

## USG Guided Ilioinguinal and Iliohypogastric Nerve Block for Post-Operative Analgesia Following Inguinal Hernia Repair

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### Abstract

**Background & Aims:** Inguinal hernia repair is one of the commonest surgeries performed. Poorly controlled postoperative pain following herniorrhaphy might be a predisposing factor for the development of chronic pain. Use of ultrasound for nerve block enhances the success rate. Study conducted with the aim to gauge the analgesic efficacy of ultrasound-guided II-IH block in patients undergoing unilateral inguinal hernia repair. **Materials and methods:** Sixty patients of American Society of Anesthesiologists (ASA) grade I-II undergoing elective unilateral inguinal hernioplasty were enrolled into the study. Patients were randomly divided into two groups of 30 patients each. USG guided II-IH block performed with 15 ml of normal saline (group C) and 15 ml of 0.25% Bupivacaine (group S). VAS score was used for pain assessment. Patient who had VAS of 3 or more received i/v Pentazocine. Patients were monitored for VAS scores and total analgesic consumption for the 24-hour period. **Results:** II-IH block reduced VAS score at 2,4,6,8,12 hours. This nerve block with 0.25% bupivacain resulted 7.50 hours duration of analgesia. Rescue analgesia consumed less in group S. No complication observed in this study. **Conclusion:** Ultrasound guided ilioinguinal-iliohypogastric(II-IH) nerve block is effective and safe adjunct to multimodal postoperative analgesia after inguinal hernia repair surgeries. This reduces rescue analgesia consumption, provides good VAS score. No complication observed in any group.

**Keywords:** Inguinal hernia repair, postoperative analgesia, bupivacaine, ilioinguinal-iliohypogastric block, ultrasound.

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### Introduction

Inguinal hernia repair is one of the commonest surgeries performed. Incidence is reported as 11/10,000 in persons between 16 and 24 years of age, 200/10,000 in persons more than 75 years of age. Postoperative pain is not only distresses the patient, but prolongs the hospital stay[1]. The provision of effective postoperative analgesia is of key importance to facilitate early ambulation and prevention of postoperative morbidity. Chronic pain occurs in 5-10% after the inguinal hernia repair that creates an important problem[2].

Poorly controlled postoperative pain following herniorrhaphy might be a predisposing factor for the development of chronic pain. A considerable part of pain after hernia surgery is caused by the abdominal wall incision[3].

The somatic pain generated at the incision site is conducted by the ilioinguinal and iliohypogastric nerves (II-IH), which innervate the L1-L2 dermatome distribution. Analgesic multi modalities were recommended to relieve the post-operative pain[4].

Generalized wound infiltration, Opioids, NSAIDs, Epidural analgesia have been tried for post operative analgesia but these means of intervention also have limitations when used as sole agent. Peripheral nerve blocks provide excellent analgesia over a limited field and with minimal systemic effects[13]. USG guided blocks are generally easy to perform and very safe. Transversus abdominis plane block and Ilioinguinal- Iliohypogastric(II-IH) nerve blocks were performed well in the past with effective postoperative analgesia after inguinal hernia surgery without systemic side effects.

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Both nerve blocks were documented to reduce post-operative VAS score as well as opioid consumption without significant systemic side effects in hernia surgeries. Performing these blocks under ultrasound guidance is absolutely safe and accurate.

The objective of this double prospective, double blinded, randomised study was to evaluate analgesic efficacy of ultrasound-guided Ilioinguinal and iliohypogastric (II-IH) block in patients following unilateral inguinal hernia repair. In this study, we analyzed the visual analog scale (VAS) pain score and total analgesic consumption following TAP block in inguinal hernia surgery.

### Material and methods

After getting approval from Institutional Ethics Committee and written informed consent from patients, 60 patients of American Society of Anesthesiologists (ASA) grade I-II undergoing elective unilateral inguinal hernioplasty were enrolled into the study. Patients between the age group of 20-60 years and weighing between 50 and 80 kg were selected into the study. Patients with psychological disorders, significant liver and renal disease, Bilateral inguinal hernia, Scrotal hernia, Recurrent inguinal hernia, Obstructed inguinal hernia, and known allergy or contraindication to study drugs were omitted from the study.

