e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(10); 938-945

Original Research Article

A Randomized Comparative Assessment of the Efficacy of the TAP Block and II-IH Block in Controlling Post Caesarean Section Pain

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Received: 25-07-2022 / Revised: 18-08-2022 / Accepted: 16-09-2022
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Conflict of interest: Nil

Abstract

Aim: The aim of this study was to compare the efficacy of the TAP block and II-IH block in controlling post caesarean section pain.

Methods: The present study was conducted in the Department of Anesthesiology, Patna medical College and Hospital, Patna, Bihar, India for 1 year. 105 pregnant mothers were assessed for eligibility and only three refused to give consent. 100 pregnant mothers scheduled for elective cesarean delivery were randomized to either ilioinguinal-iliohypogastric nerve block or transverses abdominis nerve block after skin closure at the end of surgery.

Results: A total of 100 parturient were enrolled in the current study. Mean age was 27.33 ± 3.74 for group T and 27.23 ± 4.66 for group I. According to the 2018 modified ASA physical status classification all patients fall in the ASA II category. With regard to the number of previous C-sections majority of the participants were having their first C-section while 13.9% were having their second operative delivery and a single parturient was having third operative delivery in group T. Interval tramadol consumption was not statistically significant at 12 & 48 hours with U = 654.5, Z = 0.086, P = 0.920 & U = 700.5, Z = 0.838 & P = 0.400 respectively. However, median tramadol consumption at 24 hour was 0.0 mg for TAP & 50.0 mg for II/IH. This was found to be statistically significant with U = 832.0, Z = 2.310, & P = 0.020. Similarly at 36 hour median tramadol consumption was 25 & 50 mg for TAP & II/IH groups respectively.

Conclusion: In summary both ilioinguinal-iliohypogastric and transverses abdominis nerve block were equally effective in decreasing post-operative pain after cesarean section, total tramadol consumption within 24 hr. TAP block has achieved longer analgesic duration compared to Ilioinguinal-iliohypogastric nerve block.

Keywords: Ilioinguinal and iliohypogastric nerve block, transverses abdominis plane block, cesarean section

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. [1] 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. Ilioinguinal‑iliohypogastric nerve (ILIH) block has been gaining importance in lower abdominal surgeries.5 This method has been used successfully for pain relief following lower segment cesarean sections (LSCS). [6,7]

The postoperative pain after cesarean section is believed to be of mild to moderate intensity lasting for up to 72 hours. The development of chronic pain, prolonged hospitalization and compromised breast feeding were among the consequence of untreated acute pain.[8,9] The key to facilitate early postoperative movement, better infant care and reduction of postoperative complication were significantly relied on effective postoperative management. [10]

The use of a conventional opioid and NSAIDs had never been without side effects for post cesarean section mothers. Abdominal field block was among alternative techniques for postoperative pain management after cesarean section. Ultrasound guided Ilioinguinal-iliohypogastric nerve block (II&IH) and transverses abdominis plane block (TAP) were proven effective postoperative pain management alternative after it has proven against placebo. [11-13]

The aim of this study was to compare the efficacy of the TAP block and II-IH block in controlling post caesarean section pain.

Methods

The present study was conducted in the Department of Anesthesiology, Patna medical College and Hospital, Patna, Bihar, India for 1 year. 105 pregnant mothers were assessed for eligibility and only three refused to give consent. 100 pregnant mothers scheduled for elective cesarean delivery were randomized to either ilioinguinal-iliohypogastric nerve block or transverses abdominis nerve block after skin closure at the end of surgery.

A pregnant mothers ASA II aged 18–45 was included. Pregnant mothers with hypertensive disorders, progressive neurologic disease, spinal anesthesia converted to general anesthesia, weight < 50 kg or > 100 and a mother with peptic ulcer disease were excluded from the study. A sealed envelope randomization technique by anesthetist who did not participate in the research or patient care.

All patients were fasted for 8 hours for solid food & 2 hours for clear fluid. All patients were pre-medicated with 50 mg IV of ranitidine before 30 minutes, 10 mg IV metoclopramide before 10 minutes & 0.1 mg/kg of dexamethasone before performing a spinal anesthesia. Noninvasive monitors such as an electrocardiogram, noninvasive blood pressure (BP), and pulse oximeter were connected. Before performing a spinal anesthetic 10–15 ml/kg of crystalloid was co-loaded to parturient using a standard fluid infuser. Following this under strict aseptic technique, local infiltration of the entry point using 2 ml (40 mg) of 2% plain lidocaine was performed before placing a standard spinal needle. Subarachnoid block was performed using a 25G standard spinal needle, with patient on sitting position through the midline approach using 2 ml (10 mg) plain bupivacaine & 25 mcg fentanyl. Immediately after the spinal anesthesia patient was positioned on supine position and a pillow inserted under the right hip or bed tilted 15 degrees left to prevent aortocaval compression. Level of block was checked (alcohol drips for autonomic, pin prick for sensory & Bromage scale for motor) and incision was allowed when a sensory level of T6 is reached. Only patients with successful spinal block (sensory block of T6) are included in this study.

