A Randomized Control Trial on the Efficacy of Bilateral Ilioinguinal-Iliohypogastric Nerve Block and Local Infiltration for Post-Cesarean Delivery Analgesia

Abstract

Background and Aims: The management of post-cesarean delivery pain is of utmost importance to prevent undesirable outcomes. Local anesthetic wound infiltration and bilateral ilioinguinal-iliohypogastric (ILIH) nerve block are two potential techniques to provide better postoperative analgesia. In this study, these two techniques have been compared for the management of postoperative pain in the elective cesarean section. Materials and Methods: After approval from the institutional ethics committee and informed consent from patients, this study was conducted on 150 patients who underwent elective cesarean section under spinal anesthesia. Patients were allotted into three groups: group C (postoperative sham injection), group L (postoperative infiltration of incision site with 20 mL of 0.5% ropivacaine), and the group I (postoperative bilateral ILIH block with 10 mL of 0.5% ropivacaine on each side under ultrasound guidance). The objectives of our study were to evaluate the duration of analgesia, visual analog scale (VAS) score, and the cumulative analgesic requirement for pain relief and a number of analgesic demands. Student t-test and Mann-Whitney U test were used to compare the analgesic parameters among the groups. Results: Group I had a significantly longer duration of analgesia (515.64 ± 82.87 min) compared to group L (280.87 ± 39.47 min), and group C (246.89 ± 37.85 min). Group I had significantly lower VAS scores compared to the groups L and C. Group I (1.72 ± 0.68) had lower analgesic demands compared to group L (3.26 ± 0.64) and group C (4.62 ± 0.65). The cumulative analgesic requirement was significantly lower in group I. Conclusion: ILIH nerve block has a longer duration of postoperative pain relief in cesarean delivery patients compared to local infiltration and placebo. Trial Registration: Registered with Central Trial Registry, India. Registration number CTRI/2017/08/009344.

Keywords: Analgesia: obstetric, analgesics, nerve block, cesarean section, iliohypogastric/ilioinguinal nerve block, postoperative pain

Introduction

Cesarean section is one of the common lower abdominal surgeries in young females with significant postoperative pain. It is imperative for the new mother to be pain-free to facilitate the early mobilization and for the optimum care of the newborn by early initiation of breastfeeding.[1] Postoperative analgesia also plays an important role in reducing the duration of hospital stay and the incidence of perioperative complications.[2] There is no single best method available for optimum pain relief. Multimodal analgesia in the form of parenteral nonsteroidal anti-inflammatory drugs, opioids, epidural analgesia, and peripheral nerve blocks have been tried over several decades.[3] The ideal analgesic method should be cost-effective with fewer side effects.

Regional anesthesia (RA) techniques are gaining more popularity as a part of multimodal analgesia. RA has shown to reduce the opioid consumption postoperatively and its associated side effects such as sedation, pruritis, nausea, and vomiting. Infiltration of the incision site with the local anesthetic drug is a commonly used simple technique to reduce postoperative pain.[3,4] Peripheral nerve blocks with local anesthetics are an important part of regional anesthesia for pain relief. Iliointernal-iliohypogastric nerve (ILIH) block has been gaining importance in lower abdominal

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This method has been used successfully for pain relief following lower segment cesarean sections (LSCS). [6,7]

The objectives of our study were to evaluate the efficacy of ILIH nerve block and incision site infiltration with local anesthetics in elective cesarean section cases in terms of the duration of analgesia, visual analog scale (VAS) score, the cumulative analgesic requirement for pain relief, and a number of analgesic demands in first 24 h. We found no previous studies that have compared ultrasound-guided bilateral ILIH and infiltration of incision site with local anesthesia for postoperative analgesia following LSCS, hence, the need for this study.

Materials and Methods

American Society of Anesthesiologists grades 1 and 2 patients (n = 150) aged between 18 and 40 years opted for elective LSCS under spinal anesthesia in our tertiary care hospital from October 2015 to August 2017 were recruited into this prospective randomized controlled study. Patients who had intraoperative complications such as major blood loss or severe hypotension requiring postoperative vasopressor infusions, patients with impaired coagulation, conversion to general anesthesia or use of intraoperative opiate analgesics, patients with significant hepatic, renal, pulmonary, metabolic, psychiatric disorders, and an incision other than Pfannenstiel incision for LSCS were excluded from the study.

