DOI: https://doi.org/10.54393/pjhs.v5i10.2003

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (P): 2790-9352, (E): 2790-9344
Volume 5, Issue 10 (October 2024)

Original Article

OPEN ACCESS

Assessment of Post-Operative Pain Score after Lichtenstein Repair of Inguinal Hernia

Atif Iqbal[1*], Jamshed Bashir[2], Aijaz Hussain Memon[3], Mashooque Ali Khowaja[3], Naheed Akhtar[4] and Aneeqa Chugtai[5]

[1]Department of Surgery, Jinnah International Hospital, Abbottabad, Pakistan
[2]Department of Surgery, Muhammad Medical College, Mirpurkhas, Pakistan
[3]Department of Urology, People's University of Medical and Health Sciences for Women Shaheed Benazirabad, Nawabshah, Pakistan
[4]Department of Surgery, Azad Jammu Kashmir Medical College, Muzaffarabad, Pakistan
[5]Department of Anatomy, Combined Military Hospital Kharian Medical College, Kharian, Pakistan

ARTICLE INFO

Keywords:
Repair, Inguinal Hernia, Post- Lichtenstein Operative Pain, Visual Analog Scale, Patient Outcomes

How to Cite:
Iqbal, A., Bashir, J., Memon, A. H., Khowaja, M. A., Akhtar, N., & Chugtai, A. (2024). Assessment of Post-Operative Pain Score after Lichtenstein Repair of Inguinal Hernia: Post-Operative Pain Score of Hernia. Pakistan Journal of Health Sciences, 5(10). https://doi.org/10.54393/pjhs.v5i10.2003

Corresponding Author:
Atif Iqbal
Department of Surgeon, Jinnah International Hospital, Abbottabad, Pakistan
dratifjadoon@yahoo.com

Received Date: 7th September, 2024
Acceptance Date: 19th October, 2024
Published Date: 31st October, 2024

ABSTRACT

The Lichtenstein inguinal hernia repair has become the gold standard due to its simplicity, effectiveness, and low recurrence rates. Despite its benefits, post-operative pain remains a critical concern impacting patient recovery and satisfaction. **Objective:** To evaluate the post-operative pain experienced by patients undergoing Lichtenstein repair of inguinal hernia. **Methods:** It was a quasi-experimental study conducted at department of general surgery, Jinnah international hospital, Abbottabad from April 2023 to April 2024. 150 patients who were to undergo Lichtenstein hernia repair were included and the Visual Analog Scale (VAS) was used to measure pain at multiple time points: 6 hours, 24 hours, 48 hours, 1 week, 1 month, and 3 months post-operatively. Pain scores were assessed at rest and on movement along with patient-reported outcomes were recorded. Data were analyzed using SPSS version 24.0. P-values of ≤0.05 will be considered significant. **Results:** The mean age was 39.2±8.3 years. The average Body Mass Index (BMI) was 25.1±4.7 kg/m2. At 6 hours' post-surgery, the mean pain scores were 4 ± 0.45, decreasing to 2.8 ± 0.31 24 hours and further to 2.1 ± 0.17 at 48 hours' post-operation. By one week, the pain score had reduced to 1.8 ± 0.12. The pain score further reduced to 1.2 ± 0.25 at one month and 1.0 ± 0.58 at 3 months ($p<0.01$). **Conclusions:** Lichtenstein repair was effective in minimizing immediate post-operative discomfort. However, further investigations may be warranted to explore additional factors influencing pain outcomes