Patients' hemodynamics (SpO2, HR, ECG and BP) were measured every 5 minutes and recorded every 10 minutes. If mean arterial pressure of patient drops below 65 mmHg, & is not responding for fluids, a bolus of 5–10 mg ephedrine was given & with repetition as needed up to a maximum of 20 mg. Oxygen was delivered using nasal prong at flow rate 2–3 L min-1 during the intraoperative and recovery periods. Following closure of the skin, using antiseptic solution was prepared in the respective areas to do either TAP or II-IH nerve blocks based on which intervention they were randomized. Patient was under the influence of spinal anesthesia and will not be aware of sensation to the area and a screen was applied above the umbilicus so as to prevent patient looking area of block.

For group T (TAP block group) a landmark technique TAP block was performed as described by McDonnell et al.[14] The block aims at the lumbar triangle of Petit which is bounded superiorly by costal margin, inferiorly by iliac crest, anteriorly by the external oblique muscle and posteriorly by the latissimus dorsi. Needle insertion point was 2 cm cephalad to the iliac crest. Using 22G blunted needle. Up on insertion of the needle there will be feeling of double pops (loss of resistance) as the needle pass through the external oblique and internal oblique muscles, which signifies the correct location of needle, following which a 20 ml of local anesthetic (0.25% bupivacaine) is deposited in the facial plane between the internal oblique and transversus abdominis muscle. This was repeated similarly for the other side.

For group I (II-IH) 16 ml of local anesthetic (0.25% bupivacaine) per each side was injected at a needle entry point 2 cm medial to anterior superior iliac spine (ASIS). A 22G blunted needle is used and upon insertion of the needle an initial click (pop) sound or a loss of resistance will be felt as the blunt needle passes through the external oblique muscle sheath and 8 ml of 0.25% Bupivacaine is injected in a fanwise fashion to block the ilioinguinal nerves. The needle was further advanced and another pop sound or loss of resistance is felt upon passing the internal oblique muscle sheath and additional 8 ml volume of local anesthetic is injected in a similar fashion to the previous one, to block the iliohypogastric nerves. This procedure was repeated on the other side of the lower abdomen in the same manner. [15] To avoid intravascular injection aspiration of the syringe for blood will be performed every 5 ml injection of the local anesthetic

or following change in the direction of needle.

Tramadol consumption was recorded every 12-hour interval. Total cumulative 48hr. tramadol consumption was the primary end-point. Secondary outcomes include; post-operative pain score both at purposeful movement and rest, first analgesic request time and side effects. 48hr. Pain score was recorded using a worldwide validated tool called the numerical pain rating scale (NRS) score both at rest and on movement (light compression of wound dressing and purposeful flexion of the thigh at the hip). Pain score was recorded at 0, 4, 8, 12, 24, 36 and 48 hours. During each visit patients were asked for any kind of pruritus, nausea vomiting, and sedation. Patients were told to record their pain intensity at any time and request analgesics. Pain score was labeled as 0 if there was no pain and 10 is considered as the worst pain ever experienced. Any form of sedation was scored using a sedation score of 0 to 3 (0 = awake and alert, 1 = quietly awake, 2 = asleep but easily arousal, 3 = deep sleep & only responding to painful stimulus). Pruritus was graded as mild, moderate or severe correlating with scores of 1, 2, and 3 respectively. The patients received standard analgesia according to obstetric department protocol consisting IM diclofenac 75 mg 8 hourly, first dose was given on arrival to PACU. IV tramadol 50 mg was used as a rescue analgesia on patient demand. Despite our protocol depicts the use of 1 mg/kg IM Pethidine for further inadequacy in administered analgesia within 30 minutes or breakthrough pain there were no such requirements for further pain killer in our cohort. Patients were considered as sedated if a sedation score is more than 2 and oxygen by nasal prongs was protocolled. Intra-operative antiemetic was not used routinely, but if needed 0.1 mg/kg ondansetron was the protocol.

Statistical Analysis

SPSS version 20 was used for analysis. Normality of data was checked using the Shapiro-Wilk normality test, Q-Q plots and histograms. Quantitative categorical variables were analyzed using chi-square or Fisher's exact test. Continuous variables were analyzed using independent t-test for normally distributed data or Mann Whitney U-test for irregular distribution. A Kaplan Meier analysis was done to see if there were differences based on the time of survival until an initial request of analgesia and to determine the proportion of patients who did not require analgesia for 48 hour follow up period. Normally distributed data are presented as mean ± SD, and non-normal equivalent are presented as median (interquartile range), and categorical data are presented as raw data and frequencies.

