

Prophylactic ilio-inguinal neurectomy in open inguinal hernia repair

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Abstract:

Objective: To evaluate the effect of ilio-inguinal neurectomy on chronic inguinodynia after Lichtenstein technique of hernia repair.

Study design: Randomized controlled trial

Place and duration of study: Surgical ward, Jinnah Postgraduate Medical Centre, Karachi from January 2018 to December 2018.

Material and Methods: 60 patients of unilateral inguinal hernia were randomly allocated in two groups, group-A (patients having prophylactic ilio-inguinal neurectomy) and group-B (patients having ilioinguinal nerve preservation). The method of using visual analogue scale was explained to the patients pre-operatively with end points as 'no pain' and 'worst pain'.

Results: The mean pain scores experienced after various activities of daily living including cycling, climbing stairs and after coughing were taken on VAS were almost the same between the 2 groups except that mean pain score was significantly reduced at rest in nerve excision group which was 0.0_0.0 (range 0) $p=0.02$. Mean pain score(VAS) was significant only at rest all the time(at 1st, 3rd and 6th month) with high scores when nerve was preserved (group-B) as compared to when nerve was cut (group-A) Mean pain score (VAS) was significantly higher when climbing stairs at 6th month with when nerve was preserved (group-B) as compared to when nerve was cut (group-A). However the severity scores when compared between two groups on VAS (0-10) showed less severe pain scores in group-A (ilio-inguinal neurectomy) than in patients of nerve preservation.

Conclusion: Prophylactic neurectomy of ilio-inguinal nerve may be considered for routine incorporation as a surgical step during open mesh hernia repair however it only reduces chronic pain on rest significantly not on exertion and activity.

Keywords: ilio-inguinal neurectomy, Lichtenstein hernia repair, inguinal hernia

Introduction:

Hernia repair is the most common operation performed by general surgeons. Despite the frequency of this procedure, no surgeon has ideal results, and complications such as post-operative pain, nerve injury, infection, and recurrence continue to challenge surgeons.

There are various methods of treating inguinal hernias, the most promising one is surgery. Inguinal herniorrhaphy is unfortunately associated with a high incidence of chronic post-operative

pain.^{1,2} The cause of this neuralgic pain can be due to either entrapment, fixation, or ligation of the ilio-inguinal, genitofemoral, or ilio-hypogastric nerves. Identifying these three nerves has been shown to be an important factor in reducing chronic groin pain, though there are no well conducted randomised studies to recommend the benefits of nerve excision versus preservation.

Routine neurectomy is practiced by some surgeons, and the routine division of the ilioin-

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guinal nerve during inguinal hernia repairs has become increasing popular in some circles. Noticeable decrease in patient symptoms of post-operative pain is reported with this procedure.

A study done in Iran stated that by using the visual analog scale to detect pain severity on 1st Post-op day, 1-month, 6-month and 1-year after surgery. This study confirmed that ilioinguinal neurectomy decreased pain after inguinal hernia mesh repair until the 1 month after surgery after which the complaint of the patient remained the same whether neurectomy was done or not.

Performing routine neurectomy in surgery is not a unique concept to inguinal hernia repairs. Abdullah et al observed in his study of preservation or division of the intercosto-brachial nerve in axillary node dissections for invasive breast cancer.⁴ Pain was present in 13% in the nerve preservation group versus 20% in the nerve division group. The difference was not significant.⁵

A double blinded RCT done by Mui Lik-Man W. et al showed prophylactic excision of ilioinguinal nerve during Lichtenstein technique of inguinal hernia repair decreased the incidence of post-operative chronic groin pain on exertion. And the procedure is not associated with any additional morbidities.⁶

Performing excision of the ilio-inguinal nerve routinely has been proposed as a means to avoid the troubling complication of long-term neuralgia after herniorraphy. In theory, this excision of the ilio-inguinal nerve would eliminate the possibility of post-operative neuralgia arising from entrapment, inflammation, formation of a neuroma, or fibrotic reactions of the nerve.⁷

However, in patients with neuropathic pain, surgical revision with radical neurectomy was required before a success rate of up to 80% were achieved.^{1,8}

The purpose of this study was to evaluate the effect of ilio-inguinal neurectomy on the mean pain scores of chronic groin pain after Lichtenstein hernia repair.

