Available online at www.jsan.org.np

Journal of Society of Anesthesiologists of Nepal

Original Article

Comparison of intrathecal bupivacaine with or without fentanyl for urosurgeries

Bibhush Shrestha*, Subhash Prasad Acharya, Amatya Roshana**.**

***Manmohan Cardiothoracic Vascular and Transplant Centre, Institute of Medicine, Maharajgunj, Kathmandu, Nepal.**

****Tribhuvan University Teaching Hospital, Institute of Medicine, Maharajgunj, Kathmandu, Nepal.**

Abstract

Introduction: Spinal anaesthesia has been widely used for urological operations because it permits early recognition of symptoms caused by overhydration, transurethral resection of prostate syndrome and bladder perforation. Short acting spinal anaesthesia may help to prevent complications associated with delayed immobilization. Our study was undertaken to examine whether adding 25µg fentanyl to bupivacaine would intensify sensory and motor block without prolonging recovery time.

Materials and Methods: Ninety American Society of Anaesthesiologists physical status I and II scheduled for elective urological procedures were studied in a double-blinded, randomized prospective manner. Random allocation was done as , Group I (n=30) receiving intrathecal bupivacaine 12.5 mg; Group II (n=30) bupivacaine 10 mg with 25 µg of fentanyl; and Group III (n=30), bupivacaine 5 mg with 25 µg of fentanyl. Assessment of sensory, motor block and duration of sensory analgesia was done.

Result: There was statistically significant difference regarding total duration of motor block, time for two-segment regression and duration of sensory analgesia between each pair of groups. The duration of motor block, time for two segment regression and duration of sensory analgesia was found to be longest in Group II and shortest in Group III. There were no significant differences in the incidence of complications.

Conclusion: Addition of 25 µg fentanyl to 5 mg bupivacaine resulted in short-acting motor block whereas with 10 mg of bupivacaine, it increased the intensity and duration of motor block, prolonged sensory analgesia and two segment regression time.

Keywords

Bupivacaine; Fentanyl; Spinal anaesthesia; Urosurgeries.

Article History

Received	28th January 2014	Published on print	01st March 2014
Accepted	27th February 2014	Published online	24th December 2014

Corresponding author:

Bibhush Shrestha, MD
Lecturer, Manmohan Cardiothoracic Vascular and Transplant Centre,
Institute of Medicine, Maharajgunj, Kathmandu, Nepal.
E-mail: bibhush1978@gmail.com

Phone:+977 9841296855 / +977 15535297

How to cite this article: Shrestha B, Acharya SP, Roshana A. Comparison of intrathecal bupivacaine with or without fentanyl for urosurgeries. JSAN 2014;1:18-21.

Introduction

Spinal blocks are major regional techniques with a long history of effective use for a variety of surgical procedures and pain relief. It produces sympathetic block, sensory analgesia, and motor block, depending on dose, concentration, or volume of local anaesthetic. Nevertheless, precipitous hypotension and difficulty in controlling the level of analgesia are major disadvantages of spinal block. There is considerable controversy over the use of vasopressors and intravenous fluids to treat or prevent the hypotension of Spinal Anaesthesia (HAS). [1,2] Lidocaine had been a popular anesthetic for urologic procedures[3]. But several editorials have questioned the use of lidocaine for spinal anaesthesia because of the frequency of Transient Neurological Symptoms (TNS). These observations have generated towards alternating local anaesthetics solution or in combination with opioids.[3] Opioids and local anaesthetics administered together intrathecally have a potent synergistic analgesic effect. [4-7] Intrathecal opioids enhance analgesia from subtherapeutic doses of local anaesthetic[7-8] and make it possible to achieve successful spinal anaesthetic using otherwise inadequate doses of local anesthetic. [9] Yet because intrathecal fentanyl causes neither by itself nor in combination with bupivacaine any further depression of efferent sympathetic activity[9], it is possible to enhance the sensory blockade without altering the degree of sympathetic blockade.

Materials and methods

Data was prospectively collected from a total of 90 enrolled patients. American Society of Anaesthesiologists (ASA) physical status ≥ III, requirement of General Anaesthesia, failed Subarachnoid block (SAB) or requirement of other forms of anaesthesia, duration of Surgery > 2 hours, bladder tumour involving lateral wall (requiring obturator nerve block) and contraindications to SAB were excluded. After getting Ethical approval from Institutional Review Board (IRB), the enrolled patients posted for surgery were randomly allocated into three groups by sealed envelope technique: **Group I:** (n=30) received 0.5% heavy bupivacaine 12.5 mg (2.5 ml) ,**Group II:** (n=30) received 0.5% heavy bupivacaine 10 mg (2 ml) plus 25 µg fentanyl (0.5 ml) ,**Group III:** (n=30) received 0.5% heavy bupivacaine 5 mg (1 ml) plus 25 µg Fentanyl (0.5 ml)

The final volume for SAB was adjusted to 2.5 ml by using normal saline. After administering the study drug intrathecally, recording of parameters (Systolic, diastolic and mean blood pressure, heart rate, SPO2) every 5 minutes. Level of Sensory block (assessed by pinprick), was assessed at 5 min after the study drug was given, then at 10, 20, 30 min, at the end of operation, and thereafter at 30 min intervals until two segment regression occurred. Motor block assessment was done by using Modified Bromage scale just before the start of the operation, at the end of operation and at 30 min intervals till fully recovered. Surgical procedure was allowed only after the level of sensory block reached T10 dermatomal level. Any complications were noted and intervened.

