Original Research Article

A prospective study comparing prophylactic division versus preservation of the ilioinguinal nerve in open Lichtenstein inguinal hernioplasty

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ABSTRACT

Background: Inguinal hernia is one of the most common surgeries done all over the world. Chronic groin pain is one of the most annoying problems after mesh hernioplasty. This study aimed at evaluating the incidence of chronic groin pain and numbness occurring after prophylactic ilioinguinal neurectomy, as compared to its preservation during Lichtenstein's inguinal hernioplasty.

Methods: This prospective randomized study involved 90 patients complaining of inguinal hernias admitted to the department of general surgery, Tanta university hospitals during the study period. Our patients were divided randomly in two equal groups. (Group A) patients were subjected to Lichtenstein hernia repair with ilioinguinal neurectomy while (group B) patients were subjected to Lichtenstein hernia repair with nerve preservation. Post-operatively the incidence of groin pain and numbness were assessed in all patients. The pain was evaluated using a visual analogue scale. Whereas numbness was examined by the monofilament test and evaluated in comparison to the opposite side.

Results: In the present study, the incidence of pain was higher in nerve preservation study group whereas, numbness was not a major complication after prophylactic ilioinguinal nerve division and did not add to patient morbidity.

Conclusions: Prophylactic ilioinguinal nerve division could be an appropriate and beneficial solution for chronic groin pain after the Lichtenstein procedure and may be added as a surgical step during the classic procedures for hernia repair. Also, numbness was not a major complication after the prophylactic division of the ilioinguinal nerve and did not add to the patient morbidity.

Keywords: Inguinal hernia, Mesh hernioplasty, Post-operative pain ilioinguinal nerve, Neurectomy, nerve preservation

INTRODUCTION

Despite laparoscopic hernia repairs becoming popular today, Lichtenstein repair for inguinal hernia is the most commonly used type of repair and is still the gold standard for Inguinal hernia repairs.[1,2] Inguinal hernia surgery is one of the most common surgeries performed, and persistent postoperative pain is not uncommon.[3,4] Chronic pain is defined generally as pain lasting >3 months, but the studies on postoperative chronic pain often address the presence of pain several years after inguinal herniorrhaphy.[5] The prevalence of groin pain after inguinal hernia repair has been reported to be 20-30%.[4] When these pain syndromes occur, which can happen irrespective of the repair type performed, they cause enough disability for patients to seek therapy options ranging from nonsteroidal anti-inflammatory drugs to physical therapy and even to additional surgery (for neurectomy, neuroma excision, etc.).[6] Routine excision of the ilioinguinal nerve in an attempt to decrease the incidence of chronic inguinodynia has been proposed.[7,8]

METHODS

This prospective study was carried out in the department of general surgery, Tanta university hospital, on 90 patients presented with unilateral non-complicated inguinal hernia over 1 year from January 2019 to February 2020. After discussing the pros and cons of the procedure with patients and informed consent was taken from ninety patients between 18-65 years who underwent elective unilateral tension-free mesh hernioplasty. 45 patients were placed in group 'A' or neurectomy group and subjected to elective ilioinguinal neurectomy. The rest of the patients were put in group 'B' or nerve preservation group and underwent standard Liechtenstein's mesh hernia repair, without division of the ilioinguinal nerve. Randomization was achieved by allocating alternate patients to each group 'A' prophylactic neurectomy, and 'B' nerve preservation. The study was approved by the ethical committee. All male patients above 18 years of age; both direct and indirect unilateral non- complicated inguinal hernias who underwent Lichtenstein mesh repair were included in the study, while the excluded patients were those with recurrent hernias, obstructed and or strangulated hernia, bilateral hernia, mental retardation, diabetes and other neurological problems causing peripheral neuropathy. Also, females and patients with severe cardio-respiratory embarrassment were excluded from the study. The presence of inguinal hernia was diagnosed by clinical examination. Preoperative evaluation included a thorough history and clinical examination. Routine laboratory investigations including CBC, serum urea and creatinine, random blood sugar, urine examination, liver function tests, serology e.g., HIV, HCV, HBV were also done. Ultrasonography of the abdomen and pelvis was done in patients above 40 years to look for possible etiologies e.g., organomegaly. Also, ECG and chest X-ray were done for all patients for anesthetic evaluation. A single dose of a preoperative broad-spectrum antibiotic (ceftriaxone 1 gm\iv\od) was given and continued for 2 days postoperatively.

