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Original Research Article

Prophylactic ilio-inguinal neurectomy following Lichtenstein tension free hernioplasty for inguinal hernia: a prospective study

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ABSTRACT

Background: The objective of the study was to evaluate effect of prophylactic ilio-inguinal neurectomy on incidence of chronic groin pain following the Lichtenstein tension free hernioplasty for inguinal hernia.
Methods: This prospective study included male cases admitted with uncomplicated inguinal hernia. Patients were categorised into two groups: Group A: Ilioinguinal nerve preserved, Group B: Ilioinguinal nerve excision. Standard tension-free Lichtenstein mesh repair was adopted. Patients were followed up for assessment of chronic groin pain, hypoesthesia, and numbness at post-operative day (POD) 3, POD14, 1 month and 3 months. Visual analog scale (VAS) was used to assess severity of pain. Sensory assessment was done using standard Semmes-Weinstein monofilament test. Student t test was used and a 2-sided $p<0.05$ was considered significant.
Results: A total of 60 patients with uncomplicated inguinal hernia underwent Lichenstein mesh Hernioplasty (mean age of patients in nerve preservation: 35.8±11.9 years and nerve excision group: 42.7±9.6 years). Postoperative pain significantly decreased in group B at POD 3 (65.5% vs. 89.7%, p=0.01) and 3 months (0% vs. 24.1%, p=0.003) when compared to group A. Prevalence of numbness reduced significantly in group A at 3 month (44.8% vs. 86.2%, p=0.001). Although post-operative hypo aesthesia was comparable between the groups at POD 3 (84.6% vs. 78.1%), it decreased significantly in group A at 3 months (27.6 % vs. 86.2%, $p<0.001$) when compared to group B.
Conclusions: Prophylactic excision of ilio-inguinal nerve during Lichtenstein mesh hernia repair decreases the incidence of chronic groin pain after surgery, without additional morbidities.

Keywords: Neurectomy, Ilio-inguinal nerve, Chronic, Groin pain

INTRODUCTION

Inguinal hernias accounts for 80% of all hernias diagnosed, occurring in about 15% of adult men.[1,2] Although various techniques have been tried to repair inguinal hernias, Lichtenstein mesh for tension-free reconstruction of hernial defects has emerged as the gold standard. [3]

However, after a successful inguinal repair surgery, chronic groin pain remains an important concern and has been reported in 63% of inguinal hernia repair cases.[4] Chronic groin pain can be classified into neuropathic and nociceptive (somatic) pain. Neuropathic pain is caused due to entrapment or direct nerve injury. Nociceptive (somatic) pain is caused by mesh-related fibrosis, mechanical pressure caused by a folded mesh, gradual mesh displacement or contraction, damaged surrounding

structures such as periosteal layers or musculo tendinous tissues, or postoperative causes.[5]

Use of non-surgical treatment options including analgesics, peripheral nerve blocks with local anaesthetics, transcutaneous electric nerve stimulation, laser therapy, pulsed radio frequency for chronic post hernioplasty pain have been used as therapeutic strategies for a limited number of patients.[6] However, by far, surgical option involving selective ilioinguinal, ilio-hypogastric, and genito femoral neurolysis or neurectomy, removal of mesh, and revision of repair are common deployed.[7]

Nonetheless, disagreement over the best management option for the ilioinguinal nerve during hernia repair still exists. Traditionally, surgeons opt to preserve the ilioinguinal nerve at all times during repair because, the nerve injury is often associated with cutaneous sensory loss and chronic groin pain. On the contrary, elective division of the ilioinguinal nerve to reduce incidence of chronic post hernioplasty pain has been recommended. Recently reported randomized controlled trials have confirmed the benefits of neurectomy in chronic post hernioplasty pain.[8]

The aim of this study was to evaluate the effect of prophylactic ilioinguinal neurectomy on the incidence and severity of chronic groin pain following the Lichtenstein tension free hernioplasty for inguinal hernia.

METHODS

The present work was conducted was conducted in Department of Surgery at ESIC Medical College, Bangalore from November 2016 to October 2018. This prospective study included male cases who were admitted with uncomplicated inguinal hernia to the Department of General Surgery.

However, patients with bilateral and recurrent hernia, chronic cough/ COPD, peripheral neuropathy, history of diabetes, heart disease and chronic renal disease, females, impaired cognitive function and aged <18 years were excluded. All patients provided informed consent for the study and the study was approved the institutional ethical review board.

