Section: Anaesthesiology

Original Research Article

COMPARATIVE EVALUATION OF ILIOINGUINAL/ ILIOHYPOGASTRIC NERVE BLOCK WITH SPINAL ANAESTHESIA FOR UNILATERAL OPEN INGUINAL HERNIA REPAIR

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Abstract

Background: Repair of inguinal hernia is one of the most commonly performed procedures withmost of them being performed on a day surgery centre.1 Spinal anaesthesia had been associated with hemodynamic instability, vomiting, urinary retention, post dural puncture headache, and backache2. Local inguinal field block which includes the blockade of ilioinguinal and iliohypogastric nerves 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. **Materials and Methods:** The study was conducted in the Anaesthesiology department, at the tertiary care hospital for a period of 18 months. 60 patients aged between 18 years to 60 years of ASA Class 1 and 2, posted for uncomplicated unilateral inguinal hernia repair in the department of Anaesthesia, were included in the study. Group B- administered ilioinguinal and iliohypogastric nerve block by single puncture technique with wound infiltration was adapted from modification of the Dalen's technique. Group C - administered spinal anaesthesia with 3.0 ml of 0.5% heavy bupivacaine. **Result:** The mean time to first dose of analgesia of patients in Group B is 6.5± 1.5hours. The mean time to first dose of analgesia of patients in Group C is 2.5± 1.09 hours. In group B, 53% of the patients required 2 doses of analgesia in 24 hours. In group B, 36% of the patients required 1 doses of analgesia in 24 hours. The mean VAS score at 30 minutes in patients of Group B is 0.13 ± 0.3 The mean VAS score at 30 minutes in patients of Group C is 0.7 ± 0.5. The mean VAS score at 8 hours in patients of Group B is 3.7 ± 0.9 The mean VAS score at 8 hours in patients of Group C is 4.5 ± 0.7. The mean VAS score at 24 hours in patients of Group B is 3. The mean VAS score at 24 hours in patients of Group C is 5.4 ± 0.9. **Conclusion:**It is concluded from the present study that ilioinguinal /iliohypogastric nerve block for inguinal hernia repair is superior to spinal anaesthesia in terms of efficacy and safety.

INTRODUCTION

Repair of inguinal hernia is one of the most commonly performed procedures. Choice of anaesthetic technique for inguinal herniorrhaphy depends on several factors, including feasibility of the technique, patient and surgeon preferences, intra- and postoperative pain control, recovery time and monitoring requirements, postoperative morbidity and costs. Spinal anaesthesia had been associated with hemodynamic instability, vomiting, urinary retention, post dural puncture headache, and backache.[1,2] Local inguinal field block which includes the blockade of ilioinguinal and iliohypogastric nerves 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.[3] Although not a very extensive surgery, reports of inguinal hernia repair association with 60% incidence of moderate to severepostoperative pain is observed.[4] This acute postoperative pain eventually ends up into chronic pain in about 54% of patients.[5] Incisional pain is an essential component of post-hernia surgery pain, and several medications and non- pharmacological techniques have been adopted for postoperative analgesia.[6] Recently, ilioinguinal/iliohypogastric (II/IH) nerve block plane is getting more and more attention as viable alternatives to provide effective peri-operative analgesia for inguinal surgery.[7,8] Hence the present study was taken up to know whether the use of local anaesthesia performed with IINB and IHNB against spinal anaesthesia in inguinal hernia repair is accepted as an alternative medicine in terms of sensory block onset time, patient satisfaction, need for postoperative analgesia, duration of the surgery and intra-operative hemodynamic values.

Aim: To compare efficacy, feasibility and safety of ilioinguinal /iliohypogastricnerve block for inguinal hernia repair with spinal anaesthesia.

