

Comparative Evaluation of Inguinal Hernia Block v/s Spinal Anaesthesia for Unilateral Open Inguinal Hernia Repair**Sneha Smruti Nayak¹, Vaishnavi Vishwas Kulkarni², Mangesh Khadse³, Nazima Memon⁴**¹Junior Resident, Department of Anaesthesiology, Dr. SCGMC, Nanded²Professor and Head, Department of Anaesthesiology, Dr. SCGMC, Nanded³Assistant professor, Department of Anaesthesiology, Dr. SCGMC, Nanded⁴Associate professor, Department of Anaesthesiology, Dr. SCGMC, Nanded

Received: 14-08-2025 / Revised: 13-09-2025 / Accepted: 14-10-2025

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Conflict of interest: Nil

Abstract:

Introduction: Inguinal hernias are accounting for almost 78% of all hernias and 90% are seen in male patients. Lichtenstein tension-free mesh repair technique for adult open hernia repair is widely accepted as the standard procedure. The choice of anaesthesia for hernia repair depends on factors such as patient acceptance, duration, and type of surgery – open/laparoscopic, bilateral, recurrent/strangulated hernia, and anaesthetic considerations. In recent years, the use of local infiltrative anaesthesia, has proven to be an effective Spinal anaesthesia alternative, with a wide margin of safety, minor postoperative side effects, few complications, and overall short recovery period. The present study was conducted to compare safety and effectiveness of unilateral open inguinal hernia repair under local anaesthesia versus spinal anaesthesia in relation to duration of procedure, hemodynamic stability, and perioperative complications.

Methods: The present study was conducted in the Department of Anaesthesiology of a tertiary care center during Feb.2023 to July 2024 amongst 150 patients admitted to the Surgery male and female wards scheduled for Unilateral open inguinal hernia repair, aged 18 to 65 years.

By simple randomization, patients were divided into two groups. i) Group A (75 patients)- Receiving local anaesthesia (LA) with Injection Bupivacaine and Inj. Lignocaine with Adrenaline. ii) Group B (75 patients)- Receiving spinal anaesthesia (SA) with 0.5% Heavy Bupivacaine Local anaesthetic solution was prepared by combining 2% lignocaine hydrochloride with adrenaline 1:2,00,000 and 0.5% bupivacaine hydrochloride in a 50:50 mixture, along with normal saline as a diluent.

Results: The mean time required in the Hernia Block group was 10.36 minutes (SD = 1.65), while in the Spinal anaesthesia group, it was significantly shorter at 5.17 minutes (SD = 0.45).

The Spinal anaesthesia group achieved surgical anaesthesia faster, with a mean time of 9.65 minutes (SD = 2.83), and the difference was statistically significant. Within the Hernia Block group, 4 participants (5.33%) required GA. In the present study, in the Hernia Block group, all 75 patients (100%) exhibited a Bromage score of 0, indicating no motor block. The intra-operative requirement of supplemental sedation was significantly higher in the Hernia Block group i.e. 7 patients (9.3%) whereas none of the patients in the Spinal anaesthesia group required it. Hernia Block provided more prolonged and effective pain relief, thereby reducing the need for additional analgesic doses within the first 24 hours. This difference was statistically significant ($p < 0.001$).

Conclusion: The present study concludes that the Inguinal Hernia Block is a safe, effective, and patient-friendly, achieving surgical anaesthesia slightly longer, with greater hemodynamic stability, and fewer intraoperative and postoperative complications along with adequate postoperative pain relief. Therefore, Inguinal Hernia Block can be considered a superior anaesthetic technique, particularly for patients with comorbidities or those at higher risk from neuraxial blockade.

Keywords: Spinal Anaesthesia, Inguinal Hernia, Lichtenstein Tension-Free Mesh Repair Technique, Bupivacaine, Neuraxial Blockade.

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Introduction

Inguinal hernias are accounting for almost 78% of all hernias and 90% are seen in male patients with rising incidence observed with advancing age. [1]

The choice of surgery and anaesthetic technique for a given surgical procedure should satisfy criteria of patient safety and the provision of optimum

operating conditions for the surgeon. Lichtenstein tension-free mesh repair technique for adult open hernia repair is widely accepted as the standard procedure for hernia repair worldwide. However, there is a dilemma regarding choice for a better feasible anaesthetic technique (local anaesthesia versus spinal anaesthesia) for a set-up where the number of patients outnumbers availability of expertise and resources. [2]

General, spinal, epidural, and local anaesthesia techniques have all been used, each having its own advantages and disadvantages. The choice of anaesthesia for hernia repair depends on factors such as patient acceptance, duration and type of surgery – open/laparoscopic, bilateral, recurrent/strangulated hernia, and anaesthetic considerations.[3] General anaesthesia carries risks of possible airway complications, postoperative deterioration of cognitive function, sore throat, nausea, vomiting, and prolonged period of immobilization with associated risk of deep vein thrombosis and longer hospital stay.[4]

In Spinal Anaesthesia (subarachnoid block), local anaesthetic is deposited in the subarachnoid space and produces intense motor, sensory, and sympathetic blockade. Spinal anaesthesia, although effective, is not without risk in patients with decompensated heart disease, recent head injury, convulsions, and coagulopathies. Also, spinal and epidural anaesthesia have been associated with hemodynamic instability, vomiting, urinary retention, post-dural puncture headache, and backache. Local inguinal field block is primarily a technique of peripheral block for inguinal herniorrhaphy. It primarily includes the blockade of ilioinguinal and iliohypogastric nerves; it may be an ideal technique as it blocks the surgical stress, provides better hemodynamic stability, extended analgesia, early ambulation, and is associated with low risk of complications. [5]

