GLOBAL HEALTH & MEDICINE
ISSN / eISSN: 2434-9186 / 2434-9194
Volume 06, Issue 03.111-122
https://ghsjournal.com/

Comparison of Mean Post-Operative Pain after Nerve Preservation versus Prophylactic Ilioinguinal Neurectomy in Lichtenstein Tension free Meshplasty for Inguinal Hernia Repair

DR Syed Usman Ali Gillani (CMH Rawalakot)
DR Afia Hussain Usmani (PMC Rawalakot)
DR Ehtisham Younas (AJKMC MZD)
DR Maaela khan (AJKMC MZD)
DR Zaeem AHMED (AJKMC MZD
DR Farrukh Qayyum (AJKMC MZD)

ABSTRACT

Objective: To compare the mean post-operative pain of nerve preservation and prophylactic ilioinguinal neurectomy in patients undergoing Lichtenstein tension free meshplasty.

Study Design and Setting: This is a prospective comparative study that was conducted at the University of Lahore Teaching Hospital over the given period from November 2024 to May 2025.

Methodology: The study sample was 134 people between the ages of 18 and 60 who were diagnosed with inguinal hernia. The participants were randomly allocated into two different groups - Group-A in which the nerve preservation was performed and Group-B in which prophylactic ilioinguinal neurectomy was done. Post-operational pain levels were checked on the third day after the surgery on a numerical analogue scale from 0 to 10. Statistical analysis was done by software package of the statistical programme and data analysis (SPSS) version 25. The results of this study were analysed by independent student t-test which p<=0.05.

Results: A total of 134 patients were included, with 67 patients in each group. The majority of patients in both groups were male and belonged to the age group above 45 years, with comparable baseline characteristics between the groups. The mean post-operative pain score at 72 hours was significantly lower in the neurectomy group (2.12±1.17) compared to the nerve preservation group (3.07±1.10) (p=0.001), indicating better pain control with prophylactic ilioinguinal neurectomy.

Conclusion: Prophylactic ilioinguinal neurectomy decreased the pain experienced after surgery compared to nerve preservation in patients undergoing Lichtenstein tension-free meshplasty for inguinal hernia repair.

Keywords: Inguinal Hernia, Ilioinguinal Neurectomy, Lichtenstein Meshplasty, Nerve Preservation, Post-Operative Pain.

INTRODUCTION

The phenomenon known as hernia represents a significant medical condition that has been a focal point of great interest on the part of healthcare professionals and researchers through the annals of history due to the existence of surgical interventions necessary to cure such cases, which can be traced back to the ancient civilization of Hammurabi, as well as the documentation of findings found within the ancient Egyptian Papyrus texts as well that highlight the long standing nature of this ailment.[1] Among the various types of hernias, inguinal hernia arises as a particularly prevalent condition that is observed throughout the globe with epidemiological studies indicating the incidence rates of this condition during the lifetime fluctuating.[2, 3]

In the year 1884, something significant was achieved in the world of hernia intervention in the life of the surgeon through the efforts carried out by the grand surgeon Bassini, who achieved an unprecedented feat of making the first operation on an artificial hernia to be carried out. This revolutionary success led to an enlightening revolution in the methodologies and techniques used in operative procedures used to deal with hernias and paved the way for

innovations to be used in the surgical field in years to come. Subsequently, a whole host of innovative techniques, such as but not limited to the Lotheissen method, the McVay technique and the Shouldice approach have been carefully documented and extensively studied in the medical literature. These developments have cumulatively added to the surgeon's repertoire allowing them to better treat his hernia and benefit patient outcomes.[4, 5]

Postoperative pain (groin pain) is a significant and complex complication that often occurs after surgery that is directed at the repair of inguinal hernias by conventional open surgical methods. This particular complication has been noticed to occur in a notable percentage of affected individuals, and the circumstance has been reported to vary significantly in the extent of the levels of occurrence, with incidences varying from approximately 18% and from as high as 63%, which profoundly affects the capacity of the affected individuals to engage and perform their daily routine and essential activities with ease. The experience of this ailment can be extremely troublesome and burdensome for the patient, often resulting in a plethora of problems to the patient themselves that can complicate the process of overall recovery, and often, the treatment options offered for this condition can itself be an equally troubling and troublesome experience.[6,7]

