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Original Research Article

Comparative Study of Using Intrathecal Clonidine and Fentanyl as an Adjuvant to Hyperbaric Bupivacaine (0.5%) in Lower Abdomen Surgeries

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ABSTRACT

Objective: The present study was carried out to compare the effect of intrathecal Clonidine and intrathecal Fentanyl as an adjuvant to hyperbaric Bupivacaine in terms if efficacy, safety and post-operative analgesia in patients undergoing lower abdominal surgeries.
Material and methods: 100 patients planned for elective lower abdominal surgery under spinal anaesthesia were included in present study. The patients were divided into two groups viz. group I (n=50) in which patients were given 2.5 ml of hyperbaric Bupivacaine (0.5%) with 50µg of Clonidine intrathecally and group II (n=50) in which patients were given 2.5 ml of hyperbaric Bupivacaine (0.5%) with 25µg of Fentanyl intrathecally. Assessment was done in terms of time taken for onset of sensory and motor blockade, duration of sensory and motor blockade and requirement of rescue analgesia.
Results: Patients' age, height, weight, sex ratio, mean arterial pressure during surgery (MAP), heart rate (HR) and duration of surgery were not significantly different between two groups. Onset of sensory blockade was significantly lower in Fentanyl group (group II) (2.02±0.15 min) while onset of motor blockade was significantly lower in Clonidine group (group I) (4.62±1.21 min). Duration of sensory and motor blockade was significantly less in Fentanyl group. Time for requirement of first dose of analgesia was also significantly longer in clonidine group (490.55±28.98 min) when compared to fentanyl group (421.19±26.64 min).
Conclusion: addition of 50µg Clonidine to hyperbaric Bupivacaine as an adjuvant in spinal anaesthesia for lower abdominal surgeries offers longer post-operative analgesia than Fentanyl with no side effects.

Keywords: Clonidine, Bupivacaine, Spinal, Fentanyl, abdominal surgery

INTRODUCTION

Bupivacaine is most commonly used local anaesthetic for spinal anaesthesia but the duration of anaesthesia is short and limited. Short duration of action can be overcome by using large doses of Bupivacaine but it can produce serious cardiac toxicity. Perioperative hemodynamic stability is also a concern. Hence, to address the problem of short duration of action and to improve perioperative hemodynamic status and quality of analgesia, various adjuvants are being used intrathecally along with Bupivacaine. [(1,2)] Various adjuvants used are Midazolam, opioids, neostigmine, Dexmedetomidine, and Clonidine. [(3)]

Fentanyl (µ1- and µ2- receptor agonist) is most common opioid used as an adjuvant to local anaesthetic in spinal anaesthesia. It has rapid onset and short duration of action along with minimal cephalic spread. However, it also has some side effects like nausea, vomiting, pruritis,

respiratory depression and urinary retention. [4,5]

Clonidine is a selective alpha-2 receptor agonist agent, routinely used as premedication agent for general anaesthesia. It prolongs sensory and motor block in spinal anaesthesia and provides prolonged postoperative analgesia. It acts by indirectly inhibiting the activity of wide dynamic range (WDR) neurons.

In present study, we have compared the effect of intrathecal Clonidine and intrathecal Fentanyl as an adjuvant to hyperbaric Bupivacaine in terms if efficacy, safety and post-operative analgesia in patients undergoing lower abdominal surgeries.

MATERIALS AND METHODS

The present study is a prospective study carried out during the period of one year from October 2016 to October 2017, after obtaining approval from institutional ethical committee and properly informed written consent from all the participants.

100 patients planned for elective lower abdominal surgery under spinal anaesthesia were included in present study. The patients were pre-medicated with glycopyrrolate 0.2 mg intravenous (IV) and ondansetron 4mg (IV). Sedatives were not used during whole procedure. In the operation theatre, the baseline parameters (pulse, blood pressure, SpO2, electrocardiogram) were recorded and preloading was done with Ringer lactate solution 10-15/kg. The patients were divided into two groups:

Group I (n=50): patients were given 2.5 ml of hyperbaric Bupivacaine (0.5%) with 50µg of Clonidine intrathecally.

Group II (n=50): Patients were given 2.5 ml of hyperbaric Bupivacaine (0.5%) with 25µg of Fentanyl intrathecally.

Exclusion criteria:

1. Patients with systemic disorders like diabetes, hypertension, and heart disease with ASA grade more than II.
2. Allergy to drugs used in the study.
3. Patients with contraindication to spinal anaesthesia like spine deformity raised intracranial pressure, neurological disorders, bleeding disorders or infection at puncture site.
4. Patient's refusal to give consent for the procedure.

Procedure: Under all aseptic precautions, subarachnoid block was administered with 23 G spinal needle through mid‑line approach in sitting position. Intrathecal (IT) drug was injected in L3-L4 intervertebral space over 30 seconds. After the block was performed, the patients were made supine and were given supplemental oxygen. Bradycardia and hypotension were treated with IV atropine and ephedrine, respectively.

The following parameters were noted after subarachnoid block:

- Time of onset of sensory block (tested by pinprick method)
- Time taken for onset of motor blockade (assessed by modified Bromage scale: Bromage 0: Patients able to move hip, knee, and ankle, Bromage 1: Patients unable to move hip but able to move the knee and ankle, Bromage 2: Patient unable to move hip and knee but able to move the ankle, Bromage 3: Patient unable to move hip, knee, and ankle). [6]
- Intra operative haemodynamic monitoring (heart rate (HR), systolic blood pressure (SBP) measured immediately after subarachnoid block, 2nd min, 5th min, 10th min and every 5 min till the end of surgery)
- Total duration of analgesia (time from the onset of analgesia to the point where the patient complained of pain at the surgical site requiring rescue analgesia)
- Duration of motor block (complete recovery of motor power).

