

Evaluation of Effect on Hemodynamic Parameters of Supplementation of Low Dose Intravenous Dexmedetomidine on Characteristics of Spinal Anaesthesia with Hyperbaric Bupivacaine

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Keywords

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Abstract

Background: The most frequent symptom leading patients to seek medical attention is pain. Not only a sensory modality, but also an actual experience, is pain. The way a person reacts to pain can vary greatly between individuals as well as within the same person over time.

Aim and Objective: The purpose of the current study was to investigate how the addition of low dosage intravenous dexmedetomidine affected the features of spinal anaesthesia with hyperbaric bupivacaine.

Methodology: The present study was carried out at Santosh Medical College & Hospital, Ghaziabad in 50 patients of age group 18-65 years & weight 30- 70 kg of both sexes belonging to ASA I & II undergoing lower abdominal & lower limb surgeries.

Result: There were 18 females and 32 males in the study population. In the groups D, the mean age was 36.28 ± 12.70 years, while in the groups C, it was 39.36 ± 13.43 years. There was no statistically significant intergroup difference in heart rate, SBP, DBP, and MAP.

Conclusion: SBP, DBP, and MAP did not differ significantly across groups. Therefore, it was determined by the study that hemodynamic changes are not statistically significant.

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1. Introduction

The most frequent symptom leading patients to seek medical attention is pain. Not only a sensory modality, but also an actual experience, is pain. According to the International Association for the Study of Pain, pain is a distressing sensory and emotional sensation that is connected to existing or potential tissue damage or is expressed as such damage. This definition acknowledges how psychological and emotional elements interact. [1]

In the field of anaesthesiology, pain control is a crucial skill, particularly in the postoperative phase. Morphine has been extensively used for prolonged postoperative analgesia but it causes pruritus and postoperative nausea and vomiting. [2]

A novel selective α_2 adrenoceptor agonist, dexmedetomidine is largely utilised for IV sedation. The duration of anaesthesia 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 anaesthetic adjuvant. However, the majority of studies assessing the impact of IV dexmedetomidine on the length of regional anaesthesia are constrained by their small sample sizes and have produced qualitatively inconsistent findings.

For the majority of lower abdomen and lower limb procedures, regional anaesthesia is the technique of choice for administering anaesthesia. The patient can stay awake, and airway management issues are either completely avoided or much reduced. Spinal anaesthesia is a reliable technique with rapid onset of action, good muscle relaxation and requires minimal quantity of anaesthetic agents. [10-12] Most commonly used for spinal anaesthesia is 0.5% hyperbaric bupivacaine. Bupivacaine has a long-lasting onset of action; however, it won't result in long-lasting post-operative analgesia. The postoperative analgesia has been prolonged by using adjuvant in conjunction with intrathecal local anaesthesia. In the lower abdomen and lower limb procedures included in our study, the addition of low dosage intravenous dexmedetomidine has an impact on the spinal anaesthesia's features when combined 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, kyphosis, 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: "25 patients receiving IV dexmedetomidine 0.5 mcg/kg diluted to 20 ml with normal saline and infused over 10 minutes as a loading dose, prior to SAB, and infusion of dexmedetomidine at the 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".

Each patient underwent a comprehensive pre-anesthesia evaluation. Informed consent was obtained once the appropriate investigations were conducted. A systolic blood pressure drops of more than 30% from the starting point or a systolic pressure below 100 mmHg were both considered to be signs of hypotension. Initially, IV fluids were used to manage it, and if that didn't work, a 6 mg IV bolus dose of mephentermine was given.

After the information was imported into Microsoft Excel, a statistical analysis was performed using SPSS version 21.0. "Chi-square test and T-test" were employed to compare frequency and mean values, respectively. Statistical significance is defined as a P value of 0.05 or less.

3. Results

The current study involved 50 patients who underwent lower abdomen and lower limb procedures at Santosh Medical College & Hospital

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in Ghaziabad. They were all ASA I & II patients, aged 18 to 65, and weighed between 30 and 70 kg.

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

Table 1 shows demographic characteristics of study subjects. There were 32 male and 18 female in the study. Patients in group D had mean age 36.28 ±

12.70 years and weight 54.56 ± 10.71 kg while patients in group C had mean age 39.36 ± 13.43 years and 65.16 ± 10.98 kg.

Table2: Variation of heart rate (bpm), Systolic Blood Pressure, Diastolic Blood Pressure and Mean Arterial Pressure values among the patients between the groups.

Comparison of mean Time		Mean±SD		p-value
		D GROUP	C GROUP	
Heart Rate	0minute	72.45±8.929	72.45±5.698	0.74
	30minutes	68.85±8.468	67.15±5.373	0.24
	60minutes	67.35±8.119	65.55±5.826	0.36
	120minutes	73.45±6.825	71.35±9.343	0.35
	240minutes	72.45±8.929	75.70±5.121	0.80
Systolic Blood Pressure	0 minute	122.80±8.421	120.80±6.787	0.41

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	30 minutes	116.00±6.649	114.00±8.052	0.39
	60 minutes	113.90±6.696	111.80±7.281	0.52
	120 minutes	120.10±7.469	121.30±7.057	0.3
	240 minutes	122.10±6.206	119.10±5.170	0.54
Diastolic Blood Pressure	0minute	79.50±6.452	79.40±5.471	0.95
	30minutes	75.00±7.413	74.00±6.122	0.64
	60minutes	73.90±8.012	71.90±6.034	0.1
	120minutes	79.30±8.266	78.90±5.821	0.9
	240minutes	81.10±6.406	78.40±4.751	0.13
Mean Arterial Pressure	0minute	93.95±6.525	93.20±4.830	0.68
	30minutes	88.70±6.498	87.35±5.518	0.48
	60minutes	87.20±6.670	85.15±5.304	0.64
	120minutes	92.85±7.386	93.10±5.210	0.09
	240minutes	94.75±5.240	92.00±3.584	0.141

