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A COMPARATIVE STUDY OF BILATERAL ILIOINGUINAL AND ILIOHYPOGASTRIC NERVE BLOCK FOR POSTOPERATIVE ANALGESIA IN LOWER SEGMENT CESAREAN SECTION

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ABSTRACT

Background: Post-cesarean pain management remains challenging in resource-limited settings. **Aim:** This study aimed to evaluate the efficacy of bilateral ilioinguinal and iliohypogastric nerve blocks for post-cesarean analgesia in Bangladesh.**Materials and Method:** A prospective randomized controlled trial was conducted at MMCH (Mymensingh Medical College Hospital, Mymensingh) involving 50 women undergoing elective cesarean section. Participants were randomized to receive either bilateral nerve blocks with 0.25% bupivacaine (Group A, n=25) or standard post-operative care (Group B, n=25). Primary outcomes included pain scores using Visual Analog Scale (VAS), analgesic (tramadol) consumption, and time to mobilization.**Results:** Group A demonstrated significantly lower pain scores (mean VAS 2.8±0.9 vs 5.4±1.2, $p<0.001$), reduced tramadol consumption (87.5±25.4mg vs 175.0±32.6mg, $p<0.001$), and earlier mobilization (6.2±1.1 vs 8.9±1.4 hours, $p<0.001$). Quality of recovery scores were superior in Group A (122.4±8.7 vs 98.6±11.2, $p<0.001$), with no significant complications.**Conclusion:** Bilateral ilioinguinal and iliohypogastric nerve blocks provide effective post-cesarean analgesia, reducing opioid requirements and improve recovery parameters. The technique presents a viable option for enhanced recovery protocols in developing nations.

Keywords: Cesarean section, Post-operative pain, Nerve block, Analgesia, Bangladesh.

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INTRODUCTION

Cesarean section rates have risen significantly worldwide, with postoperative pain management remaining a crucial challenge in obstetric care[1]. Effective pain control after cesarean delivery is essential for early mobilization, infant care, and prevention of chronic pain development[2,3]. While conventional opioid-based analgesia has been the mainstay of post-cesarean pain management, concerns about adverse effects and the need for multimodal approaches have led to increased interest in regional nerve blocks [4].

The ilioinguinal and ilio-hypogastric nerves, branches of thoracic 12 and lumbar 1 spinal nerves, provide sensory innervation to the anterior abdominal wall, including the Pfannenstiel incision site commonly used in cesarean sections[5].

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Bilateral nerve blocks of these nerves have emerged as a promising technique for post-cesarean analgesia, potentially reducing opioid requirements and associated side effects[6,7]. Recent reviews have demonstrated that regional nerve blocks can effectively complement multimodal analgesia protocols[8]. However, variations in technique, timing of administration, and choice of local anesthetic agents have led to inconsistent results across studies[9]. Additionally, while some research has been carried out regarding the efficacy of bilateral nerve block in different countries, high-quality evidence from developing nations remains limited[10-12].

Bangladesh, with its rising cesarean section rates and resource constraints, presents a unique context for evaluating cost-effective analgesic strategies. This prospective study aims to evaluate the efficacy of bilateral ilioinguinal and ilio-hypogastric nerve blocks for post-cesarean analgesia in a Bangladeshi tertiary care setting, focusing on pain scores, opioid consumption, and early mobilization outcomes.

MATERIALS AND METHOD

Study Design and Population

This prospective randomized controlled trial was conducted at the department of Obstetrics and Gynecology, MMCH, Mymensingh, Bangladesh, from July 2019 to December 2019. The study included 50 women aged 20-35 years undergoing elective cesarean section under spinal anesthesia. Exclusion criteria encompassed emergency cesarean sections, local infection at injection sites, coagulopathy, allergy to local anesthetics, and pre-existing chronic pain conditions.

Randomization and Group Allocation

Participants were randomly allocated into two groups using computer-generated random numbers. Group A (n=25) received bilateral ilioinguinal and ilio-hypogastric nerve blocks with 0.25% bupivacaine, while Group B (n=25) received standard post-operative care. The randomization sequence was concealed using sealed opaque envelopes opened immediately after surgery.

Anesthetic Technique

All patients received standardized spinal anesthesia using 12.5mg of 0.5% hyperbaric bupivacaine with 25µg fentanyl at lumbar 3 (L3)-lumbar 4 (L4) interspace . Standard monitoring included performance of continuous electrocardiography (ECG), non-invasive blood pressure measurement, and pulse oximetry. The surgical technique was standardized using Pfannenstiel incision.

