International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

A Comparison of Analgesic Effect of Different Doses of Intrathecal Nalbuphine Hydrochloride with Bupivacaine and Bupivacaine Alone for Infraumblical Surgeries

Dr. Alaka Purohit[1], Dr. Hukam Chand Sharma[2]

Abstract: ***Background: Subarachnoid block (SAB) possesses many benefits with a drawback of short duration of anesthetic action. Intrathecal opioids have been used to enhance the clinical efficiency and duration of action of local anaesthetic drugs. Nalbuphine is a synthetic opioid with mixed agonist-antagonist action, when added as adjuvant to intrathecal bupivacaine acts on kappa receptors in the dorsal horn of the spinal cord producing analgesia. We compared the analgesic effect of different doses of intrathecal nalbuphine with 0.5% hyperbaric bupivacaine for infra umblical surgeries. Materials & Methods: 210 ASA class-I and II adult patients of either sex, aged 20-60 years undergoing infraumlical surgeries under spinal anaesthesia were selected and randomly allocated in 3 groups (n=70) in a randomized, double-blinded manner. Group A received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 0.9% normal saline to a total volume of 3.5 mL. Group B received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 0.8 mg nalbuphine with 0.9% normal saline to a total volume of 3.5 mL. Group C received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 2.5 mg nalbuphine with 0.9% normal saline to a total volume of 3.5 mL. We assessed the duration of analgesia following administration of spinal anaesthesia. Observation: There was no difference between the groups with regard to demographic data, duration of surgery, highest sensory and motor level achieved. The mean total analgesia time in subjects of group C (264.56 min) was highest, while subjects of group A had 123.01 min and group B had 185.19 min duration of analgesia. This difference in mean total analgesia time among the three study groups was statistically significant. (p<0.001) Conclusion: Our study shows the combination of intrathecal bupivacaine with Nalbuphine significantly prolonged postoperative analgesia as compared to the control group and Nalbuphine 2.5 mg dose intrathecally showed the best results among all other study groups.***

Keywords: Spinal anaesthesia,Nalbuphine,Bupivacaine, infra umblical surgeries

1. Introduction

Pain in the post-operative period is one of the major factors that impede recovery from anesthesia and surgery.[(1)] Relief of pain during surgery is the raison d'etre of anesthesia. Uncontrolled post-operative pain resulting from any kind of surgery may produce a range of detrimental acute and chronic effects. The transmission of nociceptive stimuli from the periphery to the CNS results in neuro-endocrine stress response resulting in increased sympathetic tone, increased catecholamine levels and catabolic hormone secretion. The effects include sodium and water retention, hyper metabolic state, hypercoagulability, hyperglycemia (leading to poor wound healing and depressed immunity) and paralytic ileus. Adequate post-operative analgesia along with intraoperative anesthesia may lead to improvement in morbidity and patient satisfaction.

Spinal anesthesia is still the most commonly used technique for lower abdominal surgeries as it is very economical and easy to administer. However, postoperative pain control is a major problem because spinal anesthesia using only local anesthetics is associated with relatively short duration of action, and thus early analgesic intervention is needed in the postoperative period. Neuraxial adjuvants are used to improve or prolong analgesia and decrease the adverse effects associated with high doses of a single local anaesthetic agent.

Nalbuphine is an opioid that is μ-receptors antagonist and κ receptor agonist . Nalbuphine when added as adjunct to intrathecal local anesthetics has the potential to provide good intraoperative and postoperative analgesia with decreased incidence and severity of receptor side effects.[(2)(3)] In contrast to other centrally acting opioid analgesics, nalbuphine has minimal respiratory depressant effect and low potential abuse; it can be used as an alternative to other opiates.[(4)]

Here we studied the analgesic duration of two different doses of nalbuphine with 0.5% hyperbaric bupivacaine intrathecally.

2. Material and Method

Study was conducted in Sms medical college, Jaipur after the approval of local institutional ethical committee and obtaining written informed consent from all patients before participation.

210 ASA class-I and II adult patients of either sex, undergoing infraumlical surgeries under spinal anaesthesia were selected and randomly allocated in 3 groups (n=70) in a randomized, double-blinded manner. Group A received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 0.9% normal saline to a total volume of 3.5 mL. Group B received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 0.8 mg nalbuphine with 0.9% normal saline to a total volume of 3.5 mL. Group C received 3 mL of 0.5% heavy bupivacaine 15 mg + 0.5 mL of 2.5 mg nalbuphine with 0.9% normal saline to a total volume of 3.5 mL

Inclusion Criteria: Patients aged 20- 60 yrs, Height ≥ 150 cms ,Weight 45-75 Kg. ,ASA grade I-II., Undergoing

infraumblical surgery like appendicectomy, herniorraphy, abdominal hysterectomy etc. Duration about 1-4 hrs.

