

RESEARCH ARTICLE

**PROSPECTIVE RANDOMISED CONTROLLED STUDY ON EFFECT OF
DEXMEDETOMIDINE AS AN ADJUVANT TO INTRATHECAL BUPIVACAINE ON
DURATION OF POST-OPERATIVE ANALGESIA IN PATIENTS UNDERGOING
LOWER ABDOMINAL SURGERIES**

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Introduction: spinal anaesthesia has emerged as a most popular technique for abdominal and lower abdominal surgeries for its safety, simplicity and effectivity. Adding adjuvants drugs to intrathecal local anaesthetics improves quality and duration of spinal blockade, and prolongs postoperative analgesia.. Intrathecal dexmedetomidine with low-dose bupivacaine provides faster onset, prolonged sensory and motor block and reduced rescue analgesic requirement in patient undergoing TURP. **Aims and objectives :** To assess the Onset of sensory analgesia, onset of motor block, fixation time of sensory block, highest level of sensory block, quality of analgesia. **Material and methods :** This Prospective – Randomized study was conducted in the Anaesthesia Department in Government Medical College, Nagpur from December 2018 to November 2020. 60 adult female patients between the age of 18 and 60 years participated in the study. The samples were equally divided into 2 groups, Group D- Case group- 30 patients and Group B- Control group- 30 patients. Intravenous cannula of 18/20 G was secured and patient was preloaded with 10ml/kg of Ringer lactate solution over 10-30 minutes. Baseline vital signs such blood pressure, pulse rate were recorded. **Result :** Maximum number of patients in group D and group B i. e 100% and 60% respectively had an excellent quality of analgesia during the procedure. Quality of analgesia was reported as satisfactory in 30% of patients and poor in 10% patients in group B. Quality of analgesia was found to be comparable in

the two groups ($p= 0.001$). Thus, addition of dexmedetomidine only marginally improved quality of surgical analgesia in our study.

Conclusion: Intrathecal inj. Dexmedetomidine 5mcg acts synergistically to potentiate intrathecal local anaesthetic bupivacaine with the result that there is relatively faster onset of sensory block and prolongation of both sensory and motor block

Key Words: Dexmedetomidine, bupivacaine, sensory block, motor block, anaesthesia.

INTRODUCTION

The term “spinal anesthesia” was introduced by a neurologist called Corning due to the personal theory that spinal cocaine could improve some neurological disorders.^[1,2] spinal anaesthesia has emerged as a most popular technique for abdominal and lower abdominal surgeries for its safety, simplicity and effectivity.^[2,-4]

Adding adjuvants drugs to intrathecal local anaesthetics improves quality and duration of spinal blockade, and prolongs postoperative analgesia.^[6-8]

Dexmedetomidine antinociceptive properties of intrathecal α_2 adrenoceptor agonists are manifested by suppressing the release of C-fibre transmitters, hyperpolarization of post synaptic dorsal horn neurons and inhibition of release of substance P.^[9-11] Intrathecal dexmedetomidine with low-dose bupivacaine provides faster onset, prolonged sensory and motor block and reduced rescue analgesic requirement in patient undergoing TURP.^[12-14]

MATERIAL AND METHOD

This Prospective – Randomized study was conducted in the Anaesthesia Department in Tertiary care hospital from SEPTEMBER 2018 TO DECEMBER 2020. 60 adult female patients between the age of 18 and 60 years participated in the study. The

samples were equally divided into 2 groups, Group D- Case group- 30 patients and Group B- Control group- 30 patients. In the preoperative room, pulse rate, blood pressure, SpO₂ were noted in the pre-anaesthetic room. Patients were explained about the procedure in simple language and written informed consent was obtained from them. In the operation theatre, resuscitation and general anaesthesia equipment and drugs were kept ready. Intravenous cannula of 18/20 G was secured and patient was preloaded with 10ml/kg of Ringer lactate solution over 10-30 minutes.