Objective:

1. To study efficacy, feasibility and safety of spinal anaesthesia in inguinal herniorrhaphy.
2. To study efficacy, feasibility and safety of ilioinguinal / iliohypogastric nerve block in inguinal herniorrhaphy.
3. To compare the efficacy, feasibility and safety of spinal anaesthesia with ilioinguinal / iliohypogastric nerve block in inguinal herniorrhaphy.

MATERIALS AND METHODS

The study was done in government general hospital, Ongole over a period of 18 months. The study was undertaken after obtaining ethical committee clearance and informed consent from all patients. Source of data: 60 patients posted for inguinal hernia repair belonging to ASA class I and II. Inclusion criteria: Adult patients of either sex aged between 18-60 years weighing between 40-80 kgs posted for elective uncomplicated inguinal hernia repair belonging to ASA Class I and II. Exclusion criteria: Large and irreducible hernia, Bilateral hernia, recurrent inguinal hernia, BMI>35kg/m2 , Emergency surgeries , Skin infection at puncture site, Allergy to local anaesthetics, and patients on medication for chronic pain were excluded from the study.

Statistics: The results obtained in the study are analysed using Microsoft Excel and SPSS 20 software. The present study results between the three groups was compared statistically using Analysis Of Variance(ANOVA) and Student ‘t’ test (independent samples ‘t’ test).

RESULTS

Age: The mean age of patients in Group B is 50 ± 11.5 years. The mean age of patients in Group C is 52.4 ± 7.7 years. The minimum age of the patients in group B is 19 years. The maximum age of the patients in group B is 63 years. The minimum age of the patients in group C is 30 years. The maximum age of the patients in group C is 61 years.

Weight: The mean weight of patients in Group B is 61.4 ± 5.9 kg. The mean weight of patients in Group C is 61.3 ± 5.2 kg. The minimum weight of the patients in group B is 43 kg. The maximum weight of the patients in group B is 49 kg. The minimum weight of the patients in group C is 69 kg. The maximum weight of the patients in group C is 70 kg.

Table 1: Mean age.

Method	Variances	P value
Pooled	Equal	0.3557
Groups	**Mean**	**SD**
B	50.0667	11.5578
C	52.4333	7.7623

Table 2: mean weight

Groups	Mean	S D
B	61.4000	5.9631
C	61.3000	5.2005
Method	**P value**	
Pooled	0.9450	

Time to first dose of Analgesia: The mean time to first dose of analgesia of patients in Group B is 6.5± 1.5hours. The mean time to first dose of analgesia of patients in Group C is 2.5± 1.09 hours. There is statistically significant difference between the means of time between the two groups(p<0.001).

The minimum time to first dose of analgesia of the patients in group B is 5 hours. The maximum time to first dose of analgesia of the patients in group B is 8 hours. The minimum time to first dose of analgesia of the patients in group C is 1 hours. The maximum time to first dose of analgesia of the patients in group C is 4 hours.

Total dose of analgesia required: In group B, 53% of the patients required 2 doses of analgesia in 24 hours.In group B, 36% of the patients required 1 doses of analgesia in 24 hours. In group B, 10% of the patients required 3 doses of analgesia in 24 hours.In group C, 3% of the patients required 2 doses of analgesia in 24 hours. In group C, 76% of the patients required 3 doses of analgesia in 24 hours. In group C, 20% of the patients required 4 doses of analgesia in 24 hours.

Table 3: Frequency of analgesia requirement in group B & C

ARPO- 24HRS	Frequencyin group B	Percentagein group B	Frequency in group C	Percentagein group C
1 Dose	11	36.67%	0	0
2 Dose	16	53.00%	1	3.33%
3 Dose	3	10.00%	23	76.67%
4 Dose	0	0	6	20.00%
Total	30	100.00%	30	100.00%

VAS 30 minutes: The mean VAS score at 30 minutes in patients of Group B is 0.13 ± 0.3.The mean VAS score at 30 minutes in patients of Group C is 0.7 ± 0.5. The mean VAS score at 30 minutes is significantly lower in patients with ilio-inguinal and ilio-hypogastric nerve block(p<0.001). The maximum VAS score at 30 minutes in patients of Group B is 1. The maximum VAS score at 30 minutes in patients of Group C is 2.

