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A Comparative Study of Dexmedetomidine verses Clonidine as Adjuvant with Hyperbaric Bupivacaine under Spinal Anesthesia for Gynecological Surgeries

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Abstract

Background: Newer α_2 agonist agents have created a new chapter in faster and prolongation of neuraxial block and good postoperative analgesia**.** Intrathecal Dexmedetomidine studied in comparison with clonidine along with bupivacaine given intrathecaly for gynaecological surgeries. *Materials & Method*: patients belonging to the age group of 30-60 years posted for gynecological surgeries were taken for study. Patients were randomized into two groups, group D (30) received 15mg hyperbaric bubivacaine with 15 mcg Dexmedetomidine and group C received 15mg hyperbaric bubivacaine with 60mcg clonidine intrathecal. The quality of anaesthesia is evaluated by the onset of sensory and motor block, maximum height of sensory block, segmental regression of sensory block and total duration of motor block. Rescue analgesia required during the postoperative period was recorded. *Result:* Prolonged duration of sensory and motor block was feature of patients received dexmedetomidine. These patients are also hemodynamically stable with lack of sedation. Which is statistically significant ($p < .001$). The rescue analgesia time was 587 minutes in dexmedetomidine when compares to clonidine 408 minutes. *Conclusion:* Intrathecal dexmedetomidine causes good quality of anesthesia in the intraoperative period with prolonged postoperative analgesia with less requirement of rescue analgesia when compare to intrathecal clonidine.

Keywords: Dexmedetomidine; Clonidine; Motor Block; Hyperbaric; Bubivacaine.

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Introduction

Various adjuvant are used with local anaesthetics for spinal anaesthesia to have good quality of anaesthesia and less demand for analgesia in post operative period [1].

Dexmedetomidine is an α_2-adrenoreceptor agonist and approved as an intravenous sedative drug. Intrathecal Dexmedetomidine inhibits the release of substance p from spinal cord .

Clonidine Alpha -2 adrenergic agonists produce clinical effects by binding to alpha -2 receptors. Alpha -2 afferent terminals are situated all over the central nervosa system.

In this background the Present study undertaken to evaluate the effect of Dexmedetomidine and Clonidine with bupivacaine under spinal anaesthesia in gynaecological surgeries.

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Materials and Method

The prospective randomized study was conducted on patients undergoing gynaecological surgeries under subarachnoid block in vani villas hospital and Bowring and lady Curzon hospital. Study period of march 2015 to august 2016. Institutional ethical committee approval taken .

All female patients between the age group of 30 to 60 years without any co morbid diseases with ASA I-II included in the study. Patients taking any chronic medication, morbid obesity, post spinal instrumentation and bleeding disorder were excluded from the study.

The patients were allocated randomly into two groups of 30 patients each by using the computer randomization table (www.randomizer.org).

Group D (n = 30): Hyperbaric bupivacaine 15 mg with 15mcg (micro-grames) of Dexmedtomidine.

Group C(n = 30): Hyperbaric bupivacaine 15 mg with 60mcg of Clonidine. Both volumes were made to 3.5 ml with normal saline in both the groups.

All patients were kept overnight fasting (8-10 hours) previous day of surgery. Anxiolytic medication and Tab Rantac 150 mg was given pervious night of surgery. Inj. Rantac 50 mg intravenously was given before surgery.

In preoperative room for all the patients, intravenous line taken and patients were per loaded with 10-15 ml/per body wt of ringer lactate in 20-30 minutes. Multimonitor like ECG, pulsoxymeter non invasive blood pressure were connected and baseline values taken before spinal anaesthesia.

The spinal anaesthesia performed in L3-L4 space in the lateral position in all patients with 25 or 26 spinal needle under aseptic percussion. The spinal given time as zero time of the study and all the measurements were recorded from that time.

Following Subarachnoid Block, patients were made to lie supine. Sensory testing will be assessed by loss of pinprick sensation to 23 G sterile hypodermic needles for onset and dermatome level will be tested every 1 minute (min) for the first 5 min. There after sensory block was monitored at regular interval till the end of surgery. Motor block was assed according to the Bromage scale at regular interval. Intraoperative and post operative period sedation was assed by Ramaswamy sedation scale at every 10 minutes throught the procedure.