Nerve Block Procedure

In Group A, bilateral nerve blocks were performed immediately after skin closure under aseptic conditions. Using anatomical landmarks and fascial click technique, the ilioinguinal and ilio- hypogastric nerves were identified approximately 2cm medial and superior to the anterior superior iliac spine. After negative aspiration, 15ml of 0.25% bupivacaine was injected on each side. The procedure was performed by experienced anesthesiologists who had conducted at least 50 similar blocks.

Post-operative Management

Both groups received standard post-operative care including regular vital sign monitoring and early mobilization protocols. Rescue analgesia consisted of intravenous tramadol 100mg when requested or when visual analog scale (VAS) pain score exceeded 4/10. Additional analgesics were documented meticulously.

Outcome Measures

Primary outcomes included post-operative pain scores at rest and movement (assessed using VAS at 2, 4, 8, 12, and 24 hours), time to first analgesic request, and total analgesic consumption. Secondary outcomes encompassed time to first mobilization, patient satisfaction scores, and complications. Quality of recovery was assessed using the QoR-15 questionnaire[13].

Data Collection and Analysis

Demographic data, surgical details, and outcome measures were recorded using standardized forms. Pain assessments were conducted by trained nurses blinded to group allocation. Data analysis was performed using SPSS version 25.0, with $p<0.05$ considered statistically significant. Continuous variables were compared using Student's t-test or Mann-Whitney U test based on distribution normality.

Sample Size Calculation

Sample size was calculated using G*Power software, assuming a 30% reduction in post-operative opioid consumption with 80% power and 5% significance level. The calculation yielded a minimum requirement of 23 patients per group, increased to 25 (to account for potential dropouts).

Ethical Considerations

The study protocol was approved by the institutional ethics committee (Reference number: MMCH/2019/Ethics/125), and written informed consent was obtained from all participants.

RESULTS

Demographic and Baseline Characteristics: Among the 50 participants, 48 completed the study (24 in each group). Two participants were excluded due to protocol violations. The groups were comparable in terms of age, Body Mass Index (BMI), gestational age, and surgical duration (Table 1).

Table 1: Demographic and Baseline Characteristics

Parameter	Group A (n=24)	Group B (n=24)	*p*-value
Age (years)	27.4 ± 4.2	28.1 ± 3.9	0.542
BMI (kg/m^2)	26.8 ± 2.7	27.1 ± 2.4	0.672
Gestational age (weeks)	38.2 ± 1.1	38.4 ± 0.9	0.484
Surgery duration (min)	42.5 ± 8.3	43.2 ± 7.8	0.758
*Values presented as mean ± SD			

n=Number of participants in each group; BMI: Body Mass index

Pain Scores: Group A demonstrated significantly lower VAS pain scores both at rest and movement across all time points ($p<0.001$). The most pronounced difference was observed at 4-8 hours post-operation, with mean VAS scores in Group A being 2.8 ± 0.9 compared to 5.4 ± 1.2 in Group B (Figure 1).

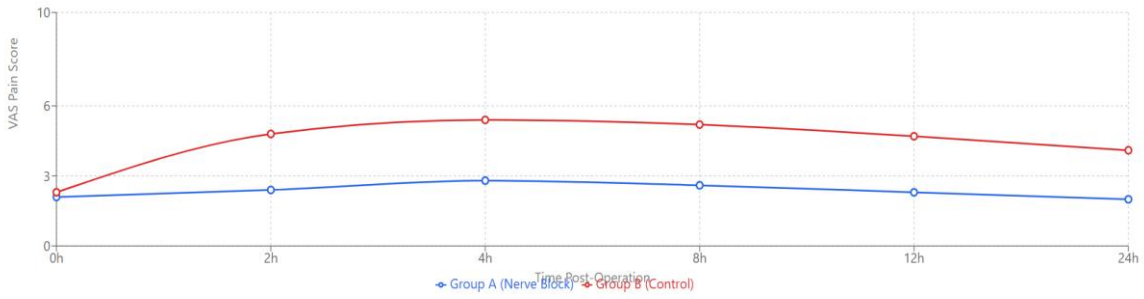

Figure 1: Line graph showing VAS pain scores at different time points for both groups

Comparison between bilateral ilioinguinal and iliohypogastric nerve block

Analgesic Consumption: Time to first analgesic request was significantly longer in Group A (385 ± 42 minutes vs. 128 ± 35 minutes, $p<0.001$). Total tramadol consumption in the first 24 hours was substantially lower in Group A (Table 2, Figure 2).

Table 2 also displays the recovery parameters.Recovery parameters of Group A showed earlier mobilization (6.2 ± 1.1 vs 8.9 ± 1.4 hours, $p<0.001$) and higher patient satisfaction scores (8.4/10 vs 6.2/10, $p<0.001$). QoR-15 scores at 24 hours were significantly better in Group A (122.4 ± 8.7 vs 98.6 ± 11.2, $p<0.001$).