VAS score at 8 hours: The mean VAS score at 8 hours in patients of Group B is 3.7 ± 0.9 The mean VAS score at 8 hours in patients of Group C is 4.5 ± 0.7 The maximum VAS score at 8 hours in patients of Group B is 6 The maximum VAS score at 8 hours in patients of Group C is 6. The mean VAS score at 8 hours is significantly lower in patients with ilio inguinal and ilio-hypogastric nerve block(p<0.001).

VAS score at 24 hours: The mean VAS score at 24 hours in patients of Group B is 3. The mean VAS score at 24 hours in patients of Group C is 5.4 ± 0.9 The maximum VAS score at 24 hours in patients of Group B is 3. The maximum VAS score at 24 hours in patients of Group C is 6. The mean VAS score at 24 hours is significantly lower in patients with ilio inguinal and ilio-hypogastric nerve block(p<0.001).

Table 4: Comparison of VAS scores in two groups

Mean VAS score	Group B	Group C
30 minutes	0.13	0.7
8 hours	3.7	4.5
24 hours	3	5.4

Pulse rate intraoperatively: The mean Pulse rate of patients in Group B is 77.9 ± 7.3 bpm. The mean Pulse rate of patients in Group C is 79.4 ± 5.6 bpm. There is no significant difference in the mean pulse rate of the two groups in the study. (p=0.4). The minimum Pulse rate of the patients in group B is 65 bpm. The maximum pulse rate of the patients in group B is 89bpm. The minimum Pulse rate of the patients in group C is 66bpm. The maximum Pulse rate of the patients in group C is 87 bpm.

Pulse rate at 15 minutes (after surgery): The mean Pulse rate at 15 minutes during surgery in patients belonging to Group B is 74.3 ± 6.7bpm. The mean Pulse rate at 15 minutes during surgery in patients belonging to Group C is 75.8 ± 5.8 bpm. There is no significant difference in the mean pulse rate of the two groups in the study (p=0.3). The minimum Pulse rate at 15 minutes during surgery in patients belonging to group B is 65 bpm. The maximum Pulse rate at 15 minutes during surgery in patients belonging to group B is 86 bpm. The minimum Pulse rate at 15 minutes during surgery in patients belonging to C is 62 bpm. The maximum Pulse rate at 15 minutes during surgery in patients belonging to group C is 86 bpm.

Pulse rate at 2hours (after surgery): The mean Pulse rate at 45 minutes during surgery in patients belonging to Group B is 76.4± 6.3bpm. The mean Pulse rate at 45 minutes during surgery in patients belonging to Group C is 78.2 ± 5.3 bpm. There is significant difference in the mean pulse rate of the two groups in the study (p=0.2). The minimum Pulse rate at 45 minutes during surgery in patients belonging to group B is 67 bpm. The maximum Pulse rate at 45 minutes during surgery in patients belonging to group B is 88 bpm. The minimum Pulse rate at 45 minutes during surgery in patients belonging to C is 64 bpm. The maximum Pulse rate at 45 minutes during surgery in patients belonging to group C is 86 bpm.

Table 5: Pulse rate of two study groups at various time points.

HR at different time points	Group B	Group C	P value
Intra operatively	77.9± 7.3	79.4 ± 5.6	0.4
15 min post –op	76.4 ± 7.1	81.2 ± 7.7	0.01
30 min post –op	75.2 ± 7.05	80.3 ± 7.8	0.01
45 min post –op	74.3 ± 6.7	78.5 ± 6.3	0.016
1 hour post –op	73.9 ± 5.8	76.9 ± 5.6	0.04
2 hours post –op	76.4 ± 6.3	79.5 ± 5.0	0.04

Mean Arterial Pressure at different time points:MAP in two groups is similar at all measured time points.

