Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page:www.jamdsr.com doi:10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Assessment of nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anaesthesia in patients undergoing lower limb orthopaedic surgeries

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ABSTRACT:
Background: Early anesthesia recovery is preferred due to the rise in the number of procedures performed in daycare facilities. The present study was conducted to assess nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anaesthesia in patients undergoing lower limb orthopaedic surgeries. **Materials & Methods:** 70 patients scheduled for lower limb, knee or below knee orthopaedic surgeries were divided into 2 groups of 35 each. Group I received 1.4 ml of 0.5% bupivacaine heavy + 0.4 ml of nalbuphine (0.8 mg) and group II received same volume of bupivacaine with 20µg of fentanyl. **Results:** ASA grade I was seen in 20 in group I and 22 in group II and ASA grade II was seen in 15 in group and 13 in group II. The sensory onset (T12) was 2.71 minutes in group I and 2.94 minutes in group II, TT10 was 4.31 minutes in group I and 4.75 minutes in group II, TPeak motor was 5.31 minutes in group I and 5.92 minutes in group II, duration of motor block (III) (mins) was 129.3 and 126.4, time to regression to L2 (mins) was 170.3 and 178.2, duration of analgesia was 254.3 minutes and 260.1 minutes in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** Due to its accessibility, nalbuphine can be utilized as a reliable substitute for fentanyl as an adjuvant in unilateral spinal anesthesia.
Key words: bupivacaine, nalbuphine, lower limb

Received: 16 December, 2018 Accepted: 19 January, 2019

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This article may be cited as: Pande S, Kumar D. Assessment of nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anaesthesia in patients undergoing lower limb orthopaedic surgeries. J Adv Med Dent Scie Res 2019; 7(2): 248-251.

INTRODUCTION

When local anesthetic is administered into the intrathecal space, it preferentially blocks the nerve fibers supplying the surgical side, resulting in unilateral spinal anesthesia.[1,2] As the motor, sensory, and sympathetic fibers of the dependent side are intended to be blocked, unilateral block of only the operative side has the advantage of causing less hypotension than bilateral block.[3] This is better suited to those with cardiovascular risk factors including valvular stenosis or coronary artery disease.[4]

Additionally, early anesthesia recovery is preferred due to the rise in the number of procedures performed in daycare facilities. The benefit of unilateral anesthesia is early recovery and thus early discharge.[5] To prolong sensor-motor block, lengthen the duration of analgesia, and reduce the negative effects of an increasing dose of local anaesthetics on hemodynamics, adjuvants or additives are given to local anaesthetics injected in intrathecal space. The most often utilized opioid adjuvant is fentanyl, an opioid with a lipophilic structure.[6]Opioid availability, however, varies and is carefully regulated by the Narcotics Act. When given as an adjuvant, the opioid agonist antagonist nalbuphine has enhanced perioperative analgesia with little adverse effects.[7]

The present study was conducted to assess nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anaesthesia in patients undergoing lower limb orthopaedic surgeries.

MATERIALS & METHODS

The present study consisted of 70 patients scheduled for lower limb, knee or below knee orthopaedic surgeries of American Society of Anaesthesiologist (ASA) status I and II of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 35 each. Group I received 1.4 ml of 0.5% bupivacaine heavy + 0.4 ml of nalbuphine (0.8 mg) and group II received same volume of bupivacaine with 20µg of fentanyl. Parameters such as Duration of surgery (mins), sensory Onset (T12) (mins), TT10 (mins), TPeak Motor (mins), duration of motor block(III) (mins), time to regression to L2 (mins), duration of analgesia (mins) etc. were compared. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Group I (35)	Group II (35)
ASA (I/II)	20/15	22/13
Duration of surgery (mins)	94.2	98.5

