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## Original Article

# A comparative study of bilateral ilioinguinal and iliohypogastric nerve block for postoperative analgesia in lower segment cesarean section.

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**Abstract**

**Background**

Modern techniques incorporate regional anesthesia in pain management and it is the best and safest technique. It avoids the side effects that remain with the traditional use of opioids. Ilioinguinal and iliohypogastric nerve block can provide a satisfactory postoperative analgesia in parturients with pfannenstiel incision thereby reducing postoperative opioid consumption.

**Objective**

To compare opioid consumption and pain relief postoperatively with ilioinguinal and iliohypogastric nerve block in patients undergoing lower segment cesarean section.

**Methods**

It is a hospital based comparative study done in Nepalgunj Medical College Teaching Hospital, Kohalpur, Banke in a period of one year. Total of sixty patients, thirty in each were randomly allocated into the two groups. Group B received bilateral ilioinguinal and iliohypogastric nerve block by landmark technique with 20ml of 0.5% bupivacaine; 10ml in each side. Group NS received ilioinguinal and iliohypogastric nerve block with 20ml of 0.9% normal saline. In postoperative period blood pressure, pulse, oxygen saturation, numerical rating scale score at different allocated duration, total dose of tramadol consumption and time to first dose of tramadol were recorded.

**Results**

The total postoperative tramadol consumption in the first 24hr postoperatively was significantly less in group B (125 ± 34.11mg) than in group NS (205 ±37.93mg). The mean effective duration of analgesia measured from the time of onset of spinal blockade to the time of request for tramadol was 264 ±78.27 minutes in group B and 178.17±30.61minutes in group NS, which was statistically significant and also numerical rating scale scores were low at all points postoperatively in group B.

**Conclusion**

Bilateral ilioinguinal and iliohypogastric nerve block significantly lowers the consumption of tramadol and also provides adequate postoperative pain relief.

**Keywords**: Bupivacaine; Ilioinguinal and iliohypogastric nerve block; Lower segment cesarean section

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**Introduction**

To relief pain has always been the prime aim of an anesthesiologist. Moreover, pain relief in a mother has more compelling reasons because high levels of pain interfere with early infant care and breastfeeding.[1] So, effective postoperative analgesia facilitates early ambulation, infant care and prevention of postoperative morbidity.[2]

There have been a variety of pharmacological alternatives including oral or parenteral acetaminophen, non-steroidal anti-inflammatory drugs, opioids, intrathecal opioids, epidural techniques and patient controlled analgesia. Traditional use of opioids though provides adequate postoperative analgesia, also have well documented side effects like sedation, nausea, pruritus, respiratory depression and need continuous monitoring and intervention, when necessary. Therefore, to overcome the above problems alternative therapies are to be explored.

Regional anesthesia is widely employed which provides satisfactory postoperative pain relief and is devoid of significant side effects. The postoperative pain that follows a cesarean section (CS) with the pfannenstiel incision has both a somatic component and a visceral component.[3] The somatic pain generated at the incision site is conducted by II/IH, which innervate the L1–2dermatome distribution.[4] Because of the II/IH nerve involvement, block of this nerve produces a significant degree of post-CS pain relief. In contrast to the somatic component of postoperative pain, the visceral pain component is diffuse with no peripheral nerve association.[5]

So far, no study has been done on II/IH nerve block in patients undergoing cesarean section in our Nepalese population. The various benefits of this regional anesthesia and its analgesic efficacy in postoperative period are still not known. Therefore, this study has been conducted to assess the efficacy of ilioinguinal and iliohypogastric nerve block in postoperative pain relief thereby reducing opioid consumption among the parturients undergoing lower segment cesarean section.

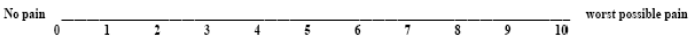
**Methods**

A randomized comparative study for one year was conducted in Nepalgunj Medical College Teaching Hospital, Kohalpur after ethical approval obtained from the ethical committee, written and informed consent obtained from the patients or patient's attendants. The study was conducted in 60 patients of ASA physical status I and II of age between 20 to 35 years undergoing non-emergent lower section ceaserean section surgery under spinal anesthesia. Those patients belonging to ASA physical status III, IV and V, unwilling to participate, preeclampsia and eclampsia, allergic to bupivacaine and contraindicated to spinal anesthesia were excluded from the study. At the end of the surgery, bilateral iiliinguinal and iliohypogastric nerve was blocked either with bupivacaine or normal saline. In a time period of one year from Jan 2014 to Dec 2014, a sample size of sixty patients was taken and divided into two equal groups using sealed envelope technique.