Table 6: MAP of two study groups at various time points.

MAP at different time points	Group B	Group C	P value
Intra operatively	82.03	84.5	0.23
15 min post –op	80.26	80.3	0.95
30 min post –op	79.5	81.7	0.2
45 min post –op	79.6	81.8	0.26
1 hour post –op	79.3	81.6	0.25
2 hour post –op	81.3	84.5	0.12

Onset of sensory block: The mean time taken for onset of sensory block in patients of Group B is 12.3±2.1 minutes. The mean time taken for onset of sensory block in patients of Group C is 5.8± 1.1 minutes. There is significant difference in the meantime taken for onset of sensory block in patients of the two groups in the study ($p<0.001$).

Duration of Sensory block: The mean duration of sensory block in patients of Group B is 5.3± 0.4hours. The mean duration of sensory block in patients of Group C is 3.1 ± 0.2 hours. There is significant difference in the mean duration of sensory block in patients of the two groups in the study($p<0.001$).

Weaning of Sensory block: The mean time taken for weaning of sensory block in patients of Group B is after 5.3 ± 0.4 hours.

The mean time taken for weaning of sensory block in patients of Group C is after 3.1± 0.2 hours. There is significant difference in the meantime taken for weaning of sensory block in patients of the two groups in the study($p<0.001$).

Onset of motor block: The mean time taken for onset of motor block in patients of Group C is 3.1 ± 0.2 minutes.

Duration of motor block: The mean duration of motor block in patients of Group C is 3.2 ± 0.4hours.

Weaning of motor block: The mean time taken for weaning of motor block in patients of Group C is after 3.2± 0.4 hours.

DISCUSSION

Age, weight, height, BMI parameters of the present study are comparable with the values obtained in studies of Swathi et al, and Mustafa et al.[9,10]

ASA: 56% of the study population included in the study belonged to ASA category 2. 43% of the study population included in the study belonged to ASA category 1.

Table 7: Comparison of frequency of ASA category in different studies

	Study by Swathi10	Present study
ASA category 1 Group B	21(70%)	13 (43.3%)
ASA category 1 Group C	20 (66.7%)	13 (43.3%)
ASA category 2 Group B	9(30%)	17 (56.6%)
ASA category 2 Group C	10 (33.3%)	17 (56.6%)

Time to first dose of Analgesia: The mean time to first dose of analgesia of patients in Group B is 6.5± 1.5hours. The mean time to first dose of analgesia of patients in Group C is 2.5± 1.09 hours. There is statistically significant difference between the means of time to first dose of analgesia requirement between the two groups ($p<0.001$). The minimum time to first dose of analgesia of the patients in group B is 5 hours. The maximum time to first dose of analgesia of the patients in group B is 8 hours. The minimum time to first dose of analgesia of the patients in group C is 1 hours. The maximum time to first dose of analgesia of the patients in group C is 4 hours.

Zamani et al,[11] compared local anaesthesia and spinal anaesthesia methods used in inguinal hernia surgeries. The need for analgesia decreased especially in the first 12-h period in local anaesthesia group when compared to spinal anaesthesia. Similar to the above quoted study, time taken for the intake of first dose and also frequency of analgesia intake is higher in spinal anaesthesia group when compared to nerve block.

Sensory block Onset, duration and weaning: The mean time taken for onset of sensory block in patients of Group B is 12.3±2.1 minutes. The mean time taken for onset of sensory block in patients of Group C is 5.8± 1.1 minutes. There is significant difference in the meantime taken for onset of sensory block in patients of the two groups in the study. ($p<0.001$). The mean duration of sensory block in patients of Group B is 5.3± 0. 4hours.The mean duration of sensory block in patients of Group C is 3.1 ± 0.2 hours. There is significant difference in the mean duration of sensory block in patients of the two groups in the study. ($p<0.001$). The mean time taken for weaning of sensory block in patients of Group B is after 5.3 ± 0.4 hours. The mean time taken for weaning of sensory block in patients of Group C is after 3.1± 0.2 hours. There is significant difference in the meantime taken for weaning of sensory block in patients of the two groups in the study ($p<0.001$).

