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Comparative Study Intrathecal Clonidine versus Intrathecal Fentanyl in Hyperbaric Bupivacaine for Spinal Anaesthesia and Postoperative Analgesia in Patients Undergoing Lower Limb Surgeries

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Abstract: ***Introduction: Fentany land clonidine both prolong sensory and motor block of spinal anaesthesia and duration of post operative analgesia when used as an adjuvant to intrathecal bupivacaine. Although these drugs are routinely used in the operating room, direct comparison as such of these two drugs in terms of efficacy and analgesia has not been fully explored yet. The aim of this study is to compare the efficacy of intrathecal clonidine with that intrathecal fentanyl with respect to time of onset, duration and post op analgesia of the subarachnoid block. Materials and Methods: The study was conducted in the department of Anaesthesiology at MGM Hospital, Navi Mumbai. A total of 40 patients belonging to ASA 1 and 2 between 20 to 60 years of age of either sex were included in the study. It was a prospective randomized study in which forty patients posted for lower limb orthopedic or general surgery were divided into two groups of twenty each. Group C– Received intrathecalhyper baricbupivacaine (2.5ml) +30 µg clonidine. Group F–Received intrathecalhyper baricbupivacaine (2.5ml) +fentanyl20µg. Time of onset and duration of sensory and motor block characteristics, hemodynamic parameters, post op analgesia and side effects, if any were studied. Results and Conclusion: It was concluded that, addition of clonidine to intrathecal bupivacaine offers longer duration of postoperative analgesia than fentanyl and with higher sedation.***

Keywords: Bupivacaine, Intrathecal, Clonidine, Fentanyl, Postoperative Analgesia

1. Introduction

It is well established that subarachnoid block can be potentiated by using adjuvants to local anaesthetics like adrenaline, midazolam, opioids, neostigmine and clonidine. Administration of opioids as adjuvants to local anaesthetics intrathecally results in both synergistic and multimodal analgesia.[1] The successful use of intrathecal morphine in human beings was first described by Wang et al in 1979. Since then, many opioids have been used via this route. Fentanyl citrate, a μ - 1 and μ - 2 agonist is a very potent drug because of its high lipophilicity. It is preferred as an adjuvant in spinal anaesthesia because of its rapid onset and short duration of action with lesser incidence of respiratory depression.2 However, pruritus, nausea, vomiting, urinary retention and late respiratory depression of other opioids have directed pain research towards non - opioids. It was shown in some studies that intrathecal clonidine prolongs sensory and motor block of spinal anaesthesia. It decreases local anaesthetic requirements, and provides prolonged postoperative analgesia. Other beneficial effects are antiemesis, reduced post spinal shivering, anxiolysis and sedation. Unlike opioids, clonidine does not produce pruritus or respiratory depression.3 In this study we have compared intrathecal clonidine with intrathecal fentanyl in regard to their efficacy and safety as an adjuvant to intrathecal hyperbaric bupivacaine for spinal anaesthesia and postoperative analgesia in patients undergoing lower limb surgeries.

2. Materials and Methods

The study was conducted in the department of Anaesthesiology at MGM Hospital, Navi Mumbai.

Inclusion Criteria

A total of 40 patients belonging to ASA Grades 1 and 2 between 20 and 60 years age of either sex were included in the study, scheduled for various surgical or orthopaedic procedures of lower limb.

Exclusion Criteria

Patients with peripheral neuropathy systemic disorders such as diabetes mellitus, hypertension, heart disease, allergy to bupivacaine, spine deformity, increased intracranial pressure, neurological disorders, hemorrhagic diathesis, and infection at the puncture site were excluded from the study.

After explaining the details of the procedure, written consent was taken from each patient. Pre - operative assessment was carried out in every patient 1 day before surgery visual analog scale (VAS) was explained to all patients. They were kept fasting for 6 hours preoperatively and on the day of the surgery the patients were randomly allocated into two groups (n=20) according to the drug received:

Group C – Received hyperbaric bupivacaine (2.5 ml) +30 μg clonidine administered intrathecally.
Group F – Received hyperbaric bupivacaine (2.5 ml) + 20μg fentanyladministered intrathecally.

