



## Comparative Study of Inguinal Hernia Repair under Local Anesthesia versus Spinal Anesthesia in Reducing Hospital Stay of Patient

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### Declaration

#### Authors' Contribution

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### ABSTRACT

**Background:** Inguinal hernia is a very common problem in men. Mostly end in hernia repair. As inguinal hernia present in lower abdomen, below umbilicus, repair can be done under spinal anesthesia. Local anesthesia can also be a good replacement for spinal anesthesia. But local evidence is scarce and need to conduct a trial to find more effective and beneficial mode of anesthesia in inguinal hernia repair. **Objective:** To compare and evaluate the outcomes of inguinal hernia repair under local anesthesia versus spinal anesthesia in reducing inpatient stay. **Study Design:** Randomized controlled trial. **Place and Duration:** Surgery Department, Lahore General Hospital, Lahore from September 2022 to March 2023. **Material and Methods:** There were 40 people undergoing inguinal hernia repair who were enrolled. Consent was obtained, and demographics were noted. Patients were randomly segregated into two groups. In Group A, repair was done under local anesthesia, while in Group B, repair was done under spinal anesthesia. Outcomes were noted and analyzed using SPSS version 25. **Results:** In patients of local anesthesia, mean age was  $47.20 \pm 17.95$  years. In Spinal anesthesia group, mean age of patients was  $53.60 \pm 13.09$  years. The mean duration of hernia was  $2.20 \pm 1.61$  years vs.  $2.65 \pm 1.73$  years, respectively. The mean pain score on day 1 of surgery was  $1.85 \pm 0.88$  with local anesthesia and  $4.00 \pm 0.79$  with spinal anesthesia ( $p < 0.001$ ). Hematoma formed in 8 (40%) cases and seroma in 6 (30%) cases in spinal anesthesia group while zero in local anesthesia group. Urinary retention occurred in 3 (15%) vs. 12 (60%) cases ( $p < 0.05$ ). The mean time taken to start walking was  $1.00 \pm 0.00$  days with local anesthesia vs.  $1.55 \pm 0.51$  days with spinal anesthesia, started using stairs after  $2.30 \pm 0.47$  days vs.  $3.20 \pm 1.01$  days, mean time to return to work was  $4.75 \pm 0.91$  days vs.  $6.65 \pm 1.18$  days ( $p < 0.05$ ). **Conclusions:** The outcomes of local anesthesia are better than spinal anesthesia for inguinal hernia repair.

### INTRODUCTION

Surgery is a common approach for an inguinal hernia. More than 800,000 repairs are done every year. 75% of abdominal wall hernias occur in the inguinal region. Inguinal hernias occur most often between the ages of 5 and 70 years, with another peak around age 70 years.<sup>1</sup> The diagnosis may generally be made from the patient's history and physical examination only.<sup>2</sup> Groin discomfort is a common symptom, and it may be very intense in a few cases, including a dragging, heavy sensation in the groin, especially at the end of the day or after strenuous physical exercise.<sup>3,4</sup>

A physical examination of a patient who is coughing or straining entails feeling for a bulge or impulse. Physical examination may miss a hernia in an athlete, but ultrasonography or magnetic resonance imaging may aid in making the diagnosis if there is no discernible impulse

or bulge. Recurrent hernias, suspicion of hydrocele, and diagnostic or postoperative problems may all call for ultrasonography. Even though most hernias are treatable, surgery may not be required in cases where the hernia is minor and causes only mild symptoms. Patient should be counselled about the preferability of the open and the laproscopic method of repair. Hernia recurrence and surgical complications are quite rare. However, if feasible, a patient with recurrence should be referred back to the doctor who initially treated them.<sup>9-11</sup>

Depending on the medical history of the patient and the surgeon's consideration, open inguinal hernia repair may be performed under general, spinal, or local anesthesia. In healthy young patients, any of the three anesthetic methods may be safely provided by trained professionals in high-income countries (HICs). However, in individuals over the age of 65, general and spinal

anesthesia are associated with increased risks of myocardial infarction and urinary retention, respectively. Without standardization, the selection of mode of anesthesia for inguinal hernia surgery is arbitrary. Given the discrepancy between existing scientific data and clinical practice, well-designed research in this area is crucial.

