



Research Article

To Compare the Onset and Duration of Sensory and Motor Block of Dexmedetomidine and Clonidine as an Adjuvant to Intrathecal Bupivacaine in Patients Undergoing total Abdominal Hysterectomy

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Article Info: Received: 02-01-202 / Revised: 18-03-2023 / Accepted: 28-04-2023

DOI: <https://doi.org/10.32553/jbpr.v12i3.976>

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Conflict of interest statement: No conflict of interest

Abstract:

Background: Spinal anaesthesia is commonly used in gynaecological surgeries, with Bupivacaine being the most commonly used anaesthetic. Bupivacaine, on the other hand, has a shorter duration of action. This clinical study was conducted to evaluate the behaviour of intrathecal clonidine and dexmedetomidine as an adjuvant to bupivacaine in augmenting block characteristics in patients undergoing gynaecological procedures.

Methods: A prospective randomized single blind study was conducted in the Department of Anesthesia IGMC SHIMLA at Kamla Nehru state hospital.

Results: The mean onset time of sensory block at T6 level was significantly more in group C and was 175.09 ± 68.01 sec and was 124.44 ± 20.64 sec in group D. ($p=0.001$). The mean time to reach the maximum sensory height was significantly early in group D and was 18.64 ± 4.82 min in Group C and 13.53 ± 2.97 min in Group D respectively. ($p=0.001$). Mean time to two segment regression of the block was significantly early in group C and was 103.58 ± 11.25 min in Group C and 115.24 ± 8.91 min in Group D respectively. ($p=0.001$). Mean onset motor time in seconds (modified bromage scale ≤ 2) for Group C and Group D was 115 ± 8.11 and 74.6 ± 14.19 respectively. Group C had notably higher onset motor time than group D ($p=0.001$). Mean Duration of motor blockade in minutes (modified bromage scale =6) for Group C and Group D were 273.51 ± 18.95 and 316.67 ± 21.39 respectively. The difference between the groups were statistically significant ($p=0.001$).

Conclusion: We observed statistically significant, early onset, prolonged duration of sensory and motor block in patients where dexmedetomidine $5 \mu\text{g}$ was used as an adjuvant to bupivacaine 0.5% heavy in patients undergoing total abdominal hysterectomies without any significant side effects as compared to $30 \mu\text{g}$ clonidine.

Keywords: Dexmedetomidine, Clonidine, Bupivacaine, motor, sensory

Introduction

Hysterectomy is the most frequently performed gynaecologic surgical procedure. It has a broad spectrum of indications ranging from benign tumours to malignant gynaecological diseases. Hysterectomy is most often indicated when medical treatment or less invasive methods have failed¹. Various drugs have been used intrathecally in the past to increase the duration of block and postoperative analgesia like ketamine, fentanyl, magnesium sulphate, morphine, tramadol with varying result. Opioids are commonly used as intrathecal adjuvants without significant motor or autonomic blockade however side effects of pruritus, nausea, vomiting, delayed respiratory depression has prompted further research towards non opioids adjuvants with lesser side effects.²⁻³ α_2 -adrenergic agonists are new neuraxial adjuvants being studied to improve the quality of subarachnoid blockade regarding both sensory and motor blockade. There are many studies supporting their efficacy as adjuvants individually. Among that, dexmedetomidine (DEX) and clonidine are found to be of use. Their primary mechanism of action is believed to be at the level of spinal cord. This includes pre and postsynaptic sites of action. Presynaptically, α_2 -receptor activation inhibits release of substance *P* from afferent “c” fibers within dorsal horn. Postsynaptically, it inhibits the development and subsequent transmission of integrated pain signals within

second-order neurons of the substantia gelatinosa⁴.

Material and Methods

A prospective randomized single blind study was conducted in the Department of Anaesthesia IGMC SHIMLA at Kamla Nehru state hospital.