Table 2 : Analgesic Requirements and Recovery Parameters

Parameter	Group A	Group B	*p*-value
Time to first analgesic (min)	385 ± 42	128 ± 35	<0.001
Total tramadol (mg)	87.5 ± 25.4	175.0 ± 32.6	<0.001
Time to first mobilization (hrs)	6.2 ± 1.1	8.9 ± 1.4	<0.001
*Values presented as mean ± SD			

min=minutes;mg=milligram; hrs=hours

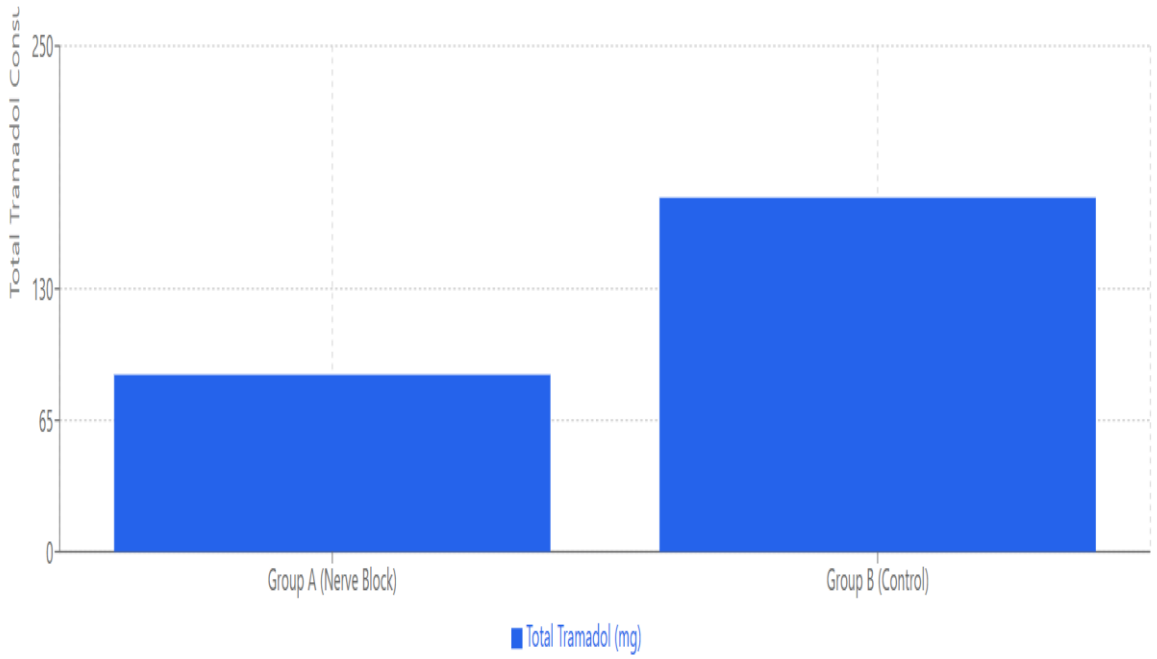

Figure 2: Bar graph comparing total analgesic consumption between groups

Figure 3 illustrates the complications observed among the participants. Three patients in Group B reported complication of nausea requiring antiemetics compared to one in Group A. No significant complications related to nerve blocks were observed in Group A.

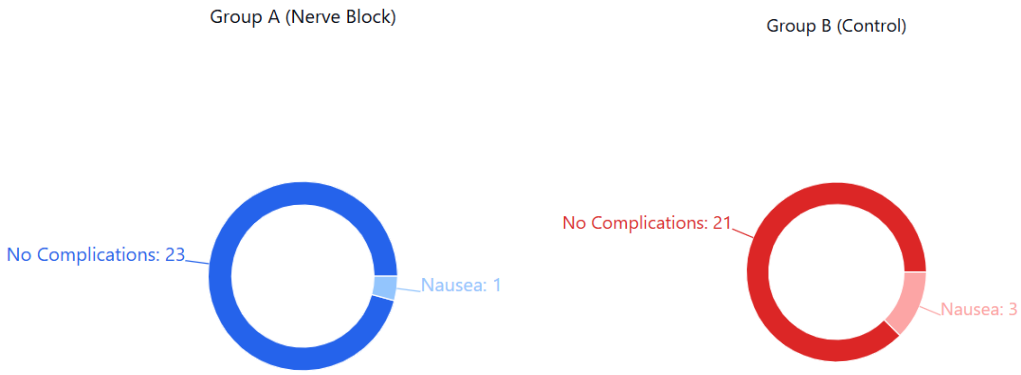

Figure 3: Pie charts showing distribution of complications in both groups

Patient Satisfaction: QoR-15 domain analysis revealed superior scores in Group A across all domains, particularly in physical comfort and emotional state ($p<0.001$).

