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Evaluation of Effect on Sensory and Motor Block Parameters with Supplementation of Low Dose Intravenous Dexmedetomidine on Characteristics of Spinal Anaesthesia with Hyperbaric Bupivacaine

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Keywords
Dexmedetomidine, Hyperbaric Bupivacaine, Spinal Anaesthesia, sensory and Motor block parameters.

Abstract
Background: The most typical symptom that prompts patients to visit a doctor is pain. Pain is an experience as well as a sensory modality. People's reactions to pain might vary greatly from one another as well as from moment to moment within the same person.

Aim and Objective: The purpose of the current study was to determine the impact of adding low dosage intravenous dexmedetomidine to spinal anaesthesia to study how sensory and motor block parameters changed.

Methodology: The current study was conducted at Santosh Medical College & Hospital in Ghaziabad on 50 patients who were ASA I & II and had lower abdomen and lower limb procedures. The patients' ages ranged from 18 to 65, and their weights ranged from 30 to 70 kg for both sexes.

Result: In the study's sample, there were 32 men and 18 women. The mean age in groups D was 36.28 + 12.70 years, compared to 39.36 + 13.43 years in groups C. Mean onset time of sensory block was reported as 5.95±3.486 in group D and 7.90±3.538 in group C which was statistically significant, p=0.001 Mean VAS score in the D & C group remained zero for 90 minutes after the administration of the drug.

Conclusion: Dexmedetomidine group's sensory block onset time is earlier. The study found that Dexmedetomedine

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administered intravenously during spinal anesthesia decreased the onset and maximum motor blockage of sensory blocks.

1. Introduction

Pain is the most frequent symptom that causes people to go to the doctor. In addition to being a sensory modality, pain is an experience. The International Association for the Study of Pain states that pain is an upsetting sensory and emotional experience related to actual or probable tissue damage or expressed as such harm. This term acknowledges the interaction between psychological and emotional elements. [1] An key practice in the field of anaesthesiology is pain control, particularly in the post-operative period. The extended surgical analgesia caused by morphine produces itching, postoperative nausea, and vomiting. [2]

The main application of the novel selective -2 adrenoceptor agonist dexmedetomidine is IV sedation. The duration of anesthesia caused by single-injection neuraxial [3-6] and peripheral [7-9] nerve blocking has been found to be prolonged by the off-label use of dexmedetomidine as a local anesthetic adjuvant. However, the majority of studies looking at how IV dexmedetomidine affects the length of regional anesthesia are constrained by their small sample sizes and have produced quantitatively inconsistent results.

Lower abdomen and lower leg procedures use regional anesthesia as their preferred method of anesthesia delivery. It keeps the patient awake and reduces or totally avoids the issues related to airway control. A trusted treatment, spinal anesthesia has a quick onset of effect, excellent muscular relaxation, and uses less anesthetic material. [10-12]

For spinal anesthesia, 0.5% hyperbaric bupivacaine is frequently employed. Bupivacaine has a long-lasting effect; however, it won't provide persistent post-operative analgesia. To extend the duration of the postoperative analgesia, adjuvant has been used in conjunction with intrathecal local anesthesia. In the lower abdomen and lower limb procedures covered in our study, the addition of low dosage intravenous dexmedetomidine affects the features of spinal anesthesia with hyperbaric bupivacaine.

2. Materials and Methods

The Department of Anaesthesiology at Santosh Medical College & Hospital in Ghaziabad, Uttar Pradesh, conducted this Randomized comparative double blind study between the years of 2014 and 2015 with approval from the Board of Studies and Ethical Committee. There were 50 ASA grade I/II patients in the overall sample. Patients will be divided into two groups of 25 patients each.

Patients with Anatomical deformities like lordosis, scoliosis, khyphosis, Local infection on site, Coagulopathies, Allergy to local anesthetics, History of chronic pain/ neuropathy, Hypersensitivity reaction and Psychiatric and Neurological diseases were not included in the study.

Group D: Prior to SAB, 25 patients received an IV dexmedetomidine loading dose of 0.5 mcg/kg diluted to 20 ml with normal saline over 10 minutes. Thereafter, dexmedetomidine was administered at a rate of 0.5 mcg/kg/hr.

Group C: 25 patients receiving similar volume of normal saline, maintenance infusion of normal saline was administered at the rate of 0.5 mcg/kg/hr.

A detailed pre anesthetic examination was done in all the patients. Necessary investigations were done and informed consent was taken. Pin prick testing was used to determine the beginning of the sensory block, its highest level, and how long it took to reach that level. The Bromage Scale, which was modified by Axelsson and Windman to account for motor function, was used to measure motor blockage in the lower limbs.

The data was imported into Microsoft Excel before being subjected to the statistical analysis using the statistical application SPSS version 21.0. Comparing frequency was done using the chi-square test, while comparing mean values was done using the T-test. It will be assumed that a P value of 0.05 or below, or p0.05, indicates statistical significance.