Standard tension-free Lichtenstein mesh repair was the adopted procedure; all cases were performed under the spinal anesthesia. The ilioinguinal nerve was identified in both groups and carefully preserved in group B, during placement of the 6x11 cm prolene mesh. In the neurectomy group, about 4 cm of the ilioinguinal nerve was excised laterally from the deep inguinal ring then it was sent for histopathologic examination for confirmation. The rest of the operation in both groups followed the standard Lichtenstein repair. Postoperative pain scoring was done by using a visual Analogue Score and was followed up for 6 months. Non-steroid anti-inflammatory analgesic was given post-operatively BID for 2 days then we shifted to oral paracetamol 1 gm BID for 5 days then SOS. All patients were discharged on the next day and they were asked to come for a follow-up visit at surgical OPD one week after discharge. All patients were examined for any minor postoperative complications like testicular oedema, seroma, wound infection or recurrence. Sutures were then removed. Also, pain and sensory changes were assessed at 1 month, 3 months, and 6 months.

Chronic groin pain was defined as any discomfort or pain, during normal physical activity and included bending forward, squatting, and extending the leg of the operated side to a reasonable degree. The sensory assessment was done using the standard Semmes-Weinstein monofilament test as described by Bell.[9] Five quadrants around the incision site, namely the upper outer, upper-lower, lower outer, lower inner, and lateral side of the scrotum were tested. Any asymmetry between the two sides was documented as groin numbness. The primary outcome measure was the incidence of postoperative pain up to 6 months after surgery. The secondary outcome measure was the incidence of groin numbness.

Statistical analysis

The data was entered using SPSS 20 software. Statistical analysis was done using SPSS version 20 software. Qualitative data were described using the number and per cent. Results were presented in tables, graphs, and diagrams. A Chi-square test was done. Significance was defined as a $p < 0.05$.

RESULTS

A total of 90 patients were enrolled in this study. These patients were randomized into 45 patients in either neurectomy (A) or nerve preservation group (B). All Patients were followed for a total period of 6 months. In the present study, the youngest patients aged 18 and 20 years in the neurectomy and nerve preservation groups, respectively, while the oldest was 57 and 65 years in the neurectomy group and the nerve preservation group, respectively.

In the present study, the right oblique hernia was the commonest representing 40% in the neurectomy group and 42.2% in the nerve preservation group. Left direct hernia represented 17.8% in the neurectomy group and 15.6% in the nerve preservation group whereas left oblique type constituted 17.8% of the studied cases in the nerve preservation group

Table 1: Age incidence.

Age (year)	Neurectomy group (A) (%)	Nerve preservation group (B) (%)
>30	9 (20)	11 (24.4)
31-40	12 (26.7)	13 (28.9)
41-50	10 (22.2)	9 (20)
51-60	8 (17.8)	7 (15.6)
61-70	6 (13.3)	5 (11.1)

Table 2: Type of hernia.

Type of hernia	Neurectomy group (A) (%)	Nerve preservation group (B) (%)
Right direct	9 (20)	11 (24.4)
Right oblique	18 (40)	19 (42.2)
Left direct	8 (17.8)	7 (15.6)
Left oblique	10 (22.2)	8 (17.8)

In neurectomy group (A) pain at rest was present in 3 cases (6.7%) after the 1st month while none of the cases complained of pain at rest after 6 months follow up, while in nerve preservation group (B) 5 cases (11.1%) had pain at rest and only 4 cases experienced this pain for the next 6 months (8.9%) with a p-value 0.225 (non-significant)

Table 3: Incidence of pain at rest.

Pain at rest	1 Month (%)	3 Months (%)	6 Months (%)
Neurectomy group (A)	3 (6.7)	none	none
Nerve preservation group (B)	5 (11.1)	4 (8.9)	4 (8.9)

After one month follow up the pain incidence after normal daily activities were 40% in the neurectomy group (A) and 33.3% in the nerve preservation group (B). Pain during normal daily activities was noted in 11.1% in the neurectomy group and 24.4% in the nerve preservation group after 6 months follow up. This difference in pain incidence between the two groups was found to be statistically significant (p value=0.002).

