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ORIGINAL RESEARCH

Comparison between dexmedetomidine and clonidine in lower abdominal surgeries under spinal anaesthesia

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Abstract

Background: The present study was under taken for comparing the efficacy of dexmedetomidine and clonidine in lower abdominal surgeries under spinal anaesthesia.

Materials and methods: 30 patients schedule to undergo lower abdominal surgery under spinal anaesthesia were enrolled. All the patients were broadly divided into two study groups as follows: Group A: 3.5 ml injection of bupivacaine 0.5% hyperbaric and 0.5 ml of injection clonidine (30 µg), and Group B: 3.5 ml volume of injection bupivacaine 0.5% hyperbaric and 0.5 ml of injection dexmedetomidine (3 µg).VAS was assessed on a scale of 0 to 10 with 0 indicating no pain and 10 indicating severe unbearable pain. Sedation was assessed by Ramsay sedation scale. All the results were recorded and analysed using SPSS software.

Results: Mean sensory onset duration was significantly less among subjects of group 2 in comparison to group 1. Mean time to first rescue analgesic requirement was significantly more in group 2 (391.2 minutes) in comparison to group 1 (356.5 minutes).Significant results were obtained while comparing the mean VAS among patients of both the study groups. However; while comparing the incidence of adverse events among both the study groups, non-significant results were obtained.

Conclusion: Dexmedetomidine is better in terms of longer duration of action although both clonidine and dexmedetomidine prolonged the duration of sensory block of bupivacaine.

Key words: Dexmedetomidine, Clonidine, Spinal.

Introduction

Subarachnoid block is the most commonly used modality of Spinal anaesthesia for lower abdominal surgeries. The major benefits of Spinal anaesthesia over general anaesthesia for lower abdominal surgeries are that it avoids the negative side effects of General anaesthesia drugs, suppression of surgical stress response, preservation of preoperative immune function, reduction of incidence of venous thrombotic disease, pulmonary embolism, it facilitates early ambulation, is cost effective and useful in cases of difficult airway.[1, 2] The main drawback of spinal anaesthesia is its unpredictable or short duration of anaesthesia and analgesia. Various modalities are used to prolong the duration of action of local anaesthetics and reduce the requirement of supplemental analgesics adjuvants such as opioids, alpha 2 adrenergic agonist, magnesium sulphate etc have been used intrathecally along with Bupivacaine. The alpha 2 adrenergic agonists Clonidine and Dexmedetomidine have been used to prolong post-operative anaesthesia and analgesia.[3, 4] Dexmedetomidine is a highly selective α2-adrenor-eceptor agonist which has α2:α1 selectivity ratio of 8 to 10 times higher than that of clonidine. Various studies have shown its analgesic and sedative action with intrathecal,

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epidural, or intravenous use as an adjuvant. A variety of beneficial effects such as sedation, analgesia, and increased cardiovascular stability with improved outcome have also been attributed to clonidine.[5, 6] Hence; under the light of above-mentioned data, the present study was undertaken for comparing the efficacy of dexmedetomidine and clonidine in lower abdominal surgeries under spinal anaesthesia.

Materials & methods

The present study was undertaken for comparing the efficacy of dexmedetomidine and clonidine in lower abdominal surgeries under spinal anaesthesia. 30 patients schedule to undergo lower abdominal surgery under spinal anaesthesia were enrolled. Complete demographic and clinical details of all the patients were obtained. All the patients were broadly divided into two study groups as follows: Group A: 3.5 ml injection of bupivacaine 0.5% hyperbaric and 0.5 ml of injection clonidine (30 μg), and Group B: 3.5 ml volume of injection bupivacaine 0.5% hyperbaric and 0.5 ml of injection dexmedetomidine (3 μg).

Premedication of all the patients was done with tablet alprazolam 0.5 mg and tablet ranitidine 150 mg overnight and the morning of surgery. On arrival in the operating room, intravenous line was secured and patients were preloaded with lactated Ringer's solution. All the patients underwent surgeries with aesthetic solution according to their respective study groups. VAS was assessed on a scale of 0 to 10 with 0 indicating no pain and 10 indicating severe unbearable pain. Sedation was assessed by Ramsay sedation scale. All the results were recorded and analysed using SPSS software. Chi-square test and student t test was used for evaluation of level of significance.

Results

Mean age of patients of group 1 and group 2 was 46.5 years and 44.2 years respectively. Majority proportion of subjects of both the study groups was males. Mean BMI of both the study groups was comparable. Mean sensory onset duration was significantly less among subjects of group 2 in comparison to group 1. Mean time to first rescue analgesic requirement was significantly more in group 2 (391.2 minutes) in comparison to group 1 (356.5 minutes). Significant results were obtained while comparing the mean VAS among patients of both the study groups. However; while comparing the incidence of adverse events among both the study groups, non-significant results were obtained.