Exclusion Criteria: Patient not willing to give consent, Any deformity or local sepsis in spinal lumbar region, Severe hypovolemia, increased intracranial pressure, Any bleeding or coagulation abnormalities, Patients receiving tranquilizers, phenothiazines, or other CNS depressants (including alcohol) ,History of allergy or hypersensitivity to any of the study drugs

3. Procedure

- After taking informed written consent and confirming overnight fasting, patient was taken on the operation table, was connected to monitors and baseline vitals like BP, pulse rate, respiratory rate were recorded. After an 18 gauge intravenous (IV) cannula was inserted at the forearm level, lactated Ringer's solution was administered as a bolus of 10 ml/kg before subarachnoid block to all patients.
- The study drug was diluted up to 6.3 ml using normal saline to get 0.8 mg/0.5 ml or upto 2.0 ml using normal saline to get 2.5 mg/ml and added to 3 ml bupivacaine and spinal anaesthesia performed. In order to facilitate blinding, the medications were prepared by another person who was not involved in the study. Neither the patient nor the person doing the study knew in which group a particular patient had been allotted.
- Spinal anaesthesia was performed at L3-L4 interspace (L4-L5 in case of failure) with the patient in left lateral position by using a 25 Gauge Quincke needle under strict aseptic conditions. Free flow of cerebrospinal fluid was verified before injection of the anesthetic solution, which was administered over 30 seconds. All patients were immediately placed in a supine position following the injection with a 15º head down tilt to achieve level of block of T6-T7. Monitoring was done using continuous electrocardiography (lead II & V), heart rate, non-invasive blood pressure and continuous pulse oximetry and patients were given 4.0 L/min of oxygen by venti-mask.

4. Results

These 210 patients were randomized into two groups of 70 each. There were no differences between the groups regarding the basic data including age, sex, baseline temperature, duration of surgery and maximum level of sensory block.

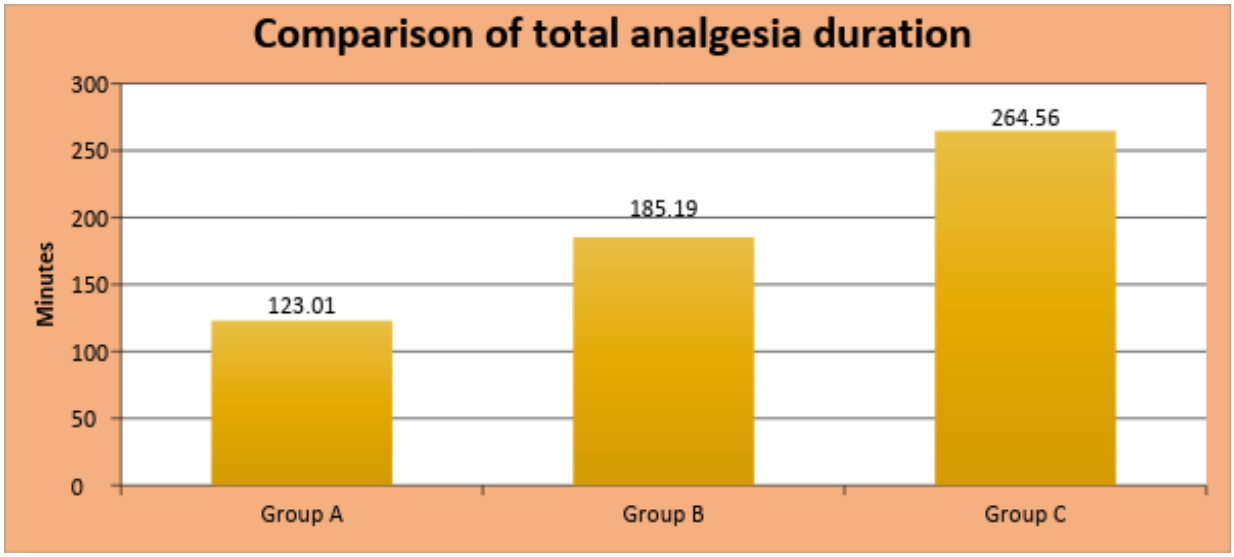
Variable	Group A	Group B	Group C	P Value
Age (years)	40	41	42	0.303
Sex(F:M)	59:11	60:10	64:6	0.357
Height	166.80	166.14	165.20	0.614
Weight (kg)	56	55	57	0.377
Onset of sensory block	6.27±1.28	4.26±0.83	4.26±0.81	<0.001
Onset of motor block	7.16±1.37	4.72±0.76	4.59±0.69	<0.001
Duration of surgery	61.31±11	60.20±12	61.30±16	0.849