Several things that can be returned as the possible indicators of pain in the postoperative period after surgery. These factors include potential inguinal nerve injury, entrapment of the ilioinguinal nerve during the suturing process, development of fibrosis of the region of the mesh, placement of the mesh implant, partial nerve division, and development of neuromas. Elective division of ilioinguinal nerve has been suggested by researchers to reduce postoperative pain. Preservation of the nerve was therefore recommended for the first time as one method for lessening chronic pain following surgery.[8, 9]

Several research studies have demonstrated varying levels of post-operative pain following surgical procedures involving either elective nerve division or nerve preservation. One study revealed a mean post-operative pain intensity of 0.7±0.7 in cases where elective nerve division was performed, contrasting with a higher mean of 1.5±0.7 in cases where nerve preservation was opted for.[10] Similarly, another investigation found that the mean post-operative pain level was 0.5±1 in procedures involving elective nerve division, whereas it escalated to 2.5±1 in cases of nerve preservation.[11] Additionally, a different study reported a mean post-operative pain score of 0.98±0.25 in instances of elective nerve division compared to a higher mean of 1.73±0.62 in cases where nerve preservation was chosen.[12]

Still there is no final consensus about the optimal method. Therefore, this study was designed to compare the postoperative pain scores after preservation and elective division of ilioinguinal nerve in inguinal hernioplasty on the basis of numerical analogue scoring system so that a better alternative would be opted to minimize the pain after hernioplasty.

METHODOLOGY

This prospective comparative (non-randomized) study was conducted in the Surgical Department of the University of Lahore Teaching Hospital, over a period of time from November 16, 2024, to May 15, 2025. Prior to the start of the study, formal approval was obtained (IPMS/HR/0102/24 October 20/24)rom the ethical committee of the hospital and all participants gave written informed consent. The sample size of 134 individuals with 67 patients in each group was determined based on 95% confidence level, 80% statistical power and expected mean level of post-operative pain of 0.98±0.25 in cases in elective nerve division compared to 1.73±0.62 in cases with nerve preservation in patients undergoing inguinal mesh hernioplasty.[12]

Patients enrolled consecutively of both genders, aged 18 to 60 years, having inguinal hernia as per ultrasonography test as defined by swelling plus cough impulse. Direct and indirect hernias were differentiated using the ring occlusion test, where a positive test indicated indirect hernia and a negative test indicated direct hernia. Patients with recurrent or bilateral inguinal hernia, complicated hernias (irreducible, obstructed, or strangulated), and patients who were not consenting were excluded.

Patients were assigned to two groups randomly based on the lottery method. Group-A were those patients undergoing nerve preservation, and Group-B were those patients undergoing the prophylactic ilioinguinal neurectomy. Basic demographic details including name, age and sex were noted for all patients. After admission, all patients had detailed history and comprehensive clinical examination to arrive at a provisional diagnosis.

In Group-A the ilioinguinal nerve was identified at the superficial inguinal ring in carefully selected patients undergoing Lichtenstein tension-free meshplasty. The nerve was carefully dissected without involvement of perineural structures and was kept intact the entire time which involved minimal handling to avoid inadvertent injury. Mesh placement was done in the standard way with care taken not to entrap the nerve.

In Group-B prophylactic ilioinguinal neurectomy was carried out. The nerve was then identified, gently mobilized and excised by deliberate dissection as far as possible lateral to the deep inguinal ring. The proximal end was free to withdraw on no ligation/implantation into nearby muscle. The rest of the procedure, including mesh placement, was performed in the standard Lichtenstein technique.

After the surgical procedures, patients were assessed at 72 hours for postoperative pain using numerical analogue scale from 0 to 10 given by the senior resident. Pain scores of 1-

2 were classified as absent, 3-4 as mild, 5-6 as moderate, 7-8 as severe and 9-10 as intense. Data collection was carried out with the help of a pre-defined data collection form.

The data collected were entered and analysed with Statistical Package for the Social Sciences (SPSS) version 25.0. Mean and standard deviation were calculated for continuous variables such as age, duration of hernia and post-operative pain score while frequencies and percentages were calculated for categorical variables such as gender and site of hernia. The normality of the continuous data was investigated with the Shapiro-Wilk test. As the post-operative pain scores were found to be normally distributed, independent samples t-test was performed to compare the mean pain scores of Group-A and Group-B. Stratification was done with respect to age, gender, site and duration of hernia based on effect modifier and post-stratification comparisons were also made by independent samples t-test. A p-value <0.05 was considered statistically significant.