In recent years, however, the use of local infiltrative anaesthesia, specifically among adult patients, has proven to be an effective alternative, with a wide margin of safety, minor postoperative side effects, few complications, and overall short recovery period. Several studies indicate that local infiltration anaesthesia for inguinal hernioplasty blocks surgical stress effectively, provides extended postoperative analgesia is simple to execute and safe for high-risk patients. In addition, patients can mobilize early without post-anaesthesia side effects. Lichtenstein mesh repair for inguinal hernia under local anaesthesia has been shown to be an effective day care technique, particularly in the elderly and medically unfit patients. This procedure has been associated with low morbidity and low recurrence rate. [6]

The present study was conducted to compare safety and effectiveness of unilateral open inguinal hernia repair under local anaesthesia versus spinal anaesthesia in relation to duration of procedure, hemodynamic stability, and perioperative complications.

Material and Methods

The present quasi-experimental study was conducted in the Department of Anaesthesiology of a tertiary care center during Feb.2023 to July 2024 amongst patients admitted to the Surgery male and female wards scheduled for Unilateral open inguinal hernia repair, aged 18 to 65 years, with ASA (American Society of Anaesthesiologists) grade I and II physical status.

The sampling method employed was convenience sampling, all the cases available during the study period were considered as the sample size, i.e., 150.

By simple randomization, patients were divided into two groups. i) Group A (75 patients)- Receiving local anaesthesia (LA) with Injection Bupivacaine and Inj. Lignocaine with Adrenaline.

ii) Group B (75 patients)- Receiving spinal anaesthesia (SA) with 0.5% Heavy Bupivacaine Local anaesthetic solution was prepared by combining 2% lignocaine hydrochloride with adrenaline 1:2,00,000 and 0.5% bupivacaine hydrochloride in a 50:50 mixture, along with normal saline as a diluent, to achieve a total volume of 40-60 ml in a concentration of 0.25% bupivacaine and 1% lignocaine.

Inclusion criteria: patients with ASA grade 1 and 2, aged between 18 to 65, willing to participate in the study, patients with unilateral inguinal hernia.

Exclusion criteria: When consent for surgery under suggested anaesthesia was not given by the patient, bilateral hernias, Recurrent hernias, Complicated hernias like Irreducible/incarcerated, obstructed, and strangulated hernias, morbidly obese patient, active skin infections, history of hypersensitivity to lignocaine or bupivacaine, Coagulopathy, Femoral hernias, ASA grade 3 and above, Contraindication for spinal anaesthesia.

Methodology: Pre-operative anaesthetic assessment, including history, physical examination, and routine investigation, was done a day before surgery.

All the patients enlisted for surgery were tested for sensitivity to lignocaine and bupivacaine by an intradermal skin test after the pre-anaesthetic assessment was done one day prior to surgery.

On day of surgery NBM status was confirmed, iv line was taken and iv fluid started. ECG, NIBP,

SPO2 monitoring connected. Monitoring of the patient was done by Spo2, NIBP, and ECG.

Group A inguinal hernia block: Under all aseptic precautions standard inguinal hernia block was achieved using local anaesthetic solution by combining 2% lignocaine hydrochloride with adrenaline 1:2,00,000 and 0.5% bupivacaine hydrochloride in a 50:50 mixture, along with normal saline as a diluent, to achieve a total volume of 40-60 ml in a concentration of 0.25% bupivacaine and 1% lignocaine.

A skin wheal was raised 2cm medial and 2cm inferior to the anterior superior iliac spine. The needle was inserted through the skin puncture site perpendicular to the skin. Increased resistance was appreciated as the needle encountered the external oblique aponeurosis, and the first loss of resistance was felt as the needle passed through the muscle to lie between it and the internal oblique. The needle was then further moved down to appreciate the second loss of resistance as it crosses the internal oblique and lies between it and the transversus abdominis muscle. 7-8 ml of local anaesthetic was injected. The needle was then withdrawn till the skin and redirected at an angle of 45 degrees towards the midpoint of the inguinal ligament to pierce the external oblique and the internal oblique muscles. After the second loss of resistance, 7-8 ml of local anaesthetic was injected. At this point Ilioinguinal and Iliohypogastric nerves were blocked.

Field block- A point just above the pubic tubercle on the side to be operated is marked, and a skin wheal is made just lateral to the pubic tubercle by injecting 2-3ml of LA to block the genital branch of the genitofemoral nerve. From the same point, a 23-gauge needle with attached syringe is inserted towards the Anterior superior iliac spine (at an angle of around 50-60 degrees) and 5ml of local anaesthetic solution was injected in the subdermal plane to block subdermal nerve endings and at the intradermic plane, 3 ml LA was given to block crossover fibres. The same subdermic and intradermic infiltration with 5ml of mixture was done from the pubic tubercle towards the umbilicus. The block

was completed by a subcutaneous infiltration along the line of surgical incision, and 10 ml of solution was deposited.

Group B (spinal anaesthesia): Under all aseptic precautions patients in a sitting position Spinal anaesthesia was performed using a midline approach and using a 25 G Quincke spinal needle, 0.5% hyperbaric bupivacaine was injected at L3 – L4 space.