Group B: Bilateral Iliinguinal and Iliohypogastric nerve was blocked with 10ml of 0.5% bupivacaine on each side with a total of 20ml.

Group NS: Bilateral Iliinguinal and Iliohypogastric nerve was blocked with 10ml of 0.9% normal saline with a total of 20ml.

All patients admitted to the hospital before surgery had a complete pre-anesthetic evaluation including detailed history taking, thorough physical examination and routine pre-operative investigations. Numerical Rating Scale (NRS)[6] was explained preoperatively in a simple language, which the patient could understand. (0-10 whole numbers, starting from 0 = no pain 1-3= mild pain, 4-6 =moderate pain, 7-9=severe pain and 10 = worst pain imaginable).




0: No pain 1-3: Mild pain 4-6: Moderate pain 7-9: Severe pain 10: Worst pain possible

Then, the patient was kept in left-lateral position and by using the midline approach at L3-4 vertebral interspaces a 25-gauze Quincke's spinal needle was inserted for spinal anesthesia. Once free flow of cerebrospinal fluid was recognized, the intrathecal anesthetic solution in a standardized dose, of 2.5 ml of 0.5% bupivacaine in dextrose (hyperbaric) was injected into the subarachnoid space at the rate of 0.2ml/sec. At the end of the injection, a small sterile dressing was applied and the patient immediately turned into supine position, with a pillow under the head. Intraoperatively, continuous electrocardiogram monitoring was done. Blood pressure was monitored every five minutes using an oscillometric non-invasive blood pressure monitor. Oxygen saturation was monitored with the help of a pulse oximeter.

The time of start of spinal anesthesia and level of sensory block and the time of start of surgery was noted. If during the surgery hypotension occurred, it was managed by incremental doses of injection mephenteramine 6mg intravenously.

After completion of surgery II/IH nerve was blocked

bilaterally for postoperative analgesia. The ilioinguinal and iliohypogastric nerve block injection was performed by landmark technique as described by Bell et al.[3] in a standardized fashion for all parturients following wound closure. A landmark of 2cm medial and 2cm superior to anterior superior iliac spine was taken, pointing towards the midpoint of inguinal ligament. The needle was then advanced until first loss of resistance and drug was deposited in between external oblique and internal oblique muscle. It was further advanced and on second loss of resistance again drug was deposited in between internal oblique and transverse abdominus muscle. The needle was then withdrawn to the skin and redirected medially and later laterally in a fan-shaped manner and same procedure repeated. This way a total of 10ml of either 0.5% bupivacaine or normal saline was deposited in one side and same procedure repeated on the contralateral side with total of 20ml. After the block the patient was transferred to post anesthesia care unit.

The time of great toe movement in post-operative room was noted which indicated the regression of spinal anesthesia. At that point of time, the success of ilioinguinal and iliohypogastric nerve was assessed by pinprick at the site of incision and adequacy and presence of block was noted and confirmed. With the primary outcome variable being the assessment of pain relief with the II/IH nerve block with bupivacaine or without bupivacaine and duration of analgesia the patients were followed subsequently and level of pain was assessed by using the NRS scores. It was recorded initially at 30mins postoperatively, then at 2hrs, 4hrs, 8hrs, 12hrs, 16hrs, 20hrs and 24hrs. The duration was analgesia was assessed by the time for first dose of tramadol and total consumption of tramadol was calculated. Blood pressure, pulse and oxygen saturation by pulse oximeter were also recorded along with the NRS score in post anesthesia care unit. If the pain score was more than 3 then intravenous tramadol 50mg was given and time to first dose of tramadol was noted. Regardless of their NRS score on frequent intervals, patients were enquired wheather they require additional analgesia and intravenous tramadol 50mg was given if required. Patients were also instructed to request pain medication from the nurse whenever they required pain relief and not to wait for their next scheduled pain assessment. Patients were not allowed to view their previous pain responses. Adverse effects and complications of opioids like nausea, vomiting, pruritus and drowsiness if any were recorded.

The primary outcome variable was decrease in total consumption of tramadol within 24hrs postoperatively in parturients receiving ilioinguinal and iliohypogastric nerve block with bupivacaine. A sample size of 25 in each group was required to evaluate 30% decrease in total consumption of tramadol with a power of 90% at 5% significant level.[7] To account for the dropouts 30 patients were included in each group. All data so obtained was compiled in Excel worksheet software and statistical analysis was done using Statistical Package for Social Science (SPSS 19.0). All the continuous and categorical data were compared. Student t-test was used for continuous data. If p value equals to 0.05 or less, then it was considered statistically significant.