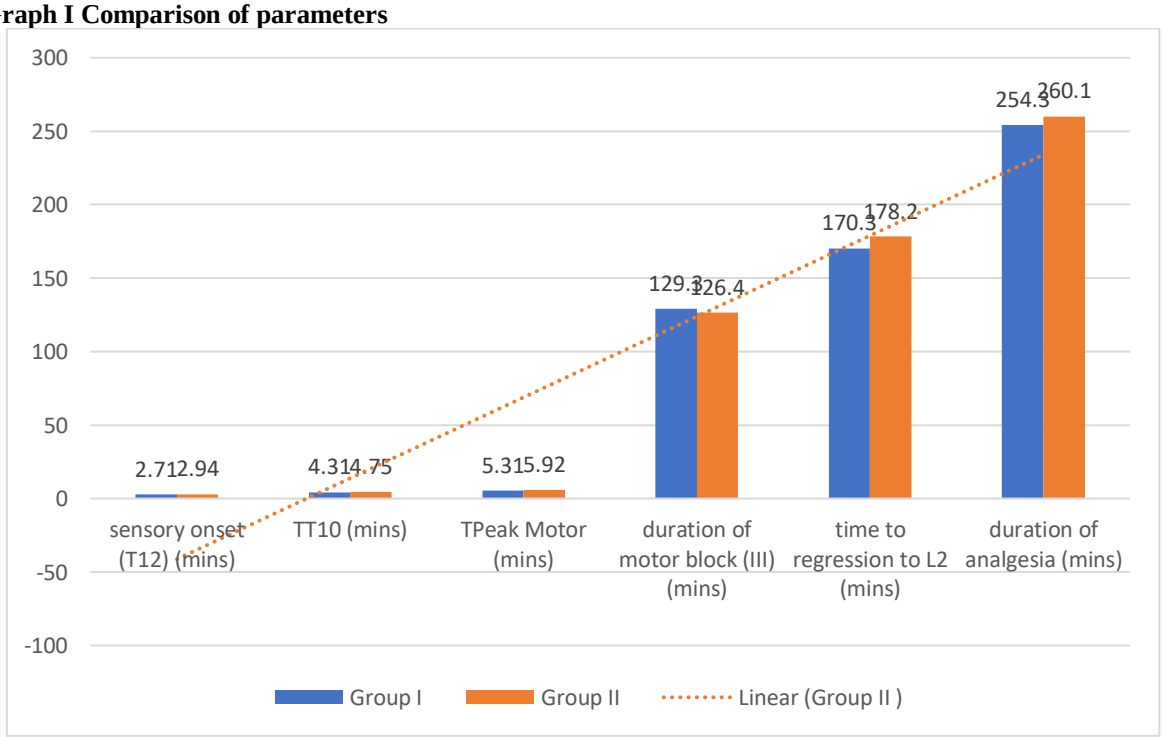
Table I shows that ASA grade I was seen in 20 in group I and 22 in group II and ASA grade II was seen in 15 in group and 13 in group II.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
sensory onset (T12) (mins)	2.71	2.94	0.91
TT10 (mins)	4.31	4.75	0.87
TPeak Motor (mins)	5.31	5.92	0.05
duration of motor block (III) (mins)	129.3	126.4	0.81
time to regression to L2 (mins)	170.3	178.2	0.04
duration of analgesia (mins)	254.3	260.1	0.95

Table II, graph I shows that sensory onset (T12) was 2.71 minutes in group I and 2.94 minutes in group II, TT10 was 4.31 minutes in group I and 4.75 minutes in group II, TPeakmotor was 5.31 minutes in group I and 5.92 minutes in group II, duration of motor block (III) (mins) was 129.3 and 126.4, time to regression to L2 (mins) was 170.3 and 178.2, duration of analgesia was 254.3 minutes and 260.1 minutes in group I and II respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters



