

# EFFICACY OF ILIOINGUINAL / ILIOHYPOGASTRIC & GENITOFEMORAL NERVE BLOCK IN POSTOPERATIVE PAIN MANAGEMENT IN PATIENTS UNDERGOING INGUINAL HERNIA REPAIR

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**Abstract**

**Background and Aims:** Inguinal hernia repair is a common surgery in geriatric age group patients, performed under Regional Anaesthesia or General Anaesthesia. Irrespective of surgical technique, pain remains a problem in inguinal hernia surgeries despite pre-emptive use of opioids, non-steroidal anti-inflammatory drugs or local anaesthetic infiltration. The aim of this study is to observe the analgesic efficacy of Ilioinguinal/ Iliohypogastric & Genitofemoral nerve block for post operative analgesia in patients undergoing inguinal hernia repair.

**Materials and Methods:** Prospective observational study. In the study, 60 patients, scheduled for elective inguinal hernia repair surgery were taken up after getting informed and written consent and were randomised into 2 groups to receive spinal anaesthesia followed by either Ultrasound guided Ilioinguinal/ Iliohypogastric & Genitofemoral nerve block (Group A) or Spinal Anaesthesia alone (Group B) followed by surgery. Postoperative pain was assessed using Visual Analogue Score (VAS), time to first rescue analgesia and total analgesic requirement of the patients amongst the two groups was observed and compared.

**Results:** The mean VAS was found to be significantly lesser in Group A as compared to Group B. Intravenous Fentanyl [1-2mcg/kg] was used as rescue analgesia for patients with VAS>4. Patients belonging to Group B received rescue analgesia earlier and in higher dosage as compared with Group A.

**Conclusion:** Ilioinguinal/ Iliohypogastric & Genitofemoral nerve block was found to be

efficacious for postoperative analgesia & can be used as part of multimodal analgesia in patients undergoing inguinal hernia repair.

**Keywords:** Ilioinguinal/ Iliohypogastric nerve block, Genitofemoral nerve block, Ultrasound guidance, Visual Analogue Score, Inguinal Hernia repair.

## 1. Introduction

A hernia is defined as an abnormal protrusion of a peritoneum lined sac through a Musculo- aponeurotic wall of the abdomen. Hernia involving the abdominal wall are quite common with Inguinal Hernia accounting for 75% of abdominal wall hernias [1]. Inguinal hernia repair surgery is one of the most common day care surgical procedures with more than 20 million repairs done globally, each year. Anaesthesia for Inguinal hernia repair surgery includes Regional anaesthesia (spinal or epidural anaesthesia) or general anaesthesia. Despite the effective perioperative pain management strategies, the frequency of moderate to severe pain from Inguinal hernia repair surgery is seen in approximately 30–75% of the patients in postoperative period [2].

Most postoperative pain in inguinal hernia surgery occurs within first 24 hours of surgery. Post-operative pain is most of the times managed with systemic opioids either by intramuscular injection/intravenous injection or using an intravenous patient-controlled analgesia device [3]. Intravenous paracetamol is useful in mild to moderate pain but has a potential of hepatotoxicity in overdose and should be avoided in patients with hepatic compromise. Diclofenac is most commonly used NSAID useful in moderate pain but having the risk of renal failure. Opioids, mainly morphine, used in moderate to severe pain, provides good pain control, and is the mainstay of intravenous therapy, is associated with its own set of drawbacks such as nausea & vomiting, respiratory depression and constipation. Tramadol is a weak opioid produces lesser side effects in comparison to morphine [4].

It has been demonstrated that Ilioinguinal-Iliohypogastric and Genitofemoral nerves (II/IH &GF) have a variable origin, course, and distribution in the inguinal region [5,6]. Consequently, the inguinal region may also receive sensory innervation from the genitofemoral nerve. Genitofemoral entrapment neuralgia as a result of inguinal surgery has been reported [5-7]. Complete analgesia for any inguinal hernia surgery not only requires blockade of the ilioinguinal nerve (IIN) and iliohypogastric (IHN) nerve but also blockade of the genital branch of the genitofemoral nerve (GFN), as patients without GFN block complain of pain during handling of hernia sac during surgery. Blocks of the IIN and IHN can be performed with anatomical landmarks (conventional, blind technique) or with ultrasound guidance (USG) techniques. The present study was done to establish the efficacy of Ultrasound guided ilioinguinal nerve (IIN) and iliohypogastric (IHN) & genitofemoral nerve (GFN) block for postoperative analgesia in patients undergoing inguinal hernia repair under spinal anaesthesia.