**Results**

Over one year of study period a total of 73 patients enrolled for non-emergent cesarean section under spinal anesthesia were assessed for eligibility and a total of 60 patients thirty patients in each group were included in our study.

**CONSORT 2010 Flow Diagram**

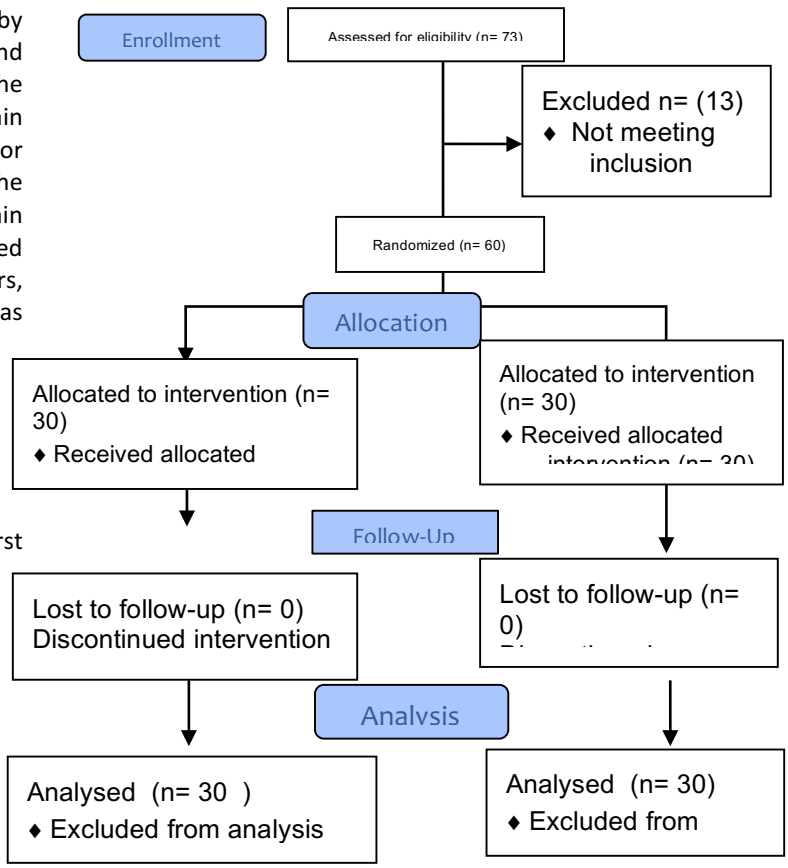


**Table 1 Demographic profile of the study patients and duration of surgery**

| Variables | Group B; n=30 | Group NS; n=30 | P value |
|---|---|---|---|
| Age | 25.50±4.10 | 26.20±4.36 | 0.525 |
| Weight | 57.73± 3.90 | 56.80±4.21 | 0.377 |
| ASA I:II | 27:3 | 27:3 | - |
| Duration of surgery (minutes) | 52.33 ± 14.84 | 56.00 ± 14.59 | 0.338 |

ASA: American Society of Anaesthesiologist

The demographic profiles of the patients in both the groups were comparable with regards to age and weight. The distribution as per ASA status was similar in both the groups and duration of surgery was comparable in both the groups [Table 1]. There was no significant difference in mean heart rate, systolic blood pressure and diastolic blood pressure in two groups at postopertive period at 30mins, 2 ,4,8,12,16, 20 and 24hr. (Figures 1, 2 and 3).

