International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

Original Research Article.

Comparison of Intrathecal Clonidine and Fentanyl as Adjuvant to Hyperbaric Bupivacaine in Spinal Anaesthesia for Lower Limb Orthopedic Surgery: An Hospital Based Study

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ABSTRACT

Background: There are various adjuvant used with hyperbaric bupivacaine to prolong the effect of spinal anesthesia but commonly used fentanyl and clonidine. The present study was undertaken to compare clonidine and fentanyl as adjuvant in spinal anesthesia in terms of time to onset of sensory and motor blockade, duration of sensory and motor blockade and duration of postoperative analgesia and complications.

Methods: The present study was undertaken in the department of Anaesthesia, Government Medical College, Barmer, Rajasthan, India with primary aim to compare duration of postoperative analgesia. A total of 80 patients were enrolled in the present study. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients. Complete demographic details of all the patients were obtained. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: In our study we found that time for first dose of rescue analgesic was delayed in Group C (492.32 ± 17.32 min) compared to Group F (418.80 ± 19.68min) which was statistically significant ($P < 0.0001$). Duration of sensory block in Group C was 146.17 ± 19.42 min compared to 128.24 ± 18.68min in Group F and Duration of motor block was 190.12 ± 25.13 min in Group C in comparison to 176.18 ± 23.54 min in Group F which was statistically significant ($P < 0.01$). Demographic profile, onset of sensory and motor blockade in both the groups were comparable. Sedation score is more in clonidine group.

Conclusion: Intrathecal clonidine as adjuvant to bupivacaine provide longer duration of postoperative analgesia as compared to intrathecal fentanyl but with higher degree of sedation.

Keywords: Bupivacaine, Spinal Anesthesia, Clonidine, Fentanyl.

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Article History:

Received: 06-02-2020, **Revised:** 02-03-2020, **Accepted:** 28-03-2020

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2020.6.2.016	

INTRODUCTION

Subarachnoid blockade is the most commonly used regional anesthetic technique for lower limb surgery. Potentiation of the effect of subarachnoid block and prolongation of postoperative analgesia can be achieved by using adjuvants to local anesthetic agents such as midazolam, neostigmine, clonidine, and opioids.[1-6] Almost all opioid used as an adjuvant but fentanyl is preferred because of highly potent, rapid onset, short duration of action with lower incidence of respiratory depression.[7]

However nausea, vomiting, pruritus, urinary retention, respiratory depression are common side effects. Intrathecal clonidine is demonstrated to potentiate the effect of subarachnoid block prolonged postoperative analgesia[3-5,8], with advantage of antiemetic, reduced shivering, anxiolysis and provide sedation. Hence in this study we evaluate and compare the effects of intrathecal clonidine and intrathecal fentanyl as adjuvant in spinal anesthesia with primary aim time of first dose of rescue analgesia.

SUBJECTS AND METHODS

After obtaining approval from the Hospital Ethical Committee 80 patients of the American Society of Anesthesiologists (ASA) Classes I or II of either sex and of age 18–60 years of age posted for lower limb surgery were randomly enrolled in prospective, randomised and blinded study. Written informed consent was obtained from all patients.

Exclusion Criteria

- Patients having severe systemic disorders such as diabetes mellitus, hypertension, ischaemic heart disease.
- All contraindication of spinal anesthesia like allergy to

bupivacaine, spine deformity, increased intracranial pressure, patients refused, infection at the puncture site, bleeding diathesis.

- ASA classes III and IV
- Pregnancy

The patients were randomized into two groups of 40 each and given 2.5 ml of 0.5% hyperbaric bupivacaine with either 50 µg of clonidine or 25 µg of fentanyl intrathecally. Group C – Received hyperbaric bupivacaine (2.5 ml) + 50 µg clonidine (diluted to 0.5 ml) administered intrathecally. Group F – Received hyperbaric bupivacaine (2.5 ml) + fentanyl 25 µg (diluted to 0.5 ml) administered intrathecally. Total volume of study drug was 3 ml. All the patients were kept nil orally as per fasting guideline and give tab alprazolam 0.5 mg and tablet ranitidine 150 mg overnight before surgery. After arrival in operation theatre, intravenous (IV) cannula was inserted, and preloading was done with Ringer lactate solution (10 ml/kg). Preoperative parameters such as heart rate, oxygen saturation, and non-invasive blood pressure (NIBP) were recorded. Under all aseptic precaution, spinal anesthesia was administered at the level of L3–L4 intervertebral space in sitting position using midline approach by 25-gauge Quincke spinal needle. After giving spinal anesthesia patients were made in supine position. The onset and duration of sensory block, onset and duration of motor block and time for first dose of rescue analgesia (min) recorded.

