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Original Research Article

A comparison of postoperative pain and duration of hospital stay between Lichtenstein's repair and laparoscopic repair of inguinal hernia

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ABSTRACT

Background: This comparative study is to focus on advantage and disadvantage of two types of procedures: open and laparoscopic hernioplasty regarding postoperative pain and duration of hospital stay. Even if similar studies has been conducted outside of Kerala, there is no statistics available from a tertiary care centre in Kerala. In order to promote a more efficient repair approach, I aim to conduct this research to assess the outcomes of both open and laparoscopic repairs and determine whether the minimally invasive repair is superior to open in our setup. The study compares the length of hospital stay and postoperative pain among Lichtenstein's open hernioplasty and laparoscopic hernioplasty.
Methods: The 32 patients with unilateral inguinal hernias underwent laparoscopic or Lichtenstein's tension-free repair from November 2022 to March 2024 at the Pushpagiri institute of medical sciences in Tiruvalla. This research was a longitudinal observational study.
Results: The comparison of post-operative pain among different groups on various post-operative days on day 2, day 7, day 30 and day 180 revealed a median pain score of 4.5 on day 2, decreasing to 1.5 on day 7, and reaching zero on day 30 as well as day 180. For Lichtenstein's repair, the average duration of hospitalization was 2.5 days and for laparoscopic repair, it was 2 days.
Conclusions: Laparoscopic repair was found better in terms of less postoperative pain but no discernible variation among the two groups when duration of hospital stay is concerned.

Keywords: Lichtenstein's tension free repair, Laparoscopic hernia repair Inguinal hernia, Post-operative pain, Hospital stay

INTRODUCTION

The previous era of hernia surgery is extensive, and since prehistoric times, doctors have worked to gradually improve it. In actuality, knowing the anatomy of groin is a game of precision; the player who comprehends the anatomy of the groin will have the best chance of performing an impeccable repair. One of the most prevalent general surgical interventions was herniorrhaphy, with estimated millions of hernia operations done yearly in the US and the number continuing to climb. The results of surgeries have significantly improved as a result of advancements in prosthetic materials, surgical procedures, and usage knowledge.[1] However, open Lichtenstein and laparoscopic procedures are widely recognized as the best therapeutic alternatives for inguinal hernia repair.[2] Recurrence, extended hospital stays, and post-operative

pain are common issues following hernia surgery. Hernia surgery centres with a failure rate of less than 1% are known to specialize in this operation.

Primary indicators of a successful groin hernia repair procedure include the procedure's longevity, lowest rate of complications, lowest possible cost, and fastest possible return to baseline functional status. This success is primarily dependent on the surgeon's skills, preoperative patient selection and preparation, surgical procedure expertise, and the materials that are currently accessible for repair.1The past ten years have seen a major growth in endoscopic hernia surgery due to the development of novel operating techniques. Around the world, certain centres regularly conduct open hernia surgery on day-care patients. For patients right after surgery, prolonged hospital stays and post-operative pain are especially concerning.

Comparing laparoscopic hernioplasty to open hernioplasty, surgeons assert that there is less postoperative pain and a shorter hospital stay following surgery. In any case, there is still debate over the ideal approach to repair an inguinal hernia. This study compared the open procedure to the laparoscopic approach in terms of hospital stay and pain following surgery.

Evidence-based medicine is the most scientific approach to determine whether one approach is superior to another. Thus, laparoscopic mesh repair and open hernia repair should be contrasted. Here, we contrast laparoscopic repair and Lichtenstein tension-free open hernioplasty by comparing the two groups' hospital stays and postoperative pain.

Objectives

Objectives were to evaluate the differences between open and laparoscopic hernioplasty postoperative complications in terms of pain and length of hospital stay and to determine which of the two inguinal hernia repair techniques had the lowest rate of complications.

METHODS

Study design

It was a longitudinal observational study.

Study setting

Study conducted at department of general and laparoscopic surgery, Pushpagiri institute of medical sciences and research centre (PIMS and RC), Tiruvalla.

Study period

Study carried out from November 2022 to March 2024.

Study population

All cases of inguinal hernia repair (open and laparoscopic) performed in department of general and laparoscopic surgery.

Inclusion criteria

All cases of primary uncomplicated unilateral direct or indirect inguinal hernia operated in elective theatre at PIMS and RC.

Exclusion criteria

Individuals with bilateral hernias, sliding hernias, or recurring hernias, patients with non-reducible, obstructed or strangulated hernias, those patients who have contraindication to pelvic laparoscopy and patients with previous pelvic surgery were excluded.

