Original Article

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Comparison of Analgesic Effect of Intrathecal Fentanyl & Dexmedetomidine with Hyperbaric Bupivacaine in Orthopedic Lower Limb Surgery

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Abstract

Background: To evaluate effectiveness of dexmedetomidine and fentanyl supplementary to intrathecal bupivacaine in orthopedic events in lower limbs at stipulations of block potency and instance. **Subjects and Methods:** in the present study, 120 subjects enduring possible lower limb surgeries were arbitrarily owed to bupivacaine and normal saline (BN), bupivacaine and dexmedetomidine (BD) and bupivacaine and fentanyl. Hemodynamic changes, the maximum sensory level, regression from block, analgesic request, Time to attain the whole motor block, and period of the drug consequence, and side effects were evaluated among the groups. **Results:** There was noteworthy dissimilarity among BD with BF and BN groups in terms of all parameters like two segmental regression, regression to Bromage etc. **Conclusion:** Dexmedetomidine as a subsidiary to bupivacaine for intrathecal analgesia in lower limb surgeries has larger period of sensory and motor block, larger postoperative analgesia with little consequences.

Keywords: Bupivacaine, Dexmedetomidine, Intrathecal analgesia, lower limb

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Introduction

Various data proposed that fewer than partially subjects who experience surgery report sufficient postoperative pain release.[1] Various trials revealed that multimodal analgesia during dissimilar methods is connected with better pain release and reduced opioid utilization contrast with the utilize of a solitary medication directed during single technique.[2,3]

Spinal block has subordinate danger of illness and is gainful. Nevertheless, post-operative tenderness is significant difficulty as the utilized drugs have incomplete period of result; as a result the post-operative pain reliever management is necessary.[4–6]

Mainly widespread local anesthetic utilized for Spinal anesthesia is 0.5% hyperbaric bupivacaine: The present performance in contemporary anesthesia is to include diminutive doses of assistance to local anesthetics to rapid the onset time, advance excellence of intra-operative anesthesia, extend analgesia and reduce the impediments connected with intrathecal management of elevated dose of hyperbaric bupivacaine alone.[7,8] Fentanyl is a imitation opioid with middle action, utilized extensively for tenderness management. Intrathecal fentanyl has enhanced spinal anesthesia and abridged the anesthetic drug connected consequences Fentanyl in a variety of doses as supplementary to hyperbaric bupivacaine for subarachnoid block create protracted period of analgesia.[9–12]

Dexmedetomidine, with its elevated α_2 adrenergic agonism, has been establish to be a helpful alternative to intrathecal bupivacaine in extending sensory and motor block and dropping local anesthetic obligation.[13,14] A small number of researches have effort to evaluate the effects of additives with unreliable doses of bupivacaine for spinal anesthesia in an effort to appear at an optimum dose with smallest amount adverse effects.[15–17] Dexmedetomidine has been establish to be successful for urological and orthopedic surgeries with low-dose bupivacaine.[18,19]

Present study was done with an aim to evaluate the effectiveness of dexmedetomidine and fentanyl supplementary to

intrathecal bupivacaine in orthopedic events in lower limbs in terms of block strength and time.[20]

Subjects and Methods

After taking approval from hospital ethical committee, subjects among 20 and 65 years old, ASA grade I and II of both sex endure discretionary lower limb surgeries at tertiary care institute of Gujarat were recruited. Subjects with a account of sensitivity to also dexmedetomidine or bupivacaine, infection at the puncture site and labile hypertension were disqualified from the research.

The subjects were randomly allocated to bupivacaine and normal saline (BN), bupivacaine and dexmedetomidine (BD) and bupivacaine and fentanyl. The subjects received 2.5 ml intrathecal hyperbaric bupivacaine with 0.5 ml normal saline (BN) or 5 micrograms dexmedetomidine (BD) or 25 micrograms fentanyl (BF).

On surgery day subjects were prearranged imitation haphazard statistics and were owed into 2 groups of 60 subjects in each group. All the subjects were reserved for 8 hour fasting previous to surgery. All subjects acknowledged complemental oxygen via mask. Beneath appropriate aseptic circumstances, spinal anesthesia was prearranged at the level of L4-L5 interspace in sitting point utilizing a midline loom by a 25G Quincke spinal needle.

Systolic and Diastolic blood pressure and heart rate previous to local anesthesia and in the 5, 10, 15, 30, 45 and 60 minutes following anesthesia were documented. After surgery, evaluation executed each 10 minute awaiting the time to regression of 2 sensory levels, after that each 20 min awaiting the regression time to the dermatome S1 and motor scale to Bromage 0. The data was analyzed using of SPSS version 15.