Sensory Block	Mustafa,[9]	Swathi,[10]	Present study
Onset	9.3 vs 9.66(p=0.035)	6.5 vs 6.2(p=0.1)	12.3 vs 5.8 (p<0.001)
Duration	-	-	5.3 vs 3.1 (p<0.001)
Weaning	-	-	5.3 vs 3.1 (p<0.001)

Table 8: Comparison of sensory block with other study.

Motor block: The mean time taken for onset of motor block in patients of Group C is 3.1 ± 0.2 minutes. The mean duration of motor block in patients of Group C is 3.2 ± 0.4 hours. The meantime taken for weaning of motor block in patients of Group C is after 3.2± 0.4 hours in the present study. Pulse rate: Spinal anaesthesia is widely used in daily clinical routine. Although regionalanaesthesia can be advantageous in some respects (i.e., postoperative outcome, respiratory function),[11-13] hypotension after SA is a common adverse event.[14,15] No strategy of preventing the relative hypovolemia caused by regional anaesthesia- intravenous crystalloids and colloids as well as prophylactic intramuscular or intravenous vasopressors- has proved entirely satisfactory.[16,17] Systemic hemodynamic regulation is modulated by the autonomic nervous system (ANS)18. Hypotension due to central neuro axial block is mainly a result of decreased systemic vascular resistance after blockade of preganglionic sympathetic fibres. Preoperative determination of the ANS regulation may provide an opportunity to detect patients at risk of significant hemodynamic compromise. A non-invasive method of measuring the activity of the ANS is the analysis of heart rate variability (HRV).[18,19]

In the present study the mean Pulse rate of patients in Group B is 77.9 ± 7.3 bpm.The mean Pulse rate of patients in Group C is 79.4 ± 5.6 bpm. There is no significant difference in the mean pulse rate of the two groups in the study. (p=0.4) The mean Pulse rate at 15 minutes during surgery in patients belonging to Group B is 74.3 ± 6.7bpm. The mean Pulse rate at 15 minutes during surgery in patients belonging to Group C is 75.8 ± 5.8 bpm. There is no significant difference in the mean pulse rate of the two groups in the study. (p=0.3).The mean Pulse rate at 45 minutes during surgery in patients belonging to Group B is 76.4± 6.3bpm. The mean Pulse rate at 45 minutes during surgery in patients belonging to Group C is 78.2 ± 5.3 bpm. There is no significant differencein the mean pulse rate of the two groups in the study. (p=0.2).

Table 9: Comparison of heart rate with other studies at different time points.

HR at different time points	Present study	Mustafa9
Intra operatively	77.9 vs 79.4 (p=0.4)	74.5 vs 77.5
15 min post –op	76.4 vs 81.2 (p=0.01)	75.2 vs 77
30 min post –op	75.2 vs 80.3 (p=0.01)	74 vs 74.2

Mean Arterial pressure: The most common side effects of spinal anaesthesia are bradycardia and hypotension. The reduction in both cardiac output and systemic vascular resistance (SVR) contributes significantly to spinal anaesthesia-induced hypotension. At T4 -T6 sensory levels of spinal anaesthesia, SVR decreases by 23 to 26%, central venous pressure by 2 to 3 mm Hg, and left ventricular end diastolic volume by 20%. The higher degree of resting sympathetic tone exhibited by elderly patients may explain the important decrease in SVR to sympathetic blockade compared with younger patients36. The mean arterial pressures measured at different time intervals were statistically similar between the two groups (p>0.05) in the present study. In the below cited study by Mustafa, the MAP was significantly different in two groups. Also, the MAP was around 100 mmHg while in the present study, the MAPwas around 80 mmHg.

Table10: comparison of MAP with other studies at different time points.