Total volume of study drug was 3 ml.

Standard monitors were attached and preop vitals were recorded. Patient was then carefully positioned and under all aseptic precaution, spinal anaesthesia was administered at the level of L3–L4 intervertebral space in sitting position using midline approach by 25 - gauge Quincke spinal needle.

Sensory and motor block was monitored at 2, 4, 6, 8, 10, 15 min, and after that at 15 min interval. 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. The onset of sensory block was taken from the time of intrathecal injection till loss of pin prick sensation at T10. Duration of sensory block was taken as time from maximum height of block till regression to Level 1. The onset of motor block was defined as time from intrathecal injection to motor blockade Level 2 in Bromage scale. 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.

Postoperatively, the pain score was recorded by using VAS between 0 and 10 (0 = no pain, 10 = severe pain). Injection paracetamol (1 gm) was given intravenously as rescue analgesic when VAS was >5. Time of administering the first dose of rescue analgesia was noted.

3. Results

A total of 40 patients were studied in the age group of 20 - 60 years of either sex. There was no statistically significant difference in hemodynamic parameter (blood pressure and heart rate) observed in both groups.

Comparison of blockade in terms of onset, duration, wearing off, and need of rescue analgesia is shown in Table 1.

Severe hypotension was not noted in any group and only 1 incidence of bradycardia requiring treatment with atropine was noted in group given intrathecal clonidine.

Both the groups were comparable in terms of onset and offset of sensory and motor blockade, whereas duration of analgesia was prolonged in Group C as compared to Group F and the time for requirement of first analgesic dose is longer in Group C as compared to Group F.

Complications and side effects are similar in both the groups and are not significant statistically (P > 0.05) and these complications are depicted in Table 2.

Table 1: Comparison of blockade (onset and regression of sensory and motor block) and analgesic duration

Parameters	Mean ±SD		P - Value
F Group (n=20)		**C Group (n=20)**	
Time in min to onset of sensory blockade	0.90±0.19	0.91±0.18	0.82
Time in min to onset of motor blockade	1.58±0.45	1.71±0.49	0.44
Time in min for peak of sensory blockade	7.34±0.96	7.56±1.78	0.94
Two segment regression time in 132±14.56 min for sensory blockade		136.56±12.67	0.35
Time in min for weaning offer motor block	190.50±18.65	184.58±12.07	0.23
Time in min for first dose rescue 416.87±105.67 analgesic		497.20±139.78	0.0004

Table 2: Complications and side effects

Side Effects	F group (n=20)	C group (n=20)
Nausea	1	0
Vomiting	0	1
Pruritis	0	0
Hypotension	0	0
Bradycardia	0	1
Respiratory depression	0	0
Shivering	4	3

4. Discussion

Both clonidine and fentanyl when used in lower dose are safe and prolongs the postoperative analgesia of intrathecal bupivacaine, and there is a paucity of studies comparing the safety and efficacy of these two drugs.4 In our study we compared efficacy of intrathecal fentanyl with that of intrathecal clonidine as adjuncts with hyperbaric bupivacaine for subarachnoid block with respect to onset, offset and duration of sensory and motor block and the time required for first dose of rescue analgesia. Like several studies, we found that both fentanyl and clonidine are effective as adjuncts to hyperbaric bupivacaine in prolonging analgesia duration. Duration of analgesia was significantly higher in clonidine group (497.20 ±139.78 min) than in fentanyl group (416.87±105.67), (P<0.05). Analgesia duration due to fentanyl and clonidine in our study is consistent with study conducted by Shidhaye et al.[5, 6] Only one patient had significant bradycardia requiring treatment with IV atropine. Similarly, Sethi et al. and Shah et al.[7, 8]observed very few incidences of hypotension and bradycardia. Both the groups are similar regarding onset, peak, and duration of sensory and motor block, but the duration of analgesia is significantly higher in clonidine group than in fentanyl group (P < 0.05).

5. Conclusion

Addition of 30 μg clonidine intrathecally with hyperbaric bupivacaine offers longer duration of blockade than fentanyl 20μg. Both the drugs offer similar surgical conditions and prolongs post op analgesia (clonidine more than fentanyl).

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