Results

One hundred and twenty subjects were arbitrarily owed to 3 groups of 40 subjects. There was no noteworthy dissimilarity among the groups in baseline conclusion [Table 1]. There was major dissimilarity among BD with BF and BN groups in in terms of all parameters like two segmental regression, regression to Bromage etc. (Table 2) in each groups, the uppermost sensory block occurred in T6 dermatome.

Successive transform and decrease in SBP, DBP and HR in BF group were notably superior to BD and BN groups. Side effects were advanced in BN group and hypotension and bradycardia were superior in BF group, except no noteworthy dissimilarity between among them.

Discussion

The utilization of conformist local anesthetics like bupivacaine has been incapable to offer analgesia for an comprehensive period.[11] The majority of subjects need additional analgesics throughout the postoperative phase. Different adjutants are inserted to local anesthetics for this reason. In current study though there was no noteworthy dissimilarity amid various parameters as discussed in result section. Likewise, Mahendru et al.[21] establish no important dissimilarity in onset of motor block among both groups. Whereas Yektas and Ravipatiaccounted quicker onset of motor block for dexmedetomidine contrasted to fentanyl.[22,23] Additional researches too declared analogous findings.[21–23] Dexmedetomidine has been found to prolong the period of spinal anesthesia in a dose-dependent method.[24–26]

In the present research, uppermost sensory stage in BD and BF group were T6 and T5 as in BN cluster was T6 and T7 dermatomes. Single research accounted maximum sensory level at T5 dermatome,[27] and Mahendru,[21] accounted in T6 dermatome. Several studies have attempted to study the effects of adjuvants with varying doses of bupivacaine.[15,16] In a research by Sendhil et al.[15] fentanyl 25 μg was combined with three different doses of bupivacaine in transurethral resection of prostate surgery to arrive at an optimum dose. We used three different doses of bupivacaine in an attempt to find out whether there was an optimum dose which when combined with 5 μg dexmedetomidine could provide sufficient duration of block as well as hemodynamic stability.[28]

These subjects experienced lesser pain strength 6 hours following surgery analytic of the maximum postoperative analgesia period in BD group.[13,14,29–31] The maximum turn down happened 5 minute following spinal injection and be quite steady afterwards. Contrasting to present results, various researches did not account several important dissimilarity among fentanyl and dexmedetomidine concerning hemodynamic status.[14–19] Prakash et al.[32] also establish analogous results.

There was no noteworthy dissimilarity in the rate side effects among clusters. Similar to our conclusion, Ravipati et al had findings and also it was statistically significant. Kaur et al.[33]establish equally fentanyl also dexmedetomidine to be similar while utilize in mixture with 0.75% ropivacaine.

Conclusion

Dexmedetomidine added to bupivacaine for intrathecal analgesia in lower limb surgeries has larger period of sensory and motor block, larger postoperative analgesia by little consequences.

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Table 1: Demographic characteristics between groups

Variables	BN Group	BF Group	BD Group	P value
Age (years)	38.98 ± 14.14	38.70 ± 15.20	41.98 ± 14.90	0.5
Gender				
Male	27 (67.5%)	28 (70%)	26 (65%)	0.12
Female	13 (32.5%)	12 (30%)	14 (35%)	
Body mass index (kg/m^2)	23.23 ± 3.14	24.11 ± 2.48	24.31 ± 3.25	0.50
Height (cm)	171.10 ± 7.47	173.95 ± 8.40	171.24 ± 6.54	0.12
Weight (kg)	70.05 ± 13.20	73.41 ± 10.15	72.87 ± 10.90	0.09

Table 2: haracteristics of block among three groups

Variables	BN Group	BF Group	BD Group	P value
Time from injection to highest sensory level (min)	6.51 ± 1.54	7.01 ± 1.31	6.10 ± 1.54	0.9
Time of two segment regression from the highest sensory level (min)	70.10 ± 6.14	88.25 ± 12.40	148.64 ± 22.85	0.02*
Regression to Bromage 0 (min)	147.78 ± 33.10	186.60 ± 35.40	332.75 ± 72.90	0.001*
Onset to Bromage 3 (min)	5.40 ± 1.59	5.01 ± 1.72	4.74 ± 1.60	0.31
Time to rescue analgesia (min)	220.9 ± 22.40	295.69 ± 44.90	494.10 ± 70.57	0.001*
Time for sensory regression to S1 from highest sensory level (min)	241.12 ± 21.50	328.90 ± 44.32	558.36 ± 81.11	0.05*
NRS six hours after surgery	6.29 ± 1.14	6.11 ± 1.45	1.88 ± 0.47	0.001*

*** indicates statistically significance at $p \leq 0.05$**

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