Statistical Analysis: Datae were analyzed by using SPSS software version 17, ANOVA with post hoc test (Bonferroni) and chi square test. Continuous data were presented as mean (± SD) and Categorical data were presented as frequency. p value < 0.05 was interpreted as statistically significant.

Results

All the demographic data were comparable in all the three groups. The time for two segment regression was statistically significant between all three groups ($p<0.001$). The mean time for two-segment regression for group I was 103.70 minutes whereas for group II mean time was 160.90 min and for group III mean time was 79.36 minutes. It was longest for group II and shortest for group III. The total duration of motor block was compared among the three groups after initiation of the SAB. The mean duration of motor block in group I was 163.46 minutes while mean duration of motor block in group II was 241.96 min. and mean duration of

motor block in group III was 74.03 min. Statistically significant difference ($p < 0.001$) was found between all three groups. The duration of motor block was longest in group II and shortest in group III. In case of sensory analgesia, statistically significant difference ($p < 0.001$) in the duration of sensory analgesia was found among each pair of groups. The longest duration of sensory analgesia was in-group II and the shortest in group III.

Table 1. Demographic distribution

Age wise distribution (yrs)	Percentage(%)
15-24	4.4
25-34	6.7
35-44	7.8
45-54	14.4
55-64	26.7
65-74	33.3
>=75	6.7
Genderwise	
Male	88.89
Female	11.11
ASA Physical status	
I	45.56
II	54.44

Figure 1. Time for two-segment regression

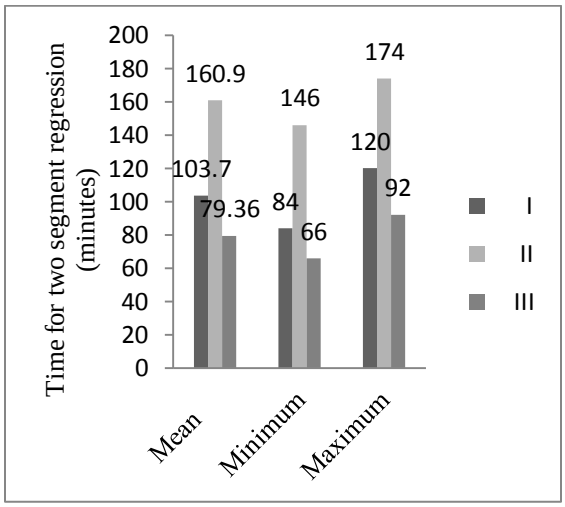


Fig.2. Total duration of motor block

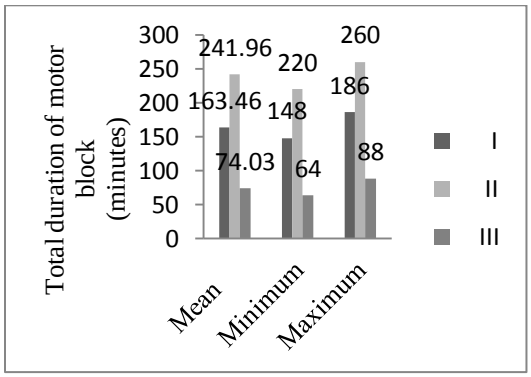
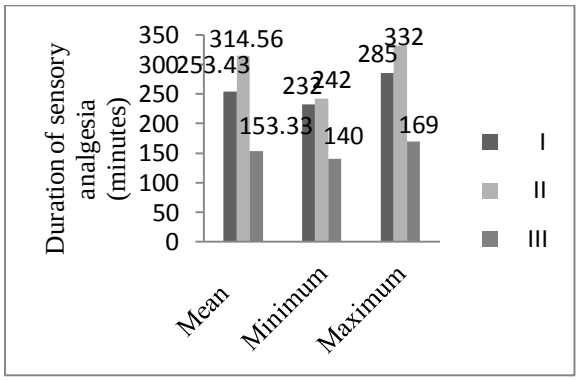


Fig.3. Duration of sensory analgesia



Hypotension was the most common side effect encountered. There were hypotensive episodes in 9 out of 90 cases. Among them, 4 from group I, 3 from group II and 2 from group III. Two patients had nausea and vomiting, which was found in group II only and patients complained of pruritus in groups containing fentanyl (group II and group III).

Discussion

Opioids and local anesthetics administered together intrathecally have been shown to have a synergistic analgesic effect.[4-7] Intrathecal opioids enhance analgesia from subtherapeutic doses of local anesthetics [7,8] and make it possible to achieve spinal anaesthesia using otherwise inadequate doses of local anaesthetic.[9] The decrease in sympathetic efferent activity after spinal anaesthesia is related to the dose of bupivacaine, and intrathecal fentanyl causes no further depression of the efferent sympathetic activity [10]. Therefore, it may be possible to achieve spinal anaesthesia with less hypotension by using a reduced dose of local anesthetic in combination with fentanyl.