DISCUSSION

Lower limb orthopedic surgeries are a broad category of surgical procedures that focus on the treatment of musculoskeletal conditions affecting the lower extremities of the body, including the hips, knees, ankles, and feet.[8] These surgeries are performed to

alleviate pain, restore function, and improve the overall quality of life for individuals with various orthopedic conditions.[9] Total Hip Replacement (THR)procedure involves replacing a damaged or arthritic hip joint with an artificial implant. It can relieve pain and improve mobility for individuals with conditions like osteoarthritis or hip fractures.[10]Total Knee Replacement (TKR) involves replacing a damaged or arthritic knee joint with a prosthetic implant. It is commonly performed to treat advanced osteoarthritis or severe knee injuries.Knee Arthroscopy is a minimally invasive procedure uses a small camera and specialized instruments to diagnose and treat various knee conditions, including meniscus tears, ligament injuries, and cartilage damage.[11]The present study was conducted to assess nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anaesthesia in patients undergoing lower limb orthopaedic surgeries.

We found that ASA grade I was seen in 20 in group I and 22 in group II and ASA grade II was seen in 15 in group and 13 in group II. Culebras et al[12] compared the analgesic efficacy and adverse effects of intrathecal nalbuphine, at three different doses, and intrathecal morphine for postoperative pain relief after cesarean deliveries. Ninety healthy patients at full term who were scheduled for elective cesarean delivery with spinal anesthesia were enrolled. They received 10 mg of hyperbaric bupivacaine 0.5% with either morphine 0.2 mg (Group 1), nalbuphine 0.2 mg (Group 2), nalbuphine 0. 8 mg (Group 3), or nalbuphine 1.6 mg (Group 4). Only patients in Groups 1 and 2 reported pain during surgery. Postoperative analgesia lasted significantly longer in the morphine group, compared with the nalbuphine groups (P: < 0.0001). In the nalbuphine groups, postoperative analgesia lasted longest with the 0.8-mg dose. The additional increase to 1.6 mg did not increase efficacy. The incidence of pruritus was significantly higher in Group 1 (11 of 22), compared with Group 2 (0 of 22, P: < 0.0002), Group 3 (0 of 23, P: < 0.0001), and Group 4 (3 of 20, P: < 0.02). Postoperative nausea and vomiting were more frequent in Group 1 (5 of 22), compared with Group 2 (0 of 22, P: < 0.05), Group 3 (0 of 23, P: < 0.05), and Group 4 (3 of 23, not significant). There was no maternal or newborn respiratory depression. Neonatal conditions (Apgar scores and umbilical vein and artery blood gas values) were similar for all groups. This study suggests that intrathecal nalbuphine 0.8 mg provides good intraoperative and early postoperative analgesia without side effects. However, only morphine provides long-lasting analgesia.

We found that sensory onset (T12) was 2.71 minutes in group I and 2.94 minutes in group II, TT10 was 4.31 minutes in group I and 4.75 minutes in group II, TPeak motor was 5.31 minutes in group I and 5.92 minutes in group II, duration of motor block (III) (mins) was 129.3 and 126.4, time to regression to L2 (mins) was 170.3 and 178.2, duration of analgesia was 254.3 minutes and 260.1 minutes in group I and II respectively. Imbelloni et al[13]aimed at investigating the depth of unilateral spinal anesthesia with 5 mg of 0.5% hyperbaric bupivacaine injected with 27G Quincke needle with patients in the lateral position and limb to be operated on facing downward.Spinal anesthesia with 0.5% bupivacaine and 27G Quincke needle was induced in 30 patients physical status ASA I-II submitted to orthopedic surgeries. Motor and sensory blocks between operated and contralateral sides were significantly different in all moments. Unilateral spinal anesthesia was obtained in 85.7% of patients. There has been hemodynamic stability in all patients. No patient has developed post dural puncture headache.

The limitation of the study is small sample size.

CONCLUSION

Authors found that due to its accessibility, nalbuphine can be utilized as a reliable substitute for fentanyl as an adjuvant in unilateral spinal anesthesia.

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