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Original Research Article

A prospective study comparing preservation of ilioinguinal nerve with neurectomy in open mesh repair of inguinal hernia

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ABSTRACT

Background: Postoperative pain after open mesh repair of inguinal hernia is an important challenge. Such type of pain sometimes does not respond to medical treatment including non-steroidal anti-inflammatory drugs and opiates. The objective of the present study was to evaluate the effect of preservation or division of the Ilioinguinal nerve on pain and post-operative symptoms, after open mesh repair of inguinal hernia.
Methods: All patients undergoing surgery for tension free Lichtenstein mesh repair over a period of 1 year were included. Patients below the age of 18 years and patients with bilateral or recurrent hernias were excluded.
Results: In present study of 42 patients, early mean postoperative pain at day 1 was 1.8 on VAS scale in ilioinguinal neurectomised patient compared to 1.5 in nerve preserved group (P=0.1408). Postoperative pain at week 1 was 1.25 in neurectomised patients compared to 1.32 in nerve preserved group (P=0.7161). Late Postoperative pain and chronic groin pain was 0.6 and 0.25 at 1 and 3 months respectively in ilioinguinal neurectomised patients as compared to 1.05 and 0.77 at 1 and 3 months respectively in nerve preserved group (P=0.0184 at 1month and P=0.0335 at 3 months).
Conclusions: The difference in postoperative pain at day 1 and at week 1 was not significant and both groups had equal pain. Late postoperative pain (at 1 month) and chronic groin pain (at 3 months) was significantly low in ilioinguinal neurectomised patient compared to nerve preserved group.

Keywords: Hernioplasty, Ilioinguinal neurectomy, Inguinal hernia, Lichtenstein mesh repair, Postoperative pain

INTRODUCTION

Pain after open mesh repair of inguinal hernia is not an uncommon complication that represents an important diagnostic therapeutic challenge. Normal postoperative pain affects patients, immediately after surgery and gradually subsides within a few weeks. However, some patients complain of pain over the surgical site which is often a nagging pain and may be chronic with varying severity, making life troublesome. Such a type of chronic pain may not be responsive to medical treatment including non-steroidal anti-inflammatory drugs and opiates.

Despite laparoscopic hernia repairs becoming popular today, Lichtenstein repair for inguinal hernia is the most commonly used repair and is still the Gold Standard for Inguinal hernia repairs.[1,2] A common complication of this repair however is chronic inguinodynia. One of the mechanisms responsible for this may be the damage or entrapment of sensory nerves i.e. ilioinguinal nerve, iliohypogastric nerve, or genitofemoral nerve passing though inguinal region.[3-5] Ilioinguinal nerve entrapment

is a common technical fault in open mesh repair of hernia.

Present study aims to assess the influence of preservation versus division of ilioinguinal nerve on pain and postoperative symptom after open mesh repair of inguinal hernia repair with polypropylene mesh. Nerve biopsies were taken and confirmed by histopathological examination. Nerve biopsies also helped to rule out any previous nerve pathology.

An attempt has been made to study postoperative pain in open mesh repair of hernia with the outcomes and proper follow-up after ilioinguinal nerve division compared with ilioinguinal nerve preservation.

METHODS

The present work is based on a study conducted over the period of one year, from August 2016 to September 2017, in different surgical units of S R N Hospital, Allahabad attached to the M L N Medical College, Allahabad. This prospective, double blinded, randomized control study was carefully and meticulously performed, and an attempt was made to cover all possible aspects. Cases included were only males and the exclusion criteria were strictly followed. Cases were matched to control group. Following patients were excluded from the study.

Exclusion criteria

- Bilateral hernia
- Recurrent hernia
- Chronic cough, COPD
- Peripheral neuropathy
- History of co-morbid conditions like diabetes, heart disease and chronic renal disease
- Female gender
- Impaired cognitive function
- Age below 18 years.

All patients underwent routine preoperative investigations and preparation for surgery. Then patients were randomized in two groups by a resident in the department without the knowledge of the principal investigators. All patients had given informed consent for the study, after clearly understanding the procedure, the complications and the Visual Analogue Score (VAS).

- Group A: Ilioinguinal nerve neurectomy done
- Group B: Ilioinguinal nerve preserved.

Standard tension-free Lichtenstein mesh repair was the adopted procedure, performed under spinal anaesthesia. All operations were performed by 4 designated surgeons specialized in hernia repair, allocated in a random manner. Standard groin incision was used for both groups. The ilioinguinal nerve was identified in both groups and carefully preserved in group B, during placement of the mesh to prevent it from being inadvertently taken in the stitches while fixing the mesh. In the neurectomy group, about 4 cm of the ilioinguinal nerve was excised laterally from the deep ring. The cut ends were left alone without ligation. It was then sent for histopathology for confirmation. Rest of the operation in both groups followed the standard Lichtenstein repair.