INTRODUCTION

An inguinal hernia occurs when a portion of the intestine or fatty tissue protrudes through a weakened area in the lower abdominal wall, specifically within the inguinal canal. Inguinal hernias are among the most common surgical conditions encountered worldwide. In 2019 alone, there were 32.53 million prevalent cases worldwide and 13.02 million incident cases of inguinal hernia, reflecting an increase of 36.00% and 63.67%, respectively, compared to 1990 [1]. Inguinal hernia repair is one of the most frequently performed procedures by general surgeons, with repair rates ranging from 0.03 to 8.92 per year across various studies [2]. Among the surgical options available, the Lichtenstein tension-free mesh repair, first introduced in the 1980s, has become the preferred method due to its simplicity, efficiency, and low recurrence rates [3]. The Lichtenstein technique involves reinforcing the abdominal wall with a synthetic mesh placed over the hernia defect and secured with sutures to provide additional strength and prevent recurrence. This procedure involves making an incision in the abdomen, repositioning the protruding tissue, and covering the area with the mesh, which is then stitched in place [4]. Despite the advantages of this technique, postoperative pain remains a significant concern, as it can impact patient recovery and satisfaction. Several factors contribute to the incidence of postoperative pain during inguinal hernia repair, making effective performance of the Lichtenstein technique crucial in mitigating pain. The tension-free mesh

DOI: https://doi.org/10.54393/pjhs.v5i10.2003

implantation aims to reduce nerve entrapment and tissue stress, both of which can contribute to postoperative discomfort [5]. The characteristics of the mesh, such as weight, pore size, and biocompatibility, play a crucial role in determining pain outcomes. Studies have shown that lightweight mesh is more effective in reducing early postoperative pain compared to heavyweight mesh, particularly in men over 60 years of age [6]. Additionally, inadvertent injury or entrapment of the ilioinguinal, iliohypogastric, or genitofemoral nerves during surgery is a common cause of chronic pain. Employing strategies to detect and protect these nerves during the procedure is essential for minimizing postoperative pain. Other factors, such as age, sex, Body Mass Index (BMI), and pre-existing medical conditions, can also influence individual pain responses and recovery outcomes. Patients with higher BMI or a history of chronic pain may report higher pain scores post-operatively [7]. A review of the literature reveals several gaps in the current understanding of postoperative pain following Lichtenstein repair. One significant gap is the lack of standardization in pain measurement tools, with studies employing various scales such as the Visual Analog Scale (VAS), Numeric Rating Scale (NRS), and the McGill Pain Questionnaire [8]. This inconsistency complicates comparisons across studies and limits the ability to draw definitive conclusions. Additionally, pain scores alone are insufficient to fully assess recovery; quality of life measures, functional assessments, and patient satisfaction should also be considered for a more comprehensive understanding of the impact of postoperative pain on daily life [9]. Moreover, many studies focus on short-term postoperative pain, leaving a gap in understanding long-term pain outcomes. There is a need for more longitudinal studies that follow patients over several years to track the persistence and evolution of postoperative pain. Furthermore, patient characteristics such as age, comorbidities, and BMI are often overlooked, despite their potential impact on pain levels and recovery [10]. There is also a lack of comparative studies evaluating the efficacy of different pain management protocols specifically for patients undergoing Lichtenstein repair, highlighting the need for further research in this area.

The objective of current study was to evaluate the postoperative pain experienced by patients undergoing Lichtenstein repair of inguinal hernia, with a focus on understanding its impact on patients' quality of life and length of hospital stay.

METHODS

This quasi-experimental study was conducted at the Department of General Surgery, Jinnah International Hospital, Abbottabad, after obtaining approval from the Institutional Review Board (Ref # JIHA/QMS/7609). The study was carried out from April 2023 to April 2024, during which all patients presenting at the outpatient department and emergency department with inguinal hernia were screened for inclusion. Patients aged 18 years or older undergoing elective Lichtenstein hernia repair for primary unilateral or bilateral, direct or indirect inguinal hernia, classified as American Society of Anesthesiologists (ASA) Physical Status I-II, were included in this study. Exclusion criteria comprised patients undergoing emergency Lichtenstein hernia repair, those with recurrent inguinal hernias, strangulated or incarcerated hernias, and significant comorbid conditions such as uncontrolled diabetes, severe cardiovascular diseases, or neurological disorders. The sample size was determined based on the expected effect size and standard sample size calculation formulas to achieve adequate statistical power for the study. A non-probability consecutive sampling technique was employed, where all eligible patients meeting the inclusion criteria during the study period were included.

