\* Data are given as number of patients

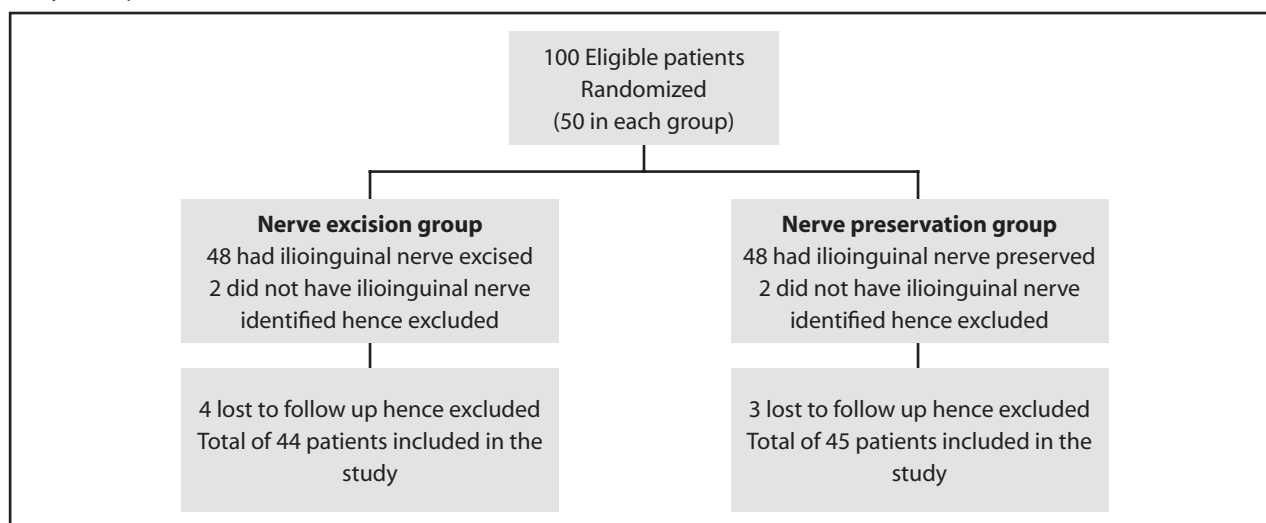
\*\* By Chi-square test

**Table 6: Incidence of wound infection\***

	Nerve excision group (n=44)	Nerve preservation group (n=45)	p value
Present	1 (2.3%)	2 (4.4%)	0.570**
Absent	43 (97.7%)	43 (95.6%)	
<b>Total</b>	<b>44 (100%)</b>	<b>45 (100%)</b>	

\* Data are given as number of patients

\*\* By Chi-square test



**Figure 1:** Consort diagram of randomization in this study.

## DISCUSSION

Chronic pain is itself not a symptom, but a disease state. It is usually defined as pain which lasts beyond the ordinary duration of time that an insult or injury to the body needs to heal. This is commonly thought of as four to six weeks, although some have chosen three months as the dividing line between acute and chronic pain<sup>4</sup>.

The exact incidence of chronic groin pain after Lichtenstein hernia repair remains to be elucidated, varying in different series and only a few studies presenting long term follow up and a sufficiently large study population. The report from the Danish hernia data base group on nationwide questionnaire survey suggests that the incidence of chronic pain, regardless of grade, 12 months after surgery is approximately 29% with 11% of patients complaining of severe pain<sup>5</sup>. A well accepted incidence of chronic groin pain according to different case series has been 26-28% after 6 months of repair<sup>2,6</sup>. Severe pain has been noted to be around 1.5 to 3% after one year of surgery<sup>7</sup>. Chronic groin pain of 35.6% in this study (16 out of 45 patients who underwent nerve preservation during hernia repair) again underlines high incidence in patients attending our unit for Lichtenstein hernia surgery.

Theoretically, excision of the ilioinguinal nerve would eliminate the possibility of postoperative neuralgia arising from entrapment, inflammation, neuroma, or fibrotic reactions<sup>4</sup>. With respect to handling of injured nerves, various expert opinions have been published. According to Schumpelick<sup>8</sup>, injured nerves should be divided as proximally as possible. Amid<sup>9</sup> resected all three nerves ilioinguinal, iliohypogastric and genital branch of genitofemoral nerves as far proximally and distally as possible, to include the involved segment and account for the numerous neural communications those exist between the three inguinal nerves.

The present study has shown reduction in the incidence of chronic pain after division of ilioinguinal nerve when compared to preservation of the nerve (20.5% versus 35.6%,  $p=0.113$ ). However, this difference failed to show statistical significance probably because of the small sample size. The fact that preserving the nerve leads to almost two fold increase in the incidence of chronic groin pain again holds some clinical significance (Relative risk= 1.8, 95 % CI 0.82-5.54). Moreover, the severity of pain in the patients who had chronic pain after three months of surgery is significantly high when the ilioinguinal nerve is not excised (2.22 versus 3.31,  $p=0.039$ ). In the present study, chronic severe pain needing frequent follow up in

the hospital and regular use of analgesics was needed only in one patient i.e. 2.1% in the nerve preservation group, which is consistent with the study done by Kehlet et al<sup>10</sup> in which the incidence of chronic severe (disabling) pain i.e. Numeric Pain Intensity Scale score of  $> 5$  has been 2-4%. None in the nerve excision group experienced severe pain.