Material and Methods:

This study was conducted in surgical ward 03, Jinnah Postgraduate Medical Centre, Karachi from January 2018 to December 2018. This was a randomized controlled trial and sampling technique was non probability purposive.

60 patients of male gender having a unilateral inguinal hernia were included in this study. Those with a recurrent hernia, irreducible or strangulated hernias, bilateral inguinal hernia, having a history of previous abdominal surgery, or having impaired cognitive function and female patients with inguinal hernia were excluded.

After taking written informed consent, patients were randomly allocated in two groups, group-A (patients having prophylactic ilioinguinal neurectomy) and group-B (patients having ilioinguinal nerve preservation) based on random numbers drawn from computer. The method of using visual analogue scale will be explained to the patients pre-operatively with end points as 'no pain' and 'worst pain'. Surgical technique was same for all patients. All the patients were given either spinal or general anaesthesia.

In group-A, 3-4 cm of the ilio-inguinal nerve was excised while in group-B, the nerve was carefully protected and preserved. The rest of the surgical steps were carried out in a standardized manner as described by Lichtenstein et al.⁹ The mesh was fixed with 3-0 polypropylene sutures. The fascial layers were closed with 2-0 Vicryl suture materials and skin with 3-0 Prolene sutures

Post-operatively, NSAIDs in the early post-surgical hours were used, with par-enteral opioids supplementation if needed. All patients were discharged the next morning and advised to followed up in out patient department. The contact numbers were taken and reminder calls were given before their scheduled visit. Each group was assessed at 1, 3 and 6 months after surgery for intensity of pain at rest and upon completion of different activities of daily living including coughing, climbing 3-stairs, and cycling for up to 10 minutes and recorded on visual analogue scale (none, mild, moderate, or severe) at 1st, 3rd

Table-1: Means Comparison

		Group A			Group B		
		Mean	SD	Range	Mean	SD	Range
1m	Cough	0.4	1.6	0-8	1.4	2.8	0-9
	Stairs	0.3	1.1	0-5	0.8	1.9	0-8
	Rest	0.0	0.0	0	0.9	2.1	0-7
	Cycle	0.4	1.4	0-7	1.3	2.6	0-8
3m	Cough	0.2	0.8	0-4	1.0	2.2	0-7
	Stairs	0.1	0.5	0-3	0.7	1.8	0-7
	Rest	0.2	0.8	0-3	1.3	2.6	0-9
	Cycle	0.3	1.2	0-6	1.0	2.1	0-7
6m	Cough	0.1	0.7	0-4	0.7	1.8	0-7
	Stairs	0.1	0.7	0-4	1.3	2.6	0-9
	Rest	0.0	0.0	0	1.3	2.3	0-7
	Cycle	0.2	0.9	0-4	1.0	1.9	0-7

T-Test for means (comparing group-A with group-B) Cough: 1m = Insignificant ($p=0.880$), 3m = Insignificant ($p=0.645$), 6m = Insignificant ($p=0.090$) Stairs: 1m = insignificant ($p=0.228$), 3m = insignificant ($p=0.0649$), 6m = significant ($p=0.0198$) Rest: 1m = significant ($p=0.0250$), 3m = significant ($p=0.0364$), 6m = significant ($p=0.0042$) Cycle: 1m = insignificant ($p=0.0877$), 3m = insignificant ($p=0.1162$) 6m = insignificant ($p=0.0592$)

and 6th month of surgery. Patients were also requested to fill in a questionnaire regarding pain or discomfort encountered during routine activities at home. Data regarding pain intensity was collected through structured proforma.

The data was analyzed as SPSS Version 15.0. The baseline data (intensity of pain) was first analyzed through VAS after 1 month of surgery. Mean±standard deviation values of VAS was calculated at the end of 1st, 3rd and 6th month of surgery for group-A and group-B. To compare mean changes in VAS (to know variations within procedures with the time duration) from 1st to 3rd month and 3rd to 6th month in each group, paired t-test was employed. To compare mean difference in VAS values at 1st, 3rd and 6th month between two groups, student's t-test was used.

The age and weight was stratified into groups to know confounding effects of any particular decade of age and weight. The results were concluded significant at $P<0.05$. Also mean and standard deviation were calculated for age.

