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A COMPARATIVE STUDY OF PRESERVATION OR ELECTIVE DIVISION OF ILIO INGUINAL NERVE IN LICHENSTEIN'S MESH REPAIR IN POST OPERATIVE PAIN PERCEPTION

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ABSTRACT :

Background: Chronic groin pain is a significant problem following open inguinal hernia repair-lichenstein's ,mesh repair , with a reported incidence ranging from 18 to 60.9% (1-3).Though the pain is often mild in nature, the quality of life studies have shown that chronic pain, irrespective of severity, can significantly interfere with normal daily activities(4-5). Most often, the condition can sometimes be debilitating and treatment is often difficult and challenging.

Methods: February to September 2023 , 50 patients who were older than 18 years with primary unilateral uncomplicated inguinal hernia, who presented for operation in the department of General surgery, Sree mookambika college of medical sciences kulasekharam were considered eligible for the study. After a approval by local bioethics committees, informed consent was obtained of preoperatively on hospital admission.

Results Twenty five patients in group A and twenty five patients in group B (98%) were available for assessment at the 6-month end follow-up. The incidence of chronic groin pain at 6 months was significantly lower in group A compared with group B (2[8%] vs. 7[28%]; P = 0.008, Fisher exact test). The incidence of the pain experienced after walking 3 flights of stairs and cycling for 10 minutes were significantly lower in group A than group B (1[4%] vs. 3[12%]; P = 0.03; 1[4%] vs. 5 [20%]; P = 0.015, Fisher exact test, respectively).

Conclusion: this comparative study demonstrate that prophylactic excision of ilioinguinal nerve during Lichtenstein inguinal hernia repair decreases the incidence of exceptional chronic groin pain after surgery. Furthermore, as the procedure is not associated with additional morbidities in terms of local cutaneous neurosensory disturbances or deterioration in quality of life.

Keywords: Mesh repair,Ilio Inguinal nerve

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INTRODUCTION:

Chronic groin pain is a significant problem following open inguinal hernia repair-lichenstein's ,mesh repair , with a reported incidence ranging from 18 to 60.9% (1-3).Though the pain is often mild in nature, the quality of life studies have shown that chronic pain, irrespective of severity, can significantly interfere with normal daily activities(4-5). Most often, the condition can sometimes be debilitating and treatment is often difficult and challenging.

The ilioinguinal nerve is a sensory nerve which innervates the skin over the groin region, the medial aspect of the thigh, the upper part of the scrotum and the penile root. It is normally encountered during open repair of inguinal hernia. Routiene surgical teaching dictates that the nerve has to be preserved at all times during repair because of the supposed morbidpity associated with cutaneous sensory loss and chronic groin pain following nerve injury.

However, some of the reports suggested that elective excision of ilioinguinal nerve causes minimal morbidities and was significantly not considered incapacitating by most patients (6,7). In addition to this, ilioinguinal neurectomy is a well-documented effective treatment of relieving chronic groin pain following open hernia repair, achieving more favorable outcomes than nerve block or mesh removal alone (8-10). More recently, retrospective studies have shown that elective excision of ilioinguinal nerve during hernioplasty were associated with a lower incidence of chronic groin pain of after the operation

(11-13).

In this trial, we have studied the effect of elective ilioinguinal neurectomy on the incidence and the severity of chronic groin pain after the inguinal hernia repair (Lichienstein's mesh repair) in a prospective randomized controlled manner.

AIM AND OBJECTIVES OF THE STUDY:

The aim of this comparative study is to find out the role of prophylactic division of ilio inguinal nerve in reducing chronic post-operative pain following open hernia repair Lichenstein's mesh repair.

By electively dividing the iliinguinal nerve during lichenstein's mesh plasty repair, the post-operative outcome of chronic groin pain which is inguinodynia is reduced as per various studies.

This comparative study is conducted to test the effectiveness of ilioinguinal neurectomy in post-operative pain perception. We have also evaluated the groin numbness which is a possible outcome of this neurectomy. And to find out whether neurectomy is useful in reducing post-operative pain along with negligible groin numbness.

MATERIALS AND METHODS:

February to September 2023 , 50 patients who were older than 18 years with primary unilateral uncomplicated inguinal hernia, who presented for operation in the department of General surgery, Sree mookambika college of medical sciences kulasekharam were considered eligible for the study. After a approval by local bioethics committees, informed consent was obtained of preoperatively on hospital admission. Before operation patients were randomly allocated to undergo

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hernia mesh repair either with ilioinguinal nerve preservation (group A) or transection (group B). Operations were all performed with the patients under spinal anesthesia.