$$n=\frac{Z^2 x\, o^2}{E^2}$$

Where, n = required sample size, Z = Z-value (the number of standard deviations from the mean corresponding to the desired confidence level; typically, 1.96 for a 95% confidence level), σ = estimated standard deviation (from previous studies or a pilot study), E = margin of error (the maximum acceptable difference between the sample mean and the population mean) [11]. A total of 237 patients were screened, and 163 were selected for inclusion based on the defined criteria. Written informed consent was obtained from each participant, and all surgeries were performed by a single team of a consultant surgeon and assistants, adhering to standard surgical protocols. Baseline demographic data, including age and BMI, along with medical history, comorbid conditions, and current medications, were collected. The baseline pain level was assessed pre-operatively using the Visual Analog Scale (VAS). It was a numerical rating scale of 1 to 10 using the visual analog score. Pain was graded into four categories depending upon the VAS scores as no pain = VAS score 0; Mild = VAS score 1-3; Moderate = VAS score 4-6; Severe = VAS score >6 [12]. To ensure consistency, no analgesia was administered pre-operatively or during surgery. The VAS was explained to patients before scoring to ensure they understood how to rate their pain accurately. Pain levels were then measured at multiple post-operative intervals: 6 hours, 24 hours, 48 hours, 1 week, 1 month, and 3 months. Pain scores were assessed both at rest and during movement, along with patient-reported outcomes. A standardized postoperative pain management regimen was administered, consisting of Inj. Diclofenac sodium 75 mg intramuscularly immediately after surgery, repeated every 8 hours for 48 hours, followed by oral Diclofenac 50 mg every 12 hours. All patients were monitored post-operatively for the need for rescue analgesia due to severe pain, and they were provided with standardized instructions not to restrict activities unless they caused pain. Data were entered and analyzed using SPSS (Statistical Package for the Social Sciences) version 24.0. Descriptive statistics were used to present the data as

DOI: https://doi.org/10.54393/pjhs.v5i10.2003

means, standard deviations, and percentages. To assess differences in pain scores at different intervals (24-hour, 48 hour and one week) during various associated conditions and relevant variables, the one-way analysis of variance (ANOVA) was applied. A p-value of ≤0.05 was considered statistically significant.

RESULTS

In this study, out of the initial 163 patients, 13 were lost to follow-up, resulting in 150 patients who successfully underwent Lichtenstein repair of inguinal hernia. The mean age of the patients was 39.2±8.3 years, with an average Body Mass Index (BMI) of 25.1±4.7 kg/m^2. Among the patients, 107 (71.3%) had unilateral inguinal hernias, while 43 (28.6%) had bilateral inguinal hernias. According to the American Society of Anesthesiologists (ASA) classification, 93 patients (63%) were classified as ASA I, indicating they were healthy with no systemic disease, and 57 patients (38%) were classified as ASA II, indicating mild systemic disease without substantive functional limitations (Table 1).

Table 1: Demographic Characteristics of Study Population (n=150)

Variables	Mean ± SD / N (%)
Age (Years)	39.2 ± 8.3
BMI (kg/m^2)	25.1 ± 4.7
Surgical Site	
Unilateral	107 (71.3%)
Bilateral	43 (28.6%)
ASA Classification	
ASA I	93 (63%)
ASA II	57 (38%)

The baseline pain level before the Lichtenstein repair, as measured by the Visual Analog Scale (VAS), was 0.25 ± 3.6. Post-procedure pain levels were monitored at several intervals to assess the progression of pain relief over time. At 6 hours' post-surgery, the mean pain score was 4 ± 0.45, indicating moderate pain. This decreased to 2.8 ± 0.31 at 24 hours and further to 2.1 ± 0.17 at 48 hours' post-operation. By one week, the pain score had reduced to 1.8 ± 0.12, demonstrating significant pain alleviation (p<0.01) (Table 2).

