Section: Anaesthesiology

Original Research Article

ULTRASOUND GUIDED ILIOINGUINAL AND ILIOHYPOGASTRIC NERVE BLOCK FOR POST OPERATIVE ANALGSIA AFTER INGUINAL HERNIA REPAIR UNDER SPINAL ANAESTHESIA

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ABSTRACT

Background: Aims: Inguinal hernia repair is one of the most frequently performed surgeries globally, with over 20 million procedures carried out annually. Effective postoperative pain control enhances patient recovery and minimizes hospital stay.[1] Spinal anesthesia is commonly used for such procedures but it has limitations in providing sustained postoperative analgesia.[2] Ultrasound guided Ilioinguinal (II) and Iliohypogastric (IH) nerve blocks provide effective pain relief post hernia repair.[3]

Materials and Methods: Sixty patients were divided into two groups B and C, All the patients were administered spinal anaesthesia using 23G spinal needle with 15mg of 0.5% Bupivacaine heavy with 25mcg of Fentanyl in sitting position. After administering spinal anaesthesia, Group B received 20ml of 0.5% Bupivacaine after spinal anaesthesia and Group C acted as control. VAS score was analysed at rest and thereafter for every 2hrs till 24 hrs. Time for first request for rescue analgesia (VAS>4) from the time of administration of block was noted.

Results: There was significant difference in mean VAS at 8 hours in between two groups (Group –B (2.566) and C (3.666)). There was significant difference in mean diclofenac requirement, opioid requirement and time for first rescue analgesia between both groups.

Conclusion: II-IH nerve block, increased the quality of pain control in the postoperative period and decreased the consumption of rescue and break through analgesics. Therefore II-IH nerve block is a preferrable option for post operative pain control for hernia surgery.

Keywords: Ultrasound, Ilioinguinal, Iliohypogastric, Postoperative Analgesia, Inguinal Hernia repair.

INTRODUCTION

Inguinal hernia is one of the most frequently performed surgeries worldwide.20 million procedures are carried out annually. While many advances are being carried out laparoscopically, open procedures remain a constant in many of economically backward areas. Effective postoperative pain control enhances patient recovery and minimizes hospital stay.[1] Spinal anesthesia is commonly used for such procedures due to its ease of administration and effectiveness; however, it has limitations in providing sustained postoperative analgesia.[2]

To augment postoperative pain relief, regional nerve blocks, particularly ilioinguinal(II) and iliohypogastric(IH) nerve blocks, have gained popularity. These nerves provide sensory innervation to the inguinal region, making their blockade an effective strategy for reducing somatic pain following hernia repair.[3] The traditional landmark-based techniques for these blocks, however, are

associated with variable success rates and potential complications such as visceral injury.

Ultrasound guidance has significantly enhanced the accuracy and safety of regional anesthesia. By allowing direct visualization of relevant anatomical structures, ultrasound-guided ilioinguinal and iliohypogastric nerve blocks yield more consistent block success, improved analgesic efficacy, and reduced risk of complications.[4-6]

This study aims to evaluate the efficacy of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks for postoperative analgesia in patients undergoing inguinal hernia repair under spinal anesthesia, focusing on parameters such as post operative pain intensity, analgesic consumption, and recovery quality.

MATERIALS AND METHODS

The current study was conducted in the Department of Anesthesiology, NRI Medical college and General Hospital, Andhra Pradesh, India for a period of 18 months. This is a randomized, single blinded, interventional study. After getting approval from IEC, patients who were admitted for undergoing hernia surgery were taken as study sample using convenience sampling. Each participant was informed about the study's purpose and the benefits of their data being used for research. Participants were assured that their data would be kept confidential.

Total 60 patients were included in the study. They were randomized into 2 groups (B and C) using shuffled opaque sealed envelope method with 30 patients in each group. Group B received II IH nerve block and group C acted as control. Male patients with uncomplicated inguinal hernia aged 18-65 years of ASA status I and II were included in the study. Patients with ASA III and IV with recurrent and bilateral hernia, BMI>35kg/m^2 undergoing emergency surgeries were excluded from the study. Patients with skin infection at puncture site and pre operative opioid and non steroidal anti inflammatory drug for chronic pain were also excluded.