All patients received the standard flat mesh repair according to the technique described by Lichtenstein et al. 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 of 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 (PROLENE, Ethico Johnson & Johnson Unit) to the reflected part of inguinal ligament and the floor of the inguinal canal. An Extreme care was used during surgery to avoid inclusion of nerve tissue during suturing and mesh placement. The patients were all managed in a standard clinical pathway postoperatively and were followed up at 1 and 6 months after operation.

Inclusion criteria are consider as All male patients between the age of 18 and 70 years All patients with unilateral inguinal hernias either direct inguinal hernia or indirect inguinal hernias,All patients who is fit to undergo elective surgery with good perfomance status,All patients with uncomplicated unilateral hernias,All patients were planned for elective hernia repair.

After explaining the procedure and proposed outcomes to the patients were divided in to two groups group a- undergoing ilioinguinal neurectomy with lichenstein's mesh repair and the second group b- preserving the ilioinguinal nerve in lichenstein's mesh repair.

Exclusion criteria are Male patients with bilateral inguinal hernias,All patients below the age of 18 years,Female patients with inguinal hernias,All male patients with complicated inguinal hernias like obstructed or strangulated inguinal hernias requiring emergency management,Those with recurrent hernias,Those with h/o peripheral neuropathy,Those with impaired cognitive function,Patients with poor performance status.The primary outcome was the incidence of groin pain at the end of six months. Secondary outcomes included incidence of groin numbness, postoperative sensory loss or change at the groin region.All follow up and measurements were carried out at the end of one and six months following surgery.

Postoperative pain was assessed using a 4-point in verbal scale (none, mild, moderate, or severe), assigning numerical values of 0 to 3 one week after operation. Mild pain was defined as an occasional in disturbance that did not limit normal activities, moderate pain as pain that interfered with normal day life activities, and of severe pain as pain that rendered the patient unable to perform normal activities. At 1-month and 6-month follow-up visits, pain experienced during the last week before all the visit was assessed using the same scale. Follow-up questionnaires were performed at the end of the study with the aim of assessing the presence and intensity of pain related to the operation, using the same 4-point verbal scale.

In addition, during follow-up visits, patients were also tested for the presence of numbness

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and sensory loss to light touch and pain sensation in the area of distribution of the ilioinguinal nerve.During each follow up visit, pain at rest and upon completion of various activities (coughing for 10 times, walking up 3 flights of stairs, and cycling for 10 minutes) were assessed by a 4-point scale (none, mild, moderate, or severe). Patients were also requested to fill in a questionnaire regarding pain or discomfort encountered during normal daily activities at home.

In addition, the groin a region was divided into 5 cutaneous areas, namely, outer upper, outer lower, inner upper, inner lower, and scrotal region in relation to the groin incision for sensory assessment. Sensation loss or changes were assessed by the standard Semmes-Weinstein monofilament test performed by the occupational therapist to the 5 regions of each side by the technique a described by Bell. The no operative side of each individual acted as the control. Sensation loss or changes were defined as any asymmetry between corresponding regions of the 2 sides demonstrated by the monofilament test.Chronic groin a pain was defined as any discomfort or pain elicited on follow-up or encountered during normal daily activities. Severe pain was defined as pain experienced in any aspects graded moderate or severe at follow- up.

Statistical analysis was done using the statistical package for social sciences (SPSS).Different statistical methods were used as appropriate. Mean ± SD was determined for quantitative data and frequency for categorical variables. The independent t- test was performed on all continuous variables. The normal distribution data was checked before any t-test. The Chi-Square test was used to analyze group difference for categorical variables A p- value < 0.05 was considered significant.

RESULTS:

A total of 50 patients were eligible for the study during the 6 month period and randomized with 25 patients in each group. The flow of participants was shown. Figure 1, respectively. The 2 groups were comparable with regard to educational level, laterality of hernia, baseline pain measurement during various activities, incidence of groin numbness, and complications. The baseline characteristics of 2 groups of patients are shown in Table 1.

PAIN AT REST

PAIN	GROUP A	GROUP B
2.NONE	23 (90)	21 (86)
3.MILD	2 (10)	3 (12)
4.MODERATE	0 (0)	1 (2)
5.SEVERE	0 (0)	0 (0)

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PAIN AFTER COUGHING 10TIMES [(no%)]

PAIN	GROUP A	GROUP B
2.NONE	18 (72)	18 (72)
3.MILD	4(16)	5(20)
4.MODERATE	2(8)	2(8)
5.SEVERE	1(4)	0(0)

PAIN AFTER WALKING 3 FLIGHT OF STAIRS [NO(%)]

PAIN	GROUP A	GROUP B
2.NONE	19(76)	17(68)
3.MILD	3(12)	5(20)
4.MODERATE	3(12)	3(12)
5.SEVERE	0(0)	0(0)

PAIN AFTER CYCLING FOR 5MIN [NO(%)]

PAIN	GROUP A	GROUP B
2.NONE	18(72)	17(68)
3.MILD	2(8)	3(12)