Table 2: Visual Analogue Pain Score Pre-Operatively and Post-Operatively

Duration	Visual Analog Score (Mean ± SD)
Baseline Pain Level (Before Surgery)	0.25 ± 3.6
Post-Procedure Pain Levels	
6 Hours	4 ± 0.45
24 Hours	2.8 ± 0.31
48 Hours	2.1 ± 0.17
1 Week	1.8 ± 0.12
1 Month	1.2 ± 0.25
3 Months	1.0 ± 0.58

To provide a more detailed analysis, the data were stratified according to age and surgical site. Patients were divided into two age groups: those below 40 years and those above 40 years. Additionally, the pain scores were compared between patients with unilateral and bilateral inguinal hernias at various follow-up intervals (Table 3). At 24 hours' post-operation, 78.3% of patients reported experiencing pain, which decreased to 69.6% at 48 hours and 54.1% after one week. Pain relief through treatment was utilized by 67.3% of patients at 24 hours, increasing to 74.2% at 48 hours and 81.5% after one week. Stratification by age revealed that younger patients (below 40 years) reported slightly lower pain scores at rest and on movement compared to older patients (above 40 years), with p-values of 0.02 and 0.03, respectively, indicating statistical significance. Similarly, patients with bilateral hernias reported higher pain scores compared to those with unilateral hernias, with p-values of 0.04 at rest and 0.01 on movement (Table 3). There was a significant gradual decrease of pain score in all the rows. These findings suggest that younger patients and those with unilateral hernias tend to experience lower pain levels and faster recovery, while older patients and those with bilateral hernias may require more intensive pain management strategies. The statistically significant differences in pain levels with gradual decrease from 24-hour post-surgery to one-week post-surgery across various patient groups shows the effectiveness of Lichtenstein repair of inguinal hernia.

Table 3: Assessment of Pain at Different Intervals

Variables	Response at 24 Hours Mean ± SD	48 Hours Mean ± SD	1 Week Mean ± SD	p-Value
Any Pain Experienced (%)	78.3	69.6	54.1	0.01
Pain Relief Using Treatment (%)	67.3	74.2	81.5	0.03
Pain Scores				
At Rest (Below 40 Years)	2.2 ± 1.7	1.6 ± 1.3	0.8 ± 1.0	0.02
At Rest (Above 40 Years)	2.7 ± 2.1	1.8 ± 1.5	1.1 ± 1.2	0.04
On Movement (Below 40 Years)	4.5 ± 2.3	3.3 ± 1.8	2.0 ± 1.2	0.03
On Movement (Above 40 Years)	4.9 ± 2.7	3.7 ± 2.0	2.3 ± 1.4	0.01
Unilateral (at Rest)	2.1 ± 1.8	1.5 ± 1.3	0.7 ± 1.0	0.02
Bilateral (at Rest)	2.8 ± 2.1	1.9 ± 1.5	1.3 ± 1.2	0.03
Unilateral (on Movement)	4.4 ± 2.4	3.2 ± 1.8	1.9 ± 1.2	0.04
Bilateral (on Movement)	5.1 ± 2.6	3.8 ± 2.0	2.4 ± 1.4	0.01
Difficulty Falling Asleep	1.2 ± 1.7	0.7 ± 1.3	0.5 ± 1.1	0.03
Staying Asleep	1.1 ± 0.9	0.5 ± 1.1	0.3 ± 0.7	0.02

