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A COMPARATIVE STUDY OF BILATERAL ILIOINGUINAL AND ILIOHYPOGASTRIC NERVE BLOCK VERSUS WOUND INFILTRATION FOR POST-OPERATIVE ANALGESIA IN CAESAREAN SECTION

Anaesthesiology

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ABSTRACT

Background: Pain forms the inevitable post-operative sequelae of any surgical procedure including caesarean section. No single optimal post-operative pain treatment method after caesarean delivery (CD) under spinal anaesthesia has been reported. Various opioids, NSAIDS, local anaesthetic wound infiltration, regional nerve blocks like Transversus abdominis block and bilateral ilioinguinal and iliohypogastric (IIIH) block have been used for providing post-operative analgesia in CD patients. We have used wound infiltration and bilateral IIIH block for post-operative analgesia in caesarean section patients because both are simple methods, does not require any invasive instruments. Thus, this study was done to compare the efficacy, quality, duration of post-operative analgesia and side effects in between IIIH block and wound infiltration. **Material and Methods:** A total of 60 female patients undergoing elective or emergency caesarean section were randomly allocated into two groups of 30 each. Group I received wound infiltration after negative aspiration with 30 ml of 0.5% ropivacaine plus 30 µgm fentanyl and Group II received bilateral IIIH block with 15 ml of 0.5% ropivacaine plus 15 µgm fentanyl on each side after the effect of spinal regressed to T_{10} level. Then the patients were assessed for post-operative pain using VAS scores at rest and with movement for 24 hours. **Results:** The mean VAS score in Group II was significantly lower than Group I both at rest and with movement. At all time intervals, mean VAS at rest was significant except at 24 hours whereas it was significant at time intervals of 2, 8, 12 and 24 hours with movement. Also, the mean duration of analgesia was 7.93±0.36 hours in Group II and 6.33±2.43 hours in Group I and number of doses of rescue analgesia required were significantly less in Group II (1.23±0.42) than Group I (2.17±0.73). **Conclusion:** We concluded that both IIIH nerve block and wound infiltration were effective in providing surgical anaesthesia and hemodynamic stability in caesarean section. Bilateral IIIH nerve block with combination of ropivacaine and fentanyl resulted in significant lowering of VAS score following caesarean section in comparison to wound infiltration. It provided significant duration of post-operative analgesia thus delaying the requirement of additional analgesics.

KEYWORDS

Ropivacaine, Ilioinguinal and Iliohypogastric nerve block, Caesarean section, VAS score

INTRODUCTION

Pain forms the inevitable post-operative sequelae of any surgical procedure and the relief of post-operative pain of these patients forms a major component of their post-operative care. Despite various advances in post-operative pain management, pain relief and satisfaction are still inadequate in some patients because of individual variability.[1] The advantages of effective post-operative pain management include patient's comfort and satisfaction, early mobilization,[2] fewer pulmonary and cardiac complications. The inhibition of nociceptive impulses, blunting the neuro-endocrine response to pain, enhancing the restoration of function, thus, reducing the risk of deep vein thrombosis, faster recovery with less likelihood of the development of neuropathic pain along with reduced cost of post-operative care.[3]

Childbirth is an emotion-filled event, and the mother wants to bond with her newborn as early as possible. Inadequate post-operative pain relief can negatively impact ambulation, breastfeeding, and even maternal bonding.[4-5] In current surgical practice, laparotomy via pfannensteil incision is one of the most common operations involving female abdomen.[6] Caesarean delivery (CD) patients have even more compelling reasons to achieve optimal post-operative pain relief than other surgical patients as they present with unique challenges.[7] Recent studies have reported that CD which is performed via pfannenstiel incision is a major source for both acute and chronic pain.[8] Poor treatment of post-operative pain after CD is the main reason for patient dissatisfaction. No single optimal post-operative pain treatment method after CD under spinal anaesthesia (SA) has been reported. Opioids and NSAIDS have been used for post-caesarean pain relief but they are known to cause significant side effects such as respiratory depression, nausea, vomiting, pruritus and urinary retention.[9] Post CD patients are at a higher risk for thromboembolic events, which may also be precipitated by immobility from inadequate pain control or excessive sedation from opioids.