RESULTS

For Group-A, which in terms of the demographic aspects of the study showed that the total number of males was 65, i.e. a large number of 97.0%, while the number of females was small to the extent of 2, and that means 3.0% of the total group; and for Group-B, which is partially different in that there are 63 males, which means 94.0% of participants which is considered large and 4 females in group-B, which assumes 6.0% of the population under examination. In respect of age distribution pertaining to these cohorts, all the 10 patients (14.9%) were positioned in the younger age group of 18 to 30 years, while 26 patients (38.8%) belonged to the mid-aged group of 31 to 45 years and a dominant 31 patients (46.3%) were considered seniors aged over 45 years, which eventually gave mean age of 44.34 years with a standard deviation of 12.18 years. On the other hand, Group-B comprised of those 12 patients or 17.9% also falling between the ages of 18 and 30 years, 26 patients representing 38.8% at the age of between 31 and 45 years and 29 patients representing 43.3% above the age of 45 years, culminating in a mean age of 43.24 years with a standard deviation of +-11.75 years.

Regarding the duration of the presentation of hernia 45 patients in Group-A representing 67.2% and 22 patients representing 32.8 had a presentation of hernia for less than 5 years and 5 years and more than 5 years respectively, this calculated mean duration of hernia to be 6.5 years and standard deviation +/- 2.3 years. In comparison, Group-B showed that 48 patients were representing 71.6%, which pertains to less than 5 year of their hernia whereas, 19 patients were suffering from their hernia 5 years or more in their life, which resulted into a mean number of 6.9 year considering a standard deviation of 2.5 year. At the level of hernia exploration, it was observed that the patients in Group-A had 32 number or 47.8% of the hernia patients with right sided hernia and 35 number or 52.2% patients with left sided hernia and in group-B 31 number or 46.3% of hernia patients had right sided hernia and 36 number or 53.7% of hernia patients had left-sided hernia.

The analysis of the pain intensity showed the: The mean pain score for Group-A that has a nerve preservation technique was calculated as 3.07 with a standard deviation of +-1.10, while in group-B which is the nerve division technique was significantly lower which was 2.12 with a standard deviation of +-1.17, the p-value of 0.001 indicated statistically significant difference between the two groups, well, that the surgical approach was very effective. The results shown in Table-3 illuminated the fact that the average pain scores were invariably lower in the nerve division cohort compared to the nerve preservation cohort for all evaluated variables supporting the hypothesis of better pain management linked to the nerve division approach. Furthermore, it was noted that both male and female individuals participants in Group-B had lower pain score in comparison to their counterparts in Group-A, thereby suggesting a wider application of nerve division technique both in genders. Pain levels were reduced significantly in Group-B regardless of age demographic, whether the hernia was located at the right or left side and between patients having hernia duration of less than and more than 5 years with the p-value suggesting statistical significance in each group, proving once again that nerve division may be able to provide an enhanced outcome in pain relief.

Table-1: Comparison of distribution of different variables between groups

Variables		Groups	
		Group-A (Nerve preservation)	Group-B (Nerve division)
Gender	Male	65(97.0%)	63(94.0%)
	Female	2(3.0%)	4(6.0%)
Age groups	18-30 years	10(14.9%)	12(17.9%)
	31-45 years	26(38.8%)	26(38.8%)
	>45 years	31(46.3%)	29(43.3%)
	Mean±S.D	44.34±12.18	43.24±11.75
Duration of hernia	<5 years	45(67.2%)	48(71.6%)
	=5 years	22(32.8%)	19(28.4%)
	Mean±S.D	6.5±2.3	6.9±2.5
Site of hernia	Right	32(47.8%)	31(46.3%)
	Left	35(52.2%)	36(53.7%)

Table-2: Comparison of pain score after 72 hours between groups

Pain score (VAS)	Group-A (Nerve preservation)	Group-B (Nerve division)	p-value
	3.07±1.10	2.12±1.17	0.001

Table-3: Stratification of pain score between groups with respect to different variables