Sample size

To calculate the sample size, I used the formula

$n=(Z\alpha + Z1-\beta)\ 2 \times S1\ 2 + S2\ 2\ (\mu 1 - \mu 2)\ 2$

n= sample size per group

Zα at 95% CI=1.96

Z1-β at 80% power=0.84

S1=Standard deviation of 1st group

S2=Standard deviation of 2nd group

Assuming 95% confidence interval and 80% power based on mean and standard deviation of mean severity of post-operative pain of each group (reference study), the required minimum sample size is 16 in each group, with a total minimum sample size is 32.[1]

Sampling method

Sampling method was non-probability sampling study.

Variables

Pre-operative variables include age, sex, BMI, comorbidities, previous laparotomy, number of viable pregnancies, smoking. Clinical variables include hernia type, size, defect size, hernia location

Dependent variable

Type of mesh repair (same weight mesh used for both procedures), outcome variable: post-operative pain, duration of hospital stays.

Study tool

Performa questionnaire form which includes 100mm VAS for assessment of delayed post-operative pain. Consent form, patient information sheet and tables that illustrate the length of hospital stay and post-operative pain between Lichtenstein's open hernia repair and laparoscopic hernia repair.

Method of data collection

Patients in general surgery wards and posted for inguinal hernia repair (both open vs laparoscopy) are included after obtaining informed written consent. ¬a proforma is used for the study, accordingly clinical history and findings are documented before during and after surgery ¬standard antibiotic chemoprophylaxis is given before surgery and during anaesthesia. ¬type of procedure (open or laparoscopy) ¬patients are followed up at the intervals of post-operative day 2, day7, after 1 month and after 6 months of surgery using proforma and pain scale.

Statistical analysis

In order to compare the pain in between two procedures, Mann Whitney test is to be used (data is ordinal 10 point, only nonparametric test is suitable). To compare the pain in different time period, Friedman's test to be used (data is ordinal 10 point, only non-parametric test is suitable). To compare the period of stay, Mann Whitney test to be used (if the data is not normal). If the data is normal, independent samples t test can be used.

RESULTS

This study was conducted among 32 patients undergoing inguinal hernia repair in tertiary care centre in south Kerala. Study participants divided into 2 groups based on repair technique used-Lichtenstein's repair group (16 subjects) and laparoscopic repair group (16 subjects).

Study population consisted of 84.4% (n=27) males and 15.6% (n=5) females. Among 16 cases of Lichtenstein's repair, 81.3% were male and 18.7% were female. Similarly, for Laparoscopic repair, 87.5% were male and 12.5% were female out of a total of 16 cases. Fisher's exact test yielded a p=1.00, indicating that the observed gender distribution was not statistically significant different between the two procedure groups.

The mean age of the study population was 55.59 years with a standard deviation of13.807 years (23 years-76 years). The average age for Lichtenstein's repair group was 57.88 with a standard deviation of 10.960, while for Laparoscopic repair group, it was 53.31 years with a standard deviation of 16.210. The independent samples t-test resulted in a t=0.933 and a p=0.358, indicating that the difference in mean ages between the two-procedure groups was not statistically significant. Hence, the two groups were comparable with respect to age.

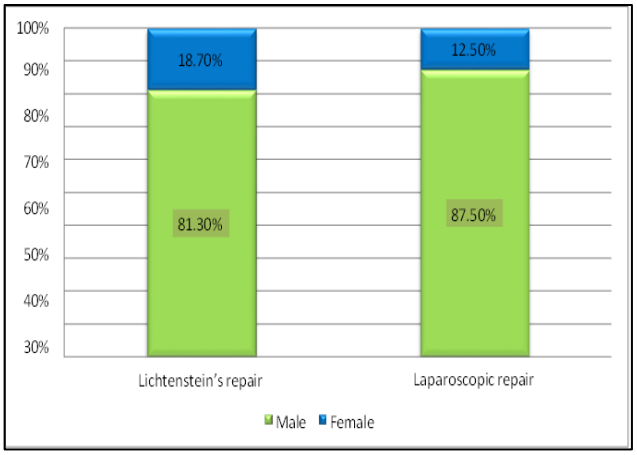

Figure 1: Distribution of study population based on gender and type of procedure.

Table 1: Table based on type of comorbidities.

Comorbidity	N	Percent (%)
Hypertension	10	31.30
Diabetes mellitus	6	18.80
Dyslipidemia	6	18.80
Coronary artery disease	3	9.40
Bronchial asthma	2	6.30
COPD	2	6.30
Obstructive airway disease	1	3.10
Chronic kidney disease	1	3.10
BPH	1	3.10

In the Lichtenstein's repair group, 56.3% had comorbidities, while 43.8% did not. Conversely, in the laparoscopic repair group, 43.8% had comorbidities, and 56.3% did not. The chi-square test yielded a chi-square value of 0.50 with a p=0.480, signifying that the observed differences in comorbidity status between the two procedure groups were not statistically significant. Hence the two groups were comparable in this aspect also.