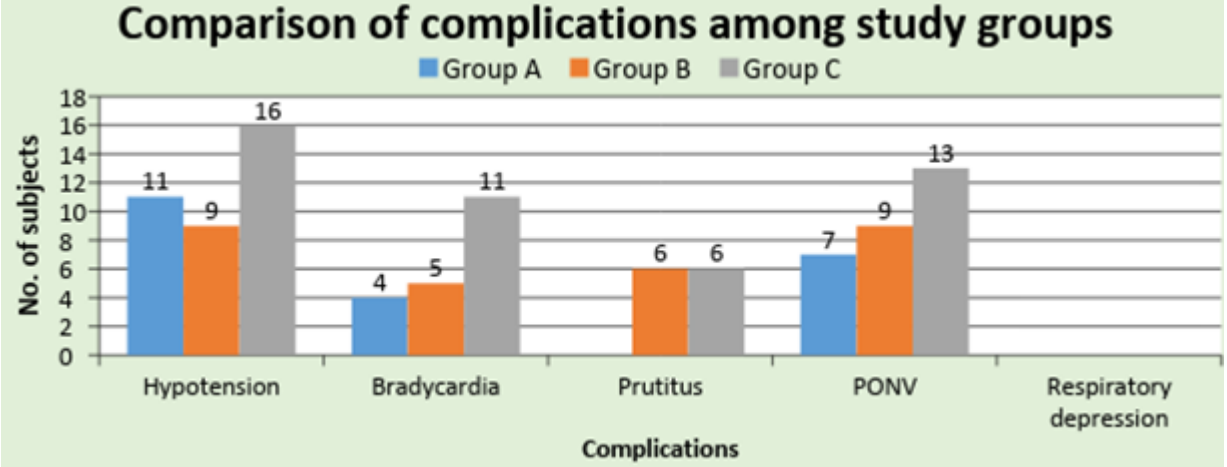
Table: Comparison of total analgesia duration (min) among study groups

Group	N	Mean	Std. deviation	P value
Group A	70	123.01	16.97	<0.001 (S)
Group B	70	185.19	23.95	
Group C	70	264.56	39.91	

Multiple comparison	A vs. B	A vs. C	B vs. C
P value	<0.001 (S)	<0.001 (S)	<0.001 (S)

Above table depicts the mean total analgesia time in subjects of group C (264.56 min) was highest, while subjects of group A had 123.01 min and group B had 185.19 min duration of analgesia. This difference in mean total analgesia time among the three study groups was statistically significant. (p<0.001)





5. Discussion

Intrathecal opioids used as adjuncts are capable of producing analgesia of prolonged duration but allow early ambulation of patients because of their sympathetic and motor nerve sparing activities.[5][6] Nalbuphine and other kappa agonists had provided reasonably potent analgesia in certain models of visceral nociception. They have a short duration of action, consistent with their lipid solubility and rapid clearance compared with other opioids like morphine. Used as the sole opioid analgesic, it can satisfactorily cover mild to moderate pain with a low incidence of side effects.

We conducted our study with 210 patients undergoing infraumblical surgery using intrathecal Nalbuphine in three different doses(0.8mg & 2.5mg) along with 15mg 0.5% hyperbaric Bupivacaine and compared them with control. Our results re-emphasized the now well known fact that intrathecal Nalbuphine is an effective neuraxial adjunct. In our study when we used Nalbuphine in 2.5 mg dose the duration of effective analgesia (time from induction to VAS >3) is significantly increased with reduced VAS pain score, when compared to control *(p value <0.05)* without any significant increase in associated adverse effects *(p value>0.05)*. Also we found that 0.8mg dose did increase the analgesia duration as compared to control (*p value <0.05*), but less than the increase in 2.5 mg group and also the VAS scores noted were higher. The side effects in both groups were comparable with the control group using Bupivacaine alone. There was progressive decrease in VAS score noted at an interval of 30 mins from first hour to 270 mins in control, 0.8mg & 2.5 mg .

In the present study the time of onset of sensory block, onset of motor block was early in Nalbuphine using groups when statistically compared with bupivacaine only group.None of our patients in any of the three groups experienced respiratory depression or desaturation intra or post operatively which is an issue of great concern when other opioids like Morphine are used intrathecally. The effective intrathecal dose of Nalbuphine is still debatable.

In 2000, C*ulebras et al*.[3] suggested that intrathecal nalbuphine 0.8 mg provides good intra operative and early postoperative analgesia without side effects such as pruritus and postoperative nausea and vomiting and this allows earlier discharge of patients from the recovery room. The additional increase to 1.6 mg did not increase efficacy. Their study group included ninety healthy patients at full term who were scheduled for elective cesarean delivery with spinal anesthesia.