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4.MODERATE	3(12)	2(8)
5.SEVERE	2(8)	2(8)

PERCENTAGE WITH GROIN NUMBNESS [NO(%)]

PAIN	GROUP A	GROUP B
2.NONE	24(96)	22(88)
3.MILD	1(4)	1(4)
4.MODERATE	0(0)	1(4)
5.SEVERE	0(0)	1(4)

COMPLICATIONS [NO (%)]

COMPLICATIONS	GROUP A	GROUP B	MEAN (SD)
WOUND INFECTION	1(4)	0(0)	1.0
HEMATOMA	1(4)	2(8)	1.0
RETENTION OF URINE	2(8)	1(4)	1.0

The ilioinguinal nerve a was identified in all patients, and complete excision of nerve was confirmed by histology in all patients from group A. Twenty five in both groups were available for assessment at 1 month. The incidence of chronic groin pain, pain experienced urging normal daily activities at home and of after various activities (at rest, coughing for 10times, walking up 3 flights of stairs, and cycling for 10 minutes), were similar between the 2 groups. There were no significant differences in the incidence of groin numbness and sensation changes or loss at groin region between the 2 groups. The results at 1month of follow up are

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PAIN AFTER WALKING 3 FLIGHT OF STAIRS [N (%)]

PAIN	GROUP A	GROUP B
2.NONE	21(84)	18(72)
3.MILD	2(8)	4(16)
4.MODERATE	2(8)	3(12)
5.SEVERE	0(0)	0(0)

GROIN NUMBNESS [NO (%)]

PAIN	GROUP A	GROUP B
2.NONE	19(76)	15(60)
3.MILD	5(20)	8(32)
4.MODERATE	1(4)	2(8)
5.SEVERE	0(0)	0(0)

Results at the End of 6 Month Follow Up:

Twenty five patients in group A and twenty five patients in group B (98%) were available for assessment at the 6-month end follow-up. The incidence of chronic groin pain at 6 months was significantly lower in group A compared with group B (2[8%] vs. 7[28%]; P = 0.008, Fisher exact test). The incidence of the pain experienced after walking 3 flights of stairs and cycling for 10 minutes were significantly lower in group A than group B (1[4%] vs. 3[12%]; P = 0.03; 1[4%] vs. 5 [20%]; P = 0.015, Fisher exact test, respectively). The severity of chronic pain developed was comparable between the 2 groups. There were no significant differences in the incidence of pain experienced during normal daily activities at home and after coughing for 10 times at 6 months. The incidences of groin numbness and sensation changes or loss of sensation at groin region were also similar between the 2 groups at 6

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months. The results are summarized

PAIN AT NORMAL ACTIVITY [NO(%)]

1. ANY

PAIN	GROUP A	GROUP B
2.NONE	25(100)	24(96)
3.MILD	0(0)	1(4)
4.MODERATE	0(0)	0(0)
5.SEVERE	0(0)	0(0)

PAIN AT REST [NO (%)]

1. PAIN	GROUP A	GROUP B
2.NONE	25(100)	22(88)
3.MILD	0(0)	1(4)
4.MODERATE	0(0)	2(8)
5.SEVERE	0(0)	0(0)

PAIN AFTER COUGHING 10 TIMES [NO (%)]

1.

PAIN	GROUP A	GROUP B
2.NONE	24(96)	22(88)

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3.MILD	1(4)	2(8)
4.MODERATE	0(0)	1(4)
5.SEVERE	0(0)	0(0)

DISCUSSION:

Postoperative chronic pain is a significant problem after open inguinal hernia repair. Moderate or severe pain was fo still present in 11% of patients during mobilization and in 5% at rest 4 weeks after operation in the study by Callesen et al.(23) In the same group of patients, 19% reported some ddegree of pain at 1-year follow-up; the pain was moderate or severe in 6% of cases.4 In a large-scale study, 24 of chronic pain was present in 28.7% of patients 1 year after hernioplasty, leading to some degree of functional impairment in 11% of patients. In another large-scale study,25 chronic pain in was present in 43% of patients, and it was reported as severe or very severe in 3% of cases. Chronic pain as occurred in 30% of patients in the study by Poobalan et al.26 Tension-free repair of inguinal hernia with mesh prosthesis should lead to less postoperative pain

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However, acute postoperative pain was in similar in patients who underwent conventional or mesh hernia repair. 22, 27 In a recent meta-analysis of randomized controlled trials, comparing hernia repair with or without mesh, the results of showed a significant reduction in chronic pain when mesh was applied; however, there is still at relevant proportion of patients (10.7%) who complained of persisting pain after hernia repair with mesh In our group of study, globally considered, chronic postoperative pain 6 months after operation was correlation was found between the presence of preoperative pain and the occurrence of postoperative pain.