A total of 60 patients underwent routine preoperative investigations and preparation for surgery. The patients were then categorised into two groups: Group A (n=30): Ilioinguinal nerve preserved; Group B (n=30): Ilioinguinal nerve excision. The ilioinguinal nerve was carefully protected throughout the procedure and extreme care was taken during surgery to avoid inclusion of nerve during suturing and mesh placement in group A. In group B, the ilioinguinal nerve was excised lateral to the deep ring.

Standard tension-free Lichtenstein mesh repair was adopted and performed under spinal anaesthesia. All operations were performed by 4 designated surgeons specialized in hernia repair, allocated in a random manner. Standard postoperative care and management was given to patients in both groups.

Patients were followed up for assessment of chronic groin pain, hypoesthesia, and numbness at post-operative day (POD) 3, POD14, 1 month and 3 months after operation. 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. Visual analog scale (VAS) was used to assess the severity of pain. Sensory assessment was done using the standard Semmes-Weinstein monofilament test as described by Bell.[6] Five quadrants around the incision site, namely upper outer, upper lower, lower outer, lower inner and lateral side of scrotum were tested. Any asymmetry between the two sides was documented as groin numbness.

Statistical analysis

All statistical analyses were performed using SPSS software version 22. Student t test was used for parametric data and a 2-sided P value of less than 0.05 was considered significant. Excel 2016 used for mathematical calculations and graph pad calculator for statistical calculations.

RESULTS

A total of 60 patients with uncomplicated inguinal hernia underwent Lichenstein mesh hernioplasty in this prospective comparative study. In each group A and B, one patient was lost to follow up and thus, only 58 patients completed the study protocol. Mean age of patients in nerve preservation was 35.8±11.9 years and 42.7±9.6 years in the nerve excision group.

Majority of the patients (81%) of patients presented and were operated within 1 year of onset of hernia. Hernia was more commonly present on right side (51.7%) and 17.2% patients had bladder out let obstruction. All patients underwent Lichtenstein repair for inguinal hernia.

In nerve preservation group, 12 patients had left inguinal hernia, 16 (55.2%) patients presented with swelling alone, 5 (17.2%) had bladder outlet obstruction, and 18 (62.1) were smokers. On the other hand, in nerve excision group, 22 (75.9%) patients presented with swelling alone, 5 (17.9%) had bladder outlet obstruction and 19 (65.5) are smokers.

Follow up results

Post-operative pain significantly decreased in group B at POD 3 (65.5% vs. 89.7%, p=0.01) and 3 months (0% vs. 24.1%, P=0.003) when compared to group A; whereas the pain decreased non-significantly at POD 14 (17.2%

vs. 34.5%) and 1 month (17.2% vs. 34.5%) in group B (Table 1). The overall mean pain severity score was 1.7±0.7 vs. 0.9±0.6 at POD 3, 1.5±0.5 vs. 1.0±0.5 at POD 14, 1.5±0.5 vs. 1.0±0.5 at 1 month and 1.4±0.5 vs 0.8±0.4 on 3 months.

Table 1: Severity of pain between groups.

Pain	Group A	Group B	P value
	N (%)	N (%)	
POD 3	26 (89.7)	19 (65.5)	0.017
POD 14	10 (34.5)	5 (17.2)	0.07
1 month	10 (34.5)	5 (17.2)	0.07
3 month	7 (24.1)	0 (0.0)	0.003

POD: Post-operative day.

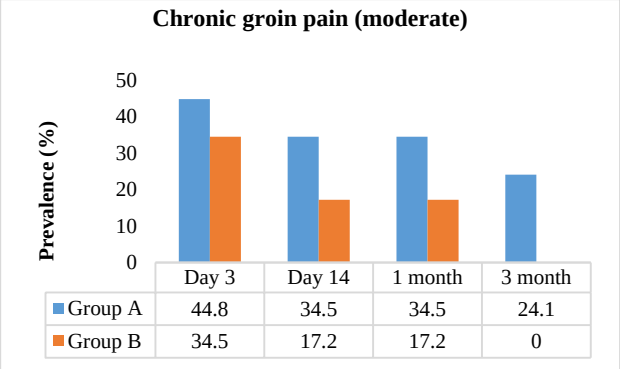

Figure 1: Prevalence of moderate pain across different time points.

Although non-significant, 13 patients reported severe pain at POD 3 in group A in comparison to group B (n=9, p=0.18). The severity of pain reduced significantly in group B at all follow-up time points when compared to group A (Figure 1).

Table 2: Numbness score between groups.

Time point	Group A	Group B
POD 3	1.7±0.5	1.2±0.4
POD 14	1.6±0.5	1.2±0.4
1 Month	1.6±0.5	1.2±0.4
3 Month	1.6±0.5	1.1±0.4

POD: Post-operative day.