Those patients failure achieve an adequate level and converted to General Anaesthesia were not taken into consideration. Haemodynamic variables were recorded at 1 minute (min), and next for every 3 min for 15 min and then for 5 min for the next half-hour and every 10 min thereafter up to 120 min after the block. Postoperatively Patient was monitored at regular interval of time for 24 hours.

Any haemodynamic abnormalities like fall in blood pressure or bradicaria were treated with intravenous medication like Mephentermine and atropine with the appropriative dosage.

In the intraoperative and postoperative period adverse effect like itching, gastritis, respiratory depression and cardiac changes were noted.

Statistical analysis done using SPSS 15.0 evaluation version. Chi-square test- compare nominal categorical data between study groups. Student t test has been used to find the significance of study parameters on a continuous scale between two groups. The Mann Whitney U test has been used to find the significance between two groups for parameters on non-interval scale.

Result

Study group patients were comparable to each other in terms of demographic characteristics and anthropometric data. The time of onset of sensory and motor block was much earlier in the dexmedetomidine group than clonadine group [Table 1].

Two segment regression was slower in dexmedetomidine compared to clonadine group [Table 2]. The time taken to regrace from the highest level of sensory block to S1 was 527± and 302±min in dexmedetomidine and clonadine respectively, which is statistically significant.

On set of motor block bromage gr 3 was 4.5±08 and 4.92±1.23 min in dexmedetomidine and clonadine respectively [Figure 1,2] . Regression of bromage gr 3 prolonged in dexmedetomidine with 478±15 min when compares to clonadine i e 255±18 min [Table 2].

The mean values of mean arterial pressure and heart rate were comparable between the two groups throughout the intra-operative and post-operative period.

In both the groups sedation score was not more than grade 3 according to Ramaswamy scale. Post operative pain scores were very low in the dexmedetomidine group (587±58 min) compare to clonadine group(408±15 min) [Figure 2]. The rescue

analgesia requirement was minimum in group D compare to group C in 24 hours of post operative period.This is statistically significant.

In the intraoperative period regarding heamodynamicaly minimal side effects are absorbed in group C compared to group D. There was no incidence of nausea, vomiting and respiratory depression in both groups.

Table 1: Demographic profile

Demography	Group D	Group C
Age (years)	42.21±3.8	44.35±4.08
Height (CM)	158±1.3	156±1.8
ASA 1:2	21:9	22:8
Weight(KG)	65.13±13.4	64.42±9.6
Duration of Surgery (min)	180±45	170±40

Table 2: Summary of results

Parameters	Group D	Group C	P value
ONSET OF SENSORY BLOCK(min)	4.05±74	4.71±08	0.001
2 SEGMENT REGRESSION (min)	200.60±30.90	103.00±28.00	0.001
TIME OF SENSORY REGRESSION TO S1 (min)	527±19	302±9	.0001
ONSET OF MOTOR BLOCK MODIFIED BROMAGE 3(min)	4.5±0.8	4.92±1.23	0.001
TIME OF RESCUE ANALGESIA(min)	587±58	408±15	.0001
REGRESSION TO BROMAGE 0(min)	478±15	255±18	<.0001

