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Original Research Article

Comparison of Effects of Intrathecal Clonidine and Fentanyl as Adjuvant to Hyperbaric Bupivacaine (0.5%) in Lower Abdominal Surgery

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Abstract

Background: There are numerous trials combining adjuvant like fentanyl and clonidine with bupivacaine in the subarachnoid block to extend postoperative analgesia. Regarding the dosage and effectiveness of both intrathecal adjuvants, the evidence is contradictory. Some adjuvant can have their own negative consequences. Hence, the hunt for the optimum intrathecal adjuvant for bupivacaine continues. In order to compare the effectiveness, safety, and post-operative analgesia of intrathecal Fentanyl and intrathecal Clonidine as an adjuvant to hyperbaric Bupivacaine in patients having lower abdominal surgeries.

Methods: The current study comprised 50 patients who were scheduled to have elective lower abdomen surgery under spinal anaesthesia. The patients were split into two groups: group I (n = 25) received 2.5 ml of hyperbaric bupivacaine (0.5%) together with 50 micrograms of clonidine intrathecally, and group II (n = 25) received 2.5 ml of hyperbaric bupivacaine (0.5%) along with 25 micrograms of fentanyl intrathecally. The assessment looked at the length of the sensory and motor blockade, how quickly it started, and whether rescue analgesia was necessary.

Results: Patients' age, height, weight, sex ratio, heart rate (HR), mean arterial pressure (MAP) during operation, and length of surgery did not differ substantially between the two groups. When compared to the Clonidine group (group I), the beginning of sensory blockade was substantially lower in the Fentanyl group (group II) (2.03±0.17 min) than it was in the Clonidine group (group I) (4.66±1.24 min). In the Fentanyl group, the duration of the sensory and motor blockage was much shorter. When compared to the fentanyl group (422.20±25.59 min), the time for the first dosage of analgesia to be required was similarly considerably longer in the clonidine group (479.44±29.0 min).

Conclusion: 50 micrograms of Clonidine added to hyperbaric bupivacaine during lower abdominal procedures, the use of clonidine as an adjuvant in spinal anaesthesia provides longer post-operative analgesia than fentanyl without any negative side effects.

Keywords*:* Clonidine, Bupivacaine, Spinal, Fentanyl, Abdominal Surgery.

Introduction

The most popular local anaesthetic for spinal anaesthesia is bupivacaine, however the anaesthesia only lasts for a short time. Large doses of bupivacaine can be used to overcome short duration of action, however they can also cause significant heart damage. Hemodynamic stability during surgery is another issue. Hence, in addition to Bupivacaine, a variety of adjuvants are employed intrathecally to address the issue of short duration of action and to improve perioperative hemodynamic state and quality of analgesia [1,2]. Midazolam, opioids, neostigmine, dexmedetomidine, and clonidine are a few of the adjuvants that are employed [3].

The most common opioid used as an adjuvant to local anaesthetic in spinal anaesthesia is fentanyl (mu-1 & mu-2 receptor agonist). It has a brief duration of action, a quick onset, and little cephalic spread. However, it also causes certain unwanted side effects, including pruritis, respiratory depression, nausea, vomiting, and urine retention [4,5]. A common premedication for general anaesthesia, clonidine is a selective alpha-2 receptor agonist. It provides prolonged postoperative analgesia and prolongs spinal anaesthesia's sensory and motor block. Wide dynamic range (WDR) neurons' activity is indirectly inhibited by it in order to work. In the current study, we investigated the efficacy, safety, and post-operative analgesia of intrathecal Clonidine and intrathecal Fentanyl as an adjuvant to hyperbaric Bupivacaine in patients having lower abdominal surgeries.

Materials and Methods

The present prospective study was carried out during the period of six months at Nalanda Medical College and Hospital, Patna, Bihar after permission of ethical committee and properly informed written consent from all the participants. The current study comprised 50 patients who were scheduled to have elective lower abdomen surgery under spinal anaesthesia. The patients received ondansetron 4 mg and glycopyrrolate 0.2 mg intravenously (IV) as premedication (IV). Throughout the entire surgery, sedatives were not administered. The baseline parameters (pulse, blood pressure, SpO_2, electrocardiogram) were obtained in the operating room, and preloading with Ringer lactate solution 10-15/kg was carried out.

Two groups of patients were created: Patients in Group I (n=25) received 50 micrograms of intrathecal Clonidine along with 2.5 ml of hyperbaric 0.5 percent Bupivacaine. Group II (n=25): Patients received 25 micrograms of intrathecal fentanyl along with 2.5 ml of hyperbaric bupivacaine (0.5%). Patients with systemic conditions like diabetes, hypertension, and heart disease with an ASA grade of more than II, drug allergies, patients with conditions that preclude the use of spinal anaesthesia, such as spine deformities that raise intracranial pressure, neurological conditions, clotting disorders, infections at the puncture site, and patients who refuse to consent to the procedure are all excluded from this study.

A 25 G spinal needle was used for the mid-line approach to provide a subarachnoid block while the patient was seated, following all aseptic procedures. For a 30-second period, an intrathecal (IT) medication was administered into the L3-L4 intervertebral region. Following the block, the patients were put supine and given additional oxygen. Intravenous atropine and ephedrine were used to treat bradycardia and hypotension, respectively.

Results

The study comprised 50 patients undergoing lower abdominal surgery under spinal anaesthesia and separated them into two groups: group I received hyperbaric Bupivacaine and Clonidine, and group II received hyperbaric Bupivacaine and Fentanyl. Patients' age, height, weight, sex ratio, heart rate (HR), mean arterial pressure (MAP) during operation, and length of surgery did not differ substantially between the two groups. (Table 1).