Regional anaesthetic techniques have been proven to provide satisfactory post-operative analgesia free from systemic side effects. The practice of regional nerve block techniques by health professionals is rising and has demonstrated decreased requirement of supplementary analgesia.[10,11] The Ilioinguinal and iliohypogastric (IIIH) block is commonly used as a part of multimodal analgesia for lower abdominal, inguinal and pediatric surgeries.[12] Bilateral IIIH nerve block is found to be effective to provide analgesia after low transverse CD as the pfannensteil incision has both somatic and visceral component. The somatic pain generated at the incision site is innervated by ilioinguinal and iliohypogastric nerve which innervates the L_{1-2} dermatome distribution.[13] The two most common approaches for performing IIIH block are the landmark-based (anatomical) and ultrasound-guided (USG) techniques.

MATERIAL AND METHODS

A prospective, randomized, interventional, open label clinical study was conducted at our hospital after obtaining approval from Institutional Ethics Committee (BFUHS/2k19p-TH/10852). Informed and written consent from all the patients was taken before the procedure. 60 patients of American Society of Anaesthesiologists grade I and II aged 18-35 years undergoing caesarean (elective or emergency without comorbidities) under spinal anaesthesia were included in our study. Patients with any contraindication to central neuraxial block, progressive neurological disease, local anaesthetic and NSAIDS sensitivity, obese patients, patients with peptic ulcer disease, renal disease, infection at the site of block were excluded from the study. The patients were divided into two groups of thirty (30) each in a random and unbiased manner using computer generated table of random numbers. Group I(n=30) received wound infiltration whereas Group II(n=30) received bilateral ilioinguinal and iliohypogastric nerve block with 15 ml of 0.5% ropivacaine plus 15 microgram of fentanyl on each side after the effect of spinal anaesthesia regressed to T_{10} level.

A standardized anaesthetic technique was followed after pre-anaesthetic check-up with detailed history and thorough general examination and systemic examination of the patient. After the attachment of monitors, including ECG leads, non-invasive blood pressure measuring cuff and pulse oximeter, an intravenous line with 18, 20 gauge cannula was established. Baseline vitals were noted. Patient was turned to left lateral decubitus position. After scrubbing, the back of the patient was painted with povidone iodine solution. Using aseptic technique, L_3-L_4 or L_2-L_3 intervertebral space was located. Skin wheal was raised by 26 gauge needle with 2% lignocaine then 25G quincke's spinal needle was introduced into sub-arachnoid space using mid-line approach. After free flow of CSF was obtained, 2.2 ml of 0.5% hyperbaric bupivacaine was injected into sub-arachnoid space. Patient was immediately turned to supine position. The level of sensory blockade was checked by loss of sensation to pin-prick before surgical incision. Supplemental oxygen was given @5 litres per minute via simple oxygen mask.