## 2. Materials and Methods

A prospective observational study was conducted after obtaining informed & written consent with 60 patients of either sex aged 18-80 years in patients undergoing elective hernia repair surgery in a period of one year.

**Inclusion Criteria**

- 1) Patients aged between 18 to 80 years of either sex were included.
- 2) Patients suffering from primary inguinal hernia.
- 3) Patients with American society of Anaesthesiologists (ASA) I and II were included.

**Exclusion Criteria**

- 1) Patient refusal

- 2) Local infection at site
- 3) Spine deformity
- 4) Bleeding disorder
- 5) Patients with (LA) sensitivity or allergy would be excluded.
- 6) Patients with BMI of above 35kg/m<sup>2</sup>
- 7) Patients with contraindications to the proposed anaesthetic technique
- 8) Patients with recurrent or sliding type of inguinal hernia or inguinoscrotal huge hernia.
- 9) ASA  $\geq$ III
- 10) Pregnancy
- 11) Patients with history of chronic pain.
- 12) Patients with history of daily use of CNS medications were excluded.

All the patients were randomly divided into two groups: Group A received Spinal Anaesthesia followed by Ilioinguinal nerve/Iliohypogastric nerve & Genitofemoral nerve block under ultrasound guidance followed by surgery.

Group B received Spinal Anaesthesia followed by Surgery.

Both group patients were assessed for postoperative analgesic efficacy, and consumption of systemic analgesic (1 gram Paracetamol & Fentanyl) recorded.

After satisfactory pre-anaesthetic assessment, patients were taken into the operating room. An 18-gauge intravenous catheter was inserted and intravenous fluid Ringer Lactate was started. All the monitors including, oxygen saturation [SpO<sub>2</sub>], non-invasive blood pressure, electrocardiography were connected and the baseline values were recorded. All patients were administered spinal anaesthesia with 25 G spinal needle with 15 mg of hyperbaric 0.5% bupivacaine heavy in sitting position at L3-L4 interspinous space. Occasional hypotension was treated with intravenous crystalloids or IV Mephentramine.

The pin prick method (25 G hypodermic needle) was used to evaluate sensory block. Time of onset of SAB & time taken to achieve highest dermatomal level of sensory block was recorded. Motor blockade was assessed by using modified Bromage scale.

All patients in Group A received ilioinguinal/iliohypogastric & Genitofemoral nerve block using ultrasonographic guidance. The patients were placed in supine position on the operation table with the area between the costal margins superiorly and iliac crest inferiorly, exposed. To perform the II/IH nerve block we used a linear Ultrasound probe with a frequency of 6-13MHz of a portable ultrasound system (sonosite, micromaxx Bothell, Melsungen AG, Germany) to visualize the fascial plane between the Transversus abdominis and internal oblique muscle wherein the Ilioinguinal & Iliohypogastric nerves could be identified, and a 21 G 100mm needle (Stimuplex A, B braun, Melsungen AG, Germany) to deliver 20ml of 0.25% bupivacaine in increments of 5ml.

To perform the Genitofemoral nerve block, the linear Ultrasound probe was placed longitudinally in the groin to capture long axis view of the femoral vessels. Then we moved the transducer progressively cephalad to visualize the external iliac artery, a continuation of femoral artery, which is located deeper. We moved the transducer medially from this point to identify the inferior epigastric artery, a branch of external iliac artery. Moving the transducer slightly more medial uncovered the spermatic cord/round ligament within the inguinal canal. Using an out of plane approach after advancing the needle inside the inguinal canal 5 ml of 0.25% bupivacaine was injected around the spermatic cord in increments of 2ml after aspiration to avoid intravascular deposition.