In 2010, Farrag et al.[8][10]in their study of 60 patients undergoing TURP concluded that the intrathecal administration of 50 mg tramadol and intrathecal 2 mg nalbuphine when used with 0.5% bupivacaine had a similar the postoperative analgesia in the patients without producing significant related side effects like nausea, vomiting, pruritus and respiratory depression.

Moustafa et al. in 2011.[10]studied patients undergoing orthopaedic surgeries under SAB found that patients who received intrathecal Nalbuphine suffered significantly less than the control group from vomiting and pruritus meanwhile there was no effect on the postoperative analgesic requirements or the incidence of urinary retention.

Nalbuphine also provided hemodynamic stability. Similar findings are seen in the study conducted by Culebras et al,Tiwari et al[9][11] Mostafa et al.[10] where there was no gross hemodynamic changes throughout their study. From our study, we can conclude that use of nalbuphine hydrochloride along with bupivacaine causes no gross hemodynamic disturbances even with increasing the dosage from 0.8 to 2.5 mg.

The results of our study differ from the conclusion of the study by Moustafa et al.[10] & by Culebras et al.[3] In our study using 2.5 mg dose of Nalbuphine along with Bupivacaine showed significantly ($p<0.001$) increased duration of analgesia when compared to control group of Bupivacaine alone and with 0.8 mg of nalbuphine. So, we conclude that intrathecal Nalbuphine is an effective adjuvant to 0.5% hyperbaric bupivacaine in 2.5 mg dose in patients undergoing infraumlical surgery under sub-arachnoid block. It increases the duration of postoperative analgesia with the side effects well tolerated by the patients. Using 2.5mg dose offer added advantage regarding duration of analgesia.

6. Conclusion

To conclude our study shows the combination of intrathecal bupivacaine with Nalbuphine significantly prolonged postoperative analgesia as compared to the control group

with early onset of motor and sensory block and Nalbuphine 2.5 mg dose intrathecally showed the best results among all other study groups.

References

[1] Ramsay MA. Acute postoperative pain management. BUMC Proc 2000;13:244-7.
[2] Yaksh TL, Rudy TA. Analgesia mediated by a direct spinal action of narcotics. Science 1976;192:1357-8.
[3] Culebras X, Gaggero G, Zatloukal J, Kern C, Marti RA. Advantages of intrathecal nalbuphine, compared with intrathecal morphine, after cesarean delivery: An evaluation of postoperative analgesia and adverse effects. Anesth Analg 2000;91:601-5. Yaksh TL, Rudy TA. Analgesia mediated by a direct spinal action of narcotics. Science 1976;192:1357-8.
[4] Chen JC, Smith ER, Cahill M, Cohen R, Fishman JB. The opioid receptor binding of dezocine, morphine, fentanyl, butorphanol and nalbuphine. Life Sci 1993;52:389-96.
[5] Pick CG, Paul D, Pasternak GW. Nalbuphine, a mixed kappa 1and kappa 3 analgesic in mice. J Pharmacol Exp Ther 1992;262:1044-50.
[6] Culebras X, Gaggero G, Zatloukal J, Kern C, Marti RA. Advantages of intrathecal nalbuphine compared with intrathecal morphine, after cesarean delivery: An evaluation of postoperative analgesia and adverse effects. Anesth Analg 2000;91:601-5.
[7] Fournier R, Van Gessel E, Macksay M, Gamulin Z. Onset and offset of intrathecal morphine versus nalbuphine for postoperative pain relief after total hip replacement. Acta Anaesthesiol Scand 2000;44:940-5.
[8] Rawal N, Nuutinen L, Lovering SL, Gobuty AH, Hargardine J, Lehmkuhl L, et al. Behavioral and histopathologic effects following intrathecal administration of butorphanol, sufentanil, and nalbuphine in sheep. Anesthesiology 1991;75:1025-34.
[9] Tiwari AK, Tomar GS, Agrawal J. Intrathecal bupivacaine in comparision with a combination of nalbuphine and bupivacaine for subarachnoid block. Am J Ther 2013;20:592-5.
[10] Mostafa M G, Mohamad MF, Farrag WS. Which has greater analgesic effect; Intrathecal nalbuphine or intrathecal tramadol. J Am Sci 2011;7:480-4.
[11] Tiwari AK, Tomar GS, Agrawal J. Intrathecal Bupivacaine in Comparison With a Combination of Nalbuphine and Bupivacaine for Subarachnoid Block: A Randomized Prospective Double-Blind Clinical Study. Am J Ther. 2011 Sep 8.