DOI: https://doi.org/10.54393/pjhs.v5i10.2003

DISCUSSION

Post-operative pain following Lichtenstein inguinal hernia repair was a common concern and can significantly impact patient recovery. Initially, patients may experience moderate to severe pain, particularly during movement and physical activities. However, with effective pain management strategies, pain typically decreases substantially over the first week post-surgery [13]. This study provides a comprehensive analysis of post-operative pain and its management over a specified period following Lichtenstein repair of inguinal hernia. At 24 hours' post-surgery, 78.3% of patients reported experiencing pain, which decreased to 69.6% at 48 hours and further to 54.1% by the end of the first week. This gradual decline in pain occurrence over time aligns with findings from other studies, indicating that effective pain management strategies can lead to significant pain reduction [14]. Pain relief achieved through pain treatment was reported by 67.3% of patients at 24 hours, increasing to 74.2% at 48 hours and 81.5% at one week. This trend suggests that the pain management strategies employed were increasingly effective over time. Pain scores provide detailed insights into different pain experiences at various stages post-surgery. At 24 hours, pain at rest was relatively low (2.4 ± 1.9) but higher during movement (4.7 ± 2.5), indicating that movement exacerbates pain. The least pain experienced was 2.1 ± 1.5, while the worst pain experienced was notably higher at 5.9 ± 2.1. Pain during movement in bed was 3.2 ± 2.1, and pain while engaging in activities out of bed was 4.5 ± 2.3, indicating significant discomfort associated with mobility. These findings correlate with a randomized control trial by Kumar S which revealed that post-operative pain was less in patients managed by Lichtenstein repair for inguinal hernia [14]. At 48 hours, there was a noticeable decrease in pain scores: at rest (1.7 ± 1.4), during movement (3.5 ± 1.9), least pain experienced (1.9 ± 1.2), and worst pain experienced (3.9 ± 1.9). Pain during movement in bed (1.9 ± 1.4) and while engaging in activities out of bed (3.1 ± 1.2) also showed reductions, with pain scores for falling asleep (0.7 ± 1.3) and staying asleep (0.5 ± 1.1) remaining low. These findings were consistent with another randomized control trial, which found comparable post-operative pain reduction in Lichtenstein hernia repair and the transabdominal extra-peritoneal hernia repair procedure [15]. Additionally, studies comparing the sutureless hernioplasty with Lichtenstein repair have reported that average visual analogue scale (VAS) pain scores were significantly lower in sutureless hernioplasty than in Lichtenstein hernioplasty (2.2±1.0 vs. 4.0±1.1) [16]. Further supporting these findings, Robert Beaumont Wilson compared Lichtenstein procedures with and without mesh fixation for inguinal hernia repair and recorded that operative time and pain scores in the non-fixation group were significantly lower, without any increase in rates of recurrence [17]. Post-operative pain was found to be significantly less in the study group, which was one of the most important factors affecting postoperative life quality [18, 19]. Interestingly, a recent study found that the choice of mesh or fixation method had no effect on the overall long-term outcome, pain, or recurrence of hernia. Less penetrating fixation methods, such as glue or self-gripping mesh, were shown to be safe options for mesh fixation in Lichtenstein hernia repair [20]. This indicates that various approaches to mesh fixation can be considered depending on patient needs and surgeon preference. Overall, the data indicate a significant reduction in pain over the first week post-surgery, with pain management strategies proving increasingly effective. While initial post-operative pain, especially during movement, was notable, it decreased substantially over time, enhancing patient comfort and recovery [20]. Insights from the study can inform patient education materials, enabling better preparation for expected pain levels and leading to improved post-operative satisfaction and compliance with pain management protocols. However, this study has some limitations, including a potentially limited sample size, which may affect the generalizability of the results. Additionally, pain assessment was inherently subjective, with variability in individual pain thresholds and perceptions potentially leading to inconsistencies in reported pain scores [21]. The duration of follow-up may also not be sufficient to capture long-term post-operative pain outcomes. Considering the results of this study and the findings from other studies, it can be hypothesized that the frequency of post-operative pain was less in patients managed by Lichtenstein repair without mesh fixation compared to those managed with mesh fixation. Furthermore, one of the main limitations of our study was not using a control group for a comparison of the Lichtenstein repair. So, further local and multicenter trials were required to validate these results and explore optimal pain management strategies for patients undergoing inguinal hernia repair.