After obtaining approval from the institutional ethics committee, the study was registered with Central Trial Registry, India with registration number CTRI/2017/08/009344. Written informed consents were taken, patients satisfying the inclusion criteria were selected for the study. The patients were allotted into three groups of 50 each by simple randomization using a computer-generated random number table and sealed-envelope method. Group C (control group) spinal anesthesia followed by postoperative saline injection. Group L (local infiltration group) spinal anesthesia followed by postoperative infiltration of the incision site with 20 mL of 0.5% ropivacaine. Group I (nerve-block group) spinal anesthesia followed by postoperative ILIH nerve block with 10 mL of 0.5% ropivacaine on each side under ultrasound guidance.

A standardized anesthetic technique was followed. After the institution of monitoring, including the placement of electrocardiogram leads, a noninvasive blood pressure monitor and pulse oximetry, an 18G intravenous cannula was inserted and the normal saline infusion was started, before administering spinal anesthesia. Anesthesia was administered in the sitting position. Using an aseptic technique, a 25G Quincke needle was inserted via a midline approach into the L2–3 or L3–4 interspace. Anesthesia was established with a single bolus of 2 mL 0.5% hyperbaric bupivacaine (10 mg). The level of sensory blockade was assessed by the level of touch sensation before surgical incision (T6–8 was considered adequate). Supplemental oxygen 5 L/min via a Hudson mask was administered during the surgery. Oxytocin 5 units slow intravenous bolus was administered after the delivery of the fetus followed by infusion with 10 units oxytocin added into the intravenous fluid.

After skin closure, patients in the local infiltration group L received infiltration of the incision site with 20 mL of 0.5% ropivacaine. All layers of the surgical incision were infiltrated with a 23G, 38-mm needle in a controlled and systematic manner under direct visualization in fan-like fashion on each side of the incision. The patients in the nerve block group received bilateral ILIH nerve block with 10 mL of 0.5% ropivacaine on each side using GE Healthcare Venue 40 ultrasound machine and linear array high-frequency probe. In group I, the ultrasound probe was placed medial to the lateral one-third of the line joining the umbilicus and the anterior superior iliac spine (ASIS), with a part of the probe sitting on the ASIS. The ASIS, iliacus muscle, internal oblique, transverse abdominis, and the ILIH nerves between them were identified. After appreciating the sonoanatomy, the ILIH nerves were approached from the medial to lateral direction with a 100 mm X 22G Stimuplex® needle (B Braun, Melsungen, Germany) by an in-plane technique and 10 mL of 0.5% ropivacaine was injected all around and the drug spread was appreciated. If the nerves could not be clearly identified the drug was administered in the plane between the internal oblique and transversus abdominis muscle. The same procedure was repeated on the other side. The blocks were performed by an anesthesiologist with more than 5 years’ experience in administering ultrasound-guided truncal blocks. Patients in group C received a placebo injection on either side of the incision subcutaneously with 10 mL normal saline. Patients were then shifted to the post-anesthesia recovery room for monitoring and later to the postoperative ward.

The standard institutional postoperative analgesic regimen was followed. On patients’ requests for pain relief or if VAS ≥4; paracetamol 1 g IV infusion was administered over 20 min and it was repeated every 6 h. The duration of analgesia was calculated from the time of administration of spinal anesthesia until the patient requested analgesia. If the patient complained of inadequate pain relief or VAS ≥4; 30 min after the end of paracetamol infusion tramadol 50 mg IM was prescribed as rescue analgesia. If there was inadequate pain relief (VAS ≥4) after 2 h tramadol was repeated. The patients were followed up at 4, 6, 12, and 24 h postoperatively by an independent observer who was blinded to the group allocation. VAS score, duration of analgesia, time of first analgesic demand, and a number of analgesic demands were noted. The duration of analgesia was calculated from the time of administration...
of spinal anesthesia until the time the patient first requested analgesia.