Intraoperatively, Group A patients received local anaesthetic infiltration and injection of midazolam

and/or fentanyl supplementation in graded doses if required, especially at the time of sac dissection. However, the total dose of midazolam was not exceeded above 0.1 mg/kg-1. All patients received supplemental oxygen (2-3 L/min) via nasal prongs. Hypotension, defined as systolic blood pressure (SBP) < 90mmHg or >20% reduction in preoperative SBP, was managed with fluids and vasopressor aliquots. Atropine injection was administered in cases of bradycardia, defined as pulse rate (PR) < 50/min. Standard general anaesthesia (GA) was administered in cases of failure of block or spinal anaesthesia.

The following parameters were studied intraoperatively:

Total time taken for performing the procedure of anaesthesia, either local inguinal field block or spinal anaesthesia (in minutes), i.e., the time taken from the aspiration of drugs till the completion of the procedure. Time of achievement of surgical anaesthesia is the time taken for complete loss of sensation to pin-prick at the operative site. Dermatome level at the beginning and end of surgery and motor block at the beginning and end of surgery using the Modified Bromage scale.

Changes in hemodynamic responses such as heart rate, mean arterial pressure, SPO2 was recorded before and after the block in both the groups at 10 min intervals till the end of surgery. Intraoperative monitoring –PR, SBP, diastolic blood pressure (DBP), mean arterial pressure (MAP), and oxygen saturation (SPO2) every 10 minutes till the end of surgery. Supplementation required in the form of IV midazolam, fentanyl. Intraoperative complications like hypotension, bradycardia were noted

Postoperatively, patient was shifted to post anaesthesia care unit and is monitored for pulse, blood pressure, oxygen saturation. The pain level of the patients was assessed using the “Visual Analog Scale (VAS)” at 3,6, 12 ,24 and 48 hrs post-operatively both at rest and during movement. Rescue analgesia was given in the form of IV tramadol 1mg/kg-1 when the VAS score was ≥ 4 . (Total duration of analgesia is defined as the time interval from the end of surgery till the VAS score was ≥ 4 .) Postoperative complications like nausea, vomiting, urinary retention, post-dural puncture headache, and duration of ambulation were noted. Duration of ambulation is the time interval from the end of surgery till the patient could start walking without support.

Statistical analysis-results will be compiled and statistically analysed using the chi-square test for nonparametric data and analysis of variance for parametric data.

Results

Table 1: Comparison of various clinical parameters in the study groups.

Parameter Mean (SD)	Hernia Block (n = 75)	Spinal Anaesthesia (n = 75)	Total (n = 150)	p- value
Time taken to perform the procedure	10.36 (1.65)	5.17 (0.45)	7.77 (2.87)	<0.001
Achievement of Surgical Anaesthesia (min)	20.00 (3.07)	9.65 (2.83)	14.83 (5.97)	<0.001
Success of the Procedure	71 (94.67%) 4 (GA)	75 (100%)		0.04
Supplemental Anaesthesia	7 (9.3%)	0%		0.0135
Duration of Surgery(min)	56.69 (5.98)	56.69 (6.03)		1
1 st Analgesic Dose (Hrs)	7.24 (3.38)	5.76 (0.82)	6.50 (2.56)	<0.001
Total analgesic doses required	2.57 (0.82)	3.71 (0.71)	3.14 (0.96)	<0.001
Time of independent ambulation (in hrs.)	9.77 (6.73)	27.83 (3.91)	18.80 (10.59)	<0.001
Nausea	1 (1.3%)	9 (12.0%)	10 (6.7%)	0.009
Vomiting	2 (2.7%)	11 (14.7%)	13 (8.7%)	0.009
Headache	1 (1.3%)	7 (9.3%)	8 (5.3%)	0.029
Urinary Retention	0 (0.0%)	4 (5.3%)	4 (2.7%)	0.043

Table no.1 compares the meantime taken to perform the procedure between the two intervention groups. The mean time required in the Hernia Block group was 10.36 minutes (SD = 1.65), while in the Spinal Anaesthesia group, it was significantly shorter at 5.17 minutes (SD = 0.45). The overall mean time for all participants was 7.77 minutes (SD = 2.87). The time range was 7.00 to 15.00 minutes for the Hernia Block group and 5.00 to 7.00 minutes for the Spinal Anaesthesia group. The difference between the groups was statistically significant (*p* < 0.001).

The time taken to achieve surgical anaesthesia between the 2 intervention group the mean time in the Hernia Block group was 20.00 minutes (SD = 3.07), whereas the Spinal Anaesthesia group achieved surgical anaesthesia significantly faster, with a mean time of 9.65 minutes (SD = 2.83). The overall mean time for all participants was 14.83 minutes (SD = 5.97). The time ranged from 10.00 to 30.00 minutes in the Hernia Block group and from 5.00 to 15.00 minutes in the Spinal Anaesthesia group. The difference between the two groups was statistically significant (p < 0.001).

The outcomes related to the success of spinal anaesthesia among the study participants, in the Spinal Anaesthesia group, all 75 participants (100.0%) successfully underwent the procedure without requiring conversion to general anaesthesia (GA). In contrast, within the Hernia Block group, 4 participants (5.33%) required GA, while the remaining 71 participants (94.67%) completed the procedure without conversion to general anaesthesia.

The intra-operative requirement of additional anaesthesia between the two-intervention group in the Hernia Block group, 7 patients (9.3%) required supplemental anaesthesia, whereas none of the patients in the Spinal Anaesthesia group required it. A total of 143 patients (95.3%) across both groups

did not require any additional anaesthesia. The difference in supplemental anaesthesia requirement between the two groups was statistically significant (*p* = 0.0135), indicating a higher need for additional anaesthesia in the Hernia Block group.

