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Original Research

Role of Nalbuphine and fentanyl as adjuvants to bupivacaine in unilateral spinal anesthesiain lower limb orthopedic surgeries

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ABSTRACT:

Background: Unilateral spinal anesthesia occurs when a local anesthetic is injected into the intrathecal space because it selectively blocks the nerve fibers supplying the operative side. The present study was conducted to evaluate the role of nalbuphine and fentanyl as adjuvants to bupivacaine in spinal anesthesia in lower limb orthopedic surgery patients. **Materials & Methods:** 84 patients scheduled for lower limborthopedic surgeries of American Society of Anaesthesiologists (ASA) status I and II of both genderswere divided into 2 groups of 42 each. Group I received 1.4 ml of 0.5% bupivacaine heavy + 0.4 ml of nalbuphine (0.8 mg) and group II received 1.4 ml of 0.5% bupivacaine heavy with 20µg of fentanyl. Parameters such as duration of surgery (mins), sensory onset (T12) (mins), TT10 (mins), Tpeakmotor (mins), duration of motor block (III) (mins), time to regression to L2 (mins), duration of analgesia (mins) etc. were recorded. **Results:** Group I comprised 22 males and 20 females and group II 23 males and 19 females. ASA grade I was seen in 18 in group I and 20 in group II and grade II was seen in 24 in group and 22 in group II. The difference was non-significant (P> 0.05). Sensory onset (T12) was 2.76 minutes in group I and 2.96 minutes in group II, TT10 was 4.35 minutes in group I and 4.80 minutes in group II, TPeak motor was 5.32 minutes in group I and 5.90 minutes in group II, duration of motor block (III) (mins) were 128.3 and 125.4, time to regression to L2 (mins) was 172.3 and 180.2, duration of analgesia was 251.4 minutes and 262.7 minutes in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** Nalbuphine is a readily available drug that can be used as an adjuvant in unilateral spinal anesthesia in place of fentanyl.

Keywords: bupivacaine, nalbuphine, spinal anesthesia

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INTRODUCTION

Unilateral spinal anesthesia occurs when a local anesthetic is injected into the intrathecal space because it selectively blocks the nerve fibers supplying the operative side.[1] Unilateral block on the operative side alone has the advantage of producing less hypotension than bilateral block because the dependent side's motor, sensory, and sympathetic fibers are meant to be blocked. This is more appropriate for people with coronary artery disease or valvular stenosis, two cardiovascular risk factors.[2]

Furthermore, because childcare centers are performing an increasing number of surgeries, early anesthesia recovery is preferred. Early recuperation and, thus, early release are advantages of unilateral anesthesia.[3] Adjuvants or additives are added to local anesthetics injected intrathecal space to extend sensor-motor block, prolong the duration of analgesia, and lessen the adverse effects of an increasing dose of local anesthetics on hemodynamics. Fentanyl is the opioid adjuvant that is most frequently used; it has a lipophilic nature.[4]The Narcotics Act, however, strictly regulates the availability of opioids and it varies. The opioid agonist-antagonist nalbuphine improves perioperative analgesia when used as an adjuvant with minimal side effects.[5]The present study was conducted to evaluate the role of nalbuphine and fentanyl as adjuvants to bupivacaine in spinal anaesthesia in lower limb orthopaedic surgery patients.

MATERIALS & METHODS

The present study consisted of 84 patients scheduled for lower limborthopedic surgeries of American

Society of Anaesthesiologists (ASA) status I and II of both genders. All patients agreed to participate in the study with their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 42 each. Group I received 1.4 ml of 0.5% bupivacaine heavy + 0.4 ml of nalbuphine (0.8 mg) and group II received 1.4 ml of 0.5% bupivacaine heavy with 20µg of fentanyl. Parameters such as duration of surgery (mins), sensory onset (T12) (mins), TT10 (mins), Tpeakmotor (mins), duration of motor block (III) (mins), time to regression to L2 (mins), duration of analgesia (mins) etc. were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Parameters	Group I	Group II	P value
M:F	22:20	23:19	0.87
ASA (I/II)	18/24	20/22	0.65