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3. Results

Table1: Demographic data distribution of study subject.

	Demographic Distribution		
		Group D	Group C
Age	**18-40**	17(68%)	13(52%)
	41 – 65	8(32%)	12(48%)
	Mean±SD	36.28 ± 12.70	39.36 ± 13.43
Gender	**Male**	16	16
	Female	9	9
Weight	**30 – 50**	10	3
	51 – 70	15	22
	Mean±SD	54.56 ± 10.71	65.16 ± 10.98

The study respondents' demographic characteristics are shown in Table 1. There was no statistical difference in the age, gender or weight among the two groups.

"Table 2: Showing sensory block onset, time taken to achieve maximum sensory block level, duration of sensory regression to S2 level and maximum motor block blockage among both the groups."

Comparison Parameters		**Number (Percentage)**		**p-value**
		D GROUP	**C GROUP**	
Sensory Block Onset (Minute)	1-5	14(56%)	7(28%)	p=0.001
	6-10	8(32%)	13(52%)	
	11-15	3(12%)	5(20%)	
	Mean±SD	5.95±3.486	7.90±3.538	
Time Taken To Achieve Maximum Sensory Block	0-5	2(8%)	2(8%)	p=0.664
	6-10	5(20%)	6(24%)	
	11-15	15(60%)	13(52%)	

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(Minute)	16-20	3(12%)	4(16%)	
	Mean±SD	24.45±6.05	25.20±4.67	
Duration of Sensory Regression To S2 Level (Minutes)	150-200	0	6	p=0.352
	201-250	8	7	
	251-300	14	8	
	301-350	2	3	
	351-400	1	1	
Max Motor Blockage (Minutes)	Mean±SD	271.20±41.48	257.20±51.55	
	1-10	24	24	p=0.97
	11-20	1	0	
	21-30	0	1	
	Mean±SD	5.25±3.851	5.30±5.05	

Maximum number of patients 14(56%) in D group had sensory onset time between 1-5 minutes whereas in C group, 13(52%) of patients had sensory onset time of 6-10 min, which was statistically significant. 6(24%) patients in group C took between 6-10 minutes as compared to 5(20%) patients in group D to achieve maximum sensory block. Mean for D group came to be 24.45±6.05 as compared to 25.20±4.67 for C group. All the data were comparable & statistically not significant.

"Duration of sensory regression to S2 level was 257.20±51.55 in C group as compared to 271.20±41.48 in group D. p value came out to be p= 0.352 which was statistically not significant & comparable. Time taken for maximum motor blockage was in between 0-10 minutes in maximum number of patients (96%) in both the groups".

4. Discussion

Infraumbilical procedures typically use spinal anaesthesia rather than general or epidural anaesthesia. Morbidity & mortality related to pulmonary aspiration and difficult airways are both connected with G.A. In addition to requiring high dosages of local anaesthetics, epidural lacks the spinal block's dependability. Due to its extended duration of action, bupivacaine is the most widely used local anaesthetic.

In this study, the groups' demographic characteristics—age, sex, and kind of surgeries—were statistically equivalent. In our study, the mean age of the participants was 36.28 ± 12.7 years for group D and 39.36 ± 13.43 years for group C. In our study, the D group had the highest percentage of patients (68%) who were in the 18–40 age range, whereas the C group had the lowest percentage (32%) of patients in the 41–65 age range. The majority of the patients in our study fell into the weight category of 51-70 kg in both groups, with a mean weight of 54.56 ±10.71 for patients in the 30-50 kg weight range and 65.16 ± 10.98 for those in the 51-70 kg weight range. There was no statistically significant difference in the distribution of age, height, weight, and sex in the groups, according to research by SS Harsoor et al. [13] and Anbarasu Annamalai et al. [14] (p>0.05).

"In our study Time taken to achieve maximum level of sensory block was between 11-15 minutes for 52% of the patients in the C group as compared to 60% patients in D group. 24% patients in group C

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took between 6-10 minutes as compared to 20% patients in group D. Mean for D group came to be 24.45 ± 6.05 as compared to 25.20 ± 4.67 for C group. All the data were comparable & statistically not significant whereas in studies conducted by Kanazi GE et al [3], Al-Ghanem SM et al [15], Gupta R et al (6) in dexmedetomidine group there was no statistically significant difference in the maximum level of sensory blockade which concurs with our study. The results of this study indicate that infusion of dexmedetomidine hastens the onset of sensory block, though the onset of motor blockade was not affected. Lugo et al [16] in their study noted prolongation of sensory block and duration of analgesia without significant effect on motor block while using 1 mcg/kg bolus followed by 0.5 mcg/kg/h infusion of dexmedetomidine".