Lipophilic opioids (e.g. fentanyl and sufentanil) are increasingly being administered intrathecally as adjuncts to local anesthetics. Several investigators have evaluated intrathecal fentanyl with smaller doses of spinal local anesthetics. Liu et al.[11] found that fentanyl 20 µg in combination with spinal lidocaine (50 µg) prolonged sensory anaesthesia without prolonging recovery of motor function or time to micturition. Furthermore, Ben-

David et al[9] found that a small dose of fentanyl (10 µg) added to spinal anaesthesia with a small dose of dilute bupivacaine (5 mg) in ambulatory patients undergoing knee arthroscopies intensified and increased the sensory blockade without increasing the intensity of motor block or prolonging recovery of micturition or street fitness.

Most relevant to this study is the evidence that intrathecal opioids can greatly enhance analgesia from subtherapeutic doses of local anaesthetic[7,8]. It can be assumed that the recovery and mobilization of the patient could be faster if the motor block was less intense. Liu et al.[11] found that fentanyl 20 µg in combination with spinal lidocaine prolonged sensory anaesthesia without prolonging recovery of motor function or time to micturition. The prolongation of sensory blockade without delay in time to voiding was also seen in the study by Liu and colleagues[11].

Further study should be done on the optimal doses and dilutions (and diluents) of intrathecal combinations of bupivacaine and fentanyl. In this study, Fentanyl was added to bupivacaine to determine its effect on anaesthesia quality, motor block, and sensory block. The results suggests that the addition of 25 µg of fentanyl to 10 mg of bupivacaine (Group II) prolonged and intensified motor block, prolonged the two segment regression time and also prolonged the total duration of sensory analgesia. On the other hand, 5 mg of bupivacaine with the 25 µg of fentanyl (Group III) resulted in short acting motor block with adequate level of sensory analgesia for similar operative procedures. The patients in Group III could have been discharged home on the day of surgery

Despite the encouraging results, our study has some limitations regarding the number of cases enrolled and also further requirement of studies to find the optimal dosing of intrathecal combination of bupivacaine and fentanyl.

In conclusion, this study demonstrates that addition of fentanyl 25 µg to bupivacaine 5mg resulted in short-lasting motor block but adequate level of sensory analgesia for surgical procedures requiring T10 dermatomal level. And when fentanyl 25 µg was added to increased dose of bupivacaine (10 mg), it increased both the duration and intensity of motor block, prolonged the time for two segment regression of sensory level and the total duration of analgesia as well.

Acknowledgements:

The authors would like to acknowledge all the staffs of the Operating Room of TU Teaching Hospital and Department of Anesthesiology

References

1. Critchley LA. Hypotension, subarachnoid block and the elderly patient. Anaesthesia 1996;51:1139-43.
2. McCrae AF, Wildsmith JA. Prevention and treatment of hypotension during central neural block. Br J Anaesth 1993;70:672-80.
3. Kuusniemi KS, Pihlajamaki KK, Pitkanen MT, Pitkanen MT, Helenius HY, Kirvela OA. The Use of Bupivacaine and Fentanyl for Spinal anesthesia for Urologic surgery. Anesth Analg 2000;91:1452-6.
4. Maves TJ, Gebhart GF. Antinociceptive synergy between intrathecal morphine and lidocaine during visceral and somatic nociception in the rat. Anesthesiology 1992;76:91-9.
5. Tejwani GA, Rattan AK, McDonald JS. Role of spinal opioid receptors in the antinociceptive interactions between intrathecal morphine and bupivacaine. Anesth Analg 1992;74:726-34.
6. Akerman B, Arwestrom E, Post C. Local anesthetics potentiate spinal morphine antinociception. Anesth Analg 1988;67:943-8.
7. Wang C, Chakrabarti MK, Whitwam TG. Specific enhancement by fentanyl on the effects of intrathecal bupivacaine on nociceptive afferent but not on sympathetic efferent pathways in dogs. Anesthesiology 1993;79:766-73.
8. Penning JP, Yaksh TL. Interaction of intrathecal morphine with bupivacaine and lidocaine in the rat. Anesthesiology 1992;77:1186-1200.
9. Ben-David B, Solomon E, Levin H, Admoni H, Goldik Z. Intrathecal fentanyl with small-dose dilutes bupivacaine: Better anesthesia without prolonging recovery. Anesth Analg 1997;85:560-5.
10. Riley ET, Cohen SE, Rubenstein AJ, Flanagan B. Prevention of hypotension after spinal anesthesia for cesarean section: Six percent hetastarch versus lactated ringer's solution. Anesth Analg 1995;81:838-42.
11. Liu S, Chiu AA, Carpenter RL, Mulroy MF, Allen HW, Neal JM, Pollock JE. Fentanyl prolongs lidocaine spinal anesthesia without prolonging recovery. Anesth Analg 1995;80:730-4.