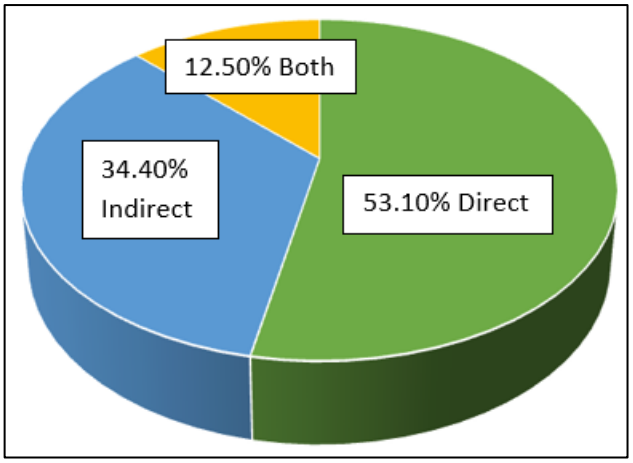

Figure 2: Distribution of study population based on type of inguinal hernia.

Among Lichtenstein's repair group, 56.3% had direct inguinal hernias, 25.0% had indirect hernias, and 18.8% had both types. Similarly, in laparoscopic repair group, 50.0% had direct hernias, 43.8% had indirect hernias, and 6.3% had both types. The total distribution across both groups showed that 53.1% had direct hernias, 34.4% had indirect hernias, and 12.5% had both types. These findings provide an overview of prevalence of different inguinal hernia types in the studied population and offer insights into distribution of hernia types among patients undergoing 2 different surgical procedures. Chi-square test revealed a test statistic ($\chi2$) of 1.877 with a p=0.379, indicating that distribution of inguinal hernia types did not significantly differ between 2 surgical approaches. This suggests comparable distribution of hernia types among patients undergoing Lichtenstein's repair and laparoscopic repair procedures. In this study, postop pain scores assessed on days 2, 7, 30 and 180 following surgeries, revealing a median pain score of 4.5 (IQR: 4) on day 2, decreasing to 1.5 (IQR: 3) on day 7, and reaching 0 (IQR: 0) on day 30 and 180. Friedman test indicated significant differences over time for overall pain scores ($\chi2$=86.93, p<0.001), Lichtenstein's repair group ($\chi2$=47.204, p<0.001) and laparoscopic repair group ($\chi2$=43.541, p<0.001).

On day 2, median pain score 6 (IQR: 1) for Lichtenstein's repair group and 2 (IQR: 1) for laparoscopic repair group, with a significant difference indicated by Mann Whitney U test (Z=5.000, p<0.001). By day 7, the pain scores further decreased to 2.5 (IQR: 1) for Lichtenstein's repair and 0 (IQR: 1) for laparoscopic repair, again showing significant difference (Z=5.015, p<0.001). However, by day 30, both groups reported median pain scores of 0 (IQR: 0), Mann Whitney U test showed no significant difference (Z=1.791, p=0.073).

These results suggest that laparoscopic repair may provide a quicker reduction in postoperative pain compared to Lichtenstein's repair in the early recovery period, though both methods ultimately result in similar pain outcomes by the one-month mark.

The median duration of hospitalization was found to be 2.5 days (IQR: 1) for Lichtenstein's repair and 2 days (IQR: 1) for laparoscopic repair. The Mann Whitney U Test revealed no significant difference between the two groups, with a test statistic (Z) of 0.495 and a p=0.621. These findings suggest that there is no statistically significant distinction in the duration of hospital stays among the two surgical approaches.

Table 2: Description of study participants based on type of inguinal hernia and type of procedure.

Procedure group	Type of inguinal hernia, N (%)			Total, n (%)
	Direct	Indirect	Both	
Lichtenstein's repair	9 (56.3)	4 (25.0)	3 (18.8)	16 (100%)
Laparoscopic repair	8 (50.0)	7 (43.8)	1 (6.3)	16 (100%)
Total	17 (53.1)	11 (34.4)	4 (12.5)	32 (100%)

$\chi2$=1.877, p=0.379 (not significant).

Table 3: Comparison of median pain scores on various post-operative days within various procedure groups.