After one month follows up, pain during vigorous activity was noted in 48.9% of patients in the neurectomy group (A), while it was noted in 55.6% of patients in the nerve preservation group (B). But after 6 months follow up, 16 patients (35.6%) were still experiencing pain in the nerve preservation group whereas, only 6 patients (13.3%) in the neurectomy group were still complaining of pain (p value=0.005) (significant).

Table 4: Incidence of pain after normal daily activities.

Pain after normal daily activities	1 month (%)	3 months (%)	6 months (%)
Neurectomy group (A)	18 (40)	9 (20)	5 (11.1)
Nerve preservation group (B)	15 (33.3)	12 (26.7)	11 (24.4)

Table 5: Incidence of pain after vigorous activity.

Pain after vigorous daily activities	1 month (%)	3 months (%)	6 months (%)
Neurectomy group (A)	22 (48.9)	8 (17.8)	6 (13.3)
Nerve preservation group (B)	25 (55.6)	22 (48.9)	16 (35.6)

Table 6: Post-operative groin numbness.

Post-operative groin numbness	1 month (%)	3 months (%)	6 months (%)
Neurectomy group (A)	12 (26.6)	8 (17.8)	6 (13.3)
Nerve preservation group (B)	11 (24.4)	7 (15.6)	5 (11.1)

Effects of neurectomy as a secondary outcome measure

Groin numbness was assessed; using the monofilament test by the technique described by Bell.[9] In the neurectomy group 12, 8, and 6 patients had groin numbness at 1 month, 3 months, and 6 months, respectively. In the nerve preserved group 11, 7 and 5 patients had groin numbness at 1 month, 3 months, and 6 months, respectively. There was no statistically significant difference between the two groups (p value was 0.7676 at 1 month, 0.7238 at 3 months, and 0.8103 at 6 months follow up.

DISCUSSION

After open mesh repair of inguinal hernia, postoperative groin pain is one of the most debilitating long-term complications, which can significantly affect the patient's satisfaction and quality of life after the operation.[10-12] A proposed mechanism for the development of postoperative chronic groin pain is the inflammation and fibrosis induced by the mesh, which is near the ilioinguinal nerve.[13]

Chronic inguinal pain (inguinodynia) was defined as "pain that continues for three months or more. Some studies have shown that postoperative pain may continue for more than 5 years in 1.8% of patients and as many as 7.5% of patients may suffer more pain than before the operation.[14-16]

In the present study, the youngest patients aged 18 and 20 years in both the neurectomy and nerve preservation group, respectively. While the oldest was 57 and 65 years in both the neurectomy group and nerve preservation group, respectively.

Mohanapriya et al reported that the youngest age of the patient presenting with the inguinal hernia was 18 and 21 years in both the neurectomy group and nerve preservation groups, respectively. While the oldest was 78 and 72 years in both the neurectomy group and the nerve preservation group, respectively.[17]

Sunkar et al reported that 8% of his patients aged between 15-30 years and 34% aged between 61and 75 years old.[18]

Saravanan et al reported that most of his patients aged between 31 to 40 years in both groups followed by 41 to 50 years.[19]

In the present study, the right oblique hernia was the commonest and represented 40% in the neurectomy group and 42.2% in the nerve preservation group. Left direct hernia represented 17.8% in the neurectomy group and 15.6% in the nerve preservation group whereas left oblique type constituted 17.8% of the studied cases in the nerve preservation group. Neogi et al reported that hernias were right and left in 29 patients and 13 patients, respectively.[20] Mohanapriya reported that the incidence of right indirect hernia was 40% in the neurectomy group and 43.3% in the nerve preservation group. The least incidence was that of the left direct hernia.[17] Saravanan reported that 58% of his patients underwent right indirect hernia repair. The least was the left direct hernia.[19]

In the present study, it was found that in neurectomy group (A) pain at rest was present in 3 cases (6.7%) after the 1st month while none of the cases complained of pain at rest after 6 months follow up, while in nerve preservation group (B) 5 cases (11.1%) had pain at rest and only 4 cases experienced this pain for the next 6 months (8.9%) with a p value 0.225 (non-significant). Mohanapriya et al reported a similar result and stated that pain at rest was present in 10% of his patients in the nerve preservation group after 8 months and it was statistically insignificant.[17] Also Saravanan et al reported that at one-month pain at rest was found in only one patient in the neurectomy group against six patients in the nerve preserving group, while after 6 months none of the neurectomy group felt pain at rest while 3 patients of the other group were still feeling pain at rest.[19]

On the other hand, Neogi et al reported that the mean of group A patients of 0.6 was less than group B (1.05) showing that postoperative pain after one month in group A was less than group B. The difference in pain in the two groups was also statistically significant and the two-tailed p value was 0.0184 (<0.05).[20]

In the present study after one month follow up the pain after normal daily activities were present in 40% of patients in the neurectomy group (A) and 33.3% in the nerve preservation group (B). Pain during normal daily activities was noted in 11.1% in the neurectomy group and 24.4% in the nerve preservation group after 6 months

follow up. That difference in pain incidence between the two groups was found to be statistically significant (p value=0.002).