The total duration of surgery between the two study groups. The mean duration of surgery was identical in both the Hernia Block and Spinal Anaesthesia groups, at 56.69 minutes, with standard deviations of 5.98 and 6.03 minutes, respectively. The overall mean duration across all participants was also 56.69 minutes (SD = 5.99). There was no statistically significant difference between the two groups regarding the total duration of surgery (*p* = 1.00), indicating that the choice of anaesthesia did not influence operative time.

The time (in hours) for the post-operative requirement of the first analgesic dose between the two group the mean time to first analgesic requirement was significantly longer in the Hernia Block group (7.24 ± 3.38 hours) compared to the Spinal Anaesthesia group (5.76 ± 0.82 hours). The overall mean for all participants was 6.50 ± 2.56 hours. The range of time until the first dose was 3.00 to 12.00 hours in the Hernia Block group and 3.00 to 6.00 hours in the Spinal Anaesthesia group. This difference was statistically significant (p < 0.001), indicating prolonged analgesic efficacy of the Hernia Block in the immediate post-operative period.

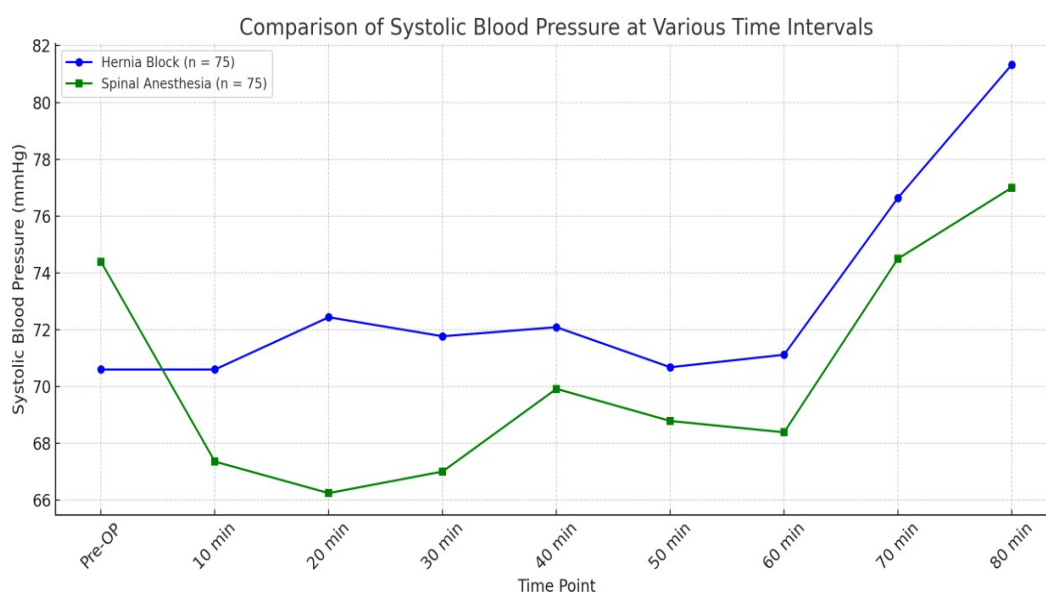
The number of analgesic doses required within the first 24 hours post-operatively between the two group patients in the Hernia Block group required fewer analgesic doses, with a mean of 2.57 (SD = 0.82), compared to 3.71 (SD = 0.71) in the Spinal Anaesthesia group. The overall mean number of doses across all participants was 3.14 (SD = 0.96). This difference was statistically significant (p < 0.001), suggesting that the Hernia Block provided

more prolonged and effective pain relief, thereby reducing the need for additional analgesic doses within the first 24 hours.

The time to independent ambulation (in hours) between the Hernia Block and Spinal Anaesthesia group the mean time to ambulation was significantly shorter in the Hernia Block group, at 9.77 hours (SD = 6.73), compared to 27.83 hours (SD = 3.91) in the Spinal Anaesthesia group. The overall mean for all participants was 18.80 hours (SD = 10.59). The range of time to ambulate independently varied from 6.00 to 36.00 hours in the Hernia Block group and from 22.00 to 39.00 hours in the Spinal Anaesthesia group. This difference was statistically significant ($p < 0.001$), indicating that patients receiving the

Hernia Block achieved earlier post-operative mobility than those who received Spinal Anaesthesia.