Evidence favoring local anesthesia over spinal anesthesia in inguinal hernia repair was presented by van Veen et al. For inguinal hernia repairs, local anesthesia is the optimal choice. The local anesthetic procedure has an easy learning curve, is simple to administer and operate, and can enhance healthcare efficiency, particularly in open anterior repairs. Local anesthesia has been shown to be superior to both general and regional anesthesia for inguinal hernia repairs. It is cost-effective, reduces operating room time, shortens hospital stays, and lowers the risk of complications such as urine retention, nausea, vomiting, and the need for postoperative pain medication. Patients can resume eating and drinking early and regain mobility sooner after surgery.<sup>14</sup>

In routine, inguinal hernia repair is mostly done under spinal or general anesthesia. But internationally, it has been reported that local anesthesia is a better option for inguinal hernia repair with fewest number of complications. But very few studies has been done before and there is a need to investigate a new technique, which leads to less complications, thus reducing the hospital stay and early discharge from the hospital. Therefore, we conducted a trial to compare both types of anesthesia to attain evidence in favor of more appropriate and effective mode of anesthesia for future use.

### Objective

To compare and contrast the outcomes of inguinal hernia repair under local and spinal anesthesia in reducing hospital stay of patient.

## MATERIAL AND METHODS

**Study Design:** Randomized controlled trial

**Place and duration:** Department of Surgery, Lahore General Hospital, Lahore

**Duration:** 6 months after approval from ethical review committee i.e. from September 2022 to March 2023.

**Sample Size:** The sample size of 40 cases; 20 in each group was determined using 5% significance level, 90% power of test and percentage of urinary retention i.e. 2.86% with local anesthesia and 44.28% with spinal anesthesia.<sup>15</sup>

**Sampling Technique:** Non-probability consecutive sampling.

### Sample Selection

**Inclusion Criteria:** Males aged 20-60 years, diagnosed with inguinal hernia, planned to undergo surgery were included in the study with ASA I and II. Patients had groin pain, gurgling, burning or aching sensation in the groin and heavy dragging sensation in evening or night or after prolonged activity and showing an abdominal bulge in prone position.

**Exclusion Criteria:** According to the exclusion criteria, the following participants were excluded: recurrent or

bilateral hernias, active skin infections, allergy history to lignocaine or bupivacaine. Patients with irreducible, incarcerated, obstructed, strangulated hernias were excluded from the study.

**Data Collection Procedure:** The research was conducted with the approval of the "Ethical Review Board". Informed consents were obtained from all candidates. All demographic data, including age, gender, BMI, duration of hernia, risk factors, type of hernia, type of surgery and suture type were recorded. Patients were randomly divided into two groups. In group A, repair was done under local anesthesia. In group B, repair was done under spinal anesthesia. Outcomes in terms of pain, urinary retention, hematoma, seroma, wound or port site infection, any other treatment required and return to daily routine were noted in specially designed proforma.

**Statistical Analysis:** Statistical Package for the Social Sciences (SPSS) version 26 was used to analyze the data. Both groups were compared by using independent samples t-test for numeric variables and chi-square test for categorical variables. *P*-value  $\leq 0.05$  was considered as significant.