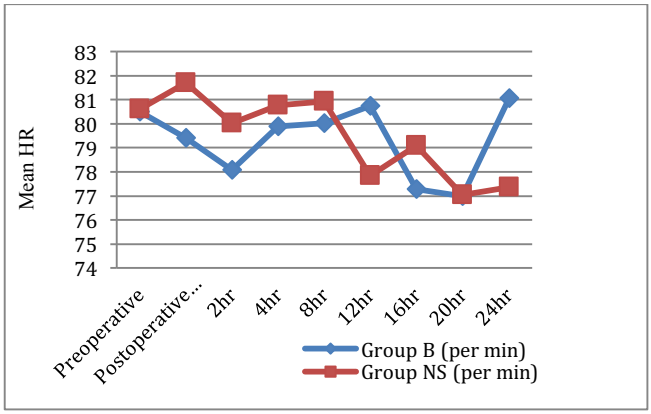



**Figure 1: Comparison of Heart Rate (HR)**

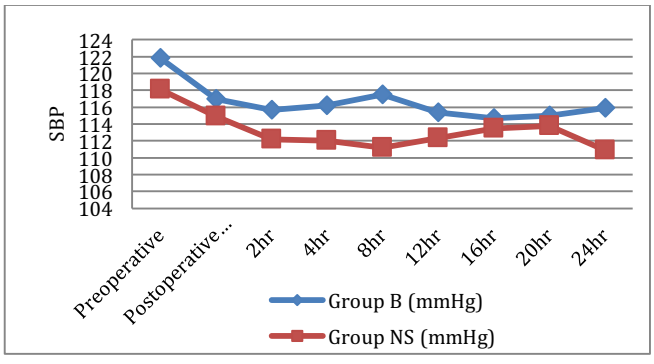



**Figure 2: Comparison of Systolic Blood Pressure (SBP)**

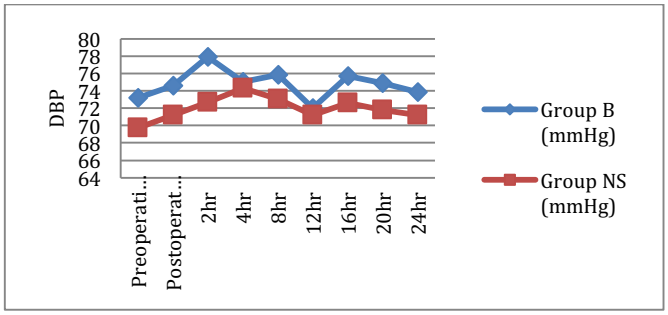



**Figure 3: Comparison of Diastolic Blood Pressure (DBP)**

In both the groups time to great toe movement i.e. time to wear off from spinal anesthesia, in postoperative period was comparable [Table 2]. At this point of time success of block was 100% in patients receiving II/IH nerve block with bupivacaine, which was confirmed by dullness at incision site. The NRS scores were lower at all points in postoperative period in Group B [Table 3].

**Table 2 : Time to Great toe movement from SAB**

| | Group B (n=30) | Group NS (n=30) | P value |
|---|---|---|---|
| Time in minutes | 148.33 ± 41.28 | 130.00 ± 38.26 | 0.080 |

**Table 3: Numerical Rating Scale (NRS) at varoius duration**

| Group (Median ± InterQuartile Range) | | |
|---|---|---|
| NRS | Group B (n=30) | NS (n=30) |
| 30mins | 0.00 | 0.00 ± 1 |
| 2hr | 2.00±3 | 4.00 ± 1 |
| 4hr | 3.50±1 | 4.00± 0 |
| 8hr | 3.00±1 | 4.00±1 |
| 12hr | 3.00±1 | 3.00± 1 |
| 16hr | 3.00±2 | 4.00± 1 |
| 20hr | 3.00±2 | 3.50± 1 |
| 24hr | 3.00±1 | 4.00± 1 |

Time to first dose of tramadol in Group B was longer i.e. 264± 78.27 as compared to 178.17±30.611 in Group NS and this difference was statistically significant. The total consumption of tramadol in Group B was lower; 125± 34.11 mg versus 205± 37.93 mg in NS and this difference was also statistically significant. [Table 4 and Fig 4]

**Table 4: Comparison of mean value of time for first dose of Tramadol and total dose of tramadol in both the groups**

| | Group B (n=30) | Group NS (n=30) | p-value |
|---|---|---|---|
| | Mean ± SD | Mean ±SD | |
| Time to 1st dose of tramadol (min) | 264.00 ± 78.27 | 178.17 ± 30.611 | 0.000 |
| Total dose of tramadol (mg) | 125.00 ± 34.11 | 205.00 ± 37.93 | 0.000 |