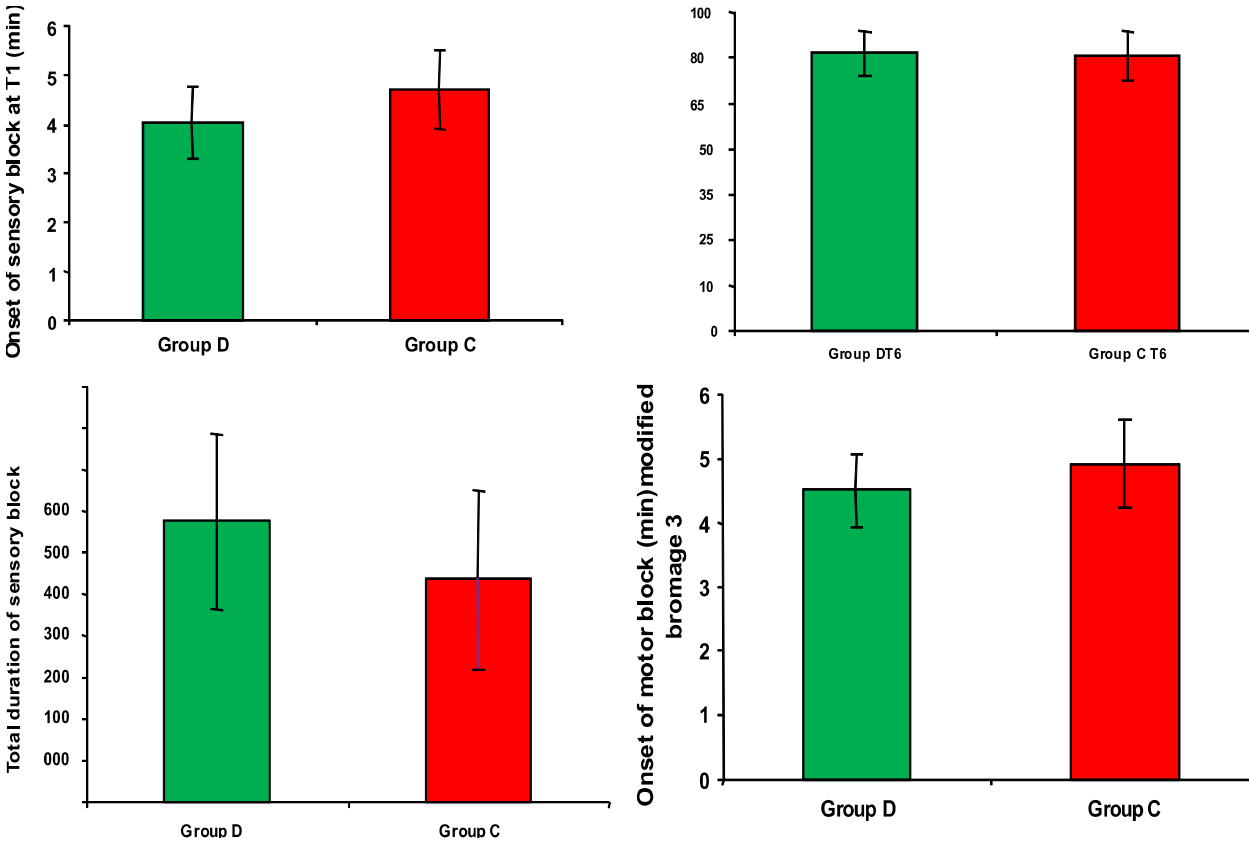

Fig. 1:

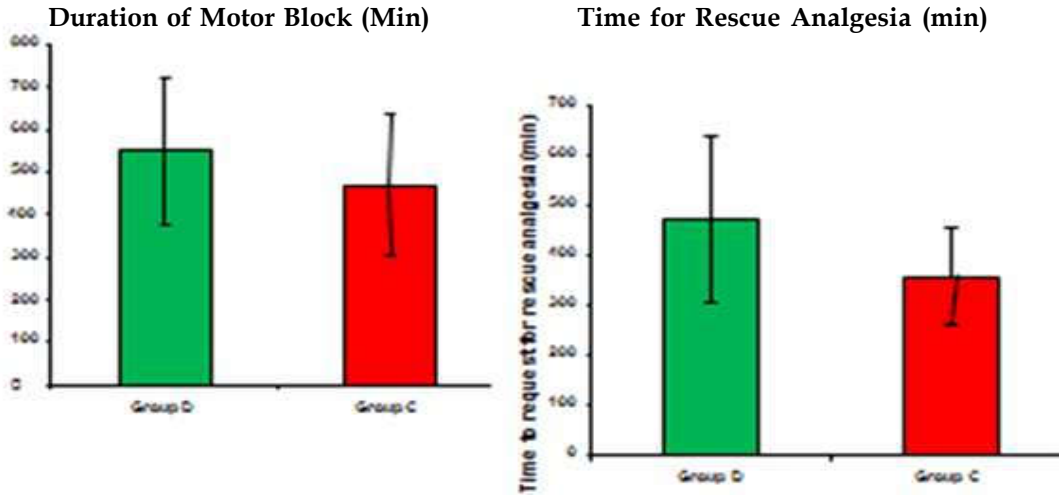

Fig. 2:

Discussion

Spinal anesthesia is the most common method of technique in gynaecological surgeries. Spinal anesthesia with hyperbaric bupivacaine provide good quality of anaeshesia, but lack of post operative analgesia. Due to above mentioned reason various adjuvant are added to hyperbaric bupivacaine for spinal anesthesia to have post operative analgesia. The common adjuvant used in spinal anesthesia is Dexmedetomidine, clonidine, tramadol, fentanyl and magnesium.