The patients were managed in a standard clinical pathway postoperatively. Postoperative pain scoring was done by using Visual Analogue Score on day l, day 7 and were followed up for 3 months. The visual analogue scale (VAS) represents a continuous range of values on a horizontal line measuring exactly 10cm. 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. Sensory assessment was done using the standard Semmes-Weinstein monofilament test as described by Bell JA.[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.

The primary outcome measure was the incidence of postoperative pain up to 3 months after surgery. The secondary outcome measure was incidence of groin numbness.

Statistical analysis

Statistical analysis was done by the Student t test for parametric data. 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

During the one-year study 50 patients were enrolled in the study and operated on for non-recurrent inguinal hernia.

On physical examination, of hernias, 90% were confined to the inguinal region, while 10% were in an inguinal-scrotal site. Eight patients were excluded from the study, under exclusion criteria. Hernias were right and left in 29 patients and 13 patients, respectively. Neurectomy of ilioinguinal nerve was done in 20 patients while in 22 patients the nerve was identified and left alone to be preserved (Table 1).

Pain as a primary outcome measure

Pain scoring was done on the VAS scale, on day 1, day 7, at one month and at 3 months follow up. Of the 20 patients in group A (neurectomy group), at day 1 visit postoperatively, pain score was 1 (below annoying) in 8 (40%) patients, 2 (nearly uncomfortable) in 8 (40%)

patients and 3 in 4 (20%) patients. Of the 22 patients in group B (nerve preserved), VAS score was 1 in 11(38%) patients, 2 in 11 (38%) patients and no patients had a score of 3. Mean of group A of 1.8 was more than group B (1.5) showing that early postoperative pain in group A was more than group B on day 1. However, the difference in pain in the two groups was not statistically significant and the two tailed P value was 0.1408 (Table 2).

Table 1: Side of inguinal hernia.

Side of hernia		Neurectomy done	Nerve preserved
Left inguinal hernia	13	6	7
Right inguinal hernia	29	14	15
Total	42	20	22

Table 2: Pain scoring at day 1.

At day 1	Group A (neurectomy done)	Group B (nerve preserved)
No. of patients	20	22
Pain experience (VAS)		
0	0	0
1	8 (40%)	11 (50%)
2	8 (40%)	11 (50%)
3	4 (20%)	0
4	0	0
Mean±SD	1.8±0.77	1.5±0.51

Of the 20 patients in group A (neurectomy group), at day 7 visit postoperatively, 2 patients had no pain, pain score was 1 (below annoying) in 11 (55%) patients and 2 (nearly uncomfortable) in 7 (35%) patients. Of the 22 patients in group B (nerve preserved), VAS score was 1 in 16 (73%) patients, 2 in 5 (23%) patients and 1 (4%) patient had a score of 3 (Table 3).

Table 3: Pain scoring at day 7.

At day 7	Group A (neurectomy done)	Group B (nerve preserved)
No. of patients	20	22
Pain experience (VAS)		
0	2 (10%)	0
1	11 (55%)	16 (73%)
2	7 (35%)	5 (23%)
3	0	1 (4%)
4	0	0
Mean±SD	1.25±0.64	1.32±0.57

Mean of group A of 1.25 was less than group B (1.32) showing that postoperative pain after one week in group A was less than group B. However, the difference in pain in the two groups was not statistically significant and the two tailed P value was 0.7161 (>0.05) (Table 3).

Table 4: Pain scoring at one month.

At 1month	Group A (neurectomy done)	Group B (nerve preserved)
No. of patients	20	22
Pain experience (VAS)		
0	8 (40%)	4 (18%)
1	12 (60%)	13 (59%)
2	0	5 (23%)
3	0	0
4	0	0
Mean±SD	0.6±0.50	1.05±0.65

Of the 20 patients in group A (neurectomy group), at one month postoperatively, 8 (40%) patients had no pain and pain score was 1 (below annoying) in 12 (60%) patients. Of the 22 patients in group B (nerve preserved), VAS score was 0 (no pain) in 4 (18%) patients, 1 in 13 (59%) patients and 2 in 5 (23%) patients.

Mean of group A 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) (Table 4).

Table 5: Pain scoring at three months.