## RESULTS

In patients of local anesthesia, mean age was  $47.20 \pm 17.95$  years. In Spinal Anesthesia Group, mean age of patients was  $53.60 \pm 13.09$  years. In local anesthesia group, 3 (15%) were farmer, 2 (10%) were programmers, 6 (3%) were shopkeepers, 6 (30%) were workers and 3 (15%) were zameendar. In spinal anesthesia group, 3 (15%) were doctor, 3 (15%) were farmer, 6 (3%) were shopkeeper, and 5 (25%) were workers. Out of 40, 37 were married, with 17 (8%) in the local anesthesia group and 20 (100%) in the spinal anesthesia group. In local anesthesia group, 9 (45%) were primary pass, and 11 (55%) were BA pass. In spinal anesthesia group, 3 (15%) were primary pass, 14 (70%) were BA pass and 3 (15%) were MBBS doctors. The mean duration of hernia was  $2.20 \pm 1.61$  years vs.  $2.65 \pm 1.73$  years, respectively. In local anesthesia group, 8 (40%) patients already had hospital visit or treatment before while in spinal anesthesia group, 6 (30%) patients already had hospital visit or treatment before. Out of 40, 25 were smokers (11 (55%) vs. 14 (70%)), 6 had chronic obstructive pulmonary disease (6 (30%) vs. 0 (0%)), chronic cough in 8 (40%) vs. 3 (15%), heavy weight lifting in 6 (30%) vs. 8 (40%) cases, constipation in 5 (20%) vs. 12 (60%), urinary tract infection in 3 (15%) vs. 0 (0%), steroids intake in 3 (15%) vs. 3 (15%), anemia was found in 5 (20%) vs. 12 (60%) cases, respectively. In both groups, 3 (15%) cases had previous hernioplasty and presented with recurrent hernia. Unilateral hernia was present in 17 (85%) vs. 8 (40%) cases, direct hernia in 0 (0%) vs. 9 (45%) cases, and complete hernia in 6 (30%) vs. 6 (30%), respectively. Hernia were reducible in 18 (90%) cases in local anesthesia group while in 17 (85%) cases in spinal anesthesia group. No case was converted to general anesthesia due to any complication occur in particular type of anesthesia. **Table # 1**

In local anesthesia group, 3 (15%) patients had emergency hernia repair while 18 (85%) had elective procedure. In spinal anesthesia group, 6 (30%) patients

had emergency hernia repair while 14 (70%) had elective procedure ( $p>0.05$ ). In local anesthesia group, all surgeries (100%) were supervised while in spinal anesthesia group, 17 (85%) surgeries were supervised. In local anesthesia group, all surgeries were performed by open method while in spinal anesthesia group, 11 (55%) cases were performed by open method ( $p<0.05$ ). Mesh repair was done in 17 (85%) cases in both groups. The mean pain score on day 1 of surgery was  $1.85 \pm 0.88$  with local anesthesia and  $4.00 \pm 0.79$  with spinal anesthesia, pain score after 2 weeks was  $2.70 \pm 0.73$  with local anesthesia and  $5.00 \pm 0.79$  with spinal anesthesia ( $p<0.001$ ). In local anesthesia, only 3 (15%) cases demanded for extra analgesia, while in spinal anesthesia group, all (100%) patients demanded for extra analgesia due to pain score  $>3$ . Hematoma formed in 8 (40%) cases and seroma in 6 (30%) cases in spinal anesthesia group while zero in local anesthesia group. Urinary retention occurred in 3 (15%) vs. 12 (60%) cases ( $p<0.05$ ), but wound or port site infection was insignificant i.e. 3 (15%) vs. 8 (40%) ( $p>0.05$ ), respectively. The mean time taken to start walking was  $1.00 \pm 0.00$  days with local anesthesia and  $1.55 \pm 0.51$  days with spinal anesthesia, started using stairs after  $2.30 \pm 0.47$  days with local anesthesia and  $3.20 \pm 1.01$  days in spinal anesthesia group, mean days to start driving was  $2.15 \pm 0.37$  days with local anesthesia and  $4.05 \pm 1.10$  days with spinal anesthesia, mean time to return to work was  $4.75 \pm 0.91$  days vs.  $6.65 \pm 1.18$  days and started lifting heavy objects in  $8.15 \pm 0.67$  days vs.  $11.00 \pm 0.80$  days ( $p<0.05$ ). **Table # 2**