“Table 2 shows that, in group D mean baseline HR was 72.45 ± 8.9 as compared to 72.45 ± 5.6 in group C. Heart rate of both groups were compared & there was no statistically significant difference in heart rate. $p\text{-value} > 0.05$ (NS). Mean baseline S. BP was 122.80 ± 8.4 in group D as compared to 120.8 ± 6.7 in group C. In group D, mean baseline D. BP was 79.50 ± 6.4 as compared 79.40 ± 5.4 in group C, however when both the groups were compared, there was no significant difference. ($p\text{ value} > 0.05$). Mean baseline MAP in group D was 93.95 ± 6.5 as compared to 93.20 ± 4.8 in group C.”

4. Discussion

The present study was done at Santosh hospital, Ghaziabad in 50 patients of age group 18-65 years & weight 30-70 kg of both sexes belonging to ASA I & II undergoing lower abdominal & lower limb surgeries. Spinal anaesthesia is widely used for infra-umbilical surgeries. It reduces mortality & morbidity, use of few drugs, less blood loss, excellent postoperative pain control. In this study the

groups were statistically comparable with respect to demographic data- age, sex & type of surgeries. The mean age of patients in our study was 36.28 ± 12.70 years in D group & 39.36 ± 13.43 years in the C group. Maximum number of patients in our study (68%) belonged to age group 18-40 years in D group as compared to (32%) in patients of age group of 41-65 years in C group. Of all the patients 64% were males and remaining 36% of the patients were females in both the groups. Mean weight of patients belonging to 30-50 kg was 54.56 ± 10.71 as compared to 65.16 ± 10.98 belonging to 51-70 kg, maximum number of patients in our study belonged to weight group of 51-70 kg in both the groups. In a study done by SS Harsoor et al [13] and Anbarasu Annamalai et al [14] which stated that there was no statistically significant difference in distribution of age, height, weight and sex in the groups ($p > 0.05$).

“In our study, mean baseline HR in group D was 72.45 ± 8.9 . In group C mean baseline was 72.45 ± 5.6 . However, there was no statistically significant intergroup difference in heart rate. Mean baseline S.

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BP was 122.80 ± 8.4 in group D as compared to 120.8 ± 6.7 in group C. However, there was no significant intergroup difference in S.BP. In group D, mean baseline D. BP was 79.50 ± 6.4 as compared to 79.40 ± 5.4 in group C. However intergroup difference came out to be insignificant.

Haemodynamic response following dexmedetomidine infusion depends upon the dose and speed of infusion. A sequence of transient hypertension with reflex bradycardia, followed by hypotension is seen with higher dose and rapid infusion in a study done by Mason KP et al [15] and Sudheesh K et al [16]. There was a minimal decrease in heart rate and blood pressure in patients receiving dexmedetomidine in our study, similar to observations of Al-Mustafa et al [4].

5. Conclusion

The present study is carried out on 50 patients undergoing lower abdominal and lower limb surgeries at Santosh Medical College & Hospital. There was no significant intergroup difference in SBP, DBP and MAP. Hence the study concluded that Haemodynamic changes are not statistically significant.

Reference

- Mighty things from small beginning grow' John Dryen (1631-1700) *Annus mirabilis*. *Anaesthesia*. 1999;54(9):823-825.
- 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.
- 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
- 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
- Eid H, Shafie M, Youssef H. Dose-related prolongation of hyperbaric bupivacaine spinal anesthesia by dexmedetomidine. *Ain Shams J Anesthesiology* 2011;4:83-95
- Parkhouse J, Lambrechts W, Simpson BRL- The incidence of postoperative pain. *Br J Anaesth* 1961;33:345-353
- 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
- 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
- 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.
- Corning J.L.N.Y. *Med. J.* 1885;42:483(reprinted in 'Classical File', *Survey of Anaesthesiology* 1960;4:332)
- Lund PC. *Principles and Practice of Spinal Anesthesia*. Springfield, IL: Charles C. Thomas, 1971.
- Deutsh. *Zeit. F. Chir.* 1899;51:361(translated and reprinted in 'Classical File', *Bier Survey of Anesthesiology* 1962;6:352).
- SS Harsoor, D Devika Rani, Bhavana Yalamuru, K Sudheesh, SS Nethra. Effect of supplementation of low dose intravenous dexmedetomidine on characteristics of spinal anaesthesia with hyperbaric bupivacaine. *Indian J Anaesth* 2013;57:265-269
- 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.
- Al-Ghanem SM, Massad IM, Al-Mustafa MM, Al- Zaben KR, Qudaisat IY, Qatawneh AM, et al. Effect of adding

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- 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.
21. Lugo VW, Gomez IA, Cisneros, Corral R, Martinez, Gallegos N. Intravenous dexmedetomidine versus intravenous clonidine to prolong bupivacaine spinal anaesthesia. A double blind study. *Anesthesia en Mexico* 2007;19:143-6
22. Revill SI, Robinson JO: The reliability of linear analogue for evaluating pain. *Analogue for evaluating pain. Anesth* 1976;31:1191-1198.
23. 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.
24. 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