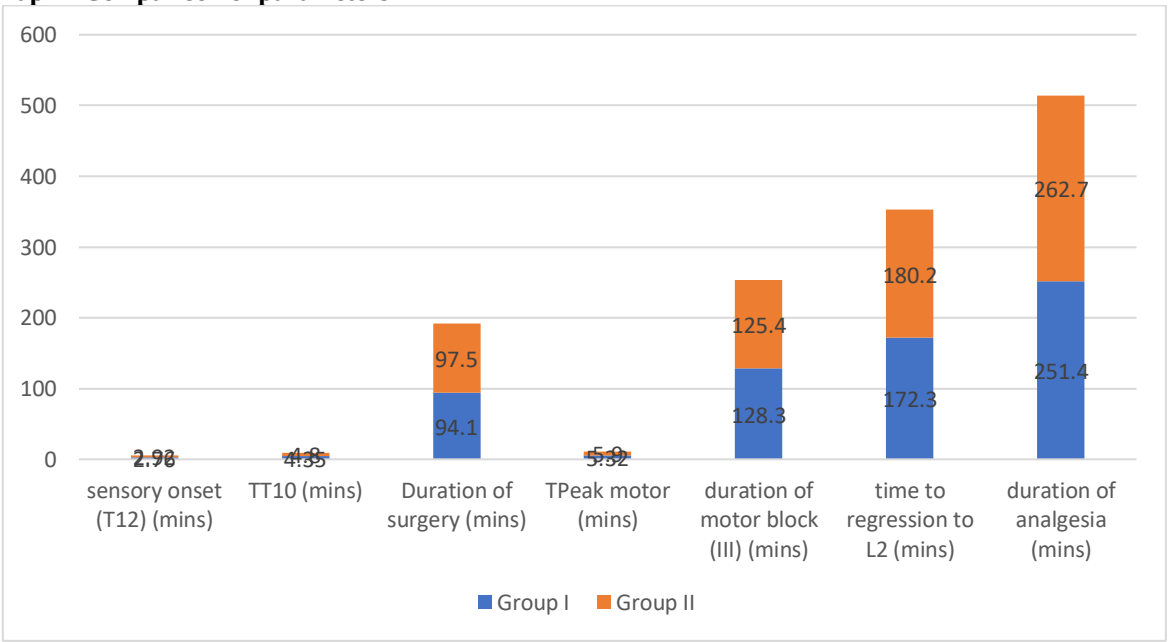
Table I shows that group I comprised 22 males and 20 females and group II 23 males and 19 females. ASA grade I was seen in 18 in group I and 20 in group II and grade II was seen in 24 in group and 22 in group II. The difference was non- significant (P> 0.05).

Table II Comparison of parameters

Parameters	Group I	Group II	P value
sensory onset (T12) (mins)	2.76	2.92	0.99
TT10 (mins)	4.35	4.80	0.82
Duration of surgery (mins)	94.1	97.5	0.04
TPeakmotor (mins)	5.32	5.90	0.05
duration of motor block (III) (mins)	128.3	125.4	0.87
time to regression to L2 (mins)	172.3	180.2	0.05
duration of analgesia (mins)	251.4	262.7	0.92

Table II, graph I showthat sensory onset (T12) was 2.76 minutes in group I and 2.96 minutes in group II, TT10 was 4.35 minutes in group I and 4.80 minutes in group II, TPeak motor was 5.32 minutes in group I and 5.90 minutes in group II, duration of motor block (III) (mins) was 128.3 and 125.4, time to regression to L2 (mins) was 172.3 and 180.2, duration of analgesia was 251.4 minutes and 262.7 minutes in group I and II respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters



DISCUSSION

A wide range of surgical operations known as "lower limb orthopedic surgeries" are aimed at treating musculoskeletal disorders that impact the lower extremities of the body, such as the hips, knees, ankles, and feet.[6] These procedures are performed to reduce pain, restore function, and improve the overall quality of life for persons with various orthopedic

disorders.[7,8] During a total hip replacement (THR) treatment, an artificial implant is used to replace a hip joint that is diseased or arthritic. It can help people with hip fractures or osteoarthritis feel better and move more freely. A prosthetic implant is used in total knee replacement (TKR) to replace a damaged or arthritic knee joint.[9] It is frequently used to treat serious knee injuries or advanced osteoarthritis. Meniscus tears, ligament injuries, and cartilage damage are among the diseases that can be diagnosed and treated with a minimally invasive surgery called knee arthroscopy. It involves the use of specialized instruments and a small camera.[10]The present study was conducted to evaluate the role of nalbuphine and fentanyl as adjuvants to bupivacaine in spinal anaesthesia in lower limb orthopaedic surgery patients.