Results

Table 1: Comparison of demographic and clinical data of cases between 2 groups

Demographic data	Group T	Group I	p-value
Age (years)	27.33 ± 3.74	27.23 ± 4.66	0.920
BMI (kg/m2)	27.73 ± 3.07	27.13 ± 2.18	0.350
Previous C-section (%)			
0	20 (40)	21 (42)	
1	22 (44)	23 (46)	
2	6 (12)	6 (12)	
3	1 (2)	0	
Baseline HR (beats/min)	88.32 ± 9.91	85.65 ± 7.80	0.190
Baseline MAP (mmHg)	87.57 ± 7.70	87.45 ± 5.03	0.900
Duration of surgery (min.)	30 (25–40)	30.5 (27.75–35)	0.320

A total of 100 parturient were enrolled in the current study. Mean age was 27.33 ± 3.74 for group T and 27.23 ± 4.66 for group I. According to the 2018 modified ASA physical status classification all patients fall in the ASA II category. With regard to the number of previous C-sections majority of the participants were having their first C-section while 13.9% were having their second operative delivery and a single parturient was having third operative delivery in group T.

Table 2: Interval and overall cumulative tramadol consumption

Time interval	Group T	Group I	p-value
12 hour	0 (0–50)	0 (0–50)	0.920
24 hour	0 (0–50)	50 (50–50)	0.020
36 hour	25 (0–50)	50 (50–50)	0.005
48 hour	50 (50–50)	50 (50–50)	0.400
Cumulative 48 hour	100 (50–150)	150 (100–200)	0.017

Interval tramadol consumption was not statistically significant at 12 & 48 hours with U = 654.5, Z = 0.086, P = 0.920 & U = 700.5, Z = 0.838 & P = 0.400 respectively. However, median tramadol consumption at 24 hour was 0.0 mg for TAP & 50.0 mg for II/IH. This was found to be statistically significant with U = 832.0, Z = 2.310, & P = 0.020. Similarly at 36 hour median tramadol consumption was 25 & 50 mg for TAP & II/IH groups respectively. This was statistically significant with U = 855.0, Z = 2.791 & P = 0.005. Overall the cumulative median tramadol consumption over 48 hour was 100 mg for TAP group and 150 mg for II/IH group. This was statistically significant between TAP & II/IH groups, with U = 853.5, Z = 2.367, P = 0.017.

Table 3: Numerical Rating Scale (NRS) at various duration

NRS	Group T	Group I
0 hour	0.00	0.00 ± 1
4 hours	2.00±3	4.00 ± 1
8 hours	3.00±1	4.00±1
12 hours	3.00±1	3.00±1
24 hours	3.00±2	4.00± 1
36 hours	3.00±2	3.50± 1
48 hours	3.00±1	4.00± 1

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.

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.[16] However, potential role of combined illioinguinal and illiohypogastric nerve block in the setting of cesarean delivery patients remained unclear.

Post-operative tramadol consumption was found to be comparable at 12 (p = 0.920) & 48 (p = 0.400) hour intervals. However, at 24- & 36-hour intervals median tramadol consumption was lower in TAP group compared to II/IH groups with p = 0.020 & p = 0.005 respectively. On top of this cumulative 48-hour median tramadol consumption was lower in TAP group with p = 0.017. Though there are limited researches on a landmark techniques, our finding is in line with L. Vamsee Kiran, et

al, where interval and cumulative 24 hour tramadol consumption were lower in TAP group compared to II/IH group after an ultrasound guided block in patients who underwent cesarean section under spinal anesthesia (p = 0.00). [17] Similarly, C. Aveline et al, in their ultra-sounded guided block comparison between TAP & II/IH nerve block for inguinal day case surgery found that postoperative morphine requirements were lower during the first 24 h in the TAP block group (p = 0.03). [18]

Our study also demonstrated that TAP block had a superior analgesic benefit beyond 24 hours as evidenced by interval and cumulative tramadol consumption was lower. TAP is accustomed to provide prolonged (48 hour) analgesia in other placebo-controlled studies too. [19-21] The proportion of patients who had either nausea vomiting, pruritus or sedation were similar between groups in our study (P > 0.05). On top of this there was no request of ant-emetic medication in any case. In the same way C. Avelin et al also did not find any differences in terms of PONV and ondansetron consumption (5.9% vs 9.3%, p = 0.69) between TAP and II/IH after day case open inguinal surgery. [22] In contrast to our result, Ghassan E et al, found that Nausea scores were higher in patients who too intrathecal morphine group than were those in the TAP group (P = 0.02). [23]

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%.7 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 covers 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. [24]

The use of a short acting opioid (fentanyl) for intrathecal use in our patients might not have the aforementioned side effects as compared to morphine which is more potent and long acting. Additionally, our strict protocol of dexamethasone administration might have contributed to the fact that less patients are experiencing in both groups and had not requested anti-emetic during the 48 hour follow up. Our action was supported by Anatoli Stav et al, who concluded that the use of prophylaxis for PONV was effective in their RCT. [25,26]

Conclusion

In summary both ilioinguinal-iliohypogastric and transverses abdominis nerve block were equally effective in decreasing post-operative pain after cesarean section, total tramadol consumption within 24 hr. TAP block has achieved longer analgesic duration compared to Ilioinguinal-iliohypogastric nerve block. 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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