Sample size calculation: An earlier study on ILIH nerve block found that the cumulative postoperative morphine requirement for analgesia in the control group was $67 \pm 28$ mg/24 h and that of the ILIH nerve block group was $48 \pm 27$ mg/24 h.\(^7\) These findings have been utilized for estimating sample size for the study in order to demonstrate a statistical significance between the groups, it was estimated that 44 patients in each group would be needed to be included into the study at a power of 90% and $\alpha$ error of 5%. The estimated sample size would also be able to demonstrate statistical significance with regard to the duration of postoperative analgesia. Thus, it was proposed to include 50 patients in each of the groups to account for the loss of patients to follow-up or failure to adhere to protocol.

All the quantitative parameters such as age, height, weight, and BMI are presented using descriptive statistics such as mean and standard deviation. Fisher’s exact test has been used to find the significant association of study characteristics between any two groups. The outcome parameters between the groups were the duration of postoperative analgesia, cumulative postoperative analgesic use, and VAS scores at 4, 6, 12, and 24 h. Student t-test/ Mann-Whitney U test was used to compare the duration of postoperative analgesia, cumulative postoperative analgesic use, and VAS scores between the groups. The Statistical software SPSS\(^\circ\) software, version 18 (IBM, USA) was used for the analysis of the data.

Results

One hundred and sixty patients were screened to be included in the study, four patients refused to participate in the study and six patients were excluded on the day of surgery due to abnormal investigations. 150 patients were eventually included in the study and randomized into three groups of 50 each. 12 patients were lost to follow-up. Hence, 45 patients in group C, 46 patients in group L, and 47 patients in group I were finally analyzed [Figure 1]. There was no statistically significant difference between the three groups with respect to demographic data like age, height, weight, BMI, and duration of surgery [Table 1].

We found that more than 80% (40 patients) of the patients in the control group had a VAS score of more than 4 at 4 h postoperatively while no patient in the ILIH nerve block group had VAS score of more than 4 at 4 h postoperatively. We found significantly lower VAS scores at 4, 6, and 12 h postoperatively in the ILIH nerve block group ($P$ values $<0.001, 0.010$, and $0.011$, respectively) as a compared control group. ILIH nerve block group had significantly lower VAS scores ($P$ value $<0.001$) at 4 h postoperatively as compared to the local infiltration group. Eleven patients in the ILIH nerve block group recorded a VAS score of less than 4 at 12 h post-surgery [Table 2].

In our study, the mean duration of analgesia in group I was $515.64 \pm 82.87$ min, which was significantly longer than both groups C ($246.89 \pm 37.85$ min; $P < 0.001$) and L ($280.87 \pm 39.47$ min; $P < 0.001$). The mean duration of analgesia was significant statistically between groups L and C with a $P$ value $< 0.001$ [Table 3 and Figure 2]. The time to first analgesic demand in ILIH nerve block which was nearly double the time found in the control group and the infiltration group, indicating a longer duration of analgesia with ILIH nerve block.

At 24 h, all patients eventually required paracetamol in all the groups; however, mean paracetamol consumption in 24 h in group I was 1.5 g which was significantly lower than the group C (3.2 g; $P < 0.001$), and group L (2.6 g; $P$ value $<0.001$). The cumulative analgesic requirement in the first 24 h post-cesarean section in those who received ILIH nerve block was significantly lower compared to the other groups. 90% of patients in the nerve block group received only 1–2 g of IV paracetamol in the first 24 h whereas patients in the placebo group have received more than 3 g of paracetamol. At 24 hours, group I had a significantly higher percentage of patients (78.72%) who did not require supplementation with tramadol as the second analgesic, and a smaller percentage of patients (21.28%) of the same group needed a single dose of tramadol (50 mg) as the second analgesic. A sizeable proportion (39.13%) of group L patients also did not require a second analgesic and more than half (56.52%) required a second analgesic. Whereas most of the group C patients needed either single or multiple doses of tramadol ($\geq$50 mg) as a second analgesic [Table 3]. The total number of
rescue analgesic tramadol doses was significantly higher in the placebo group as compared to the ILIH nerve block group ($P < 0.001$). The local anesthetic infiltration group also showed significantly better analgesia compared to the saline group with lower cumulative analgesic requirements and a lesser number of analgesic demands ($P < 0.001$).