The onset of sensory block was taken from the time of spinal anesthesia till loss of pin prick sensation at the level of T10. The onset of motor block was defined as time from spinal anesthesia to motor blockade level 2 in Bromage scale. The duration of sensory block was defined as the time of regression of two segments in the maximum block height. Sensory block was tested by pinprick method. The motor block was assessed according to the 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.[5] Duration of motor blockade was taken as time from intrathecal injection till no motor weakness (Bromage 0). Duration of analgesia was defined as time from intrathecal injection till administration of first rescue analgesic. Any side effects such as nausea, vomiting, shivering, pruritus, sedation, hypotension, bradycardia, and respiratory discomfort were noted. Patients were assessed for degree of sedation, and scoring was done with Campbell sedation score as: 1: Wide awake, 2: Awake and comfortable, 3: Drowsy and difficult to arouse, and 4: Not arousable.[5] Postoperatively, the pain score was recorded by using VAS between 0 and 10 (0 = no pain, 10 = severe pain).[9] Postoperative rescue analgesia (intramuscular diclofenac 75 mg) was given when the VAS score was >5 and the time of injection of first analgesic drug was noted.

Table 1: Demographic profile

VARIABLE	GROUP-C	GROUP-F	P VALUE
Age (years)	32.20±3.18	32.68±5.12	0.615
Sex (M:F)	32:8	31:9	0.600
Height (cm)	150.25±4.12	150.30±3.17	0.951
Weight (kg)	62.17±7.12	63.38±5.32	0.951
Duration of surgery (min)	95.32±18.52	90.31±17.58	0.218

Table 2: Comparison of block characteristics

Block characteristics	Group C	Group F	P value
Time of onset of sensory block (min)	5.52±1.17	5.96±1.18	0.098
Time of onset of motor block (min)	9.1±2.7	9.8±3.1	0.284
Duration of sensory block (min)	146.17±19.42	128.24±18.68	0.0001
Duration of motor block (min)	190.12±25.13	176.18±23.54	0.01
Time for first dose of rescue analgesia (min)	492.32±17.32	418.80±19.68	0.0001

RESULTS

In our study both groups were comparable with respect to their demographic profile data (age, height, weight, gender, and duration of surgery), and shows p value > 0.05 (statistically not significant).

Table 2 shows onset and duration of sensory and motor block, duration of postoperative analgesia. There was no statistical difference in onset of both sensory and motor block between the two groups ($P > 0.05$). Time for first dose of rescue analgesic was delayed in Group C (492.32±17.32 min) compared to Group F (418.80±19.68min) which was statistically significant ($P < 0.0001$). Duration of sensory block in Group C was 146.17±19.42 min compared to 128.24±18.68 min in Group F which was statistically significant ($P < 0.0001$). Duration of motor block was 190.12±25.13 min in Group C in comparison to 176.18±23.54 min in Group F which was statistically significant ($P < 0.01$). We observed more sedation in group C in comparison to group F. In group C sedation score 3 was found in 18 patients, sedation score 2 was found in 10 patients and sedation score 1 was in 8 patients. In contrast group F none of patients shows sedation score 3 but 1 patients shows score 2 and 2 patients shows score 1.

Other complications like hypotension (>20 % fall in baseline blood pressure) were found in 2 patients of group C which was treated by mephentermine. Incidence of bradycardia noted in 1 patient in group C which was treated by atropine. Incidence of vomiting was noted in 1 patient in group F which was treated by ondansetron.

DISCUSSION

Clonidine when used intrathecally, it activates the postsynaptic α_2-receptors in substantia gelatinosa of spinal cord and produces analgesia.[10,11] In our study we compare intrathecal clonidine and fentanyl as adjuvant to spinal anesthesia and found that cloinidine as adjuvant provide prolonged analgesia compared to fentanyl. In reference with several other studies.[3-5,12,13] We found that both drugs are effective as adjuvants to intrathecal bupivacaine in prolonging the analgesia duration. Duration of analgesia was significantly higher in clonidine group (492.32 ± 117.32 min) than in fentanyl group (418.80 ± 19.68), (P < 0.0001) which were consistent with the study conducted by Bajwa BS et al.[14] 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.[15]

We have found similar finding in our study. 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.[16]

Chhabra et al. in their study 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.[9] The dose of clonidine was limited to 50 µg in our study to decrease the side effects.

Lavand'homme et al. showed higher incidence of hypotension and sedation with intrathecal clonidine 150 µg than clonidine 75 µg.[17] Bhure et al. Also conclude 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.[18]

Singh et al.[19] Also conclude the effect of addition of intrathecal clonidine to hyperbaric bupivacaine on postoperative pain after caesarean section and has shown that the duration of postoperative analgesia increases significantly on adding 75 µg clonidine to 2 ml of hyperbaric bupivacaine without any increase in maternal side effects. There was no effect on neonatal outcome. However, Shidhaye et al.[20] also conclude that intrathecal addition of 60 µg clonidine to bupivacaine provides longer duration of postoperative analgesia than 25 µg of fentanyl and is a preferred option when sedation is acceptable. From the above observations and studies we can make out that sedation with clonidine is dose dependant.

CONCLUSION

In our study we conclude that intrathecal addition of clonidine as adjuvant with bupivacaine in spinal anaesthesia provide prolonged duration of post-operative analgesia in comparison to fentanyl but with higher degree of sedation.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Bharat Choudhary, Jagdish Kumar, Mahendra Kumar. Comparison of Intrathecal Clonidine and Fentanyl as Adjuvant to Hyperbaric Bupivacaine in Spinal Anaesthesia for Lower Limb Orthopedic Surgery: An Hospital Based Study. Int J Med Res Prof. 2020 Mar; 6(2):74-77. DOI:10.21276/ijmrp.2020.6.2.016