All the patients were asked to fast for at least six hours before the surgery. Premedication with Alprazolam 0.5mg was given one night before surgery. In the pre-op room, the patient's electrocardiograph (ECG), heart rate, oxygen saturation (SpO2) and blood pressure were monitored. After shifting the patient to the operation theatre (OT), monitors were connected, and 18 G IV line was secured. All the patients were administered spinal anesthesia using 23G spinal needle with 15mg of 0.5% Bupivacaine heavy with 25mcg of Fentanyl in sitting position. After administering spinal anesthesia, the patients in study group received ultrasound guided ilioinguinal and iliohypogastric nerve blocks with 20mL of 0.25% Bupivacaine. Hypotension or low BP (fall in the mean arterial pressure (MAP) by more than 20% from baseline or a fall in SBP below 90 mmHg) was treated with Mephenteramine 6 mg IV. Bradycardia (heart rate below 50 bpm) was treated with injection Atropine 0.6 mg IV.

Time for first request for rescue analgesia (VAS>4) from the time of administration of block was noted. It is defined as the time from administration of block to the time when VAS>4 is at rest. If the patient has VAS>4, injection Diclofenac 75mg IV infusion in 100ml normal saline was infused at the maximum of 2 doses in 24hrs. All the patients received injection Pantoprazole 40mg IV once daily. If the patients complained of VAS score >4 in spite of 2 doses of Diclofenac infusion, injection Tramadol 2mg/kg slow IV was administered. Total doses of Diclofenac sodium and Tramadol consumed in 24hrs were recorded. All the patients were observed for next the 24 hours for side effects like hypotension, nausea, vomiting, respiratory depression bradycardia, and managed accordingly.

RESULTS

Data analysis was performed using Microsoft Excel and the free version of Epi Info software (version 7.2.6). A p-value of less than 0.05 was considered statistically significant. Frequencies and percentages were reported, and means along with standard deviations (SD) were used to summarize the data. t-tests were conducted to compare numerical data between two groups, and Chi-square tests were used for comparing categorical data between two groups.

Demographical data included age and BMI of patients. ASA status and duration of surgery was compared between both the groups. There was no significant difference in all these parameters in both the groups. VAS score, heart rate, systolic and diastolic blood pressure, oxygen saturation(SpO2), heart rate were noted at baseline and measured every two hours for a period of 24 hours.

Table 1: Demographic Data

		GROUP B (30)		GROUP C (30)		p value
		Mean	SD	Mean	SD	
AGE(years)		43	91.8	41.3	10.9	0.5181
BMI		26.3	3.4	27.2	3.4	0.2932
DURAT ION OF SURGERY (min)		124.3	7.28	127.9	7.19	0.0613
ASA STATUS	I	23		22		0.765
	II	7		8		

There is no significant difference between systolic blood pressure, diastolic blood pressure and heart rate between both the groups. VAS scores in Group C were significantly higher compared to Group B at 8, 12,14 and 20 hours indicating higher pain levels in the group not receiving the block.

Table 2: Heart Rate and SpO_2

	HEART RATE (bpm)			SpO_2(%)		
GROUP	B	C		B	C	
TIME	Mean +SD	Mean + SD	p value	Mean +SD	Mean +SD	p value
Baseline	74.56 ± 4.21	74.53 ± 4.08	0.975	98.5 ± 1.04	98.5 ± 1.04	1
2 hours	73.63 ± 5.36	71.70 ± 5.11	0.130	97.8 ± 1.44	98.43 ± 1.30	0.08
4 hours	73.23 ± 4.65	72.83 ± 4.45	0.735	97.8 ± 1.44	98.43 ± 1.30	0.08
6 hours	73.20 ± 4.49	72.66 ± 4.50	0.647	98.03 ± 1.37	97.96 ± 1.52	0.85
8 hours	72.00 ± 4.37	72.73 ± 5.03	0.549	97.76 ± 1.19	98.10 ± 1.37	0.32
10 hours	71.33 ± 4.64	72.33 ± 4.37	0.393	97.93 ± 1.52	98.13 ± 1.40	0.60
12 hours	72.30 ± 4.48	72.36 ± 4.75	0.955	98.06 ± 1.43	98.20 ± 1.47	0.72
14 hours	71.83 ± 4.67	69.86 ± 4.63	0.107	97.90 ± 1.34	98.03 ± 1.65	0.73
16 hours	73.76 ± 4.12	72.70 ± 4.17	0.323	98.33 ± 1.34	98.13 ± 1.50	0.58
18 hours	73.36 ± 4.63	71.66 ± 4.26	0.144	97.73 ± 1.33	98.23 ± 1.33	0.15
20 hours	75.23 ± 4.24	74.93 ± 4.38	0.788	98.23 ± 1.43	98.20 ± 1.39	0.92
22 hours	75.76 ± 4.62	75.13 ± 4.52	0.593	97.80 ± 1.40	98.5 ± 1.45	0.06
24 hours	74.63 ± 3.76	75.1 ± 4.56	0.667	98.5 ± 1.04	98.5 ± 1.04	1