At 24 h, mean analgesic demands of groups C, L, and I were 4.62 ± 0.65, 3.26 ± 0.65, and 1.72 ± 0.68, respectively. 87.25% of group I patients had analgesic demands of ≤2. 89.13% of group L patients had an analgesic demand of ≥3.

### Table 1: Demographic data

| Variable            | Group C | Group L | Group I | P     |
|---------------------|---------|---------|---------|-------|
| Age (years)         | 27.11 (4.046) | 26.57 (3.833) | 27.74 (4.870) | 0.758 |
| Weight (kg)         | 72.09 (6.142) | 71.87 (6.659) | 72.77 (8.323) | 0.892 |
| Height (cm)         | 157.87 (5.124) | 159.46 (5.315) | 158.45 (4.500) | 0.843 |
| BMI (kg/m²)         | 28.93 (3.421) | 28.43 (3.117) | 29.04 (3.388) | 0.999 |

Data are expressed as mean (standard deviation).

### Table 2: Postoperative VAS scores at 4, 6, and 12 h

| VAS scores | Group C | Group L | Group I | P     |
|------------|---------|---------|---------|-------|
| VAS at 4 h |         |         |         |       |
| 0-1        | 0       | 1 (2.17) | 42 (89.36) | P1=0.889 |
| 2-3        | 5 (11.11) | 25 (54.35) | 5 (10.64) | P2=0.001* |
| 4-5        | 25 (55.56) | 20 (43.48) | 0        | P3<0.001* |
| 6-7        | 15 (33.33) | 0       | 0       |       |
| 8-9        | 0       | 0       | 0       |       |

| VAS at 6 h |         |         |         |       |
| 0-1        | 0       | 0       | 0       | P1=0.026* |
| 2-3        | 0       | 12 (26.09) | 33 (70.21) | P2=0.445 |
| 4-5        | 23 (51.11) | 32 (69.57) | 5 (10.64) | P3=0.010* |
| 6-7        | 21 (46.67) | 2 (4.35) | 0       |       |
| 8-9        | 1 (2.22) | 0       | 0       |       |

| VAS at 12 h |         |         |         |       |
| 0-1        | 0       | 0       | 0       | P1=0.004* |
| 2-3        | 0       | 3 (6.52) | 11 (23.40) | P2=0.588 |
| 4-5        | 20 (44.44) | 34 (73.91) | 34 (72.34) | P3=0.011* |
| 6-7        | 24 (53.33) | 9 (19.57) | 2 (4.26) |       |
| 8-9        | 1 (2.22) | 0       | 0       |       |

*P<0.05 significant, VAS: Visual analog scale, P1: P value between the control group and local infiltration group, P2: P value between local infiltration and ILIH nerve block group, P3: P value between control group and ILIH nerve block group.

Most of the group C patients had an analgesic demand of ≥4 which was far higher compared to group L ($P < 0.001$) and group I ($P < 0.001$). This difference was significant statistically with $P$ value < 0.05 [Figure 3]. There were no local or systemic adverse events during the study.

### Discussion

LSCS is one of the most common lower abdominal surgeries in young females. The efficient care of the newborn requires adequate pain relief in the mother. LSCS is performed by Pfannenstiel incision which lies on L1–L2 dermatomes. Sensory innervation of L1–L2 dermatomes is by the ilioinguinal and iliohypogastric nerves. The blockade of these nerves enables somatic pain relief in LSCS, but is ineffective for visceral pain, as the viscera are innervated by nerve roots from T10–L1 segments. The use of ultrasound-guided ILIH nerve block or local anesthetic infiltration of incision for postoperative pain relief is an attractive method because of its simplicity and safety.