**Table 1***Basic characteristics of patients in study groups*

	Group	
	Local anesthesia	Spinal anesthesia
Age (years)	47.20 $\pm$ 17.95	53.60 $\pm$ 13.09
<b>Occupation</b>		
At home	0 (0%)	3 (15%)
Doctor	0 (0%)	3 (15%)
Farmer	3 (15%)	3 (15%)
Programmer	2 (10%)	0 (0%)
Shopkeeper	6 (3%)	6 (30%)
Worker	6 (30%)	5 (25%)
Zameendar	3 (15%)	0 (0%)
<b>Marital status</b>		
Married	17 (85%)	20 (100%)
Unmarried	3 (15%)	0 (0%)
<b>Education</b>		
Primary	9 (45%)	3 (15%)
BA pass	11 (55%)	14 (70%)
Doctor	0 (0%)	3 (15%)
Duration of hernia (in years)	2.20 $\pm$ 1.61	2.65 $\pm$ 1.73
Any hospital visit or treatment before	8 (40%)	6 (30%)
Smoker	11 (55%)	14 (70%)
Chronic obstructive pulmonary disease	6 (30%)	0 (0%)
Chronic cough	8 (40%)	3 (15%)
Heavy weight lifter	6 (30%)	8 (40%)
Constipation	5 (20%)	12 (60%)
Urinary tract infection	3 (15%)	0 (0%)
Intake of steroids	3 (15%)	3 (15%)
Anemia	5 (20%)	12 (60%)
Any previous surgery (hernioplasty)	3 (15%)	3 (15%)
<b>Type of hernia</b>		
Unilateral	17 (85%)	8 (40%)
Bilateral	3 (15%)	12 (60%)
Direct hernia	0 (0%)	9 (45%)

Indirect hernia	20 (100%)	11 (55%)
Complete hernia	6 (30%)	6 (30%)
Incomplete hernia	14 (70%)	14 (70%)
Reducible	18 (90%)	17 (85%)
Irreducible	2 (10%)	3 (15%)
Primary hernia	17 (85%)	17 (85%)
Recurrent	3 (15%)	3 (15%)
Anesthesia converted to general anesthesia	0 (0%)	0 (0%)
Any anesthesia related complication	0 (0%)	0 (0%)

**Table 2***Comparison of outcome in both groups*

	Group		P-value
	Local anesthesia	Spinal anesthesia	
Type of surgery			
Emergency	3 (15%)	6 (30%)	0.258
Elective	17 (85%)	14 (70%)	
Supervised/unsupervised			
Supervised	20 (100%)	17 (85%)	0.072
Unsupervised	0 (0%)	3 (15%)	
Method			
Open	20 (100%)	11 (55%)	0.001
Laparoscopic	0 (0%)	9 (45%)	
Repair method			
Mesh repair	17 (85%)	17 (85%)	$>0.99$
Suture repair	3 (15%)	3 (15%)	9
Mesh used (propylene)	20 (100%)	20 (100%)	NA
Anchored with (proline)	20 (100%)	20 (100%)	NA
Laparoscopic method (TEP)	0 (0%)	9 (100%)	NA
TEP converted to TAPP	-	0 (0%)	NA
Laparoscopic converted to open surgery	-	0 (0%)	NA
Pain score on postoperative day 1	1.85 $\pm$ 0.88	4.00 $\pm$ 0.79	0.000
Pain score on postoperative week 2	2.70 $\pm$ 0.73	5.00 $\pm$ 0.79	0.000
Need for extra analgesia	3 (15%)	20 (100%)	0.000
Hematoma	0 (0%)	8 (40%)	0.002
Seroma	0 (0%)	6 (30%)	0.008
Urinary retention	3 (15%)	12 (60%)	0.003
Wound or port site infection	3 (15%)	8 (40%)	0.077
Complication develop on postoperative day	0 (0%)	0 (0%)	NA
Any other complication	0 (0%)	0 (0%)	NA
Days to start			
Walking	1.00 $\pm$ 0.00	1.55 $\pm$ 0.51	0.000
Use of stairs	2.30 $\pm$ 0.47	3.20 $\pm$ 1.01	0.001
Driving	2.15 $\pm$ 0.37	4.05 $\pm$ 1.10	0.000
Return to work	4.75 $\pm$ 0.91	6.65 $\pm$ 1.18	0.000
Lift heavy objects	8.15 $\pm$ 0.67	11.00 $\pm$ 0.80	0.000

**DISCUSSION**

When it comes to hernia repairs, it depends on the hospital, the surgeon, and the available infrastructure. The most common method of mesh repair is an open one. It might be difficult to determine which repair method is ideal for inguinal hernia.<sup>16, 17</sup> While it is not yet known whether spinal anesthesia or general anesthesia is preferable for pain reduction during open or laparoscopic hernia repairs, both are practical options.<sup>18</sup> Local anesthesia is a preferred and more frequently used mode of anesthesia in specialist hernia centers; however, infiltration is quite uncomfortable and 85% of the patients experience some amount of pain intraoperatively.<sup>18</sup>