Studies investigating the influence of division and preservation of the ilioinguinal nerve are conflicting. Two randomized studies<sup>11,12</sup> found no significant difference with respect to the incidence of chronic pain but a further randomized trial<sup>5</sup> suggested a significant difference in favour of division. When data from all these three randomized controlled trials were pooled together, the pooled mean showed no difference between the two treatment groups after six months of surgery. However, in a pioneer study by Ravichandran<sup>11</sup>, bilateral hernias when randomized to nerve preservation on one side and division on the other, pain was present in 5% (1 in 20) on the nerve preserved side whereas it was nil on the nerve excised side.

Furthermore in this study, the impact of pain on daily usual activities was measured using Patient Disability Index. It was noticed that detail seven point questionnaire in Patient Disability Index actually identified patients suffering postoperatively who might otherwise be missed. Among the seven variables tested by Patient Disability Index, significant difference in the pain severity was noted during activities related to home & family and during self care (1.56 versus 2.63,  $p=0.011$  & 1.89 versus 3.00,  $p=0.036$  respectively). Achieving less severe pain in the other variables may not be significant statistically but they may be significant in day to day life activities of the patients.

This study again confirms that the scrotal numbness, which is the area of distribution of ilioinguinal nerve, is higher when ilioinguinal nerve is divided. Incidence in this study being 20.5% in the nerve excision group compared to 13.3% in the nerve preservation group. Statistical analysis, however, showed no difference in the incidence of scrotal numbness ( $p=0.37$ ). In the pioneer study done by Ravichandran et al<sup>11</sup> the incidence of sensory loss in both the groups was quite high compared to this study, 40-45% in nerve excision group and 20-25% in nerve preservation group. Similarly, Picchio et al<sup>12</sup> found loss of touch sensation and loss of pain sensation in 29% and 33% respectively in patients whose ilioinguinal nerve was divided, after six months of surgery. However, when objective assessment was

done by Mui et al<sup>6</sup> to assess skin sensitivity by Semmes Weinstein monofilament testing, no difference in loss of sensation was observed regardless of preservation or division of the nerve. Similarly, no difference in the quality of life was noticed in the same study after six months of follow up. Hence, Mui et al<sup>6</sup> were able to describe the impact of the neurosensory disturbance in the quality of their lives from patients' perspective. All these studies have unanimously agreed about absence of serious clinical implication of scrotal numbness.

This study is not devoid of limitations. First and foremost, small sample size is one of the major drawbacks of this study. No statistical sample size calculation was done prior to start of the study. Procedure in this study was carried out by five surgeons including the author. Though all five surgeons followed the steps of Lichtenstein hernia repair surgery, minor variation in the technique could not be ruled out. Hence, surgeon factor influencing the results could not be eliminated. A single surgeon performing all the procedure would have added more validity to the results but that was not possible in the busy surgical unit. Moreover, a strict protocol was set during the design to exclude the cases in which ilioinguinal nerve was not identified or was accidentally divided, which actually happened in four cases (two in each group as mentioned in figure 1). This was intentionally designed to bring minimum level of uniformity in the procedure as this was the primary variable that was being tested and had direct effect in the results. This protocol in fact abolished the possibility of crossover to the opposite group. Hence, intention to treat protocol during data analysis was not possible.

One other drawback at the time of data collection was during telephonic follow up. It was designed for the convenience of the investigator but being able to judge only the subjective complaint of the patients was another major drawback. In fact, quite a few patients (four in nerve excision group and three in nerve preservation

group) were lost to follow up, as their phone numbers could not be contacted. Another limitation of the study is that the effect of ilioinguinal neurectomy on the quality of life was not assessed in this trial. Patient Disability Index is a good measure of assessing impact of pain on daily activities but still it does not give exact assessment of quality of life. No objective assessment of effect of pain on different activities was evaluated. In this study no pain scores or questionnaires were included from which postoperative pain might be differentiated as of somatic, neuropathy or visceral origin. That could be the reason why twenty percent of patients in the nerve excision group experiencing chronic groin pain in this study could not be explained.

Despite postherniorrhaphy chronic pain being a relatively common adverse event, good scientific data on prevention and management are lacking. Division of ilioinguinal nerve, unlike division of other nerves such as genital branch of genitofemoral nerve and iliohypogastric nerve, has shown some promise. Hence, findings of this study should be tested with a larger prospective randomized controlled trial with a longer follow up and with precise mechanism to assess the post-operative pain.

## CONCLUSION

Though division of the ilioinguinal nerve does not reduce the incidence of chronic groin pain significantly as shown by statistical analysis, it has shown significant reduction in the intensity of the chronic pain especially during activities related to home and during self care. A larger study with longer follow up with objective mechanism to assess pain is recommended.

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