

Original Research

Complications and Hemodynamic Stability Associated with the use of Dexmedetomidine with Bupivacaine Vs Fentanyl with Bupivacaine in Spinal Anaesthesia undergoing Orthopedic Lower Limb Surgeries

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ABSTRACT

Background: Spinal block has the incidence of being exclusively safe technique till the physiological values are within limits beyond that, complications of the technique starts seeming. The aim of the present study was to assess complications and hemodynamic stability associated with the use of dexmedetomidine with bupivacaine vs fentanyl with bupivacaine in spinal anaesthesia undergoing orthopedic lower limb surgeries. **Materials and methods:** Patients with the spinal surgery, infection on back, neurological problems or hepatic disorders were not included in the study. A total of 30 patients were enrolled in the study belonging to ASA grade I or ASA grade II group. With random sampling method patients were divided into two groups- Group I received dexmedetomidine 5 µg with hyperbaric bupivacaine 17.5 mg in 3.5 mL and Group II received fentanyl 25 µg with hyperbaric bupivacaine 17.5 mg in 3.5 mL. Patients were regarded to have bradycardia if heart rate was less than 40 while hypotension was regarded when mean arterial pressure was less than 50 in our study. Adverse reactions were noted during surgery. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Probability value of less than 0.05 was regarded as significant. **Results:** In dexmedetomidine group, it was 585±121.87 and in Fentanyl group, it was 288.63±171.62. On applying student t test, there was a significant difference between the two groups. There was 1 subject in dexmedetomidine Group and 2 in Fentanyl Group with hypotension. There was no significant difference between the groups. **Conclusion:** The duration of analgesia was significantly higher with the addition of dexmedetomidine compared to fentanyl but the incidence of side effects was comparable between the two groups.

Key words: Adrenoreceptor, bupivacaine, dexmedetomidine, hemodynamic.

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INTRODUCTION

Spinal impasse is the most often chosen technique for surgical procedures. Spinal block has the incidence of being exclusively safe technique till the physiological values are within limits beyond that, complications of the technique starts seeming. The

purpose for its renewed admiration in recent decades has been the understanding that spinal block could combine a lower degree of physiological trespass on the one hand and provide profound degree of sensory blockage and muscle easing on the other hand.^[1] Less doses of local anesthetic with the addition of

additives gives the necessary sensory level with profound analgesia.^[2] Dexmedetomidine is S enantiomer of medetomidine that has a high degree of affinity for adrenoceptor.^[3] To date, very lesser studies have been conducted on the action of intrathecal dexmedetomidine on the spinal block with bupivacaine for surgeries.^[4] The advent of opioid receptors and endorphins in spinal and supra spinal areas led to usage of spinal opioids.⁵ Opioids lead to intense, extensive analgesic action without any gross autonomic alterations, loss of motor function or impairment of sensation other than pain when given intrathecally or epidurally.⁶ The aim of the present study was to assess complications and hemodynamic stability associated with the use of dexmedetomidine with bupivacaine vs fentanyl with bupivacaine in spinal anaesthesia undergoing orthopedic lower limb surgeries.

MATERIALS AND METHODS

The present study was performed in the anaesthesia department after clearance from the institutional ethical board. The present study was performed in a prospective technique for a duration of 1 year. All the patients were informed about the study and a written informed consent was obtained from them in their vernacular language. Patients with the spinal surgery, infection on back, neurological problems or hepatic disorders were not included in the study. A total of 30 patients were enrolled in the study belonging to ASA grade I or ASA grade II group. With random sampling method patients were divided into two groups- Group I received dexmedetomidine 5 µg with hyperbaric bupivacaine 17.5 mg in 3.5 mL and Group II received fentanyl 25 µg with hyperbaric bupivacaine 17.5 mg in 3.5 mL. No anesthetic present in the study was aware of the group assigned till the entire 30 patients were enrolled and the study was accomplished. All the patients were informed not to take solid substances after midnight before the initiation of surgery and took clear liquids only up till 2 hours before the initiation of surgery. In the Operating Room monitors were fixed for obtaining blood pressure, oxygen saturation, ECG readings. The baseline values were recorded. Spinal prick was done at the level of L3-L4 or L4-L5 using a 25-gauge Quincke needle at sitting posture. After verification a clear and free flow CSF, the drug was administered and the patients were kept at the supine posture. For each patient, heart rate

and mean arterial pressure were monitored every 2 min for the initial 10 minutes after administration of spinal anaesthesia, thereafter every 5 minutes until 30 minutes and then thereafter every 30 minutes till complete motor and sensory recovery was achieved. Patients were regarded to have bradycardia if heart rate was less than 40 while hypotension was regarded when mean arterial pressure was less than 50 in our study. Adverse reactions were noted during surgery. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Probability value of less than 0.05 was regarded as significant.