We found that group I comprised 22 males and 20 females and group II 23 males and 19 females. ASA grade I was seen in 18 in group I and 20 in group II and grade II was seen in 24 in group and 22 in group II.Esmaoglu et al[11] in their study 90 patients scheduled to receive spinal block for surgery in the lower extremity were randomised into 9 groups (n = 10). The spinal block was performed through the L4-L5 intervertebral space with the patient in the lateral decubitus position. Patients in groups Ia, Ib, Ic; IIa, IIb, IIc; IIIa, IIIb, IIIc received 1.5 ml of 0.5%, 2 ml of 0.5%, and 2.5 ml of 0.5% hyperbaric bupivacaine solutions, respectively. The patients were turned to the supine position for 5 min after the injection in groups Ia, IIa, IIIa, 10 min after the injection in groups Ib, IIb, IIIb, and 15 min after the injection in groups Ic, IIc, IIIc. The onset and regression of sensory and motor block were checked and compared between the dependent and non-dependent sides in each group.The rate of block progression of the non-dependent side was higher in the groups receiving 2.5 ml 0.5% hyperbaric bupivacaine solution than in the other groups; at the same time the level of block was higher and the duration of block was longer. The incidence of hypotension was 10-20% in these groups. In the 2 ml 0.5% hyperbaric bupivacaine solution groups, a satisfactory block level and duration of anaesthesia for surgery was obtained. The rate of block progression to non-dependent side in the groups receiving 1.5 ml of 0.5% hyperbaric bupivacaine solution was lower than the other groups, but the duration of block was shorter and the level of block was lower than the other groups.

We observed that sensory onset (T12) was 2.76 minutes in group I and 2.96 minutes in group II, TT10 was 4.35 minutes in group I and 4.80 minutes in group II, TPeak motor was 5.32 minutes in group I and 5.90 minutes in group II, duration of motor block (III) (mins) was 128.3 and 125.4, time to regression to L2 (mins) was 172.3 and 180.2, duration of analgesia was 251.4 minutes and 262.7 minutes in group I and II respectively. Imbelloni et al.'s[12] study sought to determine the depth of unilateral spinal anesthesia using a 27G Quincke needle infused with 5 mg of 0.5% hyperbaric bupivacaine while the patient was in the lateral position and the operated leg was pointing downward. With the help of a 27G Quincke needle and 0.5% bupivacaine, 30 patients in physical category ASA I–II underwent orthopedic surgery under spinal anesthesia. Between the operative and contralateral sides, there were consistently noticeable differences in motor and sensory blockages. In 85.7% of cases, unilateral spinal anesthesia was achieved. Every patient has demonstrated hemodynamic stability. After a dural puncture, no patient has experienced headaches.

Culebras et al[13] examined the analgesic efficacy and side effects of intrathecal morphine and nalbuphine at three different doses for postoperative pain relief following cesarean deliveries. They enrolled ninety healthy patients at full term scheduled for elective cesarean delivery under spinal anesthesia, and 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 experiencing pain during surgery. The morphine group's postoperative analgesia was significantly longer than that of the nalbuphine groups. In the nalbuphine groups, postoperative analgesia lasted longest with the 0.8-mg dose.Compared to 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), Group 1 (11 of 22) had a considerably greater incidence of pruritus. Group 1 (5 of 22) experienced a higher frequency of postoperative nausea and vomiting than Group 2 (0 of 22, P: < 0.05), Group 3 (0 of 23, P: < 0.05), and Group 4 (3 of 23, not significant). Neither the mother nor the infant experienced respiratory depression. All groups had identical neonatal circumstances, as measured by Apgar scores and blood gas readings from the umbilical vein and artery. According to this study, intrathecal nalbuphine at a dose of 0.8 mg produces safe, effective analgesia during surgery and in the early postoperative phase. But the only drug that offers persistent analgesia is morphine.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that Nalbuphine is a readily available drug that can be used as an adjuvant in unilateral spinal anesthesia in place of fentanyl.

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