Results:

Routine ilio-inguinal nerve excision during Lichtenstein inguinal hernia repair was performed

in 30-patients with a mean age of 37.5 ± 14.9 year and weight ranges from 58 to 81kg with a mean weight of 73.6 ± 6.97 kg. Ilio-inguinal nerve preservation during Lichtenstein repair was done in 30 patients with a mean age of 39.5 ± 13.8 years and weight ranges from 48 to 78 kg with an mean weight of 63.9 ± 7.56 kg.

In group-A, there were 24 indirect and 6 direct inguinal hernias while in group-B, there were 21 indirect and 09 direct inguinal hernias. All patients were followed-up until 6 months. The baseline data (intensity of pain) was first analyzed through VAS after 1 month of surgery.

The mean pain scores experienced after various activities (at rest, coughing for 10 times, walking up 3 flights of stairs, and cycling for 10 minutes) taken on VAS were similar between the 2 groups except that mean pain score was significantly reduced at rest in nerve excision group which was $0.0_0.0$ (range 0) $p=0.02$.

Mean pain score(VAS) was significant only at rest all the time(at 1st, 3rd and 6th month) with high scores when nerve was preserved (group-B) as compared to when nerve was cut (group-A)

Mean pain score(VAS) was significantly higher when climbing stairs at 6th month with when nerve was preserved (group-B) as compared to when nerve was cut (group-A).

However the severity scores when compared between two groups on VAS (0-10) showed less severe pain scores in group-A (ilio-inguinal neurectomy) than in patients of nerve preservation.

There were no significant differences in the VAS score between 1-3 months, 3-6 months and 1-6 months within group as well as in both groups during rest, after coughing, climbing stairs and cycling for 10 minutes.

The results at 1,3 and 6 months of follow up are shown in table 1.

Discussion:

Possible causes of chronic groin pain after inguinal hernia mesh repair are either entrapment, ligation or fixation of the ilio-inguinal, genito-femoral or ilio-hypo-gastric nerves. Many investigators proposed algorithms for the management of this chronic pain. Some describe non-surgical, while others describe surgical management. Non-surgical management includes injection of local anesthetics with or without steroids, cryotherapy and behavioral therapy.¹⁰

Patients with neuropathic pain however, required surgical revision with radical neurectomy after which success rates of up to 80% were achieved.^{1,11,12} Methods to prevent this complication rather than treat it has been defined by many researchers.^{13,14}

Lichtenstein operation with implantation of a synthetic mesh is a favoured method for the repair of a groin hernia.¹⁵ However, the open inguinal approach has been associated with a high rate of post-operative chronic pain. Identification of inguinal nerves helps to avoid damage during hernia repair and also that it is beneficial to cut cleanly if already damaged during dissection in order to avoid neuroma formation.¹⁶ This is from the understanding that neurectomy causes only numbness, whereas nerve injury causes pain.^{17,18}

Although routine neurectomy has been proposed in open hernia mesh repair, the procedure does not find wide acceptance and there are still controversies remaining about its usage.

Results from various trials regarding chronic groin pain following elective neurectomy show inconsistent results and are therefore non-conclusive. But in one particular trial of 191 having undergone elective ilio-inguinal neurectomy during open hernia repair showed that none of the patients developed chronic groin pain at 12 months of follow-up.²² Lange et al¹⁴ and Alfieri et al¹⁸ showed there was less incidence of chronic groin pain when all 3 nerves were identified during open inguinal hernia repair compared

to not identifying them because of accidental nerve entrapment in mesh. Moreover, Lange et al also noted that identification of all three inguinal nerves added a mere 3–4 min to the operating time. Index study revealed that patients in the group undergoing neurectomy had less mean pain scores on exertion at 6 months post-surgery which had not been previously studied.⁶

This study involves a relatively small number of patients and secondly we didn't compare post-operative groin numbness post-operatively in both groups. Further investigation is required in prospective, randomized controlled trials, utilizing larger and multicenter studies.

Conclusion:

Prophylactic neurectomy of ilioinguinal nerve may be considered for routine incorporation as a surgical step during open mesh hernia repair however it only reduces chronic pain on rest significantly not on exertion and activity.

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Role and contribution of authors:

Dr Syed Muhammad Shafqatullah, study design, manuscript writing and data collection

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Dr Zahid Mehmood, final approval for publication

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