Standard multipara monitor containing electrocardiogram, noninvasive blood pressure (NIBP) and pulse oximeter was applied to the patient and baseline parameters e.g. pulse rate, blood pressure, Spo₂ were recorded. Premedication with injection Pantoprazole 40 mg iv and injection Ondansetron 4 mg intravascular was given according to dose per kg body weight of the patient. None of the patients received sedatives as premedication. Lumbar puncture via a midline approach with quince type 25-gauge spinal needle at L2-L3 or L3-L4 interspace. After obtaining free flow of clear cerebrospinal fluid, spinal anaesthesia was given with drug as per group allotted. Group D - Inj. hyperbaric bupivacaine (0.5%) 3.0ml plus 5mcg dexmedetomidine (which is equivalent to 2 units on insulin syringe) in Study Group and Group B - Inj. Hyperbaric bupivacaine

3.0ml (0.5%) plus Normal Saline (equivalent to 2 units on insulin syringe) in Control Group.

INCLUSION CRITERIA – ASA grade I and II female patients, Age group 18 to 60 years, Patient of height 150 to 170cm and weight 40-80kg, Written informed consent

EXCLUSION CRITERIA - Patients refusal, Patient with ASA Grade III and above, patients who all are contraindicated to spinal anesthesia.

RESULT

Table 1 : Distribution of patient according to age group (years), Height and weight

Parameters	Group D	Group B	P value
Age	46.23 ± 10.85	46.66 ± 8.60	0.8655
Height	155.46 ± 4.26	156.7 ± 3.96	0.0609
Weight	60.33 ± 10.4	55.93 ± 7.13	0.2477
Duration of surgery	130.06 ± 11.45	125.06 ± 19.04	0.2229

Table 2 : Distribution of patient according onset of sensory block, onset of motor block, duration of sensory block, duration of motor block, time to rescue analgesia.

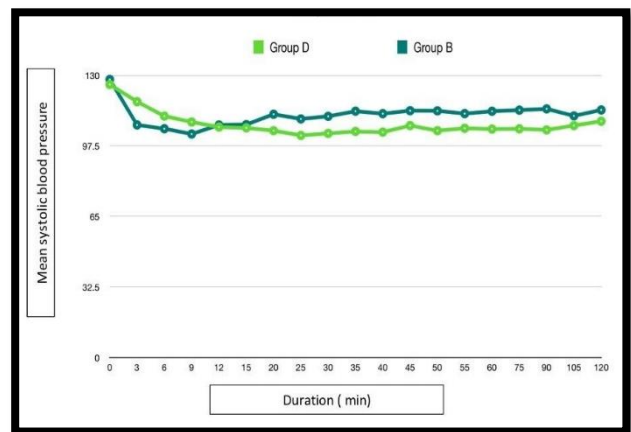
Parameters	Group D	Group B	P value
Onset of sensory block	167.5 ± 34.87	178 ± 34.41	0.2453

onset of motor block	194.67 ± 52.11	190.33 ± 51.89	0.7481
duration of sensory block	404.13 ± 39.76	171.17 ± 32.37	0.0001
duration of motor block	452.4 ± 39.34	187.97 ± 31.61	0.0001
time of rescue analgesia (min)	450 ± 36.33	184 ± 31.68	0.0001
Ramsay sedation score	1.37 ± 0.49	1.4 ± 0.49	0.791

Table 3 : Distribution of patient according pulse rate, systolic B.P. and diastolic B.P.

Parameters	Group D	Group B	P value
pulse rate	90.90 ± 12.23	85.83 ± 11.12	0.0997
systolic blood pressure	127.76± 11.91	128.10± 13.50	0.4808
diastolic blood pressure	81.76 ± 12.17	81.86 ± 12.77	0.9753

Fig 1: Comparison of mean Systolic blood



pressure (SBP)

Fig 2 : Comparison of mean Diastolic blood pressure (DBP)

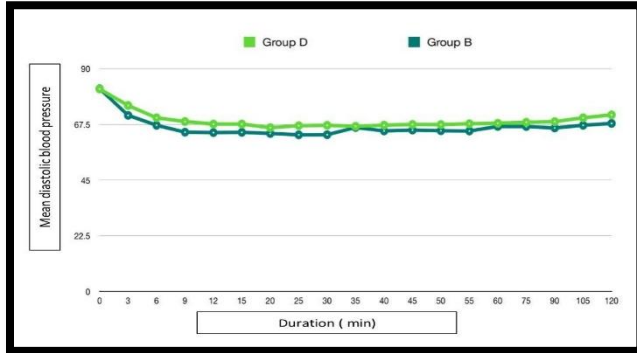
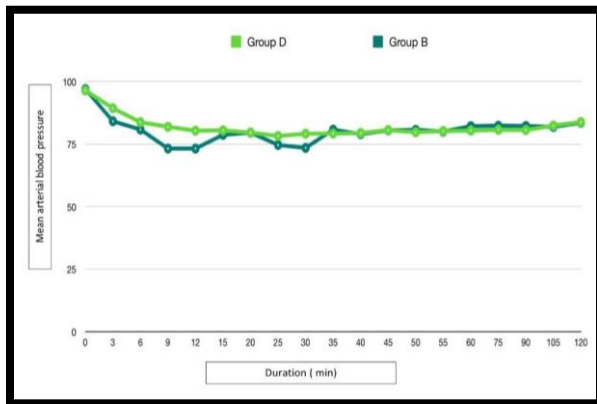