A PubMed search revealed this is the first randomized trial investigating the analgesic efficacy of ultrasound-guided bilateral ILIH nerve block and local anesthesia infiltration at the incision site for postoperative pain relief in patients undergoing elective LSCS under spinal anesthesia. The only other study is a landmark based on bilateral ILIH nerve block and wound infiltration in patients undergoing LSCS under general anesthesia where both techniques reduced significantly the pain scores and analgesic requirements compared to placebo. But pain scores and analgesic requirements between the study groups were not statistically significant. [8]

![Figure 2: Graph showing duration of analgesia](image-url)
Ultrasound is now available in most operating suites and is being routinely used for the administration of peripheral nerve blocks to achieve good pain relief postoperatively. The use of ultrasound has reduced the number of side effects associated with nerve blocks and has increased the success rate of these blocks. Eichenberger et al. found that the success rate of needle-tip placement was 95% in ultrasound-guided approach as against the conventional technique and concluded that the ultrasound-guided technique has the potential to replace the conventional blind technique of performing ILIH nerve blocks thus improving the success rate of these blocks.\(^9\)

VAS scores were lower in the nerve block group as compared to the placebo group and the local infiltration. VAS scores were also found to be lower in the nerve block group when compared to placebo by other studies\(^[6-12]\). In a few other studies patients have received either intrathecal opiates and or patient-controlled analgesia (PCA) with morphine which could be the reason for similar VAS scores between the groups.\(^[6,7,11,15]\) VAS scores were lower with skin infiltration also as compared to control at 4 and 6 h postoperatively. This is similar to other studies where the VAS scores have been found to be lower with local anesthesia infiltration of the incision site.\(^[11,14]\)

There are many studies that have found that the ILIH nerve block technique reduced the number of systemic analgesics required to control post-cesarean delivery pain.\(^[6,7,11,15]\) Bell et al. in a two-part study to determine if the ILIH nerve blocks reduced PCA morphine use. Part one was a retrospective assessment of cesarean delivery patients with and without ILIH nerve blocks and the second phase was a randomized double-blind placebo-controlled trial to compare post-cesarean morphine use and the appearance of opioid-related side effects between the ILIH nerve block and placebo-injected groups. All their patients received iv PCA morphine, both phases demonstrated that ILIH nerve block significantly reduced the amount of IV morphine used by patients in the first 24 h following cesarean delivery. But they found no reduction of opioid-related adverse effects (itching and nausea) despite reduced analgesic use and they also showed no statistically significant difference in the VAS scores.\(^[7]\)

In our study, the ILIH nerve block provided a longer duration of analgesia. These findings are similar to the study by Wolfson et al. Where bilateral ILIH nerve block was administered with 24 mL of 0.5% bupivacaine, the time to first analgesic request was 14.3 ± 1.8 h in the ILIH group whereas it was 5.6 ± 1.1 h in the saline group. But all the patients in their study had received both morphine and fentanyl intrathecally which probably was the reason for the delayed request for postoperative analgesia.\(^[9]\) In our study, we have not used any adjuvants intrathecally.

In our study, the time to first analgesic request in the local infiltration group was delayed by more than 45 min compared to the placebo group suggesting a longer duration of analgesia by a simple technique. Bamigboye et al. noted that 48% of the patients who received local infiltration experienced pain and requested a rescue analgesic 1 h after cesarean section under general anesthesia as against 94% in those who did not receive any local anesthetic infiltration. Also, the patients who received ILIH nerve blocks expressed better satisfaction scores as compared to the saline group in their study.\(^[16,17]\)

The cumulative analgesic requirement in the first 24 h post-cesarean section in those who received ILIH nerve block in our study was significantly lower compared to the other groups. The local anesthetic infiltration group in our study also showed significantly better analgesia compared to the placebo group with lower cumulative analgesic requirements and a lesser number of analgesic demands. These findings were consistent with several other studies conducted previously which are listed above.\(^[6,9,12,15]\) Also, our results indicate that a simple technique like local infiltration of incision site which requires no special equipment or skill provides better analgesia than the patient receiving conventional analgesics alone.

There are a few limitations of our study, we have followed up the patients for only 24 h postoperatively and patient satisfaction scores have not been compared between the two groups. Other modalities such as intrathecal opiates and PCA which have shown to produce good analgesia have not been compared with nerve block/local infiltration in our study.

**Conclusion**

In the present study the ultrasound-guided ILIH nerve block in post-cesarean delivery patients significantly the increased duration of postoperative analgesia, lowered thetas scores and reduced the analgesic requirement as compared to conventional analgesics and local infiltration of the incision site.
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Conflicts of interest
There are no conflicts of interest.