CONCLUSIONS

Based on the findings of this study assessing post-operative pain scores following Lichtenstein repair of inguinal hernia, it can be concluded that the majority of patients experienced pain within acceptable limits, suggesting that Lichtenstein repair was effective in minimizing immediate post-operative discomfort. However, further investigations may be warranted to explore additional factors influencing pain outcomes and to optimize pain management strategies in this surgical context.

Authors Contribution

Conceptualization: JB
Methodology: AI, JB, AC
Formal analysis: AHM
Writing, review and editing: MAK, NA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

DOI: https://doi.org/10.54393/pjhs.v5i10.2003

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Ma Q, Jing W, Liu X, Liu J, Liu M, Chen J. The global, regional, and national burden and its trends of inguinal, femoral, and abdominal hernia from 1990 to 2019: findings from the 2019 Global Burden of Disease Study-a cross-sectional study. International Journal of Surgery. 2023 Mar; 109(3): 333-42. doi:10.1097/JS9.0000000000000217.

[2] Wolf LL, Sonderman KA, Kwon NK, Armstrong LB, Weil BR, Koehlmoos TP *et al*. Epidemiology of abdominal wall and groin hernia repairs in children. Pediatric Surgery International. 2021 May; 37: 587-95. doi: 10.1007/s00383-020-04808-8.

[3] Lydeking L, Johansen N, Oehlenschläger J, Bay-Nielsen M, Bisgaard T. Re-recurrence and pain 12 years after laparoscopic transabdominal preperitoneal (TAPP) or Lichtenstein's repair for a recurrent inguinal hernia: a multi-centre single-blinded randomised clinical trial. Hernia. 2020 Aug; 24: 787-92. doi: 10.1007/s10029-020-02139-0.

[4] Moreton ML and Truter A. Evaluation of inguinal hernia repair using post-operative pain and quality of life metrics. Hernia. 2023 Feb; 27(1): 71-6.doi:10.1007/s10029-022-02701-y.

[5] Messias BA, Nicastro RG, Mocchetti ER, Waisberg J, Roll S, Junior MA. Lichtenstein technique for inguinal hernia repair: ten recommendations to optimize surgical outcomes. Hernia. 2024 Aug;28(4):1467-76.Sidharta N, Irawan A, Siregar J, Lugito N. Comparison of Early Postoperative Pain between Lightweight Mesh and Heavyweight Mesh in Lichtenstein Hernia Repair for Geriatric Patients at Rumah Sakit Siloam Karawaci from January 2018-December 2019. Medicinus. 2023; 10(1). doi:10.19166/med.v10i1.6989.

[6] Mulita F, Parchas N, Solou K, Tchabashvili L, Gatomati F, Iliopoulos F *et al*. Postoperative pain scores after open inguinal hernia repair: comparison of three postoperative analgesic regimens. Medical Archives. 2020 Oct; 74(5): 355. doi: 10.5455/medarh.2020.74.355-358.

[7] Olsson A, Sandblom G, Franneby U, Sondén A, Gunnarsson U, Dahlstrand U. Do postoperative complications correlate to chronic pain following inguinal hernia repair? A prospective cohort study from the Swedish Hernia Register. Hernia. 2023 Feb; 27(1): 21-9. doi: 10.1007/s10029-021-02545-y.

[8] Jain SK, Bhatia S, Hameed T, Khan R, Dua A. A randomised controlled trial of Lichtenstein repair with Desarda repair in the management of inguinal hernias. Annals of Medicine and Surgery. 2021 Jul; 67: 102486. Aguilar-García J, Villafuerte-Fernandez R, Ntezes-Hidalgo PI, Meade-Aguilar JA, Ramirez-GarciaLuna JL, Martinez-Jimenez MA. Postoperative inguinal pain and disability after Lichtenstein versus ONSTEP hernia repair: analysis of responses to the inguinal pain questionnaire in Spanish. Surg Today. 2021; 51: 703-712. doi: 10.1007/s00595-020-02155-8.