Post-operative day	Median pain score (IQR), N (%)		
	Overall	Lichtenstein's repair group	Laparoscopic repair group
Day 2	4.5 (4)	6 (1)	2 (1)
Day 7	1.5 (3)	2.5 (1)	0 (1)
Day 30	0 (0)	0 (0)	0 (0)
Day 180	0 (0)	0 (0)	0 (0)
Test statistic and p value (Friedman test)	$\chi2$=86.93, p<0.001	$\chi2$=47.204, p<0.001	$\chi2$=43.541, p<0.001

Table 4: Comparison of pain scores between two procedure groups on various post-operative days.

Post-operative day	Pain score {Median (IQR)}, N (%)		Test statistic and p value (Mann Whitney U test)
	Lichtenstein's repair group	Laparoscopic repair group	
Day 2	6 (1)	2 (1)	Z=5.000, p<0.001
Day 7	2.5 (1)	0 (1)	Z=5.015, p<0.001
Day 30	0 (0)	0 (0)	Z=1.791, p=0.073

Table 5: Comparison of duration of hospital stay between two procedures groups.

Procedure group	Median duration of hospital stays in days (IQR)	Test statistic and p value (Mann Whitney U Test)
Lichtenstein's repair	2.5 (1)	Z=0.495, p=0.621
Laparoscopic repair	2 (1)	

DISCUSSION

Post operative pain

Post-operative pain is an inevitable sequela after every surgery. But it becomes a problem when it persists and affects one's routine works. "Pain persisting for more than 3 months is called chronic pain". According to study conducted by Salma and et al post-operative pain was less after laparoscopic repair.[1] Study conducted by Solanki and et al post-operative pain was higher in open group.[3]

In our study group, the results suggest that laparoscopic repair provide a quicker reduction in postoperative pain compared to Lichtenstein's repair in the early recovery period but by one month the pain outcome was similar.

Duration of hospital stay

According to study conducted by Salma and et al there was no difference in hospital stay among the 2 study groups.[1] In our study also the finding was consistent; there was no difference in hospital stay amidst 2 groups.

Gender and type of procedure

Among the 16 cases of Lichtenstein's repair, 81.3% were male and 18.7% were female. Among the 16 cases of laparoscopic hernia repair, 87.5% were male and 12.5% were female. In our study it was found that the observed gender distribution was not statistically significant.

Age

Study by Salma et al the mean age was 61.48. In our research the mean age was 55.59 and the difference in mean ages between the 2 procedure groups were not found significant.

Comorbidities

COPD coexists with inguinal hernia in two cases.[2,3] It is said that formation of inguinal hernias are associated with collagen metabolism alterations.[4] Uncertain data suggests that aortic aneurysms and thoracic aortic disease also increase the risk of developing hernia. Risk factors include prostatic enlargement, chronic obstructive lung disease, and persistent coughing. Out of 313 cases analysed by Chubata and et al the most common health conditions associated with the patients were: High blood pressure (34.19%), Smoking (16.61%), diabetes (9.58%), hypothyroidism (4.47%) and chronic obstructive pulmonary disease (COPD) (3.19%).[5]

According to our study, the majority of patients who initially had inguinal hernias also had dyslipidaemia, diabetes, and hypertension as comorbidities.

Side and type of hernia

Right sided inguinal hernias were more common than left in our study. It was 78.1%. Among them 81.3% underwent Lichtenstein's open repair and 75% underwent laparoscopic repair. Among the total number of inguinal hernias, 53.1% were direct hernias and 34.4 % were indirect hernia. 12.5% presented with both types Among Lichtenstein's repair group, 56.3% had direct inguinal hernias, 25.0% had indirect hernias, and 18.8% had both types. Similarly, in the laparoscopic repair group, 50.0% had direct hernias, 43.8% had indirect hernias, and 6.3% had both types. The total distribution across both groups showed that 53.1% had direct hernias, 34.4% had indirect hernias, and 12.5% had both types. These findings provide an overview of the prevalence of different inguinal hernia types in the studied population and offer insights into the distribution of hernia types among patients undergoing the two different surgical procedures.

But this difference is not found significant.

Limitations

My study shows that there is less postoperative pain for laparoscopic hernia repair when compared to open approach but length of hospital stay does not vary among the two groups. The study included only unilateral hernias. This study's results might have been different if bilateral hernias were included. Our institution only performs the TAPP procedure, but not TEP so that I could not compare which among the two laparoscopic approaches is better which too I consider as a limitation of my study.

CONCLUSION

Primary unilateral inguinal hernias can be treated in a number of ways, including laparoscopic transabdominal preperitoneal repair, Lichtenstein's tension-free open hernia approach, and laparoscopic completely extra peritoneal approach. When taking the length of the surgery and the learning curve into account, Lichtenstein's repair is superior. But laparoscopic repair is preferable when taking into account things like post-operative pain and length of hospital stay.

Consequently, laparoscopic repair (TAPP) is superior, as per the current study.

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