A total of 90 patients were divided randomly into two groups:

Group C and Group D

Group C patient received 3ml (15mg) of bupivacaine heavy with 0.2ml (30 μ g) clonidine

Group D patients received 3ml (15mg) of bupivacaine heavy with 0.2ml (5 μ g) DEX.

Study Period: For period of 1 year [2020-2021]

Inclusion Criteria

- 1) Patients willing to give consent for study
- 2) Age between 35-60 years.
- 3) ASA I and ASA II patients.

Exclusion Criteria

- 1) Hypersensitivity to the study drugs
- 2) Patients having any bleeding disorders
- 3) Patient having decreased platelet counts ($\leq 50,000/\mu$ l)
- 4) Patients undergone any spine surgery
- 5) Infection at local site
- 6) Patients on beta blockers

Results

Table 1: Socio-demographic profile of the patients in the study group

	Group C (Mean \pm SD)	Group D (Mean \pm SD)	P value
Age	47.11 \pm 7.92	48.20 \pm 6.70	0.484
Weight	57.22 \pm 3.75	59.48 \pm 4.88	0.061
ASA Grade(I:II)	33:12	33:12	0.99

Table 2: Time of onset and total duration of sensory and motor block:

	Group C (Mean \pm SD)	Group D (Mean \pm SD)	P value
Onset of sensory block(sec)	175.09 \pm 68.01	124.44 \pm 20.64	0.001*
Max sensory level time(min)	18.64 \pm 4.82	13.53 \pm 2.97	0.001*
Two segment Regression(min)	103.58 \pm 11.25	115.24 \pm 8.91	0.001*
Onset of motor block(sec)	115 \pm 8.11	74.6 \pm 14.19	0.001*
Duration of motor block(min)	273.51 \pm 18.95	316.67 \pm 21.39	0.001*
TDOA (min)	323.91 \pm 23.0	370.60 \pm 17.98	0.001*

* Statistically significant ($p < 0.05$)

The mean onset time of sensory block at T6 level was significantly more in group C and was 175.09 ± 68.01 sec and 124.44 ± 20.64 sec in group D. ($p = 0.001$). The mean time to reach the maximum sensory height was significantly early in group D and was 18.64 ± 4.82 min in Group C and 13.53 ± 2.97 min in Group D respectively. ($p = 0.001$). Mean time to two segment regression of the block was significantly early in group C and was 103.58 ± 11.25 min in Group C and 115.24 ± 8.91 min in Group D respectively. ($p = 0.001$). Mean onset motor time in seconds (modified bromage scale ≤ 2) for Group C and Group D was 115 ± 8.11 and 74.6 ± 14.19 respectively. Group C had notably higher onset motor time than group D ($p = 0.001$). Mean Duration of motor blockade in minutes (modified bromage scale = 6) for Group C and Group D were 273.51 ± 18.95 and 316.67 ± 21.39 respectively. The difference between the groups were statistically significant ($p = 0.001$). The duration of total analgesia (TDOA) was calculated from onset of sensory block to the VAS score ≥ 4 . Mean TDOA time in minutes for Group C and Group D was 323.91 ± 23.0 and 370.60 ± 17.98 respectively. It was significantly higher in Group D as compared to that in Group C ($p = 0.001$).

Discussion

In our study, the mean time for the onset of sensory block up to T6 level was 175.09 ± 68.01 seconds in Group C and 124.44 ± 20.64 seconds in group D ($p = 0.001$). Thus DEX group had an early onset of sensory block as compared to clonidine group in our study.

Mallika Ganesh et al⁴ and Rahul Ranjan et al⁵ reported early onset of analgesia than our study and Vidhi mahendru et al⁶ Shagufta Naaz et al⁷ reported late onset than our study.

Mallika Ganesh et al⁴ and Rahul Ranjan et al⁵ observed time to onset of sensory block of 72 ± 0.20 second in DEX group as compared to 80 ± 30 seconds in clonidine group which was

less than that observed in our study. They had used 3.5 ml bupivacaine and had taken time to reach sensory block to T10 level and we had taken onset at T6 level which is at higher dermatome. So our results were slightly higher than their results.