Variables	Group-A (Nerve preservation)	Group-B (Nerve division)	p-value
Gender			
Male	3.05±1.11	2.17±1.14	0.001
Female	4.00±1.51	1.25±1.50	0.041
Age groups			
18-30 years	3.60±0.96	2.33±1.43	0.028
31-45 years	2.62±1.13	1.92±1.01	0.025
>45 years	3.29±1.01	2.21±1.20	0.001
Site of hernia			
Right	3.13±1.04	2.26±0.89	0.001
Left	3.03±1.17	2.00±1.37	0.001
Duration of hernia			
<5 years	2.69±1.08	2.04±1.12	0.006
=5 years	3.86±0.64	2.32±1.29	0.001

DISCUSSION

The results derived from the investigation indicated that the implementation of prophylactic ilioinguinal neurectomy was associated with a marked and statistically significant decrease in the degree of postoperative pain experienced by patients who underwent Lichtenstein tension-free meshplasty for the surgical correction of inguinal hernias, especially when juxtaposed with the outcomes observed in patients who received nerve preservation techniques. Specifically, the average pain intensity score recorded among those patients who underwent nerve division was calculated to be 2.12 with a standard deviation of 1.17, which was found to be considerably lower than the mean pain intensity score of the nerve preservation cohort, which stood at 3.07 with a standard deviation of 1.10, yielding a p-value of 0.001, thus underscoring the statistical significance of the findings.

These results are congruent with the findings reported in previous research studies. For instance, Rutegård M et al. documented that patients undergoing elective ilioinguinal neurectomy exhibited significantly diminished pain scores in comparison to those who had nerve preservation techniques employed during open inguinal hernia repairs.[13] Similarly, the research conducted by Mui et al. revealed a notable reduction in the incidence of chronic pain among patients who underwent prophylactic neurectomy, without observing any considerable increase in sensory disturbances that could adversely impact the patients' quality of life.[14] In the current study, it is worth noting that while sensory disturbances were not specifically evaluated, the emphasis placed on the assessment of early postoperative pain outcomes clearly demonstrates a distinct advantage associated with the use of neurectomy techniques.

In contrast to the findings presented by Moseholm VB et al., which indicated an absence of any statistically significant difference in pain scores between the groups undergoing nerve division and those undergoing nerve preservation, it becomes pertinent to explore the underlying factors that may contribute to this variance in results.[15] This observed discrepancy might be attributed to several critical elements, including but not limited to variations in sample size, the specific surgical techniques employed, or the level of expertise possessed by the surgeons performing the procedures. Furthermore, the research conducted by Picchio et al. underscored the notion that while the implementation of prophylactic neurectomy could potentially lead to a reduction in the incidence of chronic inguinal pain, there exists a possibility that such an intervention may result in numbness within the areas served by the affected nerve distribution.[16]

Consequently, it is essential to recognize that although there is a clear indication of pain alleviation following the procedure, one must also take into account the potential sensory repercussions that could arise, which should be carefully considered prior to the routine adoption of prophylactic neurectomy as a standard practice in clinical settings.

Several research studies have demonstrated varying levels of post-operative pain following surgical procedures involving either elective nerve division or nerve preservation. One study revealed a mean post-operative pain intensity of 0.7±0.7 in cases where elective nerve division was performed, contrasting with a higher mean of 1.5±0.7 in cases where nerve preservation was opted for.[10] Similarly, another investigation found that the mean post-operative pain level was 0.5±1 in procedures involving elective nerve division, whereas it escalated to 2.5±1 in cases of nerve preservation.[11] Additionally, a different study reported a mean post-operative pain score of 0.98±0.25 in instances of elective nerve division compared to a higher mean of 1.73±0.62 in cases where nerve preservation was chosen.[12]

The stratified analysis conducted in the course of this particular study has elucidated a noteworthy observation of consistently lower pain scores within the cohort designated as the nerve division group, a trend that was uniformly evident across various subgroups that were categorized based on factors such as gender, differing age groups, the specific location of the hernia, as well as the duration of the condition being treated. This significant finding is in concordance with the research conducted by Moseholm VB et al., which provided compelling evidence that the elective surgical procedure known as ilioinguinal neurectomy was effective in not only diminishing early post-operative pain but also in alleviating late post-operative discomfort in a consistent manner, regardless of the demographic variables that were assessed in the study.