[9] Rahman MM. Sample size determination for survey research and non-probability sampling techniques: A review and set of recommendations. Journal of Entrepreneurship, Business and Economics. 2023 Feb; 11(1): 42-62.

[10] Zhu X, Liu Z, Shen J, Liu J, Tang R. Comparison of open and laparoscopic inguinal-hernia repair in octogenarians. Asian Journal of Surgery. 2023 Feb; 46(2): 738-41. doi: 10.1016/j.asjsur.2022.06.149.

[11] Riaz MI, Ahmed I, Bibi A, Usman F, Kandaan AU, Bibi A *et al*. Post-operative Pain after Lichtenstein Inguinal Hernia Repair. Pakistan Journal of Medical & Health Sciences. 2023 Apr; 17(03): 337-. doi:10.53350/pjmhs2023173337.

[12] Demetrashvili Z and Ekaladze E. Chronic Pain after Lichtenstein Inguinal Hernia Repair. Research Developments in Medicine and Medical Science1. doi: 10.9734/bpi/rdmms/v2/5046E.

[13] Bökkerink WJ, Koning GG, Malagic D, Hout LV, Laarhoven CJ, Vriens PW. Long-term results from a randomized comparison of open transinguinal preperitoneal hernia repair and the Lichtenstein method (TULIP trial). Journal of British Surgery. 2019 Jun; 106(7): 856-61. doi: 10.1002/bjs.11178.

[14] Kumar S. Post-operative complications and pain comparison between modified Bassini's repair and Lichtestein's hernioplasty in inguinal hernia repair. International Surgery Journal. 2021 Jan; 8(2): 579-82. doi: 10.18203/2349-2902.isj20210367.

[15] Wilson RB and Farooque Y. Risks and prevention of surgical site infection after hernia mesh repair and the predictive utility of ACS-NSQIP. Journal of Gastrointestinal Surgery. 2022 Apr; 26(4): 95064.doi: 10.1007/s11605-022-05248-6.

[16] Gomes CA, Gomes FC, Podda M, Braga AP, Ribeiro SC, Vaz LF. Liechtenstein versus laparoscopic transabdominal preperitoneal (TAPP) hernia repair: a prospective comparative study focused on postoperative outcomes in a general surgery unit. ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo). 2022 Jan; 34: e1642. doi: 10.1590/0102672020210002e1642.

[17] Techapongsatorn S, Tansawet A, Pattanaprateep O, Attia J, Mckay GJ, Thakkinstian A. Cost-effectiveness analysis of mesh fixation techniques for laparoscopic and open inguinal hernia surgeries. BioMed Central Health Services Research. 2022 Sep; 22(1): 1125. doi: 10.1186/s12913-022-08491-4.

DOI: https://doi.org/10.54393/pjhs.v5i10.2003

[18] Schaaf S, Willms A, Schwab R, Güsgen C. Recommendations on postoperative strain and physical labor after abdominal and hernia surgery: an expert survey of attendants of the 41st EHS Annual International Congress of the European Hernia Society. Hernia. 2022 Jun: 26(3): 727-734. doi:10.1007/s10029-021-02377-w.

[19] Moreton ML, Truter A. Evaluation of inguinal hernia repair using post-operative pain and quality of life metrics. Hernia. 2023 Feb; 27(1): 71-6. doi: 10.1007/s10029-022-02701-y.

[20] Vallipriya V and Surendran S. Comparison of outcome between laparoscopic inguinal hernia repair and open inguinal hernia repair. International Surgery Journal. 2022 May; 9(6): 1231-5. doi:10.18203/2349-2902.isj20221335.

[21] Riaz MI, Ahmed I, Bibi A, Usman F, Kandaan AU, Bibi A *et al.* Post-operative Pain after Lichtenstein Inguinal Hernia Repair. Pakistan Journal of Medical & Health Sciences. 2023 Apr; 17(03): 337-. doi: 10.53350/pjmhs2023173337.