According to other studies,chronic pain was significantly related to the presence and intensity of postoperative pain.Damage to ilioinguinal nerve passing through the surgical field is suspected to be one of the main causes of chronic postherniorrhaphy pain. This theory is supported by the association between chronic pain and sensory disturbances. 30 A nerve may be damaged during operation as a result of perineural fibrosis, as entrapment by staples, sutures, or prosthetic materials, and direct lesions due to stretching, contusion, electrical injury, and partial or i complete division of the nerve.31 3 oo Elective division of the ilioinguinal nerve was proposed by a hernia surgeons to reduce the risk of its inadvertent damage and consequent chronic pain. The first randomized trial to address this problem by Ravichandran et al was underpowered and no definite conclusion could be made. 18 As the authors found no evidence to support the benefit of ilioinguinal nerve division with respect to postoperative pain within the limitation of a small sample size.

Results from the subsequent trials regarding chronic groin pain following elective neurectomy have been inconsistent. Interestingly, in a retrospective review of 191 patients who underwent elective excision of

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the ilioinguinal nerve during open hernia repair showed that none of the patients developed chronic groin pain at the 12 months of follow-up.12
In another retrospective study, Dittrick et al reported a significantly lower incidence of chronic groin pain in patients who as had elective neurectomyduring open inguinal hernia repair when compared with the control group.11 However, these results were not confirmed in a recent of randomized controlled trial by Picchio et al,19 who found similar incidence of chronic groin pain between ilioinguinal nerve excision group and control. Wantz13 showed that chronic pain as was not present in 546 patients who underwent hernia repair with elective division of the ilioinguinal nerve, whereas it was seen in patients with the nerve preserved.

No relation between ilioinguinaln nerve preservation or an elective division and chronic pain was reported in a large study by Cunningham et al.10 According to another study of 172 patients division in of cutaneous nerves during inguinal hernia repair has no significant effect on postoperative pain. However, there are very few adverse outcomes, and so, a pragmatic approach of dividing nerves when they would otherwise be damaged may be appropriate.

The prophylactic excision of ilioinguinal nerve during the Lichtenstein inguinal hernia repair decreases the incidence of exceptional chronic groin pain after surgery according to the study by aWilfred Lik-Man Mui et al. Our randomized study revealed that the incidence of chronic a groin pain during normal daily activities was similar between the 2 groups which compliment the findings by Picchio et al.19 However, in addition, we found out significantly fewer patients in the neurectomy group developed chronic groin pain upon exertion (cycling for 10 minutes and walking up 3 flights of stairs), which has not been previously studied.

The other possible potential disadvantage of ilioinguinal nerve excision is the morbidity associated with sensory loss over the groin region as well as its impact on quality of life. The previous study by Picchio et al., reported increased incidence of sensory loss to pain and touch around the groin region in patients who had nerve excision during open hernia repair.19 However, the current study a clearly demonstrated that elective excision of the ilioinguinal nerve was not associated with additional immorbidities in neurosensory disturbances, groin numbness or quality of life at the 6-month follow-up. We postulated that the sensory loss caused by neurectomy might be compensated as by cross-innervations from contralateral cutaneous nerves.

Furthermore, direct meaningful as comparison between Picchio et al., 19 and that of our study is not possible because their methodology used for testing skin sensation was not described. Semmes-Weinstein monofilament sd testing was adopted in the present study to provide a more standard and objective method to measure skin sensitivity. We are not able to demonstrate any significant differences in terms of postoperative incidence or severity of chronic groin pain at rest, during normal daily activities and after coughing between the 2 groups, which can be due to β errors. In addition, meaningful assessment of chronic pain at 1 month may not be possible in the presence of early postoperative swelling and pain, and we speculate that this may contribute to the of no differences in incidence of chronic pain at 1 month in contrast to 6 months. Another limitation of the study is that the long-term effect of ilioinguinal neurectomy was not investigated. It is possible that differences in the incidence

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of chronic pain between the of groups, as well as the quality of life measurements will change with longer follow-up duration. Larger clinical trials involving more patients and longer follow-up are warranted to study the long-term effect of prophylactic neurectomy in patients undergoing Lichtenstein repair. Lastly, although we are able to show that prophylactic neurectomy decreases the incidence of chronic pain, the exact reasoning behind this phenomenon remains unknown. Further histologic or nerve conduction studies are required to deduce the exact mechanism.

CONCLUSION:

The results of this comparative study demonstrate that prophylactic excision of ilioinguinal nerve during Lichtenstein inguinal hernia repair decreases the incidence of exceptional chronic groin pain after surgery. Furthermore, as the procedure is not associated with additional morbidities in terms of local cutaneous neurosensory disturbances or deterioration in quality of life. Ilioinguinal neurectomy should be considered as a routine surgical step during open mesh hernia repair.

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