The sample size was calculated on the basis of the 24-hour pentazocine consumption in patients undergoing inguinal hernia repair. For the purposes of sample size calculation, we found that there would be 25% reduction of dose of pentazocine at least. This was based on our pilot data. We calculated 25 patients would be required per group using an  $\alpha=0.05$  and  $\beta=0.2$ . To minimize any effect of data loss, we recruited 30 patients per group into the study.

Detailed history of all selected patients was taken. A thorough pre-anaesthetic evaluation including the airway assessment was performed. They were also educated about the VAS score. Monitors were attached and baseline parameters viz heart rate, systolic and diastolic blood pressure, mean arterial pressure, SpO<sub>2</sub>, ECG tracings were continuously monitored during surgery and postoperative period. Intravenous line was secured. All patients were given Subarachnoid Block with Bupivacaine (0.5%) heavy (bupivacaine hydrochloride in dextrose injection USP) 3ml injection into the subarachnoid space at L3-L4 spinal level via 25 gauge Quincke's spinal needle. Lichtenstein tension-free meshplasty was performed after checking the desired level of anaesthesia achieved. Drug for nerve block was prepared by some other colleague either 15 ml of normal saline or 15 ml of 0.25% Bupivacaine, and the colleague who prepared drug not take further part in study. At the end of surgery ultrasound guided nerve block was performed, who was blinded to the drug given. The patients were randomised using a computer based randomisation software, "Random Allocation Software 1.0"[Copyright @ Informer Technologies, INC] in two groups of 30 patients each, depending on the drug given for the IH/II nerve block. Group C(n=30) were the control group and were received 15 ml of normal saline. Group S(n=30) were study group and received 15 ml of 0.25% Bupivacaine.

After closure of the surgical wound, patients were undergone II-IH nerve block. The lower abdomen, the iliac crest and the groin area were exposed and anterior superior iliac spine (ASIS) was marked. After skin and transducer preparation, linear transducer (7.5 Hz) of MINDRAY DC 30 SERIES was placed obliquely along a line joining the anterior superior iliac spine (ASIS) and the umbilicus immediately 2 cm superior and 2 cm medial to the ASIS. The three muscular layers

of the abdominal wall: the external oblique (most external), the internal oblique and transverse abdominis muscles were identified (fig 1). The II and IH nerves, which were hypoechoic in appearance, are identified within the fascial plane between the transverse abdominis and internal oblique muscles above the ASIS. A 5-8 cm 22 G needle was inserted parallel to and inline with the transducer and the ultrasound beam and was accurately placed in the fascial plane between the internal oblique and transverse abdominis muscle layers. After negative aspiration for blood, 15 ml of 0.25% Bupivacaine was injected.

After completion of the block, patients were transferred to the post anaesthesia care unit (PACU). At the PACU, pain and its intensity was assessed by an anaesthesiologist unaware of the group assignment. All patient were received IV Paracetamol 1gm 8 hourly, with the first dose given at the end of surgery. Pain was assessed at rest using VAS (Visual Analogue Scale) ranging from 0 to 10 at PACU at 0,2,4,6,8,10,12 and 24 hours. Patient who had VAS of 3 or more received i/v Pentazocine 0.3 mg/kg as first dose and i/v pentazocine 0.1mg/kg as subsequent dose if needed. Total analgesic consumption in the 24-hour postoperative period was recorded. Any complications related to interventions were also noted.

Statistical analysis was performed using a standard statistical program, The statistical package for Social sciences version 20.0 software. (IBM Corporation, Armonk, NY, USA SPSS VERSION 20). Demographic data were analyzed using Student's *t*-test. Pain scores were analyzed using the unpaired *t* test. Baseline variables and pain score were expressed as mean ± standard deviation while categorical data are presented as raw data and as frequencies. The level for all analyses was set at *P*=0.05 and a *P*-value less than 0.05 were considered statistically significant.