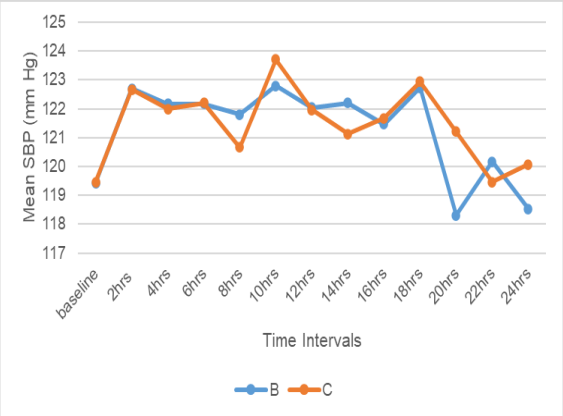

Figure 1: Mean SBP Values

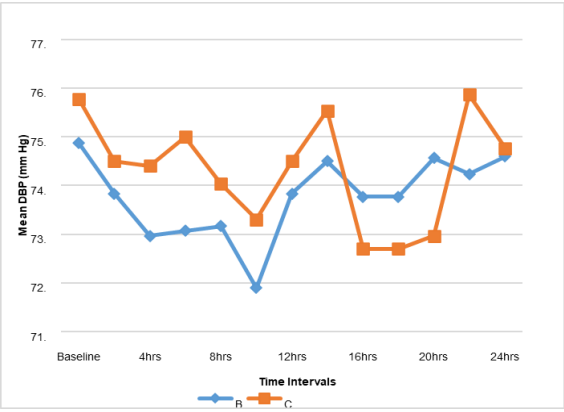

Figure 2: Mean DBP Values

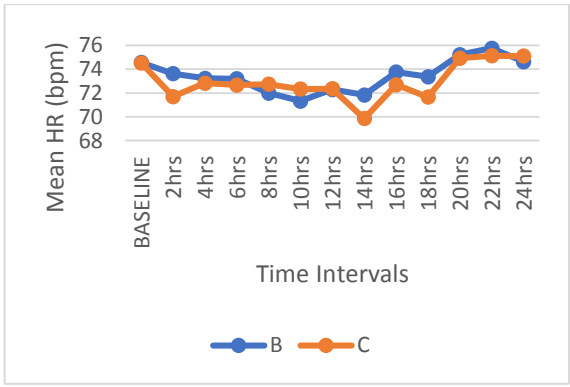

Figure 3: Mean Heart Rate

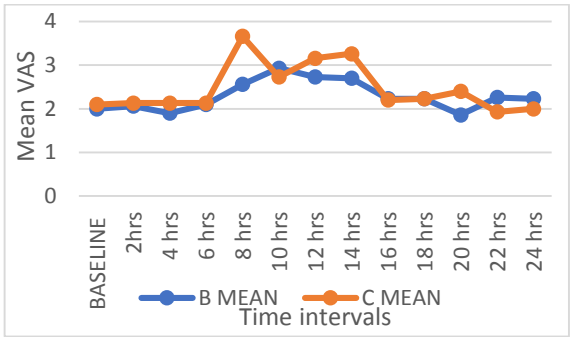

Figure 4: VAS Scores

The mean dose of Diclofenac and Tramadol needed in group c was significantly more than group B indicating higher analgesic requirement of both the drugs in the absence of block.

Table 3: Rescue Analgesia

GROUP	DICLOFENAC				TRAMADOL			
	MEAN DOSE (mg)	SD	t	p	MEAN DOSE (mg)	SD	t	p
B	65.066	58.13	2.409	0.019	13.33	34.57	2.409	0.019
C	110.00	54.77			40.00	49.82		

There was significant difference in mean time ($p < 0.0001$) for first rescue analgesia in between two groups of patients. The patients in group C received first dose of rescue analgesic (8.25 hours) earlier than the patients in group B (10.10 hours). There were no significant side effects reported in both the groups.