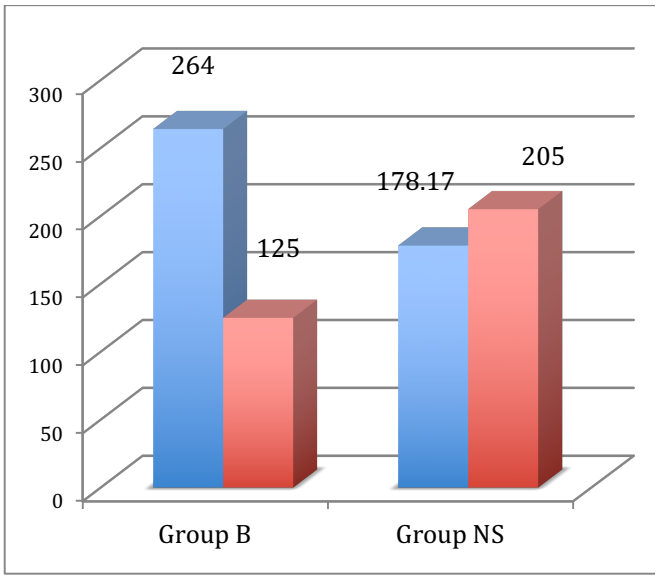



**Figure 4: Time to 1st dose of Tramadol and total dose of Tramadol between two Groups**

Nausea was noted in two patients in group B and 6 patients in group NS (p value 0.133). One patient with nausea in group B also had vomiting and 6 patients in group NS had vomiting (p value 0.045) which is statistically significant. Nausea and vomiting in the postoperative period was managed with a bolus dose of intravenous ondansetron 4mg.

**Discussion**

In past, illioinguinal nerve blocks have been used for hernial repair with effective postoperative pain relief. A study which corelates with the use of ilioinguinal and iliohypogastric nerve block for hernial repair resulting in effective pain relief was carried out in past by Andersen, Nielsen and Kehlet.[8] However, potential role of combined illioinguinal and illiohypogastric nerve block in the setting of cesearean delivery patients remained unclear.

The main finding of our study was a significant difference in the total dose of tramadol consumption by partiurients receiving the II/IH nerve block with bupivacaine than without. Also there was a longer period of analgesia and lower pain scores in patients receiving the block with bupivacaine.

In this study, classic landmark approach of block technique in a fan-shaped manner was used. Bell et al. also used the same technique with success rate of >95%.[3] Other regional blocks of the anterior abdominal wall like Transverse Abdominal Plane block, (TAP) block could also be used in this study. But TAP block covers a large area, T7-L2 dermatomes whereas II/IH nerve block cover the same two lowest nerves blocked by TAP block. So it can be said that Ilioinguinal and iliohypogastric nerves block comprises one part of TAP block. Since the pfannestiel incision lies within the L1 dermatome, bilateral ilioinguinal and iliohypogastric nerve block should adeqately provide analgesia after low transverse caesarean section.[9]

Further, although TAP block technique is apparently safe, it may be difficult, especially in obese patients because of failure to identify the landmark of the triangle of Petit resulting in an incorrect location of the needle. In addition, damage to viscera (liver and bowel) may occasionally occur.[10]

During our study patients who received II/IH nerve block with bupivacaine also reported to have pain and received tramadol on demand, although total consumption were in low doses in comparison with patients who received II/IH block with normal saline, that can be explained by the fact that while providing analgesia of the skin and deeper layers of the anterior abdominal wall, II/IH nerve blockade would not provide analgeisa for visceral pain which is diffuse and not associated with peripheral nerve supply.

In our study, in both the groups the duration of surgery was almost equal and postoperatively, the movement of great toe in both the groups were approximately 3hr. As spinal anesthesia donot end abruptly after a fixed peiod of time; rather, they recede gradually from the most cephalad dermatome to the most caudad. So, the movemet of great toe was taken a point when the spinal anesthesia has completely resolved from the surgical site i.e. from L1 dermatome. At this point of great toe movement, success and adequacy of the ilioinguinal and iliohypogastric nerve block was assessed by dullness to pinprick at the surgical site. In all the patients with II/IH nerve block, success of block

with bupivacaine was 100% and the low pain scores were noted in this group. The higher pain scores in Group NS than in Group B indicated a better quality of analgesia in Group B.

There were few limitations in our study. Use of ultrasound guided ilioinguinal and iliohypogastric nerve block would help us to confirm the block success but this was not feasible in our institution. Other limiting factor in our study is the use of neuraxial blockade to perform lower segment caesarean section surgeries which otherwise provides a considerable residual analgesia with a difficulty in assessing a successful II/IH nerve block thereby adding considerably to the existing confounding factors if any. Another limitation is that the postoperative pain involved both somatic and visceral component. The IL/IH nerve block treated the somatic pain that is conducted by the incision site whereas the visceral pain related to the peritoneal trauma and irritation and pain arising from uterus after surgery still exist.

**Conclusion**

Bilateral ilioinguinal iliohypogastric nerve block in parturients undergoing LSCS using bupivacaine significantly decreases opioid consumption and provides adequate pain relief.

**Conflict of interests:** All authors have filled the ICMJE conflict of interest form and declare that they have nothing to disclose.
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