Therefore, the implications of these findings suggest a potential paradigm shift in pain management strategies within this clinical context, highlighting the importance of

considering stratified patient demographics when evaluating the efficacy of specific surgical interventions aimed at reducing post-operative pain.[17]

The average age of the participants involved in this particular research investigation was approximately 44 years, a finding that aligns closely with the demographic trends observed in the scholarly works conducted by Cirocchi R et al. and Mui et al., both of whom documented a significant incidence of inguinal hernia primarily among middle-aged male individuals. This correlation suggests that the age distribution of the patients in our study mirrors that of previous studies, which reinforces the notion that inguinal hernia is a prevalent condition within this specific demographic group. Furthermore, the consistency of these findings across different studies highlights the importance of age as a critical factor in understanding the epidemiology of inguinal hernias, thereby contributing to the broader discourse regarding the health challenges faced by middle-aged males.[13, 18]

The demographic distribution of participants in both studied cohorts predominantly comprised males, which is indicative of the broader epidemiological patterns associated with inguinal hernias, a condition that has been extensively documented in medical literature to disproportionately affect the male population due to various biological and lifestyle factors that contribute to the higher incidence rates observed in this gender.[19, 20]

Limitations of the Study. A limitation of this study is that there was no long-term follow up to evaluate the chronic pain and sensory disturbances, which are important factors in patient satisfaction and quality of life. Also, the study included one center with non-probability sampling, which restricts the generalizability of the findings.

CONCLUSION

In conclusion, this study justifies the use of prophylactic ilioinguinal neurectomy to decrease early post-operative pain in patients undergoing Lichtenstein tension-free meshplasty. However, the impact on chronic pain/sensory loss and patient reported outcomes should be assessed in conducting multi-centre trials with longer follow-up before considering its use in routine surgery.

Conflicts of Interest: Nil

Source of Funding: Nil

Acknowledgement: Nil

REFERENCES

1. Shakil A, Aparicio K, Barta E, Munez K. Inguinal hernias: diagnosis and management. American family physician. 2020 Oct 15;102(8):487-92. DOI: https://www.aafp.org/pubs/afp/issues/2020/1015/p487.html.
2. Christou N, Ris F, Naumann D, Robert-Yap J, Mathonnet M, Gillion JF, Club-Hernie Members. Risk factors for surgical site infection after groin hernia repair: does the mesh or technique matter?. Hernia. 2022 Feb;26(1):233-42. DOI: https://link.springer.com/article/10.1007/s10029-021-02512-7.
3. Xu Z, Qu H, Kanani G, Guo Z, Ren Y, Chen X. The outcomes of routine ilioinguinal neurectomy in the treatment of chronic pain during herniorrhaphy: A meta-analysis of randomized-controlled trials. Asian journal of Surgery. 2021 Feb 1;44(2):431-9. DOI: https://doi.org/10.1016/j.asjsur.2020.10.022.
4. Perrone EE, Deprest JA. Fetal endoscopic tracheal occlusion for congenital diaphragmatic hernia: a narrative review of the history, current practice, and future directions. Translational pediatrics. 2021 May;10(5):1448. doi: 10.21037/tp-20-130.
5. Chen J, Glasgow RE. What is the Best Inguinal Hernia Repair?. Advances in surgery. 2022 Sep 1;56(1):247-58. DOI: https://www.advancessurgery.com/article/S0065-3411(22)00007-0/abstract.
6. Bande D, Moltó L, Pereira JA, Montes A. Chronic pain after groin hernia repair: pain characteristics and impact on quality of life. BMC surgery. 2020 Jul 6;20(1):147. DOI: https://link.springer.com/article/10.1186/s12893-020-00805-9.
7. Bamnodkar P, Dumbre R, Fernandese A, Phalgune D. Prophylactic ilio-inguinal neurectomy in open inguinal hernia repair: a randomized controlled study. Saudi Surgical Journal. 2020 Jul 1;8(3):125-30. DOI: 10.4103/ssj.ssj_59_21.
8. Latif AM, Lotfy AE, AbdElhady MA, Mohamed MA. Elective division versus preservation of the ilioinguinal nerve to reduce postoperative pain in hernioplasty for inguinal hernia. Egyptian Journal of Hospital Medicine. 2021;85(2):4194-203. DOI: https://www.ajol.info/index.php/ejhm/article/view/223521.
9. Moseholm VB, Baker JJ, Rosenberg J. Nerve identification during open inguinal hernia repair: a systematic review and meta-analyses. Langenbeck's Archives of Surgery. 2023 Oct 24;408(1):417. DOI: https://link.springer.com/article/10.1007/s00423-023-03154-2.
10. Malekpour F, Mirhashemi SH, Hajinasrolah E, Salehi N, Khoshkar A, Kolahi AA. Ilioinguinal nerve excision in open mesh repair of inguinal hernia—results of a randomized clinical trial: simple solution for a difficult problem?. The American journal of surgery. 2018 Jun 1;195(6):735-40. DOI: https://doi.org/10.1016/j.amjsurg.2017.09.037.
11. Muneeb MD, Baig MA. Elective division of ilioinguinal nerve in inguinal hernioplasty: remedy for the morbid postoperative inguinal pain. J Coll Physicians Surg Pak. 2017 Nov 1;27(11):682-5. DOI: //efaidnbmnnnibpcajpcglclefindmkaj/https://jcpsp.pk/archive/2017/Nov2017/04.pdf.
12. Jatoi AH, Younus SM, Ghayassuddin M, Mirani AJ, Ghayas N, Qazi A, Suchdev S, Bakshi S. Postoperative pain;: comparison after preservation and elective division of ilioinguinal nerve in inguinal hernioplasty. The Professional Medical Journal. 2014 Jun 10;21(03):559-65. DOI: 10.29309/tpmj/2014.21.03.2133.