In our study, the mean pain score on day 1 of surgery was  $1.85 \pm 0.88$  with local anesthesia and  $4.00 \pm 0.79$  with spinal anesthesia ( $p<0.001$ ). Hematoma formed in 8 (40%) cases and seroma in 6 (30%) cases in spinal anesthesia group while zero in local anesthesia group. Urinary

retention occurred in 3 (15%) vs. 12 (60%) cases ( $p < 0.05$ ). The mean time taken to start walking was  $1.00 \pm 0.00$  days with local anesthesia vs.  $1.55 \pm 0.51$  days with spinal anesthesia, started using stairs after  $2.30 \pm 0.47$  days vs.  $3.20 \pm 1.01$  days, mean time to return to work was  $4.75 \pm 0.91$  days vs.  $6.65 \pm 1.18$  days ( $p < 0.05$ ).

In a similar study, Jain et al., observed no significant variability in postoperative problems between the two groups, with exception of those caused by the spinal anesthetic. Within the first 24 hours, local anesthesia was more effective at reducing pain. With local anesthesia, patients spent less time in the hospital overall (2.36 days vs. 3.56 days). When comparing local and spinal anesthetic, local anesthesia resulted in a shorter median time to return to work (8 days vs. 11 days).<sup>15</sup>

Another study by Bhedi et al. has shown that although local anesthesia was more effective than spinal anesthesia at relieving postoperative pain initially, there was no difference in pain levels between the two groups after 24 hours. Only three individuals who underwent spinal anesthesia reported micturition problems after surgery. Patients who received local anesthetic recovered from the effects of the anesthetic far more quickly than those who received spinal anesthesia (mean duration, 4.1 hours). Neither the length of surgery nor the number of hospital days required was significantly different between the 2 groups. It was determined that local anesthesia had enough benefits to make it a viable option for hernia surgeries performed on an outpatient basis. However, the skill of the surgeon and the degree to which the patient is involved are also important considerations.<sup>19</sup>

According to the research of Bhardwaj et al., local anesthesia for inguinal hernia repair in adults is a safe and effective alternative to spinal anesthesia in terms of patient satisfaction (including surgical time, postoperative pain, spinal anesthesia complications, anesthesia recovery time, and length of hospital stay). Therefore, local anesthesia is a viable alternative to spinal anesthetic for inguinal hernia surgery. However, this cannot be proven.<sup>20</sup>

Overall, Argo et al. observed no statistically significant difference in the complication rates for local and other types of anesthesia ( $p = 0.06$ ) in their meta-analysis. Comparing local and general anesthetic, we found that both types of anesthesia resulted in about the same rates of wound infection and hematomas, but that local anesthetic considerably reduced urine retention ( $p = 0.0002$ ). Patients were just as happy with local anesthetic as they were with general ( $p = 0.10$ ). While there was no significant variability in surgical time between local and general anesthesia ( $p = 0.86$ ), local anesthesia resulted in considerably less time spent in the operating room ( $p < 0.0001$ ). According to the research, the costs associated with the length of stay (LOS) were reduced when local anesthetic was employed.<sup>21</sup>

Two earlier meta-analyses compared local to general anesthesia, and a third compared local to spinal anesthesia, but none have compared local to any other kind of anesthesia. Due to the small sample size, Reece-Smith et al.'s research could not definitively determine whether local anesthesia is better. Prakash et al. found that out of ten randomized studies, local anesthesia was more effective than SA. Robotic inguinal hernia surgery has been emerged as a potential option for patients with inguinal hernias, and laparoscopic procedures have become increasingly common since its publication.<sup>22, 23</sup>

## CONCLUSION

Local anesthesia outcomes are better than those of spinal anesthesia for inguinal hernia surgery. This will help to reduce the duration of hospital stay by reducing pain and staying in recovery room as well and minimize anesthesia-related complications. In the future, we will recommend the use of local anesthesia for inguinal hernia surgery in local settings to improve our practice. But it is strongly recommended to conduct similar trials with larger sample sizes to obtain more reliable results in favor of local anesthesia.

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