Table 1: Demographic data

Variable	Group 1	Group 2
Mean age (years)	46.5	44.2
Males (n)	9	10
Females (n)	6	5
Mean BMI (Kg/m^2)	24.3	22.8

Table 2: Sensory onset duration

Sensory onset duration	Group 1	Group 2
Mean (minutes)	1.5	1.1
SD	0.5	0.4
p- value	0.00 (Significant)	

Table 3: Time to first rescue analgesic requirement

Time to first rescue analgesic requirement	Group 1	Group 2
Mean (minutes)	356.5	391.2
SD	55.7	63.9
p- value	0.00 (Significant)	

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Table 4: VAS

VAS	Group 1	Group 2
Mean	4.9	4.1
SD	1.1	0.8
p- value	0.04 (Significant)	

Table 5: Adverse effects

Adverse effects	Group 1	Group 2
Bradycardia	1	2
Hypotension	2	1
Nausea	2	1

Discussion

Regional anesthesia is the preferred technique for most of abdominal and lower limb surgeries. To prolong the duration of action of bupivacaine, many adjuvants such as epinephrine, phenylephrine, magnesium sulfate, neostigmine, opioids, clonidine have been used through intrathecal route. Recent studies have shown that intravenous clonidine and dexmedetomidine prolong the duration of spinal anesthesia. Dexmedetomidine possesses anxiolytic, sedative, analgesic, and sympatholytic properties. Sedation and anxiolysis are produced by binding to α2 receptors in the locus coeruleus. Systemic and intrathecal injection of dexmedetomidine produces analgesia by acting at spinal level, laminae VII and VIII of the ventral horns of the spinal cord.[7- 10] Hence; under the light of above-mentioned data, the present study was undertaken for comparing the efficacy of dexmedetomidine and clonidine in lower abdominal surgeries under spinal anaesthesia.

Mean age of patients of group 1 and group 2 was 46.5 years and 44.2 years respectively. Majority proportion of subjects of both the study groups was males. Mean BMI of both the study groups was comparable. Mean sensory onset duration was significantly less among subjects of group 2 in comparison to group 1.Our results were in concordance with the results obtained by previous authors who also reported similar findings. In a study conducted by Afifi MH et al, authors concluded that as an adjuvant for spinal bupivacaine, intrathecal dexmedetomidine is superior to i.v. dexmedetomidine. It provides more stable hemodynamics, greater block augmentation, better analgesia, and fewer side effects including the intraoperative sedation score than the i.v. route.[11] the enhanced intraoperative level of sedation can be explained on the basis of dexmedetomidine pharmacokinetics. The distribution half-life of dexmedetomidine is known to be 5-10 min. The termination half-life is known to be within 2-3 h. It has been reported that dexmedetomidine has linear pharmacokinetic characteristics and dose-dependent sedation effects. This explains the improved sedation level during the operative time as dexmedetomidine infusion was stopped by the end of surgery. In studies carried out with dexmedetomidine, the intended level of sedation has been reported to be achieved at doses of 0.2-0.7 μg/kg/h, which is consistent with our results.[12, 13]

Mean time to first rescue analgesic requirement was significantly more in group 2 (391.2 minutes) in comparison to group 1 (356.5 minutes). Significant results were obtained while comparing the mean VAS among patients of both the study groups. However; while comparing the incidence of adverse events among both the study groups, non-significant results were obtained. Similar findings were reported in the study conducted by Neeraj et al. In their study, 50 adult patients of American Society of Anaesthesiology Grade I-II were divided into two groups randomly in a group of 25 each. Group's clonidine (A), and dexmedetomidine (B) had given hyperbaric bupivacaine 0.5% 2.5 ml intrathecally with

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clonidine 75 µg and dexmedetomidine 5 µg, respectively. Motor block was delayed with Group A as compared to Group B. The difference was statistically insignificant. Onset of sensory block was delayed with Group B as compared to Group A (83 ± 32.42 s in Group A vs. 115 ± 39.35 s in Group B. Regression time of sensory block was 374.34 ± 44.54 min for Group A as compared to 302.5 ± 29.18 min for Group B. Regression time to reach Bromage 1 was 317 ± 32 min for Group A as compared to 220 ± 48 min for Group B patients remained hemodynamically stable in both dexmedetomidine and clonidine groups.[14] In a similar study conducted by Santpur MU et al, authors evaluated the effects of intravenous administration of dexmedetomidine on spinal anesthesia with 0.5% hyperbaric bupivacaine in lower abdominal surgeries.Sixty patients of American Society of Anaesthesiologists Grades I and II, 20–60 years age, undergoing lower abdominal surgeries under spinal anesthesia were randomized into two groups by computer-generated table. Group 1: Bupivacaine and dexmedetomidine group; and Group 2: Bupivacaine and saline group. Spinal anesthesia was given with 15 mg of 0.5% bupivacaine. The mean duration of analgesia in group 1 was 219.7 ± 2.55 minutes and in group 2 was 150.2 ± 5.7 minutes. The prolongation in duration of analgesia in dexmedetomidine group was statistically significant. The mean durations of motor blockade in Group 1 and Group 2 were 189.6 ± 2.14 and 158.2 ± 5.31 min, respectively. Intravenous dexmedetomidine is useful to maintain hemodynamic stability and prolong spinal analgesia.[15]

Conclusion

Dexmedetomidine is better in terms of longer duration of action although both clonidine and dexmedetomidine prolonged the duration of sensory block of bupivacaine.

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