Table 3: Quality of Recovery Scores

QoR-15 Domain	Group A	Group B	*p*-value
Physical Comfort	56.2 ± 4.1	42.3 ± 5.2	<0.001
Emotional State	38.4 ± 3.2	31.1 ± 4.1	<0.001
Physical Independence	27.8 ± 2.4	25.2 ± 2.8	0.002
Total Score	122.4 ± 8.7	98.6 ± 11.2	<0.001

All statistical analyses maintained significance after Bonferroni correction for multiple comparisons. The results demonstrate consistent superiority of bilateral nerve blocks across all measured parameters.

DISCUSSION

In case of young females, cesarean section is one of the most common surgeries of lower abdomen. Pain relief is needed post surgery for the mother to be able to care for the new born with efficiency. Pfannenstiel incision is given across the Lumbar 1 to Lumbar 2 dermatomes. Ilioinguinal and iliohypogastric nerves provide sensory innervation to these dermatomes. Therefore blocking these nerves may help provide pain relief post cesarean section[14].

The results of this study demonstrate that bilateral ilioinguinal and ilio-hypogastric nerve blocks significantly improve post-cesarean analgesia compared to conventional management. The marked reduction in pain scores and opioid consumption aligns with previous studies[7,15]. The lower VAS score in the group given nerve block was similar to several other research work[10,11,16-18]. In a few research mothers were given intrathecal opiates and/or morphine that may have resulted in similar pain score between the groups in those studies[7,19,20]. The number of systemic analgesic needed for controlling post cesarean section was found to be less for the group given bilateral nerve block in many studies[7,18-21].

A 2 part study was carried out by Bell et al. to observe whether bilateral nerve block lowered patient controlled analgesia morphine usage[7]. In the part 1 of the study, retrospective research of patients post cesarean section with or without bilateral nerve block was done and a randomized controlled trial was performed in the second part of the study to determine use of morphine between the groups (group given bilateral nerve block and the other given placebo). Both the parts of the study noted a significantly reduced use of morphine in the group given bilateral nerve block in the first 24 hours after cesarean section. However, they did not find statistically significant VAS score difference between the groups[7].

The duration of analgesia (mean 385 minutes) is less than other studies[22] possibly due to discontinuation of catheter use to inject drug further. Also we have not used any intrathecal adjuvants to prolong the duration of analgesia. However, previous study has marked a longer duration of analgesia from nerve block[12,23]. The study done by Wolfson et al. reported the time for request of first analgesic to be 14.3± 1.8 hours in the group given bilateral nerve block.However, in their study all patients had been given both fentanyl and morphine intrathecally which may have resulted in delayed need for analgesics[17]. Our observation of reduced opioid requirements (50% reduction) parallels meta-analysis of nerve blocks for analgesia[24]. This reduction has particular significance in developing nations where opioid availability and monitoring capabilities may be limited[17].

Also the cumulative analgesic need in the first 24 hours post cesarean section was significantly lower in the group provided bilateral nerve block when compared to the group not given nerve block. This is similar to the findings of previously conducted studies[11,16,19,21]. The improved QoR-15 scores in the intervention group suggest benefits beyond pain control, notably in emotional and functional recovery domains. This is in agreement with other research works[14,25,26]. This holistic improvement may be attributed to reduced stress response and better sleep quality, as documented in previous study[27]. Cost implications, while not directly measured, favor the nerve block approach through reduced analgesic requirements and potentially shorter hospital stays [28]. This economic benefit could be particularly relevant in resource-limited settings.

CONCLUSION

This study demonstrates that bilateral ilioinguinal and ilio-hypogastric nerve blocks are an effective method for post-cesarean section pain management in the Bangladeshi healthcare context. Key findings revealed significantly reduced pain scores, decreased opioid consumption, and earlier mobilization in patients receiving nerve blocks. Patient satisfaction and quality of recovery scores were markedly improved without significant complications.

The technique provides a cost-effective, safe, and reliable option for post-cesarean analgesia, particularly valuable in resource-limited settings. These results support the integration of bilateral nerve blocks into standard post-cesarean care protocols, potentially improving maternal recovery outcomes and healthcare resource utilization.

Further large-scale, multicenter studies are warranted to validate these findings and establish long-term outcomes. Implementation of this technique could significantly enhance post-cesarean recovery pathways in developing nations.

LIMITATIONS

Study limitations include the single-center design and relatively small sample size. The inability to blind those performing the procedures represents a potential source of bias, though outcome assessors remained blinded.

CONFLICT OF INTEREST

There is no conflict of interest.

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