At 3months	Group A (neurectomy done)	Group B (nerve preserved)
No. of patients	20	22
Pain experience (VAS)		
0	15 (75%)	10 (45%)
1	5 (25%)	9 (41%)
2	0	2 (9%)
3	0	0
4	0	1 (5%)
Mean±SD	0.25±0.44	0.77±0.97

Of the 20 patients in group A (neurectomy group), at three months postoperatively, 15 (75%) patients had no pain and pain score was 1 (below annoying) in 5 (25%) patients. Of the 22 patients in group B (nerve preserved), VAS score was 0 (no pain) in 10 (45%) patients, 1 in 9 (41%) patients, 2 in 2 (9%) patients and 4 in 1 (5%) patient.

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) (Table 5).

Side effects of neurectomy as a secondary outcome measure

Groin numbness was assessed, using the monofilament test by the technique described by Bell JA.[6] 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. There was no statistical significance between the two groups (P value was 0.8987 at day 7, 0.8297 at 1 month and 0.9202 at 3 months follow up showing no significant difference in the incidence of groin numbness between the two groups (Table 6).

Table 6: Post-operative groin numbness.

	Numbness	Day 7	1month	3months
Patients with neurectomy	Absent	14	16	18
	Present	06	04	02
Nerve preserved patients	Absent	15	17	20
	Present	07	05	02

DISCUSSION

After open mesh repair of inguinal hernia, postoperative groin pain is one of the most debilitating long-term complication, which can significantly affect the patient's satisfaction and quality of life after the operation.[3,7-9] A proposed mechanism for the development of postoperative chronic groin pain is the inflammation and fibrosis induced by the mesh, which is in close proximity to the ilioinguinal nerve.[10] In addition, unintentional injury or strangulation of the ilioinguinal nerve during suturing may also contribute to the phenomenon. There is increasing evidence to suggest that prophylactic excision of ilioinguinal nerve during open hernia repair is not only associated with minimal morbidities but also can potentially decrease the incidence of chronic groin pain following operation. Ravichandran et al, did a randomized trial to address this issue, but it was underpowered and subsequently no definite conclusions could be made.[10] Many other trials following this trial with regard to chronic groin pain following ilioinguinal neurectomy have shown varied results. In a retrospective study, Dittrick et al, reported a significantly lower incidence of chronic groin pain in patients who had elective neurectomy during open inguinal hernia repair when compared with the control group.[11] Wantz GE, also showed similar results in a large series of 546 patients, with a lower incidence of groin pain in patients who had a neurectomy as compared to the control group.[12] Malekpour et al, Khoshmohabat et al, and Baer et al, also supported the excision of ilioinguinal nerve in their separate studies.[13-15] But on the other hand, a randomized controlled trial by Picchio et al, found no difference in chronic groin pain between the neurectomy group and control.[16] They however reported that elective neurectomy of the ilioinguinal nerve was not associated with any neurosensory disturbance or groin numbness at the 6-month follow-up.[16] Hsu et al, also reported similar findings with no significant differences found between the groups for chronic groin pain or numbness.[17] Present randomized study revealed that the incidence of early post-operative pain on day 1 was more in neurectomised patients than in the nerve preserved group, but was not statistically significant. The cause of this finding of increased pain on day 1, though statistically not significant is a matter of speculation and could be attributed to increase in pro inflammatory factors like Tumor Necrosis Factor (TNF-α), after a nerve transection.[18] The pain was less on the 7th day in both groups, with the mean value being lower in the neurectomised patients, but the difference was not significant. In contrast, 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.[13,14] However, the VAS pain scores at the end of 1 month and end of 3 months was significantly less in patients having selective ilioinguinal neurectomy as compared to nerve preserved group in our study. Mui WL et al, found that prophylactic ilioinguinal neurectomy significantly decreased the incidence of chronic groin pain at 6months after Lichtenstein hernia repair without added morbidities.[19] Several design improvements to previous trials have been incorporated into the present study. Double blinding was done, hence providing more reliable measurements of all outcome parameters. The present study has several limitations. The follow up period was short for 3 months. This was because of the fact that the completion of this entire work was time bound and limited to a total period of one year. The long-term effects of excision of ilioinguinal nerve were not investigated. With a long term follow up, there might be changes in the incidence of pain and quality of life in patients with ilioinguinal neurectomy.

CONCLUSION

Authors' observations were summarized, and following conclusions drawn. Postoperative pain on day 1 and day 7 was not conclusive and both groups had more or less equal pain. Late Postoperative pain and chronic groin pain was significantly low in ilioinguinal neurectomised patient as compared to nerve preserved group.

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