The maximum level of sensory blockade in the D group compared to the C group showed no statistically significant difference, which is consistent with our study. In studies by Gupta R et al. [17], the maximum level of sensory blockade in the dexmedetomidine group also showed no statistically significant difference. Another study by Hong JY et al. [18] and Kaya FN et al. [19] reported using a single bolus of 1 mcg/kg and 0.5 mcg/kg to extend the time that analgesia and sensory blockage last.

5. Conclusion

The present study is carried out on 50 patients undergoing lower abdominal and lower limb surgeries at Santosh Medical College & Hospital. Time of sensory block onset is earlier with dexmedetomidine group. The study concluded that Dexmedetomedine given intravenously during spinal anaesthesia reduces sensory block onset.

Reference

1. Mighty things from small beginning grow' John Dryen (1631-1700) Annus mirabilis. Anaesthesia. 1999;54(9):823-825.
2. Stappendal R., Weber E.W., Benraad B., Van Limbeek J., Dirksen R., itching after intrathecal morphine, incidence and treatment, eur j anaesthesiol 2000;17:616-21.
3. Kanazi GE, Aouad MT, Jabbour-Khoury SI, Al Jazzar MD,Alameddine MM, Al-Yaman R, Bulbul M, Baraka AS. Effect of low-dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block. Acta Anaesthesiol Scand 2006;50:222–7
4. Al-Mustafa MM, Abu-Halaweh SA, Aloweidi AS, Murshidi MM, Ammari BA, Awwad ZM, Al-Edwan GM, Ramsay MA. Effect of dexmedetomidine added to spinal bupivacaine for urological procedures. Saudi Med J 2009;30:365–70
5. Eid H, Shafie M, Youssef H. Dose-related prolongation of hyperbaric bupivacaine spinal anesthesia by dexmedetomidine. Ain Shams J Anesthesiology 2011;4:83–95
6. Parkhouse J, Lambrechts W, Simpson BRL- The incidence of postoperative pain. *Br* J Anaesth *1961*;33:345-353
7. Gupta R, Bogra J, Verma R, Kohli M, Kushwaha JK, Kumar S. Dexmedetomidine as an intrathecal adjuvant for postoperative analgesia. Indian J Anaesth 2011;55:347–51
8. Shukla D, Verma A, Agarwal A, Pandey HD, Tyagi C. Comparative study of intrathecal dexmedetomidine with intrathecal magnesium sulfate used as adjuvants to bupivacaine. J Anaesthesiol Clin Pharmacol 2011;27:495–9
9. Bonica JJ, Yaksh T, Liebeskind JC, Pechick RN, De Paulis A; Biochemistry and modulation of nociception and pain. Philadelphia; Lea and Febiger 1990;95-121.
10. Corning J.L.N.Y. Med. J. 1885;42:483(reprinted in 'Classical File', Survey of Anaesthesiology 1960;4:332)
11. Lund PC. Principles and Practice of Spinal Anesthesia. Springfield, IL: Charles C. Thomas, 1971.
12. Deutsh. Zeit. F. Chir. 1899;51:361(translated and reprinted in 'Classical File', Bier Survey of Anesthesiology 1962;6:352).
13. SS Harsoor, D Devika Rani, Bhavana Yalamuru, K Sudheesh, SS Nethra. Effect of supplementation of low dose

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intravenous dexmedetomidine on characteristics of spinal anaesthesia with hyperbaric bupivacaine. Indian J Anaesth 2013;57:265-269

14. Anbarasu Annamalai, Sanjeev Singh, Arti Singh and Deigheidy Ehab Mahrous. Can Intravenous Dexmedetomidine Prolong Bupivacaine Intrathecal Spinal Anesthesia? J Anesth Clin Res 2013;4:372.
15. Al-Ghanem SM, Massad IM, Al-Mustafa MM, Al- Zaben KR, Qudaisat IY, Qatawneh AM, et al. Effect of adding dexmedetomidine versus fentanyl to intrathecal bupivacaine on spinal block characteristics in gynaecological procedures: A double blind controlled study. Americal Journal of Applied Sciences 2009;6:882-887.
16. Lugo VW, Gomez IA, Cisneros, Corral R, Martinez, Gallegos N. Intravenous dexmedetomidine versus intravenous clonidine to prolong bupivacaine spinal anaesthesia. A double blind study. Anestesia en Mexico 2007;19:143-6
17. Revill SI, Robinson JO: The reliability of linear analogue for evaluating pain. Analogue for evaluating pain. Anesth 1976;31:1191-1198.
18. Moorf M, Khan SA, Jain D, Khan RM, Maroof SM. Evaluation of effect of dexmedetomidine in reducing shivering following epidural anesthesia. Anesthesiology 2004;101:495.
19. Kaya FN, Yavascaoglu B, Turker G, Yildirim A, Gurbet A, Mogol EB, et al. Intravenous dexmedetomidine, but not midazolam, prolongs bupivacaine spinal anesthesia. Can J Anaesth 2010;57:39-45