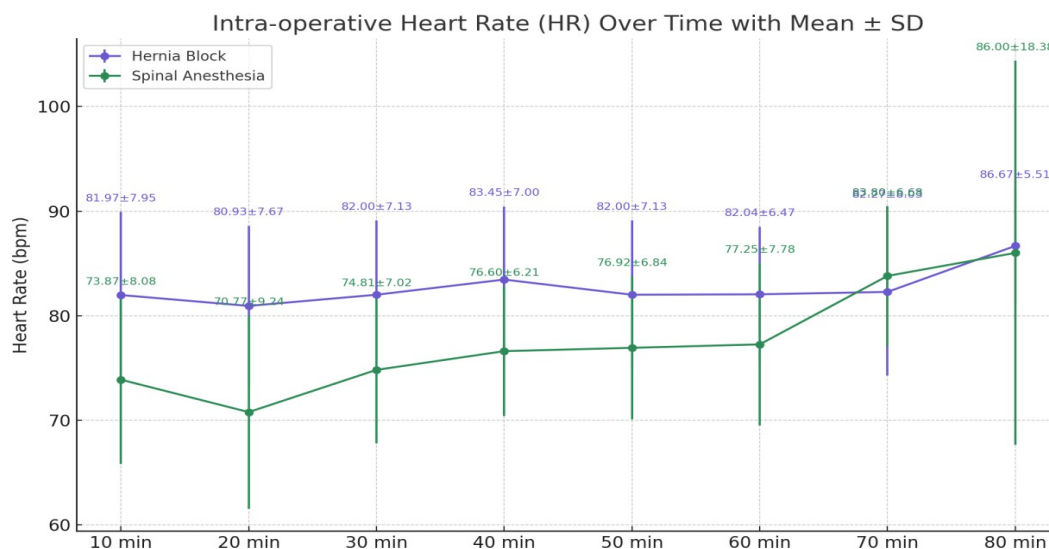
The incidence of all four assessed complications—nausea, vomiting, headache, and urinary retention—was consistently lower in the Hernia Block group compared to the Spinal Anaesthesia group. Each of these differences was statistically significant, highlighting that the Hernia Block technique was associated with a more favourable postoperative side-effect profile. This suggests a potentially safer and more comfortable recovery experience for patients undergoing hernia repair with a Hernia Block compared to those receiving Spinal Anaesthesia.



Graph 1: Comparison of Intra-Operative Map between two Groups at Various Time Intervals

Graph no.1 shows a comparison of mean arterial blood pressure (in mmHg) at various intra-operative time intervals between the Hernia Block and Spinal Anaesthesia groups. At 10 minutes, the Hernia Block group maintained the same mean (70.60 ± 8.02), while the Spinal Anaesthesia group showed a

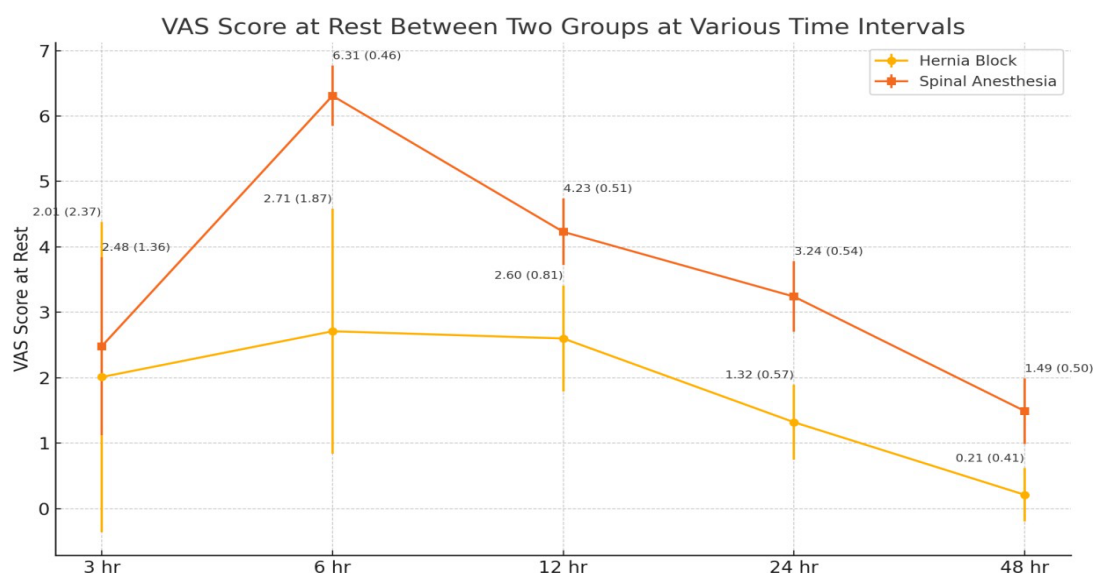
decrease (67.36 ± 6.18), yielding a statistically significant difference ($p = 0.029$), trend continued till 30 mins. The data indicated that while early intra-operative periods showed significant variations, the differences levelled out as the surgery progressed.



Graph 2: Comparison of Intra-Operative Heart Rate Between Two Intervention Groups

Graph no.2 represents the comparison of intra-operative heart rate (HR) at various time intervals between the Hernia Block and Spinal Anaesthesia groups. In the initial 60 minutes of surgery, the Spinal Anaesthesia group consistently showed significantly lower heart rates compared to the Hernia block group. At 10 minutes, the HR was 81.97 bpm (SD = 7.95) in the Hernia Block group versus