References
1. McDonnell NJ, Keating ML, Muchatuta NA, Pavy TJ, Paech MJ. Analgesia after caesarean delivery. Anaesth Intensive Care 2009;37:539-51.
2. Kehlet H, Holte K. The effect of postoperative analgesia on surgical outcome. Br J Anaesth 2001;87:62-72.
3. Trotter TN, Hayes-Gregson P, Robinson S, Cole L, Coley S, Fell D. Wound infiltration of local anaesthetic after lower segment caesarean section. Anaesthesia 1991;46:404-7.
4. Bhaskar SB. Case for local infiltration analgesia: Is all the evidence in black and white? Indian J Anaesth 2015;59:1-4.
5. Kamal K, Jain P, Bansal T, Ahlawat G. A comparative study to evaluate ultrasound-guided transversus abdominis plane block versus ilioinguinaliliohypogastric nerve block for post-operative analgesia in adult patients undergoing inguinal hernia repair. Indian J Anaesth 2018;62:292-7.
6. Pekmezci A, Cesur M, Aksoy M, Ince I, Aksoy A. The effect of ilioinguinaliliohypogastric block with or without intravenous paracetamol for pain relief after caesarean delivery. Acta Med Mediterr 2014;30:1183-8.
7. Bell EA, Jones BP, Olufolabi AJ, Dexter F, Phillips-Bute B, Greengrass RA, et al. Iliohypogastric-ilioinguinal peripheral nerve block for post-caesarean delivery analgesia decreases morphine use but not opioid-related side effects. Can J Anaesth 2002;49:694-700.
8. Ganta R, Samra SK, Maddineni VR, Furness G. Comparison of the effectiveness of bilateral ilioinguinal nerve block and wound infiltration for postoperative analgesia after caesarean section. Br J Anaesth 1994;72:229-30.
9. Eichenberger U, Greher M, Kirchmair L, Curatolo M, Moriggl B. Ultrasound-guided blocks of the ilioinguinal and iliohypogastric nerve: Accuracy of a selective new technique confirmed by anatomical dissection. Br J Anaesth 2006;97:238-43.
10. Wolfson A, Lee AJ, Wong RP. Bilateral multi-injection iliohypogastric-ilioinguinal nerve block in conjunction with neuraxial morphine is superior to neuraxial morphine alone for postcesarean analgesia. J Clin Anesth 2012;24:298-303.
11. Bamigboye AA, Hofmeyr GJ. Ropivacaine wound infiltration and peritoneal spray for post caesarean section pain relief. Int J Gynecol Obstet 2008;102:160-4.
12. Sakalli M, Ceyhan A, Uysal HY, Yazici I, Basar H. The efficacy of ilioinguinal and iliohypogastric nerve block for postoperative pain after caesarean section. J Res Med Sci 2010;15:6-13.
13. Vallejo MC, Steen TL, Cobb BT, Phelps AL, Pomerantz JM, Orebaugh SL, et al. Efficacy of the bilateral ilioinguinal-iliohypogastric block with intrathecal morphine for postoperative cesarean delivery analgesia [Internet]. ScientificWorldJournal 2012;2012:107316. Available from: https://www.hindawi.com/journals/tswj/2012/107316/. [Last cited on 2019 Jun 19]
14. Adesope O, Ituk U, Habib AS. Local anaesthetic wound infiltration for postcaesarean section analgesia: A systematic review and meta-analysis. Eur J Anaesthesiol 2016;33:731-42.
15. Naghshineh E, Shiari S, Jabalameli M. Preventive effect of ilioinguinal nerve block on postoperative pain after cesarean section. Adv Biomed Res 2015;4:229.
16. Bamigboye AA, Hofmeyr GJ. Local anaesthetic wound infiltration and abdominal nerve block during caesarean section for postoperative pain relief. Cochrane Database Syst Rev 2009;8:CD006954.
17. Bamigboye AA, Hofmeyr GJ. Caesarean section wound infiltration with local anaesthesia for postoperative pain relief-any benefit? S Afr Med J 2010;100:313-9.