Mohanapriya et al reported similar results and stated that the pain incidence after normal daily activities was nearly the same in both groups at one-month post-operative. After 8 months he noted that the incidence of pain during normal daily activities was less in the neurectomy group than in the nerve preservation group. Also, he found that the difference in the incidence of pain between the 2 groups was statistically significant.[17] Saravanan et al reported that 4 of his patients experienced pain with activity after 1 month, 2 patients in each group, whereas, after 6 months only one patient experienced pain with activity in the neurectomy group while in the nerve preserving group the 2 patients were still suffering pain with activity.[19]

Neogi et al reported that the mean of group A of (0.25) was less than group B (0.77) showing that postoperative pain after three months in group A was less than group B. The difference in pain in the two groups was again statistically significant and the two-tailed p value was 0.0335 (<0.05).[20]

Also, Sunkar et al reported that significantly fewer patients had pain after coughing 5 times at 6 months, in the neurectomy group as compared with the non-neurectomy group (p value<0.0001).[18]

In the present study, after 1 month follows up, pain during vigorous activity was noted in 48.9% of patients in the neurectomy group (A), while it was noted in 55.6% of patients in the nerve preservation group (B). But after 6 months follow up, 16 patients (35.6%) were still experiencing pain in the nerve preservation group whereas, only 6 patients (13.3%) in the neurectomy group were still complaining of pain (p value=0.005) (significant).

Mohanapriya et al reported similar results and found that the incidence of pain after vigorous activity was nearly the same in both the study groups at one-month post-operative. At 8 months post-operative the pain was still present in 11 patients in the nerve preservation group against only 4 patients in the neurectomy group and the difference was statistically significant.[17]

Also, Sunkar et al reported that a significantly lesser number of patients had pain after cycling for 20 minutes at 6 months in the neurectomy group as compared with the non-neurectomy group.[18] Whereas, Picchio and colleagues suggested that nerve preservation and nerve division have similar incidences of pain and that intraoperative nerve division just leads to an increased rate of wound anesthesia.[21]

In the present study, we found that in the neurectomy group 12, 8 and 6 patients had groin numbness at 1, 3,

and 6 months, respectively. In the nerve preserved group 11, 7, and 5 patients had groin numbness at 1, 3, and 6 months, respectively. There was no statistically significant difference between the two groups (p value was 0.7676 at 1 month, 0.7238 at 3 months, and 0.8103 at 6 months follow up.

Neogi et al reported similar results and found that in the neurectomy group 6, 4 and 2 patients had groin numbness at 7 days, 1 month, and 3 months, respectively. In the nerve preserved group 7, 5 and 2 patients had groin numbness at 7 days, 1 month, and 3 months, respectively with no statistically significant difference between both groups.[20] Mohanapriya reported that the incidence of post-operative numbness was higher in the neurectomy group at the 8 months follow-up. The incidence of hyperesthesia was high in both the study groups at 1 month follow up. At 8 months follow-up, only one patient in the nerve preservation group was found to have persistent hyperesthesia at the operated site.[17] Also Sunkar et al reported that statistically no significant difference in sensory loss could be demonstrated between the two groups at the end of 6 months follow-up.[18]

CONCLUSION

The present study revealed that chronic groin pain (inguinodynia) after Lichtenstein inguinal hernioplasty was a significant and annoying complication. pain was found to be less common in the neurectomy group (A) compared to the nerve preservation group (B). This may lead us to the possible fact that prophylactic neurectomy may be an appropriate and easy solution to an annoying problem of post-operative inguinodynia that may occur after the classic Lichtenstein inguinal hernia repair and may be considered as a routine surgical step during that operation. Also, we found that post-operative numbness was not a major complication after prophylactic ilioinguinal nerve resection and did not add to the postoperative morbidity of the patients.

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