13. Rutegård M, Lindqvist M, Svensson J, Nordin P, Haapamäki MM. Chronic pain after open inguinal hernia repair: expertise-based randomized clinical trial of heavyweight or lightweight mesh. British journal of surgery. 2021 Feb 1;108(2):138-44. DOI: https://doi.org/10.1093/bjs/znaa049.

14. Mui WL, Ng CS, Fung TM, Cheung FK, Wong CM, Ma TH, Bn MY, Ng EK. Prophylactic ilioinguinal neurectomy in open inguinal hernia repair: a double-blind randomized controlled trial. Annals of surgery. 2021 Jul 1;244(1):27-33. DOI: 10.1097/01.sla.0000217691.81562.7e.

15. Moseholm VB, Baker JJ, Rosenberg J. Identification of the ilioinguinal and iliohypogastric nerves during open inguinal hernia repair: a nationwide register-based study. Hernia. 2024 Aug;28(4):1181-6. DOI: https://link.springer.com/ article/ 10.1007/s10029-024-03002-2.

16. Picchio M, Palimento D, Attanasio U, Matarazzo PF, Bambini C, Caliendo A. Randomized controlled trial of preservation or elective division of ilioinguinal nerve on open inguinal hernia repair with polypropylene mesh. Archives of Surgery. 2024 Jul 1;139(7):755-8. DOI: 10.1001/archsurg.139.7.755.

17. Hu Q, Du YX, Wang DC, Yang YJ, Lei YH, Wei J. Efficacy and safety of ilioinguinal neurectomy in open tension-free inguinal hernia repair: A meta-analysis of randomized controlled trials. The American Journal of Surgery. 2023 Oct 1;226(4):531-41. DOI: https://doi.org/10.1016/j.amjsurg.2023.06.027.

18. Cirocchi R, Henry BM, Mercurio I, Tomaszewski KA, Palumbo P, Stabile A, Lancia M, Randolph J. Is it possible to identify the inguinal nerves during hernioplasty? A systematic review of the literature and meta-analysis of cadaveric and surgical studies. Hernia. 2019 Jun 1;23(3):569-81. DOI: https://link.springer.com/article/10.1007/s10029-018-1857-2.

19. Quirt JS, Fecteau A. Hernias—Epigastric, Inguinal and Incisional. InPearls and Tricks in Pediatric Surgery 2020 Oct 30 (pp. 113-123). Cham: Springer International Publishing. DOI: https://link.springer.com/chapter/10.1007/978-3-030-51067-1_17.

20. Beel E, Berrevoet F. Surgical treatment for chronic pain after inguinal hernia repair: a systematic literature review. Langenbeck's Archives of Surgery. 2022 Mar;407(2):541-8. DOI: https://link.springer.com/article/10.1007/s00423-021-02311-9.