DISCUSSION

Eichenberger study (2006),[7] detailed the testing of the new method in a pilot cadaver and then in ten additional embalmed cadavers which were used to perform 37 ultrasound-guided blocks of the iliohypogastric and ilioinguinal nerve. After injecting 0.1 ml of dye, the cadavers were dissected to examine the needle position and coloring of the nerves. Results showed the median diameters of the nerves calculated by ultrasound were iliohypogastric 2.9×1.6 mm and ilioinguinal 3.0×1.6 mm. The central space of the ilioinguinal nerve to the iliac bone was 6.0 mm, and the space between the two nerves was 10.4 mm. Thirty-three of the thirty-seven needle tips were situated at the exact target point, in or directly at the iliohypogastric and ilioinguinal nerve. In all those cases, the targeted nerve was entirely coloured. In two of the remaining four cases, the parts of the nerves were coloured. This relates to a simulated block success rate of ninety-five percent. Standard 'blind' techniques of inguinal nerve blocks targeted the nerves five cm cranial and posterior to the anterior superior iliac spine. The anatomical dissections confirmed that their new ultrasound-guided approach to the iliohypogastric and ilioinguinal nerve was correct. Ultrasound could become a desirable choice for the 'blind' standard iliohypogastric and ilioinguinal nerve block techniques in pain medicine and anaesthetic practice.

The demographic data was comparable between both the gropus in this study. In the study by Grosse et al,[8] there is no significant difference in mean BMI and ASA status in between nerve block and control groups. Among 103 subjects, 91 subjects belonged to ASA status I. There is no significant difference in mean duration of surgery and mean BMI. Laila Ehalwal(2022) et al,[9] found no significant difference in mean age and BMI in between nerve block and control groups, similar to the current study done in cases of cesarean sections .

Laila et al(2022),[9] also found no significant difference in between two groups with respect to haemodynamic parameters showcasing similar results to our study. In our study mean VAS at 8 hours in Group B patients was 2.566 compared to 3.666 in Group C which shows that patients without additional block significant pain earlier. Similar results were found at 12,14 and 20th hours which emphasizes the reduced instances of rescue analgesia in Group B. Harrison study 59 evaluated the impact on pain in first 24 hours after herniorrhaphy of iliohypogastric and ilioinguinal nerve block and wound infiltration with 0.5% bupivacaine or saline in 40 patients. After the surgery, subjects received morphine IV via a PCA machine. VAS scores for rest and movement were documented. Bupivacaine group patients took less morphine in the first 6 hours after surgery. There was no variation in morphine intake between the two groups in 18 hours. The time to first analgesia was delayed in bupivacaine group and was not accompanied by a rebound increase in the requirement for analgesia. There was no significant variation in VAS scores at rest but a significantly greater pain score with movement was seen in the saline group. Authors concluded that the combination of nerve block and wound infiltration decreases the consumption of morphine in the first 24 hours after herniorrhaphy. They have failed to show any effect of 0.5% bupivacaine beyond the first 6 hours after surgery.

Ding study,[10] was conducted in 60 patients to examine the effect of an ilioinguinal-hypogastric nerve block with bupivacaine 0.25% on postoperative analgesic requirement in patients undergoing inguinal herniorrhaphy with local anesthetic infiltration. Thirty healthy men undergoing elective unilateral inguinal herniorrhaphy were randomly allotted to receive an IHNB with either bupivacaine or saline according to a double-masked, IRB-approved protocol. All subjects received midazolam (2 mg IV) and fentanyl 25 microgram IV before the injection of 30 ml of either saline or bupivacaine 0.25% through oblique muscle nearly 1.5 cm medial to the anterior superior iliac spine. The surgeon infiltrated the incision site with a lidocaine 1% solution. Sedation was continued during the surgery with a variable-rate propofol infusion (25-140 micrograms.kg-1.min-1.). No significant variations were documented in the intraoperative doses of lidocaine, fentanyl, and propofol in the two treatment groups. VAS at 30 min after going into the PACU was lower in the bupivacaine group. Time to ambulation and being judged "fit for discharge" were the same in the two groups. The bupivacaine-treated subjects needed less oral analgesic medication after discharge. Authors finally concluded that the use of an ILH nerve block with bupivacaine 0.25% as an adjuvant during inguinal herniorrhaphy under monitored anaesthesia care reduced pain in the PACU and oral analgesic requirements after discharge from the day-surgery unit. These findings are similar to the current study.

Limitations: Small sample size and single center study limited the testing of our hypothesis on a larger population. The study was performed in open surgeries only. Its effect on laparoscopic surgeries analgesic effects with addition of adjuvant drugs have to be studied. Effects on patients with significant comorbidities and obesity have to be done to determine the efficiency of the block. Patient satisfaction was not assessed.

CONCLUSION

Ilioinguinal and Iliohypogastric nerve blocks, increased the quality of pain control in the postoperative period and decreased the consumption of rescue and break through analgesics. Therefore, it is suggested that II-IH nerve block is a preferrable option for the post-operative pain control for hernia

surgery. Given the limitations of the present study further research is needed.

Conflict of interests: None

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