MAP at different time points	Present study (group B vs group C)	Mustafa9
Intra operatively	82.03 vs 84.5	110 vs 100
15 min post –op	80.26 vs 80.3	105 vs 95
30 min post –op	79.5 vs 81.7	102 vs 85

Visual Analog score: The mean VAS score at 8 hours in patients of Group B is 3.7 ± 0.9. The mean VAS score at 8 hours in patients of Group C is 4.5 ± 0.7. The mean VAS score at 8 hours is significantly lower in patients with ilio-inguinal and ilio-hypogastric nerve block(p<0.001). The mean VAS score at 24 hours in patients of Group B is 3. The mean VAS score at 24 hours in patients of Group C is 5.4 ± 0.9. The mean VAS score at 24 hours is significantly lower in patients with ilio-inguinal and ilio-hypogastric nerve block (p<0.001).

Table 11: Comparison of VAS score with other studies at different time points.		
Mean VAS score	**Present study**	**Study by Mustafa9**
30 minutes	0.13 vs 0.7(p<0.01)	0.00 vs 0.26(p=0.001)
6 hours	-	4.63 vs 2.63(p=0.00)
8 hours	3.7 vs 4.5 (p<0.01)	-
24 hours	3 vs 5.4 (p<0.01)	3.09 vs 0.88(p=0.00)

Adverse events:25 patients (83.3) in group B were not having any complaints. 11patients (36.3) in group C were not having any complaints.

Table 12: Adverse events frequency comparison with different studies.

Adverse events Group B vs C	Mustafa9	Swathi10	Present study
Nausea &vomiting	-	0 vs 3.3 %	0 vs 30 %
Head ache	-	-	16.6 vs 33.3%
Urinary retention	0 vs 34.3	0 vs 16.6%	-

Duration of Ambulation (hours): The mean duration of mobilization in patients of Group B is after 4.7 ± 1.8 hours. The mean duration of mobilization in patients of Group C is after 2.9 ± 0.7 hours. There is significant difference in the mean duration of mobilization in patients of the two groups in the study. (p<0.001) in the present study.

Table13: Comparison of mean duration of ambulation with other studies

Study	Mean duration of mobilization in group B	Mean duration of mobilization in group C	P value
Swathi10	3.95 ± 2.5	9.5 ± 0.8	0.001
Mustafa9	5.71 ± 1.7	2.70 ± 1.53	0.001
Present study	4.7 ± 1.8	2.9 ± 0.7	0.01

Summary: The two groups are comparable with respect to age, height, weight (p>0.05). 56% and 43% of the study population included in the study belonged to ASA category 2 and 1 respectively. There is statistically significant difference between the means of time to first dose of analgesia requirement between the two groups(p<0.001). Majority (53%) of group B patients required 2 doses of analgesia while 76.67% in group C required 3 doses. The mean VAS score at 30 minutes is significantly lower in patients with ilio inguinal and ilio hypogastric nerve block(p<0.001). The mean VAS score at 8 hours is significantly lower in patients with ilio inguinal and ilio hypogastric nerve block (p<0.001)

The mean VAS score at 24 hours is significantly lower in patients with ilio inguinal and ilio hypogastric nerve block(p<0.001) There is significant difference in the mean pulse rate of the two groups at all time points in the study. (p<0.05) except during surgery. MAP in two groups is similar at all measured time points.(p>0.05) There is significant difference in the meantime taken for onset of sensory block in patients of the two groups in the study. (p<0.001) There is significant difference in the mean duration of sensory block in patients of the two groups in the study. (p<0.001) There is significant difference in the meantime taken for weaning of sensory block in patients of the two groups in the study. (p<0.001) 25 patients (83.3%) and 11 patients (36.3%) in group B and C were not having any complaints.

CONCLUSION

It is concluded from the present study that ilioinguinal /iliohypogastric nerve block for inguinal hernia repair is superior to spinal anaesthesia in terms of efficacy and safety.

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