Fig 3: Comparison of mean Arterial pressure (MAP)



In table 1 shows the distribution of age, height, weight, duration of surgery in two groups, which were statistically comparable.

In table 2 shows the distribution of patient in which all parameters (onset of motor block, duration of sensory block, duration of motor block) were more in Group D than Group B except onset of sensory block and time to rescue analgesia. There was no significant difference in the onset of sensory block in both the groups. the difference

between the mean values of onset of motor block in Group D and B ($P= 0.7481$) was insignificant.

In table 3 shows the distribution of patients based on their vital signs in which all the parameters were less in Group D than Group B except pulse rate.

Fig 1 shows the comparison of the systolic blood pressures at various time intervals in the two groups. The difference in mean systolic blood pressure was statistically significant at the intervals of 3, 20, 25, 30, 35, 40, 45, 50,55 ,60 ,75 and 90 min between the two groups. Observations at other intervals showed no significant differences in mean systolic blood pressure in the two groups at various intervals.

Fig 2 shows Comparison of mean Diastolic blood pressure and showed no significant differences in mean diastolic blood pressure in the two groups at various intervals.

Fig 3 shows the Comparison of mean Arterial pressure all the observations were within normal range. Observations at all the time intervals showed no significant differences in mean diastolic blood pressure in the two groups at various intervals.

DISCUSSION

Regional anaesthetic techniques of spinal anaesthesia offer many advantages over general anaesthesia including reduced stress response to surgery with postoperative analgesia. Since spinal anaesthesia provided postoperative analgesia for a short time, many intrathecal adjuvants to local

anaesthetic have been added to augment the clinical efficiency and duration of analgesia. In our study, all the patients were randomly allocated to two different groups. The dose of hyperbaric 0.5% Bupivacaine, 15 mg, was taken in our study and was identical in the two study groups. Similar doses were studied by Hala E A Eid et al⁽¹⁵⁾, the effects of dexmedetomidine on a dose related manner (control, 10 µg and 15µg) and confirmed the prolongation of duration of analgesia. In the present study the mean onset of sensory block was found to be 167.5 ± 34.87 seconds in group D (case) and 178 ± 34.41 seconds in group B (control group). Samantaray A et al⁽¹⁶⁾ found that the onset of sensory block occurred at 2.3 ± 1.2 min and Patro SS et al⁽¹⁷⁾ found that the onset of sensory block occurred at 129.33 ± 14.8 sec our findings correlated to their results .

In the present study the mean onset of motor block was found to be 194.67 ± 52.11 seconds (group D cases) and 190.33 ± 51.89 seconds (group B control). This difference between the groups was clinically and statistically not significant. Mahima Gupta et al⁽¹⁸⁾ reported the mean onset of motor block of 3.90 ± 0.89 min (cases) and 3.30 ± 0.97 min (controls) which was clinically insignificant and was relatable to our findings.

In our study, rescue analgesia was defined as duration measured from the time of injection of study drug to the time of first rescue analgesic given to the patient ($VAS \geq 4$) noted in minutes. Nethra et al⁽¹⁹⁾ found the average time of rescue analgesia in cases was 459.80 ± 100.9 min and in control group was 321.85 ± 95.08 min. Both the above findings are comparable to our result.

In our study, mean time duration for effective analgesia in group D was 450 ± 36.33 min and in group B it was 184 ± 31.68 min. The difference of the time in the requirement of rescue analgesia between the two groups was clinically and statistically significant. This study supported by a study Sarma J et al⁽²⁰⁾ found out in their studies the time of rescue analgesia 336.8 ± 55.38 minutes in cases and 204.8 ± 16.81 minutes in control which was clinically and statistically significant and was comparable to our findings.