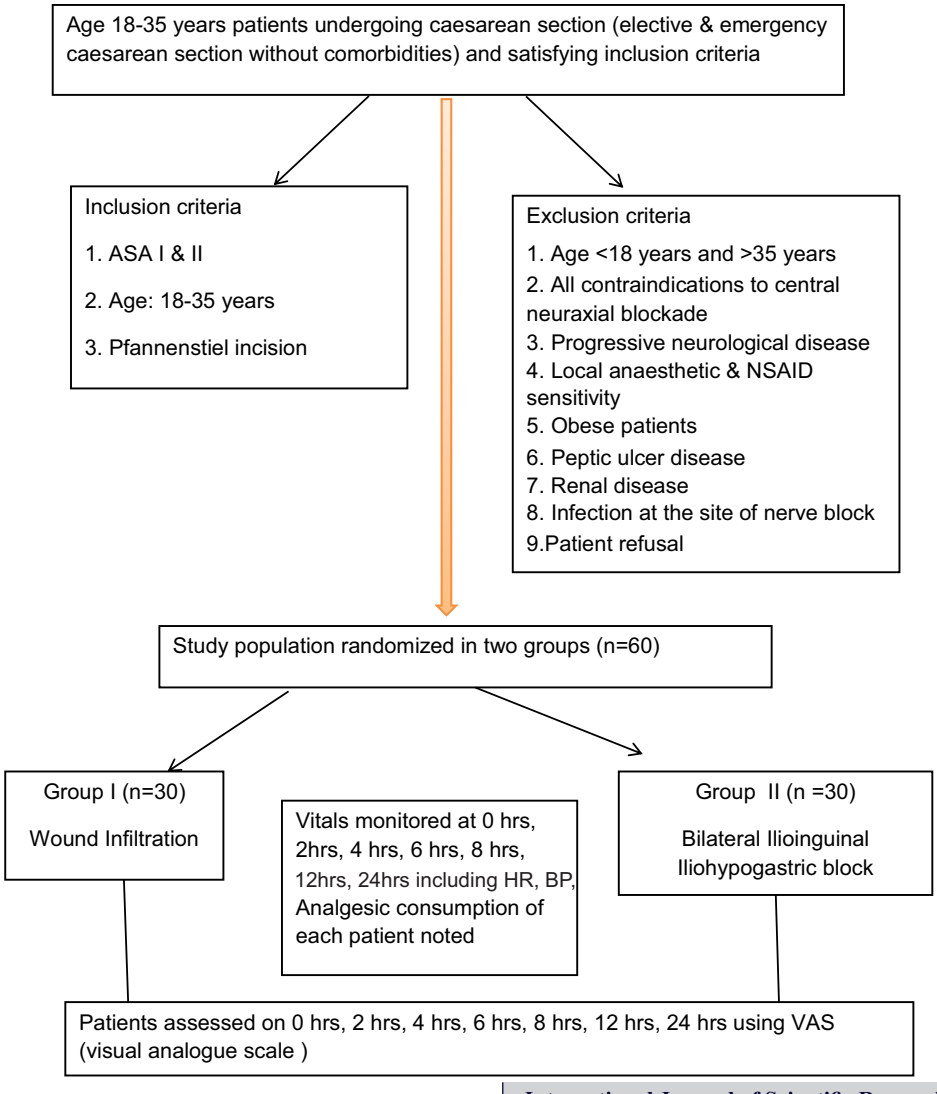
After the regression of the effect of spinal till T_{10} level, in Group I 30 ml of 0.5% ropivacaine plus 30 µgm of fentanyl was infiltrated along the wound margins after negative aspiration and in Group II bilateral IIIH block was performed using landmark technique. The anterior superior iliac spine (ASIS) was palpated. A mark was made 2 cm medial and 2 cm superior from ASIS. After giving local anaesthetic, the needle was inserted through the skin puncture site perpendicularly. Increased resistance was felt as the needle pierced the external oblique muscle. 15 ml of 0.5% ropivacaine plus 15 µgm of fentanyl was injected each side into the planes between external and internal oblique muscles and internal oblique and transverses abdominis muscles to block them.

The patient was immediately transferred to the ward and assessed for post-operative analgesia using VAS score. Assessment of the presence and intensity of pain was done at 0 hrs, 2 hrs, 4 hrs, 6 hrs, 8hrs, 12 hrs and 24 hrs after surgery both at rest and with movement (turning from side to side). The zero time was considered the time of wound infiltration or bilateral IIIH nerve block. At the same time, the HR and BP were also assessed and the patient's analgesic consumption was recorded. Each participant was treated for pain according to the pain management protocol of our institute. The first rescue analgesia was given if the VAS>3 and the time of administration was noted. Non-steroidal anti-inflammatory drugs (Inj. Diclofenac sodium) was used for first rescue analgesia. 75 mg (3ml) of Inj. Diclofenac sodium was given intramuscularly on patient's demand. Second drug used for rescue analgesia, if patient still complained of pain was opioids (Inj Tramadol hydrochloride in the dose of 1mg/kg). The time of administration of the first dose of Inj. Diclofenac sodium was the end point of the study. This was documented as the duration of analgesia provided by wound infiltration or bilateral IIIH nerve block respectively. All data was coded to identify patients on the questionnaire and the completed questionnaires were kept in a secured location.

STATISTICALANALYSIS

The data from the present study was systematically collected, compiled and statistically analyzed using software IBM SPSS 21.0 to draw relevant conclusions. All the hemodynamic parameters (BP, HR, SPO_2, RR), pain scores and side effects were entered in master chart and analyzed. Variable data was analyzed using chi-square test and continuous parameters like hemodynamic parameters, pain scores and time for rescue analgesia were analyzed using student t test (unpaired-t-test).

CONSORT DIAGRAM



OBSERVATIONS AND RESULTS

Demographic variables of the patient like age, weight, height and ASA grade showed no difference statistically.

The mean baseline parameters (HR, BP, SPO_2, RR) were noted preoperatively. Intra-operative vitals (HR, BP, SPO_2, RR) were noted till 120 minutes after surgery. The difference between mean baseline parameters and intra-operative vitals were compared statistically and was found to be statistically non-significant (p-value <0.05).