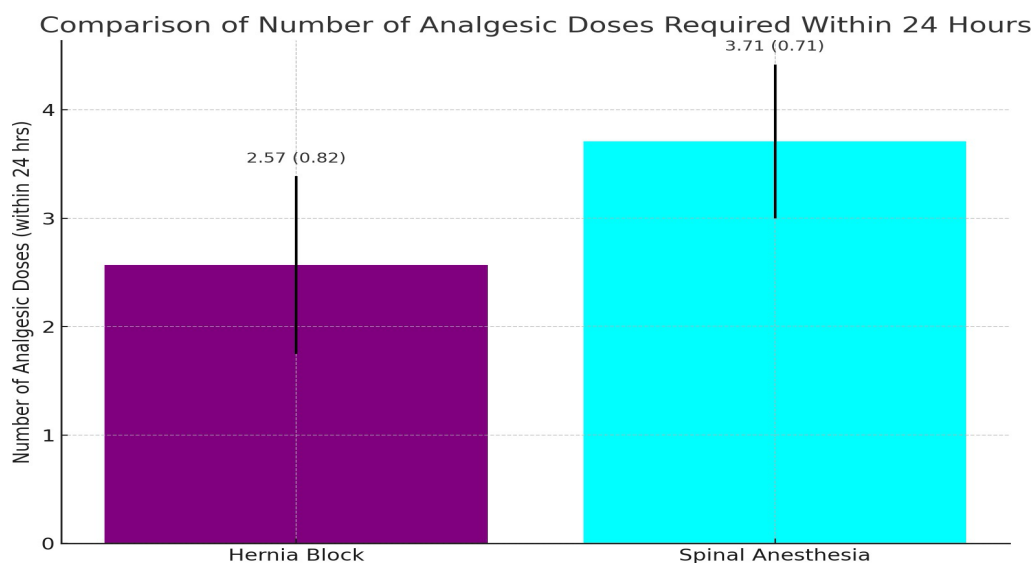
73.87 bpm (SD = 8.08) in the Spinal Anaesthesia group (* p * < 0.001). Similar statistically significant differences were observed at 20 minutes (80.93 vs. 70.77 bpm), 30 minutes (82.00 vs. 74.81 bpm), 40 minutes (83.45 vs. 76.60 bpm), 50 minutes (82.00 vs. 76.92 bpm), and 60 minutes (82.04 vs. 77.25 bpm), all with * p * < 0.001.



Graph 3: Comparison of Vas Score Between Two Interventional Groups at Nonambulatory Period

Graph no.3 shows that the Visual Analogue Scale (VAS) scores while resting between the Hernia Block and Spinal Anaesthesia groups at various post-operative time intervals. At 3 hours, the mean VAS score was slightly lower in the Hernia Block

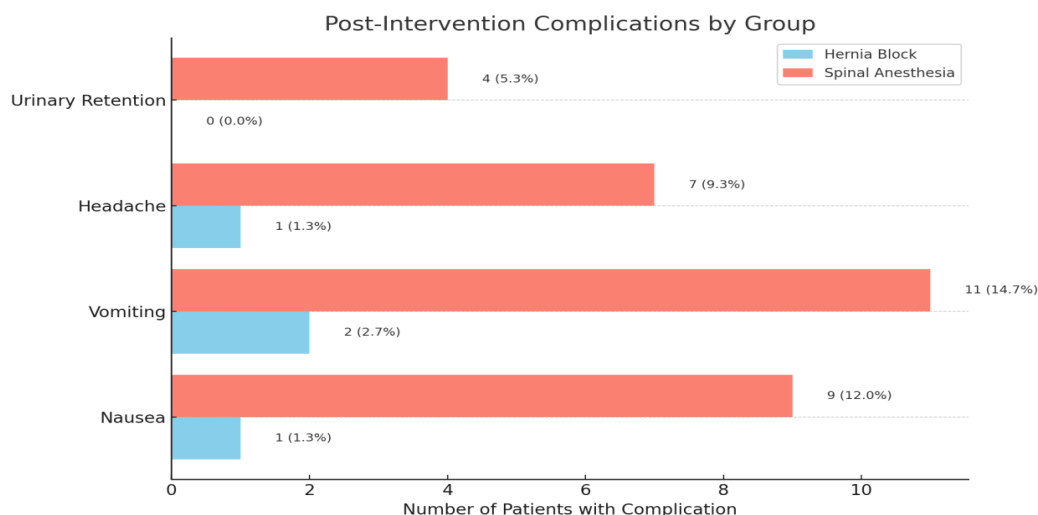
group (2.01 ± 2.37) compared to the Spinal Anaesthesia group (2.48 ± 1.36), although the difference was not statistically significant (* p * = 0.14).



Graph 4: Comparison of N the Number of Analgesic Doses Required Within 24 Hours

Graphs no.4 shows that the number of analgesic doses required within the first 24 hours post-operatively between the two groups. Patients in the Hernia Block group required fewer analgesic doses, with a mean of 2.57 (SD = 0.82), compared to 3.71 (SD = 0.71) in the Spinal Anaesthesia group. The overall mean number of doses across all participants was 3.14 (SD = 0.96). The range of doses

administered was 2.00 to 5.00 in the Hernia Block group and 3.00 to 5.00 in the Spinal Anaesthesia group. This difference was statistically significant ($p < 0.001$), suggesting that the Hernia Block provided more prolonged and effective pain relief, thereby reducing the need for additional analgesic doses within the first 24 hours.



Graph 5: Comparison of Post-Intervention Complications between the Two Groups (N=150)

Graph no.5 provides a comparative analysis of post-intervention complications between the Hernia Block and Spinal Anaesthesia groups, involving a total of 150 patients (75 in each group). The complications evaluated included nausea, vomiting, headache, and urinary retention, and the data reflected both the number and percentage of patients affected in each group. Statistically significant

differences were noted across all measured complications, with the Hernia Block group consistently exhibiting a lower incidence of adverse effects.

Discussion

In the present study, the patients in the hernia block group were aged range of 24 to 59 years, and for

spinal anaesthesia, it was 33 to 60 years. The mean age was 46.56 ± 6.15 in Spinal Anaesthesia and 44.85 ± 7.10 in Inguinal hernia block. Out of the total 150 patients, 94% were males. The study conducted by Goyal et al [7] showed that the mean age was 46.2 ± 16.64 years in group A and 42.56 ± 16.71 years in group B. All the patients were male. The study conducted by Song et al (2000) [8] included 50 patients with a mean age of 42 ± 18 years in the group operated under local anaesthesia and 39 ± 14 years in the group operated under spinal anaesthesia.