RESULTS

The present study consisted of 30 subjects with 15 subjects in each group. The mean age of the patients was 38.21+/-4.57 years. Table 1 illustrates the duration of analgesia in both the groups. In dexmedetomidine group, it was 585+/-121.87 and in Fentanyl group, it was 288.63+/-171.62. On applying student t test, there was a significant difference between the two groups. Table 2 shows the hemodynamic values in both the groups. The preoperative pulse in Fentanyl was 85.35+/- 3.24 and in dexmedetomidine was 82.75+/- 2.64. There was no significant difference between them. The preoperative BP in Fentanyl Group was 94.68+/- 8.20 and in dexmedetomidine group was 91.52+/-5.21. There was no significant difference between them. The intraoperative pulse in Fentanyl Group was 82.28+/- 2.10 and in dexmedetomidine group was 80.38+/-5.23. There was no significant difference between them. The intraoperative BP in Fentanyl Group was 90.50+/-1.80 and in dexmedetomidine group was 89.34+/-4.65. There was no significant difference between them. The postoperative pulse in Fentanyl Group was 83.30+/-1.35 and in dexmedetomidine group was 78.16+/-3.01. There was no significant difference between them. The postoperative pulse in Fentanyl Group was 91.13+/- 2.15 and in dexmedetomidine group was 90.24+/-5.53. There was no significant difference between them. Table 3 shows the intraoperative complications encountered in the study. There was 1 subject each in Group with nausea and shivering respectively. There were 2 subjects in each group with bradycardia. There was 1 subject in Fentanyl Group with vomiting. There was 1 subject in dexmedetomidine Group and 2 in Fentanyl Group with hypotension. There was no significant difference between the groups.

Table 1: Duration of anaesthesia

Duration of analgesia	dexmedetomidine	Fentanyl	P value
Mean +/-SD	585+/-121.87	288.63+/-171.62	<0.05

Table 2: Comparison of hemodynamic parameters amongst the groups

Variable	Fentanyl	dexmedetomidine	P value
Preoperative vitals			>0.05
Pulse	85.35+/- 3.24	82.75+/-2.64	
BP	94.68+/-8.20	91.52+/-5.21	
Intraoperative vitals			>0.05
Pulse	82.28+/-2.10	80.38+/-5.23	
BP	90.50+/-1.80	89.34+/-4.65	
Postoperative vitals			>0.05
Pulse	83.30+/-1.35	78.16+/-3.01	
BP	91.13+/-2.15	90.24+/-5.53	

Table 2: Intraoperative complications encountered during the study

Complications	dexmedetomidine	Fentanyl	P value
Nausea	1	1	>0.05
Hypotension	1	2	>0.05
Bradycardia	2	2	>0.05
Vomiting	0	1	>0.05
Respiratory depression	0	0	>0.05
Pruritis	0	0	>0.05
Shivering	1	1	>0.05

DISCUSSION

Spinal block has the propensity of being a safer anesthetic technique till the time physiological levels are in measurable limits after that, complications of the anesthetic starts elaborating. The disadvantages of spinal blockage, chiefly include, hypotension, reduced heart rate, pain in head, nausea, emesis and occasionally neurological alterations have doubted its reputation. In spite of waxing and fading of its popularity, spinal block stands one of the basic techniques in the area of modern anesthesiologists. The reason for its transformed popularity in recent years is due to the realization that spinal block can lead to a low level of physiological bypass on the one side and profound degree of sensual denervation and relaxation of muscle on the opposite side.^[7] The use of spinal block has its drawbacks for Surgeries that are of long duration because of short duration of action of anesthetics. Consequently, it became compulsory to see for alternatives to increase the spinal block duration. Different drugs like fentanyl, morphine, pethidine, neostigmine, phenylephrine and alpha 2 agonists are added intrathecally for this purpose.^[8] In the present study, the mean age of the patients was 38.21+/-4.57 years. In dexmedetomidine group, it was 585+/-121.87 and in Fentanyl group, it was 288.63+/-171.62. On applying student t test, there was a significant difference between the two groups. The preoperative pulse in Fentanyl was 85.35+/- 3.24 and in dexmedetomidine was 82.75+/-2.64. There was no significant difference between them. The preoperative BP in Fentanyl Group

was 94.68+/-8.20 and in dexmedetomidine group was 91.52+/-5.21. There was no significant difference between them. The intraoperative pulse in Fentanyl Group was 82.28+/-2.10 and in dexmedetomidine group was 80.38+/-5.23. There was no significant difference between them. The intraoperative BP in Fentanyl Group was 90.50+/-1.80 and in dexmedetomidine group was 89.34+/-4.65. There was no significant difference between them. The postoperative pulse in Fentanyl Group was 83.30+/-1.35 and in dexmedetomidine group was 78.16+/-3.01. There was no significant difference between them. The postoperative pulse in Fentanyl Group was 91.13+/-2.15 and in dexmedetomidine group was 90.24+/-5.53. There was no significant difference between them. There was 1 subject each in Group with nausea and shivering respectively. There were 2 subjects in each group with bradycardia. There was 1 subject in Fentanyl Group with vomiting. There was 1 subject in dexmedetomidine Group and 2 in Fentanyl Group with hypotension. There was no significant difference between the groups. The addition of drugs like clonidine and opioids intrathecally to improve the action of local anesthetics have gotten great admiration due to the belief that they provide longer duration of postoperative analgesia and enable the reduction in the amount of local anesthetic, thus reducing the frequency of side effects. The arrival of opioid and endorphins receptors in spinal and supra spinal regions led to the usage of spinal opioids.^[9] Opioids lead to penetrating, long duration analgesic action without any autonomic changes, loss of

motor function or weakening in sensation supplementary to pain when injected intrathecally or epidurally.^[10] Studies that regarded 10–15 mg as the general amount of bupivacaine, did not detect any significant changes in peak sensory blockage level between bupivacaine and bupivacaine with dexmedetomidine, but excessively reached the median blockade level T5–T6.^[11,12] Intrathecal administration of α 2-agonists produced a dose-dependent Sedation in humans.^[13] Since today, there have been very less researches amongst human on the usage of intrathecal dexmedetomidine.^[14,15]

CONCLUSION

It was concluded from the study that both the groups were comparable with respect to hemodynamics. The duration of analgesia was significantly higher with the addition of dexmedetomidine compared to fentanyl but the incidence of side effects was comparable between the two groups.

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