Mean VAS score at rest and with movement was evaluated starting at 0 hour after the regression of effect of spinal upto T_{10} level which consists of a line, approximately 10-15 cm in length, with the left side signifying no pain with a smiling face image and the right side signifying the worst pain ever with a frowning face image. VAS score was recorded at 0, 2, 4, 6, 8, 12 and 24 hours. Rescue analgesia was given in form of Inj Diclofenac sodium intramuscularly, and if pain persisted for 30 minutes thereafter, second rescue analgesia was given in the form of Inj Tramadol hydrochloride. Post-operative mean VAS scores at different time intervals was observed to be less than 3 in both the groups and was significantly lower in group II and as compared to group I. In both groups at 0 hours, no patient demanded rescue analgesic due to the residual effect of local anaesthetic drug given during subarachnoid block before surgery. At all time intervals, mean VAS at rest was significant (p-value<0.05) except at 24 hours whereas mean VAS was significant at time intervals of 2, 8,12 and 24 hours (p-value<0.05) with movement.(Figure 1 and 2)

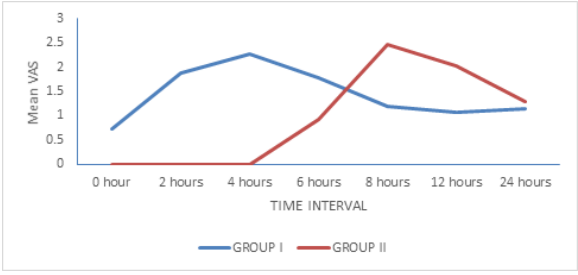


Figure 1 showing mean VAS scores at rest at different time intervals

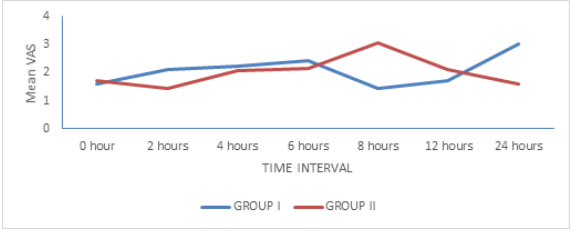


Figure 2 showing mean VAS scores with movement at different time intervals

The mean time between wound infiltration and bilateral IIIH to first analgesic requirement was 6.33±2.43 hours in Group I and 7.93±0.36 hours in Group II and it was significant (p-value= 0.001, <0.05). Thus the mean duration of analgesia was prolonged in Group II as compared to Group I (Table 1).

Table 1 showing mean duration of analgesia

Group	Duration of analgesia (in hours)	
	Mean	SD
I	6.33	2.43
II	7.93	0.36
t-value	-3.85	
p-value	0.001	

The mean number of doses of first rescue analgesia in Group I was 2.17±0.73 and in Group II was 1.23±0.42. Total number of doses of first rescue analgesia in Group I was 65 whereas in Group II, it was 37. Difference between the number of doses was highly significant (p-value=0.001) that shows that patients in Group II required less number of doses of rescue analgesia as compared to Group I (Table 2).

Table 2 showing number of doses of rescue analgesia required

	Group I	Group II	'p' Value with significance
Mean number of doses per 24 hours	2.17±0.73	1.23±0.42	0.001 (Highly Significant)

DISCUSSION

Post-operative pain relief is of utmost importance for the physicians managing the post-operative wards, especially after CD to facilitate early ambulation, infant care and prevention of post-operative morbidity.[14] Evidence from studies has demonstrated that inadequately treated pain after CD is associated with an increased incidence of chronic pain[15] and post-traumatic stress syndrome.[16] IIIH nerve block and wound infiltration have been reported to produce excellent post-operative pain control in adults and children following surgeries such as hernia repair and groin surgeries.[17] They have also been found useful for reducing pain following caesarean section but with less efficacy than with the other procedures due to the diffuse nature of post caesarean section pain. To avoid the problems associated with the use of opioids and NSAIDS, physicians have used local anaesthetics for post-operative analgesia. This may be achieved with sub-arachnoid block, epidural block, peripheral nerve block or wound infiltration as an adjuvant to general anaesthesia. However, subarachnoid and extradural block have a disadvantage in that sympathetic and motor block may accompany sensory block.[18] Sub-arachnoid block alone has the disadvantage of providing shorter duration of post-operative analgesia when compared to peripheral nerve block. Peripheral nerve blocks do not produce significant autonomic effects but motor block may be a problem if nerve involved is a mixed nerve. However, the ilioinguinal and iliohypogastric nerves are sensory nerves. For patients undergoing caesarean section performed by pfannenstiel incision, IIIH nerve block will provide effective analgesia in the postoperative period. Bilateral blockade of the IIIH nerve blocks at the level of ASIS produces analgesia covering the dermatome supplied by the lumbar nerves in its distal distribution.[19] The pfannenstiel incision lies within this dermatome. Therefore, it is possible to provide analgesia of the anterior abdominal wall following this incision using the above technique. Peripheral nerve block requires some amount of expertise and commitment but it is possible to improve the comfort of the patient with these simple blocks considerably.[20]