In the present study, the majority of patients in both groups were male— 96.0% in the Hernia Block group and 92.0% in the Spinal Anaesthesia group. The male preponderance is similar to other studies.

The study conducted by Goyal et al [7] showed that all the patients were male. Song et al [8] included 50 patients, in which 43 (86%) patients were males and 7 (14%) were females.

BMI: The mean BMI was comparable between the two groups: 23.15 kg/m^2 (SD = 2.06) in the Hernia Block group and 23.29 kg/m^2 (SD = 2.02) in the Spinal anaesthesia group.

Type of hernia: In the Hernia Block group, right-sided hernias were more common, with 27 participants (36.0%) having a right direct hernia and 19 participants (25.3%) having a right indirect hernia. On the left side, 14 participants (18.7%) had a direct hernia and 15 participants (20.0%) had an indirect hernia.

The Spinal anaesthesia group showed right indirect hernias as most prevalent, observed in 38 participants (50.7%), while right direct hernias were reported in 12 participants (16.0%). On the left side, both direct and indirect hernias were seen in 12 (16.0%) and 13 (17.3%) participants, respectively.

Goyal et al [9] also showed the incidence of right-sided hernia was higher in both the groups (68% in the Spinal anaesthesia group and 60% in the hernia block group). Also, the incidence of indirect hernias is found to be more prevalent than direct hernias. Altogether it showed a higher incidence of Right indirect hernia, similar to the present study. Inguinal hernia is more common on the right side as the right testis descends later, and also, there is a higher incidence of patent processus vaginalis on the right side [10].

Time taken to perform the procedure: The mean time required in the Hernia Block group was 10.36 minutes (SD = 1.65), while in the Spinal anaesthesia group, it was significantly shorter at 5.17 minutes (SD = 0.45). The difference between the groups was statistically significant, indicating the time required to perform an inguinal hernia block is more than that of spinal anaesthesia, similar to the study conducted by Chhatrapati et al [8] and Manatakis et al [11].

Time for achievement of surgical anaesthesia: The mean time to achieve surgical anaesthesia in the Hernia Block group was 20.00 minutes (SD = 3.07), whereas the Spinal anaesthesia group achieved surgical anaesthesia significantly faster, with a mean time of 9.65 minutes (SD = 2.83). The difference between the two groups was statistically significant ($p < 0.001$). The mean time taken for the achievement of surgical anaesthesia after spinal anaesthesia was significantly less compared to the inguinal hernia block.

Shibata et al (2007) [12], conducted a study in which the time taken for the onset of sensory block after USG guided TAP block was 30 minutes. It was suggested by Mc Donnell et al [13] that the spread of local anaesthetic within the TAP takes place over several hours and hence early assessment may be misleading.

Hemodynamic changes: In the present study group out of 75 patients, 14 patients experienced hypotension in the spinal anaesthesia group (group II), which responded to head low position and fluid therapy, and 12 patients had bradycardia intraoperatively. Whereas in the inguinal hernia block group, none of the patients had hypotension or bradycardia. Group II, where spinal anaesthesia was given, had a statistically significant decrease in SBP in the first 30 minutes of spinal anaesthesia as compared to preoperative values, and there was a significant difference in systolic blood pressure between the groups in the first 30 minutes.

Similar results were found in a study conducted by Chhatrapati et al [14] where 5 (16.6%) patients in spinal anaesthesia developed hypotension and bradycardia, whereas no patients in the block group had episodes of hypotension or bradycardia. Our findings are also in confirmation with the study conducted by Nehme et al [15] who found that the incidence of hypotension was highest in cases of spinal anaesthesia (19%), while it was negligible in cases of inguinal block.

Various studies report that inguinal hernia blocks may be an effective alternative in patients who may not tolerate the hemodynamic derangements of central neuraxial blockade. The higher fluid requirement in the spinal anaesthesia group is because of sympathetic blockade, which expands the intravascular compartment, necessitating rapid intravascular infusion to maintain good intravascular volume and blood pressure. Therefore, patients with low ejection fraction, inguinal hernia block can be a technique of choice for hernia repair.

Intra-operative requirement of supplemental sedation: In our study, 7 patients (9.3%) in the Hernia Block group required sedation in the form of midazolam and fentanyl at the time of sac handling, whereas none of the patients in the Spinal

anaesthesia group required it. The sedative dose of midazolam was provided in all patients of the Hernia block as part of premedication. Our results are comparable to Chhatrapati et al [14] in which, 36.7% (11) patients in Group I required additional dose of local anaesthetic infiltration at the time of sac handling out of which 45.45% (5) patients required Propofol sedation.

Jain et al [16] done a study in which, among group A (hernia block), 67 (95.71%) patients reported no intraoperative pain and 3 (4.29%) patients who complained of pain intraoperatively were managed by sedation with midazolam.

Duration of surgery: In our study mean duration of surgery was identical in both the Hernia Block and Spinal anaesthesia groups, at 56.69 minutes, with standard deviations of 5.98 and 6.03 minutes, respectively. The overall mean duration across all participants was also 56.69 minutes (SD = 5.99).

A study done by Gultekin et al [17] found that the average duration of surgery in Local Anaesthesia and Spinal Anaesthesia groups was 59 ± 2.8 and 55 ± 2.5 minutes, respectively. They observed no statistically significant difference between these two groups that are similar to our findings.