The intensity of pain was recorded in the post operative period for all patients using the VAS score at 3, 6, 12, 18 & 24 hours after surgery. All patients were explained about the VAS score during the pre-anaesthetic check-up. All patients were given 1 gram paracetamol 8 hourly and Intravenous Fentanyl 1-2mcg/kg was used as rescue analgesic for patients with VAS > 5. Total paracetamol and fentanyl consumption in the first 24

hours amongst the groups was noted for comparison.

The following parameters were evaluated in all the study groups:

1. Time to first request of analgesia
2. The incidence and severity of postoperative pain for 24 hours using VAS pain score
3. Total dose of Fentanyl consumed
4. Postoperative hemodynamic parameters including Pulse rate and Blood Pressure
5. Postoperative nausea & vomiting or any other complications.

All data was recorded, tabulated and statistically evaluated with appropriate software tools

### 3. Results

The study comprised of 60 patients; all were male belonging to ASA I & II. They were divided into 2 groups where group A received USG guided II/IH & GF nerve block. All patients underwent successful induction and surgery.

In the postoperative period these patients were assessed for pain using the Visual Analogue Scale, time for first rescue analgesia, & total analgesic consumption at 3, 6, 12, 18 & 24 hours after surgery.

**Table 1: COMPARISON OF MEDIAN VAS AT REST BETWEEN TWO GROUPS**

VAS	Group A		Group B		p value
	Median	IQR	Median	IQR	
3 hour	2	2 - 2	5	5 - 5	<0.001***
6 hour	3	2 - 3	5	5 - 6	<0.001***
12 hour	5	4 - 5	5	5 - 6	<0.001***
18 hour	4	3 - 4	4	3 - 4	0.394†
24 hour	3	3 - 4	4	3 - 4	0.799†

**Table 2: COMPARISON BETWEEN TIME FOR FIRST RESCUE ANALGESIA (MINUTES) & TWO GROUPS**

	Group A	Group B	p value
	Mean ± SD	Mean ± SD	
<b>Time for first rescue analgesia (minutes)</b>	628.97 ± 132.4	276.6 ± 30.98	<0.001***

**Table 3: COMPARISON OF TOTAL FENTANYL CONSUMPTION BETWEEN TWO GROUPS**

	Group A	Group B	p value
	Mean ± SD	Mean ± SD	
<b>Total Fentanyl consumption</b>	106.55 ± 29.34	315.07 ± 72.26	<0.001***

Ultrasound guided II/IH & GF nerve block with 0.25% Bupivacaine was found to provide adequate analgesia in the postoperative period with VAS score  $\leq 4$  for up to 6 hours in postoperative period. There was no significant difference in median VAS scores between the two groups after 12 hours. (Table 1)

The mean time required for first rescue analgesia in hours was significantly different between the two groups. (Table 2) Group A had a longer duration of satisfactory pain relief therefore the time for rescue analgesia is close to 10 hours after the procedure.

Rescue analgesia of Intravenous Fentanyl 1mcg/kg was given to patients when VAS  $\geq 5$ . The mean total consumption in 24 hours was significantly decreased in group A when compared with group B. (Table 3)

Throughout the post operative period, it was observed that there was no significant difference in the hemodynamic parameters of the patients belonging to either group.

#### 4. Discussion

This study shows that Ultrasound guided Ilioinguinal/ Iliohypogastric & Genitofemoral nerve block successfully provides excellent postoperative analgesia to patients of Inguinal Hernia

Surgery and can also be used to provide a balanced anesthesia and as a rescue block. Its easier application, lower potential side effect profile & deposition of drug at effector site makes it a popular modality.

Back in 1980, von Bahr [8] illustrated the anaesthetic techniques for inguinal herniorrhaphy, in which the Ilioinguinal-Iliohypogastric nerve block was combined with the genitofemoral nerve block. This suggested that the use of this combination technique was not uncommon at that time. Shandling and colleagues [9] also reported genitofemoral nerve block along with IG-IH nerve block in some patients early in their series of inguinal herniotomy. However, this technique was abandoned later because it was of doubtful benefit and constituted a potential cause of haematoma formation within the cord. Subsequently there have been no reports of genitofemoral nerve block for inguinal hernia repair.