RESULTS

100 patients undergoing lower abdominal surgery under spinal anaesthesia were included in the study and divided into two groups viz. group I, in which Clonidine was used along with hyperbaric

Bupivacaine and group II, in which Fentanyl was used along with hyperbaric Bupivacaine.

Patients' age, height, weight, sex ratio, mean arterial pressure during surgery (MAP), heart rate (HR) and duration of surgery were not significantly different between two groups. (Table 1)

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

S. No.	Parameters (Mean±SD)	Group-I	Group-II	P-value
1	Age (years)	38.61±9.22	40.01±10.48	0.4799
2	Height (cm)	148.77±9.47	146.89±9.00	0.3114
3	Weight (Kg)	61.09±6.21	62.98±6.66	0.1454
4	Sex (M:F)	36:14	38:12	1.0000
5	MAP (mmHg)	84.68±5.87	85.43±5.32	0.5048
6	HR (bpm)	82.11±4.97	83.01±4.34	0.3372
7	Duration of Surgery (min)	92.56±12	95.44±65	0.7587

Table 2 shows the comparison of blockade between two groups in terms of onset and duration of sensory and motor blockade and requirement of first dose of rescue analgesia. Onset of sensory blockade was significantly lower in Fentanyl group (group II) while onset of motor blockade was significantly lower in Clonidine group (group I). Duration of sensory and motor blockade was significantly less in Fentanyl group. Time for requirement of first dose of analgesia was also significantly less in Fentanyl group when compared to Clonidine group. (Table 2)

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

S.No.	Parameters	Group-I	Group-II	P-value
1	Onset of sensory blockade (min)	2.11±0.12	2.02±0.15	0.0013
2	Onset of motor blockade (min)	4.62±1.21	5.36±1.45	0.0067
3	Duration of sensory blockade (min)	170.87±14.43	129.32±11.31	0.0001
4	Duration of motor blockade (min)	193.61±17.22	170.43±16.43	0.0001
5	Time for first dose rescue analgesia	490.55±28.98	421.19±26.64	0.0001

Intra-operative incidences of hypotension, bradycardia, respiratory depression, nausea/vomiting and dry mouth were comparable in both the groups.

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 (2.02±.15 min) than in Clonidine group (2.11±0.12 min). Onset of motor blockade was earlier in Clonidine group. Duration of sensory and motor blockade was also for longer duration in group I than group II. These findings were similar to the findings of previous similar studies.

Clonidine is believed to prolong the motor blockade produced by local anaesthetic agents. [(7)] Clonidine produces local vasoconstriction by acting on vascular smooth muscle (α-receptors), which decreases absorption of local anaesthetics from sub-arachnoid space thereby prolonging the duration of action. [(8-10)]

In present study, mean time taken for onset of motor blockade was significantly shorter than the Fentanyl group. Similar results were obtained by Bajwa et al in their study of comparison of intrathecal Clonidine and fentanyl in hyperbaric bupivacaine for spinal anesthesia and postoperative analgesia in patients undergoing lower abdominal surgeries. [(11)]

In present study, duration of sensory and motor blockade was also for longer duration in group I than group II. Similar results were obtained by Chhabra et al. in their study of comparison between intrathecal Clonidine and Fentanyl as an

adjuvant to intrathecal Ropivacaine for major lower limb surgeries. They concluded that clonidine 60 µg has advantage over fentanyl and it prolonged the duration of the subarachnoid block and postoperative analgesia, similar to our study. [(12)] Sharan et al. compared intrathecal Clonidine 30 µg with fentanyl 25 µg and concluded that Clonidine had advantage over fentanyl which is in agreement with our study. [(13)]

In present study, group I patients required significantly longer time than group II for first dose of rescue analgesia. Khezri et al. in their study concluded that intrathecal clonidine 75 µg with Bupivacaine prolonged the time to first analgesia request compared to fentanyl which was similar to our study. [(14)]

The dose of clonidine was limited to 50 µg in our study to decrease the side effects. Kothari et al. compared different doses of clonidine as an adjuvant to intrathecal bupivacaine for spinal anesthesia in patients undergoing cesarean section aiming to find out the lowest possible effective dose and found that the incidence of both hypotension and bradycardia more in bupivacaine group than in bupivacaine with clonidine group which was not in agreement with our study. [(15)] Bhure et al. demonstrated that addition of clonidine, fentanyl, and midazolam to Bupivacaine significantly improves the onset and duration of sensory and motor block with relative hemodynamic stability, prolongs the duration of analgesia, and reduces the consumption of systemic analgesics in comparison to bupivacaine alone. They concluded that clonidine is an excellent additive to bupivacaine in spinal anesthesia and provides prolonged duration of analgesia without any deleterious effects on the mother and baby. [(16)]

No systemic side effects such as bradycardia, hypotension, or sedation were observed in both groups of our study. 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, whereas Kothari et al. [(15)] found the increased incidence of both hypotension and bradycardia in bupivacaine group than in bupivacaine with clonidine group.

CONCLUSION

Both Clonidine and Fentanyl are effective in prolonging the duration of analgesia in adjuvant to intrathecal hyperbaric Bupivacaine in spinal anaesthesia for lower abdominal surgeries. 50µg Clonidine is superior to 25µg Fentanyl intrathecally in terms of longer duration of sensory and motor blockade and longer post-operative analgesia.

Conflict of interest

No conflicts of interest exist for these authors. No relevant financial relationship exists between the authors and procedures or products used in this manuscript.

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