CONCLUSION

Intrathecal inj.Dexmedetomidine 5mcg acts synergistically to potentiate intrathecal local anaesthetic bupivacaine with the result that there is relatively faster onset of sensory block and prolongation of both sensory and motor block and it reduces the need for analgesic administration without any significant hemodynamic compromise.

REFERENCES

- 1.Krames ES. A history of intraspinal analgesia, a small and personal journey. *Neuromodulation* 2012; 15(3): 172-93.
2. Brill S, Gurman GM, Fisher A. A history of neuraxial administration of local analgesics and opioids. *Eur J Anaesth* 2003; 20(9): 682-9.
3. Bujedo B. Clinical Use of Spinal Opioids for Postoperative Pain. *ResearchGate Journal of The Analgesics*, 2015 Dec 31;3(2):17-23.
4. Miller R. D, Miller's Anesthesia, 8th edition, Chapter 56: Spinal, Epidural, and Caudal Anesthesia, page no. 1685

5. Pranalī Kurhekar, S Madan Kumar, D Sampath IJA Vol 60, No. 6, June 2016: 382-387.
6. 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
7. Miller R. D, Miller's Anesthesia, 8th edition, Chapter 30: Intravenous Anesthetics, page no 854 -857
8. Chattopadhyay I, Banerjee SS, Jha AK, Basu S. Effects of intrathecal dexmedetomidine as an additive to low-dose bupivacaine in patients undergoing transurethral resection of prostate. *Indian J Anaesth* 2017 ; 61 : 1002-8.
9. Atkinson RS, Rushman GB, Davies NJH, "Lee's synopsis of Anaesthesia", Spinal analgesia: intradural & extradural in Regional techniques. 11th edition. ButterworthHeinemann Ltd Oxford; 1993:698-704.
10. Madhur Gupta, Neeru Goyal, Pain update 2005 Neurophysio-pharmacodynamics, Neuropathic and chronic pain and multimodal approach to pain management, Published by MSRMC and ISPRAT, 2005;19-25.
11. Sunil Sharma, pain update 2005 Neurophysio-pharmacodynamics, Neuropathic and chronic pain and multimodal approach to pain management, Published by MSRMC and ISPRAT, 2005:71-81.
12. Melzack R and Wall PD, pain mechanisms: a new theory, science, 150:971-979.
13. J.G. Reves, Peter S.A. Glass: Intravenous anesthetics- Dexmedetomidine: Miller's Anesthesia 7th ed: Churchill Livingstone Elsevier 751-757.
14. Edward Morgan. Jr. adjuvants to anaesthesia Morgan 4th Edition Mc Graw Hill Publication:Chapter 15 page 284.
15. Bajwa SJS, Kulshrestha A. Anaesthesia for laparoscopic surgery: General vs regional anaesthesia. *J Minim Access Surg.* 2016 ; 12(1) : 4-9.
16. Hala E A Eid et al Effect of intrathecal Dexmedetomidine with hyperbaric bupivacaine-a prospective randomized double blind study. *Ain Shams journal of Anesthesiology.* 2011 July ; 4(2) ; 83-95.
17. Samantaray A, Hemanth N, Gunnampati K, Pasupuleti H, Mukkara M, Rao MH. Comparison of the effects of adding dexmedetomidine versus midazolam to intrathecal bupivacaine on postoperative analgesia. *Pain Physician.* 2015 JanFeb ; 18(1) : 71-77.
18. Patro SS, Deshmukh H, Ramani YR, Das G. Evaluation of Dexmedetomidine as an Adjuvant to Intrathecal Bupivacaine in Infraumbilical Surgeries. *J Clin Diagn Res.* 2016 ; 10(3)
19. Mahima gupta, S. Shailaja, K.Sudhir Hegde. *Journal of clinical and diagnostic research* 2014 ; 8(2) : 114-117.
20. Nethra S S, Sathesha M, Aanchal D, Dongare PA, Harsoor S S, Devikarani D. Intrathecal dexmedetomidine as adjuvant for spinal anaesthesia for perianal ambulatory surgeries: A randomised double-blind controlled study. *Indian J Anaesth* 2015 ; 59 : 177-81