In our study time taken for first rescue analgesia in Group A (II/IH/GF nerve block) was more i.e.  $628.97 \pm 132.4$  minutes & in Group B (SA) it was less i.e.  $276.6 \pm 30.98$  minutes. Out of 30 patients, 1 patient in Group A did not require any rescue analgesia in 24 hours. This finding indicates that USG guided II/IH & GFN block provides significant ( $p < 0.001$ ), postoperative pain relief of longer duration when compared to group with no block.

In agreement with our study, J. Toivonen et al in his study found that the time to first analgesia was delayed in the patients receiving II/IH nerve block with 10 ml of 0.5% bupivacaine, and was not followed by a rebound increase in requirement for analgesia. In those patients who required postoperative analgesics, 48 in the B-IINB group (block group) and 46 in the S-IINB group (saline group), the average time latency was 8.1 (0.9–54.7) h and 4.3 (0.4–20.6) h, respectively (P, 0.01). They concluded that reduced analgesic requirement was seen only for about 6 hours postoperatively [10].

In our study the average time latency or time for first rescue analgesia was 628 minutes in group receiving II/IH & GF nerve block. Our study definitely showed better results study probably due to our multimodal approach to pain relief where we have given paracetamol at regular intervals in both Groups. Sasaoka et al. and Asad et al. indicated that addition of a genitofemoral block to IIIH nerve block provides better pain relief compared with II/IH block alone [11, 12]. USG guidance provides a major benefit in correct placement of needle tip and injection of Local Anesthetic in the correct

myofascial plane.

In the present study, total fentanyl consumption between two groups was compared. In Group A  $106.55 \pm 29.34$  micrograms Fentanyl was consumed & in Group B it was  $315.07 \pm 72.26$  micrograms Fentanyl was consumed by the patients. This was statistically significant with p value  $p < 0.001$ . In agreement with the present study, J. Toivonen et al, in his study concluded that Opioid use at the post-anesthesia recovery unit was significantly lower in group receiving II/IH nerve block with 10 ml of 0.5% bupivacaine, whereas NSAID use was similar [10]. In our study the average opioid consumed in patients receiving II/IH & GF block was less ( $106.55 \pm 29.34$  micrograms Fentanyl) as compared to patients who did not receive any block ( $315.07 \pm 72.26$  micrograms). Our study definitely showed better results than this study probably due to our multimodal approach to pain relief where we have given paracetamol at regular intervals in both Groups.

Addition of Genitofemoral nerve block to II/IH nerve block also plays a significant role by reducing analgesic requirement as it prevents the pain arising from Inguinoscrotal region especially in patients where incision over scrotal skin is taken. It also blunts the hemodynamic response to sac traction. The improved analgesia demonstrated with the II/IH nerve block may also be attributed to the anatomical course of the ilioinguinal and iliohypogastric nerves.

In our study no complication was noted in either group. Petersen et al. also found no complications in the patients in group receiving TAP block, but three patients in the group which received blind ilioinguinal block had partial paralysis of thigh musculature [13]. Ultrasound guidance reduces the dose of drug and incidence of puncturing a blood vessel. In our study, use of USG guidance helped us avoid complications like hematoma, bowel injury or inadvertent femoral nerve block as dose and volume of local anesthetic drug was appropriate.

## 5. Conclusion

In the present study, II/IH & GF nerve block offers significant advantages in terms of decreased postoperative pain, lower postoperative fentanyl consumption and better patient satisfaction. In addition to decreased pain in the immediate postoperative period, II/IH & GF nerve block also seems to provide analgesia that exceeds the duration of action of the LA when used as a part of Multimodal Analgesia. Ultrasound guided II/IH & GF nerve block is a technique with almost no complication which in addition to providing adequate analgesia for patients undergoing Inguinal hernia repair surgery also decreases consumption of opioids and for this reason, we recommend II/IH & GF nerve block as a standard practice for inguinal hernia surgery and should be learnt by all anaesthesiologists.

## 6. References

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