Table 1: Baseline characteristics of the study participants in two groups

Parameters (Mean±SD)	Group-I	Group-II	P-value
Age (years)	39.16±9.27	41.05±11.50	0.4797
Height (cm)	149.55±9.69	141.90±9.05	0.3113
Weight (Kg)	62.01±6.57	61.97±5.55	0.1453
Sex (M:F)	18:7	19:6	1.0000
MAP (mmHg)	85.72±6.02	86.39±6.02	0.5047
HR (bpm)	83.13±5.01	84.05±5.31	0.3372
Duration of Surgery (min)	93.60±11	96.47±66	0.7586

Table 2 compares the sensory and motor blockage between the two groups in terms of the onset, duration, and need for the first dosage of rescue analgesia. When compared to the Clonidine group, the start of sensory blockage was much lower in the Fentanyl group (group II) (group I). In the Fentanyl group, the duration of the sensory and motor blockage was much shorter. When compared to the Clonidine group, the time needed for the initial dosage of analgesia was also noticeably shorter in the Fentanyl group. (Table 2)

Table 2: Comparison of blockade and analgesia effect of two groups

Parameters	Group-I	Group-II	P-value
Onset of sensory blockade (min)	2.13±0.13	2.03±0.17	0.0012
Onset of motor blockade (min)	4.66±1.24	5.38±1.49	0.0066
Duration of sensory blockade (min)	169.98±13.19	130.33±12.30	0.0001
Duration of motor blockade (min)	192.64±18.21	169.44±17.29	0.0001
Time for first dose rescue analgesia	479.44±29.0	422.20±25.59	0.0001

Both groups experienced similar levels of intraoperative hypotension, bradycardia, respiratory depression, nausea/vomiting, and dry mouth.

Discussion

Clonidine and Fentanyl are used to prolong the postoperative analgesia effect of intrathecal Bupivacaine. In present study, we compared the efficacy of intrathecal Clonidine and intrathecal Fentanyl when used along with hyperbaric Bupivacaine in spinal anaesthesia. In present study, we found that onset of sensory blockade was earlier in Fentanyl group (2.03±0.17 min) than in Clonidine group (2.13±0.13 min). In the Clonidine group, the onset of motor blockage occurred sooner. The sensory and motor blockage lasted longer in group I than in group II as well. These results concurred with earlier similar research' conclusions.

It is thought that clonidine lengthens the motor blockage caused by local anaesthetic drugs [7]. By affecting vascular smooth muscle (alfa receptors), clonidine causes local vasoconstriction, which reduces the absorption of local anaesthetics from the subarachnoid space and lengthens the duration of effect [8-10]. In the current investigation, the Fentanyl group

experienced motor blockage substantially sooner on average. In their comparison of intrathecal Clonidine and fentanyl in hyperbaric bupivacaine for spinal anaesthesia and postoperative analgesia in patients undergoing lower abdominal operations, Bajwa *et al*. found similar findings [11].

In the current investigation, group I had sensory and motor blocking for a longer period of time than group II. In their trial comparing intrathecal clonidine and fentanyl as an adjuvant to intrathecal ropivacaine for significant lower limb procedures, Chhabra *et al*. found similar findings. They came to the same conclusion as our study: Clonidine 60 micrograms is superior to fentanyl and prolongs the duration of the subarachnoid block and postoperative analgesia [12]. Sharan *et al*. compared intrathecal doses of 30 micrograms of Clonidine with 25 micrograms of fentanyl and came to the conclusion that Clonidine was superior to fentanyl, which is consistent with the results of our investigation [13].

In the current trial, group I patients needed a lot more time to receive their first dosage of rescue analgesia than group II patients did. Similar to our study, Khezri *et al*. found that intrathecal clonidine 75 microgram with bupivacaine prolonged the time to first analgesic request when compared to fentanyl [14]. In our investigation, the amount of clonidine was capped at 50 micrograms to reduce side effects. In order to determine the lowest possible effective dose, Kothari *et al*. compared various doses of clonidine as an adjuvant to intrathecal bupivacaine for spinal anaesthesia in patients undergoing caesarean section.

However, they found that the incidence of both hypotension and bradycardia was higher in the bupivacaine group than in the bupivacaine with clonidine group, which was inconsistent with our study [15] In comparison to using bupivacaine alone, Bhure *et al*. showed that combining it with clonidine, fentanyl, and midazolam significantly improves the onset and duration of sensory and motor block with reasonable hemodynamic stability, increases the length of analgesia, and decreases the need for systemic analgesics.

They came to the conclusion that clonidine is a great supplement to bupivacaine in spinal anaesthesia and that it prolongs the duration of analgesia without having any negative effects on the mother or the unborn child [16]. In neither of our study's two groups were any systemic side effects, such as bradycardia, hypotension, or sedation, noticed. In contrast to Kothari *et al* [15] who found a higher incidence of both hypotension and bradycardia in the bupivacaine group than in the bupivacaine with clonidine group, Sethi *et al* [17] and Shah *et al* [18] observed very few incidences of hypotension and bradycardia by using 1 mcg/kg of intrathecal clonidine for non-obstetric surgeries.

Conclusion

As adjunct to intrathecal hyperbaric bupivacaine, both clonidine and fentanyl are helpful at extending the duration of analgesia during spinal anaesthesia for lower abdominal procedures. In terms of greater post-operative analgesia and longer duration of sensory and motor blockage, 50 microgram Clonidine is superior to 25 microgram Fentanyl intrathecally.

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