Similar study was done by Oriola F et al[21] to compare the effect of bilateral Ilioinguinal nerve block with combination of ropivacaine and clonidine versus ilioinguinal nerve block performed using saline in 70 female patients undergoing non laparoscopic surgeries under pfannenstiel incision. The design of our study was similar and consistent with their study. All their surgeries were carried out under general anaesthesia whereas we gave spinal anaesthesia. They assessed and compared pain scores using VAS up to 48 hrs after the end of surgery, whereas we have assessed the pain scores using VAS till 24 hrs only. Morphine was the chosen analgesic in their study while we used Inj diclofenac sodium as first and Inj tramadol hydrochloride as second rescue analgesia. A 51% decrease of cumulative morphine consumption was observed during the first 48 post-operative hours after surgery when bilateral IIIH nerve block compared with the control group.

Our study design was also similar to a double blinded study conducted by Nigatu YA et al[22] which included 80 parturients undergoing CD via pfannenstiel incision under spinal anaesthesia who were randomly allocated to receive either bilateral IIIH block with 16 ml of 0.25% bupivacaine or no nerve block. Pain was assessed at 0, 4, 6, 8, 12, and 24 hrs after operation both at rest and on movement using numeric rating scale. They concluded that compared to no intervention, bilateral IIIH block in patients undergoing CD with pfannenstiel incision had significantly improved pain relief at rest and with movement and resulted in significantly less tramadol consumption in the first 24 hrs after surgery. In our study also VAS scores were decreased both at rest and with movement in block group than wound infiltration.

Sakalli M et al[6] did a similar study in 60 patients undergoing elective caesarean section under general anaesthesia in which bilateral IIIH block was performed after the skin closure with 10 ml of 0.5% ropivacaine on each side in one group and with normal saline in other. Visual analogue scale (VAS) score, tramadol consumption and side effects were noted. They concluded that IIIH nerve block when performed after the surgery may reduce analgesic consumption after caesarean section. In our study also, we had used 0.5% ropivacaine for the block and wound infiltration. Also, VAS score was decreased both at rest and with movement in block group.

Ganta R et al[18] did a comparative study in which 62 patients undergoing caesarean section under general anaesthesia were divided into 3

groups. A control group received no local anaesthetic supplementation, one group received ilioinguinal block with 0.5% bupivacaine and other group received local wound infiltration. They concluded that in both ilioinguinal block and wound infiltration pain scores were reduced significantly and analgesic requirements was also significantly reduced but the differences in pain scores and analgesic requirements between the study groups were not statistically significant. In our study, VAS score was significantly reduced in block group than wound infiltration but was statistically significant at specific intervals. Thus, by using either of the two techniques (wound infiltration and bilateral IIIH nerve block) patients could be rendered pain free in the immediate post-operative period. They were able to complete the VAS and early mobilization was done. Early use of rescue analgesia was avoided.

CONCLUSION

From our study, we concluded that both IIIH nerve block and wound infiltration were effective in providing surgical anaesthesia and hemodynamic stability. Bilateral IIIH nerve block with combination of ropivacaine and fentanyl resulted in significant lowering of VAS score following caesarean section in comparison to wound infiltration. Also, it provided significant duration of post-operative analgesia delaying the requirement of post-operative analgesics. There were no differences in adverse events between both the groups.

LIMITATION OF THE STUDY:

Nowadays, ultrasound is used for performing peripheral nerve blocks but in our study we used anatomical landmark approach for performing ilioinguinal and iliohypogastric block. It is believed that ultrasound guidance can improve the safety and certainty of the block by confirming the accurate position of the needle.

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