Vidhi et al⁶ reported onset of sensory block in 8.3 min (498 sec) in both the groups They have reported very delayed onset time which could be because they had used 12.5mg of bupivacaine in their study.

Shagufta Naaz et al⁷ also reported higher mean onset time of sensory block time that is 6min for clonidine group and 6.320 min for DEX group. They had assessed the onset of sensory and motor block every 1 min whereas in our study we recorded it every 15 sec. Hence, they could have recorded more onset time in their studies.

Mean onset time of motor block ≤ 2 modified bromage for Group C and Group D was 115 ± 8.11 sec and 74.6 ± 14.19 sec respectively. Group D had notably more faster onset motor time than Group C ($p = 0.001$).

Our results were slightly different from those obtained by Mallika Ganesh et al⁴ and Vidhi Mahendru et al⁷ in their respective studies.

Mallika Ganesh et al⁴ observed faster motor blockade in both the groups as it was 1.1 ± 0.04 (66 ± 2.4 sec) in DEX group and 1.6 ± 0.05 (96 ± 3 sec) in clonidine group. They could have reported early onset of block in both the groups due to more volume of bupivacaine used (3.5 ml) in their study as compared to 3 ml used in our study.

Our results were grossly different from those obtained by Vidhi Mahendru et al⁶, Shagufta Naaz et al⁷ who observed slower and almost similar onset of motor blockade in both the groups as it was 9.8 ± 3.6 in clonidine group and 9.7 ± 3.2 in DEX group which could have been because of low volume of bupivacaine used (2.5 ml) in Vidhi mahendru²⁴ study. Shagufta

Naaz et al⁷ assessed motor blockade time every 1 min whereas in our study we had taken it every 15 sec, hence they reported higher onset time of motor block that is 9.520 min for clonidine group and 10.760 min for DEX group as compared to our study.

The mean time in min to reach maximum sensory level was 18.64 ± 4.82 in Group C and 13.53 ± 2.97 in Group D. This indicates that time to achieve maximum sensory level was earlier in Group D. ($p = .001$)

Our results were in accordance with those seen by Shagufta Naaz et al⁷ as time to reach maximum level of sensory block was 14.43 ± 3.11 in DEX group which was comparable to our time of 13.53 ± 2.97 min.

Our study was not in accordance with the study done by Vidhi Mahendru et al⁶ as the maximum level reached in their study was at T6 and it was achieved in 9-10 min where as in our study maximum level reached was at T2 level in 13-18 min which could be the result of more volume of bupivacaine (3ml) used in our study.

Two segment regression was longer in Group D than Group C that is 115.24 ± 8.9 min and 103.58 ± 11.25 min respectively ($p = .001$).

Our results were in accordance to the study done by Shagufta Naaz et al⁷ as two segment regression in DEX group in their study was 121 ± 10.2 min where as it was 115.24 ± 8.9 min in our study which was comparable.

Researchers who used more concentration of clonidine (50 μ g) or DEX 10 μ g reported more time to two segment regression than seen in our study.

Total duration of motor blockade was 316.67 ± 21.39 in Group D and 273.51 ± 18.95 in Group C. ($p < 0.0001$)

Our observations were in accordance with the study done by Mallika Ganesh et al⁴ who also observed that duration of motor blockade was 279.2 ± 24.1 in clonidine group and 302.6 ± 36.6 in DEX group. Our results were not in accordance with the study done by Shagufta

Naaz et al⁷ as duration of motor blockade in their study was 251.4 ± 46.5 which was less as compared to ours and could be due to less volume of bupivacaine (2.5ml) used as compared to 3 ml used in our study.

Conclusion

We observed statistically significant, early onset, prolonged duration of sensory and motor block in patients where dexmedetomidine 5 μ g was used as an adjuvant to bupivacaine 0.5% heavy in patients undergoing total abdominal hysterectomies without any significant side effects as compared to 30 μ g clonidine.

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