**Results**

**Table 1: Demographic profile in two groups**

Group	Age in yrs (Mean ± S.D.)	Height in cm (Mean ± S.D.)	Weight in kg (Mean ± S.D.)
Group C	37.57 ± 12.71	158.33 ± 5.05	59.80 ± 6.96
Group S	40.23 ± 12.29	156.60 ± 5.506	60.87 ± 4.67
P value	0.412*	0.591*	0.842*

Note: SD, Standard deviation, \*p-value non significant

**Table 2: Comparison of duration of surgery in two groups**

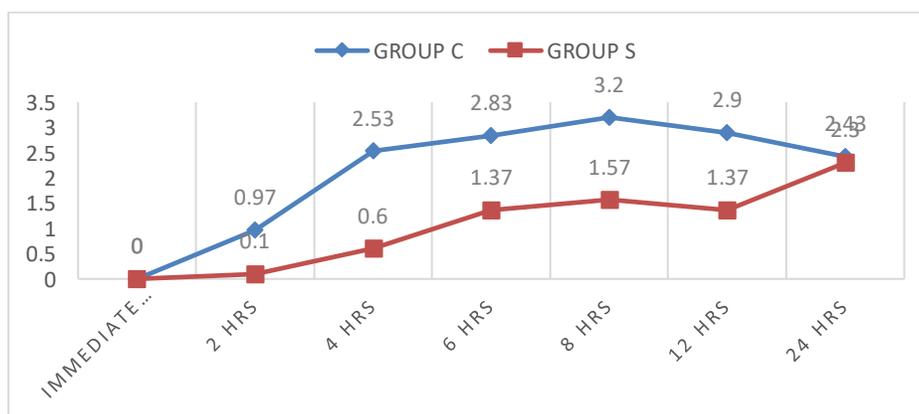
Outcome	Group C	Group S	P- value
Duration of the surgery (minutes)	59±5.04	57±4.69	0.19*

Note: Values are in mean±SD, \*p-value non significant

**Table 3: Comparative evaluation of VAS scores in both groups at different time interval**

(Mean ± S.D.)	immediate after surgery	2 hrs	4 hrs	6 hrs	8 hrs	12 hrs	24 hrs
Group C	0.00±0.00	0.97±0.81	2.53±1.17	2.83±1.09	3.20±1.45	2.90±1.09	2.43±0.77
Group S	0.00±0.00	0.10±0.31	0.60±0.97	1.37±1.13	1.57±0.94	1.37±1.13	2.30±0.90
P value	NA*	<0.0001#	<0.0001#	<0.0001#	<0.0001#	<0.0001#	0.550*

Note: Values are in mean±SD, \*p-value non significant, # p-value significant SD, Standard deviation

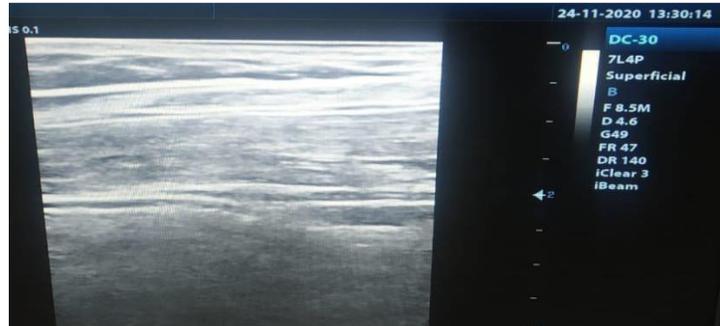


**Fig 1: VAS scores in both groups at different time interval**

**Table 4: Requirement of rescue analgesic in both groups**

Outcome	Group C	Group S	P- value
Time of first request of rescue analgesic (Pentazocine)	4.30±0.95	7.50±1.11	<0.0001 <sup>#</sup>
Total requirement of opioid analgesic	36.60±15.41	21.20±5.40	<0.0001 <sup>#</sup>

Note: Values are in mean±SD, <sup>#</sup> p-value significant(using T- test)

**Fig 2: Ultrasonic view of muscle plane**

### Discussion

Importance of post operative analgesia is well known i.e. early ambulation, early discharge and patient comfort are the major benefit. Ilioinguinal and Iliohypogastric nerves (II-IH) block have been reported to produce excellent postoperative pain control in adults and children following hernia repair and groin surgery. After review of previous studies we used bupivacaine as our local anaesthetic due to its long acting effects.

The purpose of this study was to evaluate the benefits of USG guided Ilioinguinal and Iliohypogastric nerve block for postoperative analgesic effect of inguinal hernia repair surgery. The primary endpoint was first time request of intravenous Pentazocine injection (rescue analgesic), other objectives were estimation of total opioid consumption, estimation of VAS score.