There was no statistically significant difference, indicating that the choice of anaesthesia did not influence operative time.

Failure rate of anaesthetic procedure: In our study 4 (5.33%) patients in inguinal hernia block group required conversion to general anaesthesia while no patients under spinal anaesthesia required GA. Study conducted by Singh S.K. and Giri S [18] showed 8% of patients required conversion to GA even after using PNS for IIN and IHN block. In a study done by Jihad Odeh et al [19] out of 72 patients, three (4.2%) required conversion to GA due to patient anxiety. So, it concludes that better preoperative counselling, patient preparation, knowledge of the anatomy, technique of block, more experience increases the chances of successful block.

Comparison of postoperative pain assessment between two intervention groups using vas score:

In the present study, postoperative pain was recorded at 3 hours, 6 hours, 12 hours, 24 hours, and 48 hours after operation by using a visual analogue scale. The mean pain visual analogue score was significantly less in the hernia block group as compared to the spinal anaesthesia group. The results of our study were comparable to other studies conducted by Goyal et al [7] and Song D et al (2000) [8], which showed that VAS scores in patients operated under local anaesthesia compared with patients operated under spinal anaesthesia were lower. According to a study done by Young (1987) [20], 22% of patients who were operated under local

anaesthesia did not need any post-operative analgesics in comparison to 8% of patients in spinal anaesthesia group.

These findings suggested that patients who received the Hernia Block experienced significantly lower pain levels at rest from 6 hours post-operatively onwards when compared to those who received Spinal anaesthesia.

Postoperative requirement of analgesics: The mean duration of analgesia (from the end of surgery to first request for analgesic) was significantly longer in the Hernia Block group (7.24 ± 3.38 hours) compared to the Spinal anaesthesia group (5.76 ± 0.82 hours) and this difference was statistically significant indicating prolonged analgesic efficacy of the Hernia Block in the immediate post-operative period.

Patients in the Hernia Block group required fewer analgesic doses, with a mean of 2.57 (SD = 0.82), compared to 3.71 (SD = 0.71) in the Spinal anaesthesia group, which was statistically significant. Total 11(14.6%) patients in spinal anaesthesia group required 5 post operative analgesic doses compared to only 1(1.3%) patient in hernia block group, remaining patients in both groups required 2-4 postoperative analgesic doses suggesting that the Hernia Block provided more prolonged and effective pain relief, thereby reducing the need for additional analgesic doses within the first 24 hours.

It was comparable with Goyal et al [7], where the difference in mean doses of analgesics received by group A and group B is statistically significant. The study conducted by Young DV (1987) [20] showed that no postoperative analgesics were required in 22% patients operated under local anaesthesia compared to 8% in patients operated under spinal anaesthesia.

Time taken for postoperative independent ambulation:

In the present study the mean time to ambulate independently was significantly shorter in the Hernia Block group, at 9.77 hours (SD = 6.73), compared to 27.83 hours (SD = 3.91) in the Spinal anaesthesia group, comparable to Goyal et al's [7] study indicating that patients receiving the Hernia Block achieved earlier post-operative mobility than those who received Spinal anaesthesia.

A comparative study done by Chhatrapati et al [14] stated duration of ambulation was longer in Group II (spinal anaesthesia) as compared to Group I (9.58 ± 0.87 vs 3.95 ± 2.56 hours).

Postoperative complications: Statistically significant differences were noted across all measured complications, with the Hernia Block group consistently exhibiting a lower incidence of adverse effects.

Nausea occurred far less frequently in the Hernia Block group, with only 1 out of 75 patients (1.3%) reporting this symptom, compared to 9 patients (12.0%) in the Spinal anaesthesia group, indicating that Spinal anaesthesia was associated with a significantly higher risk of nausea post-intervention.

Vomiting followed a similar trend. Only 2 patients (2.7%) in the Hernia Block group experienced vomiting, whereas it was reported in 11 patients (14.7%) in the Spinal anaesthesia group.

Urinary retention was absent in the Hernia Block group, with no cases reported (0%), whereas it affected 4 patients (5.3%) in the Spinal anaesthesia group, further supporting the lower risk profile of the Hernia Block technique.

In the comparative study done by Goyal et al [7], there was no urinary retention in group A patients, whereas 5 (20%) patients of group B had urinary retention after surgery. Results of the present study were similar to the studies conducted by Teasdale et al (1982) [21], Young DV (1987) [20].

Chhatrapati et al [14] have done a study indicating postoperative complications - 3.33% of patients had nausea and vomiting, which responded to IV ondansetron, 16.67% of patients developed urinary retention, and 3.33% of patients had PDPH in the spinal anaesthesia group.

Conclusion

The present study concludes that the Inguinal Hernia Block is a safe, effective, and patient-friendly alternative to Spinal anaesthesia for unilateral open inguinal hernia repair. Although the time to administer the block and achieve surgical anaesthesia was slightly longer, the overall operative time remained comparable. Patients undergoing hernia repair with inguinal hernia block demonstrated greater hemodynamic stability. Hernia Block group experienced significantly fewer intraoperative and postoperative complications. Additionally, postoperative pain score was lower, required fewer analgesic doses, and earlier ambulation achieved compared to those in the Spinal anaesthesia group. The minimal failure rate and reduced need for supplemental anaesthesia further support its utility. Therefore, Inguinal Hernia Block can be considered a superior anaesthetic technique, particularly for patients with comorbidities or those at higher risk from neuraxial blockade.

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