The prevalence of numbness did not vary significantly between group A and B at POD 3 (79.3% vs. 82.8%, P=0.37), whereas it reduced significantly in group A at POD 14 (44.8% vs. 82.8%, p=0.003), 1 month (44.8% vs. 82.8%, p=0.003) and 3 month (44.8% vs. 86.2%, p=0.001).The mean numbness score between group A and group B is presented in Table 2.

Although post-operative hypo aesthesia was comparable between the groups at POD 3 (84.6% vs. 78.1%), it decreased significantly in group A at POD 14 (31% vs. 86.2%, p<0.001), 1 month (31% vs. 86.2%, p<0.001)and at 3 months (27.6 % vs. 86.2%, p<0.001) when compared to group B (Table 3).The mean of hypo aesthesia at POD 3 was 1.8±0.4 vs. 1.1±0.4, 1.7±0.5 vs.1.1±0.4 at POD 14, 1.7±0.5 vs.1.1±0.4 at 1 month and 1.7±0.5 vs.1.1±0.4 at 3 months.

Table 3: Hypoaesthesia between the groups.

Hypo aesthesia	Group A	Group B	P value
	N (%)	N (%)	
POD 3	22 (84.6)	25 (78.1)	0.16
POD 14	9 (31)	25 (86.2)	<0.001
1 Month	9 (31)	25 (86.2)	<0.001
3 Month	8 (27.6)	25 (86.2)	<0.001

POD: Post-operative day.

DISCUSSION

Although chronic pain post hernioplasty can be controlled with analgesics, it has emerged as a major clinical problem after an open mesh repair, significantly affecting patient's satisfaction and quality of life.[9–11] The rate of chronic pain after inguinal hernia mesh repair can reach 51.6%.[12] Reasons for post hernioplasty chronic pain are largely unclear; however one of the proposed mechanism for this is the inflammation and fibrosis induced by the mesh, which is in close proximity to the ilioinguinal nerve.[13] Additionally, there could also be an unintentional injury or strangulation of the ilioinguinal nerve during suturing contributing to the phenomenon.

In current study, prophylactic excision of ilioinguinal nerve decreased the incidence of post-surgery chronic groin pain but was not associated with morbidities in terms of local cutaneous neurosensory disturbances. Mounting evidence suggest that prophylactic excision of ilioinguinal nerve during open hernia repair minimises morbidities and can also potentially decrease the incidence of chronic groin pain following surgery. Many studies have aimed at assessing the effect of ilioinguinal neurectomy; however results have not been consistent. A randomised trial failed to establish this fact, whereas a retrospective study has reported a significantly lower incidence of chronic groin pain in patients who underwent elective neurectomy during open inguinal hernia repair.[13,14] This finding was corroborated by Wantz et al, wherein lower incidence of groin pain in patients who had a neurectomy as compared to the controls was reported.[15] In agreement, other studies have also supported the excision of ilioinguinal nerve.[8,16,17]

On the contrary, chronic groin pain between the neurectomy group and controls did not vary in a randomized controlled trial by Picchio et al.[18] However, it was also seen that elective neurectomy of the ilio-inguinal nerve did not associate with any neurosensory disturbance or groin numbness even at 6-month post follow-up, similar to our study findings. This observation also had supporting data from another study by Hsu et al.[18,19]

We also observed that the incidence of early post-operative pain on day 1 was more significant in neurectomised patients (group B) than in the nerve preserved group. This could be attributed to the increase in pro inflammatory factors like tumour necrosis factor (TNF-α), after a nerve transection.[20] On the other hand, Malekpour et al, and Khoshmohabat et al, found pain on the 1st and 7th post-operative day to be significantly less in the neurectomy group.[8,16] However, in the current study, VAS pain scores at the end of 1 month and 3 months was significantly less in patients having selective ilioinguinal neurectomy as compared to nerve preserved group. Mui et al, found that prophylactic ilioinguinal neurectomy significantly decreased the incidence of chronic groin pain at 6months after Lichtenstein hernia repair without added morbidities.[21]

The present study has several limitations. A small sample size and short follow up period in limits the extension of result from the current study is relatively short. Prophylactic studies in larger study sample with longer follow-up are needed.

In summary, prophylactic excision of the ilioinguinal nerve during Lichtenstein mesh hernia repair decreases the incidence of chronic groin pain after surgery, without additional morbidities. Thus, we suggest that routine ilioinguinal neurectomy to be a reasonable option in open mesh repair of inguinal hernia ilio-inguinal neurectomy in patients undergoing anterior inguinal hernia mesh repair.

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