Previously the II-IH nerve block was performed by anatomical landmark technique. To reduce the failure rates with blind technique II-IH nerve blocks were performed with PNS guidance. But both the techniques carries the risk of intra-peritoneal injection, bowel injury, hematoma formation and transient femoral nerve palsy.

USG guided nerve blocks are very safe to reduce those complications and increase success rates by accurate needle positioning[10]. They also reduce the local anaesthetic requirement for producing nerve block as the drug is delivered very close vicinity to the nerve.

In our study we used 15 ml of 0.25% bupivacaine for II-IH nerve block after the closure of surgical wound. The duration of analgesia in our study group Group S (7.50±1.11 hour) was longer as compared to Group C (4.30±0.95 hours). The first request of rescue analgesia was considered as duration of analgesia.

The reason for prolonged duration of analgesic effect following single shot II/IH nerve block is not entirely clear. This may be explained by the fact that these nerves are relatively poorly vascularized, and therefore drug clearance may be slowed.

VAS score in Group S was consistently lower in study group till 12 hr later in 24hr VAS score was very close to Group C because block effect has wear off. Total opioid consumption in group S (21.20±4.49 mg) was less as compare to Group C (34.60±15.41 mg). Duration of analgesia and reduction of opioid consumption is remarkable that makes the II-IH block superior for post operative analgesia.

Similarly Supriya Krishnegowde et al[5], used bilateral II-IH nerve block for the management of postoperative pain in patient undergoing elective caesarean section. She found that longer duration of analgesia (515.64 ± 82.87 min), lower VAS scores (1.72 ± 0.68) and lower analgesic consumption

Sunita Milind Khedkar et al[6] compared rescue analgesia dose requirement and time to its first demand between USG and conventional technique of II-IH nerve block using 15 ml of 0.75% ropivacaine. They Concluded ultrasound-guided hernia block thus has

the advantage of early onset, less dose requirement and increase in time to rescue analgesia.

Demirci A et al[2014][7], compared the efficiency of ilioinguinal-iliohypogastric nerve blocks with an ultrasound-guided technique and anatomical landmark technique in cases of inguinal herniorrhaphy in adults. They found that USG guided II/IH block provides more effective analgesia and higher satisfaction of analgesia than iliohypogastric/ilioinguinal nerve block with the anatomical landmark technique. Both studies[6,7] has shown that USG guided approach is better than any other approach. Since we have not compared conventional and USG guided approach for block but based on these studies we performed USG guided block for both of our group.

Nidhi Bhatia et al 2019[8], Concluded that medial transverse abdominis plane block being a novel, simple and easily performed procedure can serve as an useful alternative to ilioinguinal-iliohypogastric nerve block for providing postoperative pain relief in inguinal hernia repair patients. In our study we found that USG guided II-IH block is easy but sometimes air between the muscle creates problem in visualisation as air is a bad acoustic window, but this was not significant.

Mahin Seyedhejazi et al 2014[9], found caudal epidural block and ilioinguinal- iliohypogastric nerve block using bupivacaine-clonidine have comparable effects on analgesia in children after surgery on inguinal region.

There was no complication have seen in our study in the 60 patients who received ilioinguinal and iliohypogastric nerve block. Although case reports of Isaac Assam Udo et al[10], K R Ghani et al[11] and Tung-Ying Tsai et al[12] found weakness in the lower limb following this nerve block. Since nerve blocks are ultrasound guided, no procedure related complications recorded in our study, none of 60 patients who received the II-IH nerve block with Bupivacaine had the above mentioned complications.

Our study of II-IH nerve block was under USG guidance facilitated real time US image facilitated accuracy of ilioinguinal and iliohypogastric nerve block.

Limitations of this study are many, first is postoperative pain, which is a subjective experience and can be difficult to quantify objectively and compare. Second study was conducted in a single centre, a multicentre larger study may be more informative. Third is for better result Patient controlled analgesia would have been better but our Institute don't have this facility. Forth by putting the catheter analgesia with block could have been increased.

### Conclusion

In our study we concluded that the analgesic efficacy of ultrasound guided ilioinguinal-iliohypogastric(II-IH) nerve block is effective and safe adjunct to multimodal postoperative analgesia in patients undergoing unilateral open inguinal hernia repair surgeries.

Consumption of intravenous opioids has been reduced with use of this block, resulting in fewer opioid-mediated side effect.

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