Dexmedetomidine is an α_2-adrenoreceptor agonist with S-enantiomer of medetomidine with a higher specificity for α2-adrenoreceptor (α2: α1, 1620: 1) compared to clonidine (α2: α1, 220: 1) . Alpha-2 receptors are present all our the CNS system and alpha-2 afferent terminals present in spinal cord nuclei, plays important role in analgesia. This explains that analgesic action Dexmedetomidine when it's given through neuro axial route.

Literature reveled when Dexmedetomidine used in dose of 3mcg to 15mcg along with bupivacaine for spinal anesthesia conferred good quality of anesthesia in terms of onset of the block and longer duration block with stable heamodynamics with less sedation.

Clonidinehydrochloride, animidazoline derivative was originally developed as a nasal decongestant and a vasoconstrictor. Clonidine produces clinical effects by binding to alpha-2 adrenergic agonist receptors. Clonidine analgesic effects are more pronounced after Neuro axial administration.

Shah. et al. and Gurduth et al. used 60 mcg of clonodine along with bupavcaine for SAB in gynecological cases. In the present study also we used 60 mcg of clonodine for SAB group C, while group D received 15mcg of Dexmedetomidine [2].

The onset time of sensory block is almost similar in both group D (4.05±0.8min) and group C (4.09± 1.23min). The similar study conducted by Maharani et al. also documents 4.10±1.06 min of onset time for sensory block with a dose of 10 mcg Dexmedetomidine [3]. Sethie et al. also reports that sensory block onset time was delayed with 60 mcg of clonodine.

The group D (527min) for two segment regression and time of regression to S1 was prolonged compared to group C (302 min). This observation is similar to that of Mahima et al. who also reported 598 min with dose 15mcg of dexmedetomidine. The study conducted by Gunjan et al. two segment regression was shorter duration with clonodine which is similar to our study [4].

Diphi N. Anandni et al. observed early onset of motor block in dexmedetomidine comparison to clnodine, which is similar to our study. The study conducted by Hala et al. also noted that intra spinal dexmedetomidine causes early onset of motor block.

In present study 15mcg intra spinal dexmedetomidine increases the duration of motor block in group Die 492min. The study, conducted with dexmedetomidine 10 mcg intrathecaly by Parake et al. noted 341 min motor block. The present study motor block was prolonged due to higher doses of dexmedetomidine. The motor block was shorter duration of 255 min in group C. Shorter duration of motor block with clonodine was also a feature noted by Munraju et al.[5].

In the present study, mean arterial pressure and heart rate are comparable in both the groups. But

seven Patients in (23%)dexmedetomidine and five patients in (15%) group clnodine had bradicardia and were treated with atropine .Three patients on (10%) dexmedetomidine and two patients on (6%) clnodine were severely hypotensive were requiring 3 to 6 mg of mephentriomen I V in divided doses.

This decreases heart rate and blood pressure. Baroreceptor reflex and heart rate response to presser agent is well preserved with the use of dexmedetomidine, Thus hypotension and bradycardia are easily treatable conferring hemodynamic stability.

This observation is similar to the study conducted by Anandandm et al and Yektas et al. [6]. Hence, we also agree with Shaguftanaaz et al that one has to be vigilant since a good number of patients had a fall in heart rate and blood pressure while using 15 mcg doses of dexmedetomidine.

In the present study sedation scores are used as per the ramaswomy sedation score was grade 3 in both groups. Hala et al. and Mehmooda et al. reported sedation score of 3 and 2 with 15mcg and 10 mcg of dexmedetomidine respectively which is similar to our study. But Kothari et al. observed that most of the patients were in grade 2 on sedation scale with dose of 50mcg of clonodine [7].

The post operative analgesia was 587± 58 mins in group D. Which is statistically significant (p= <0.001) . More prolonged analgesia provided by the 15 ug of dexmedetomidine was not only covering the intraoperative period, but also covered the postoperative period with less demand for the rescue analgesia in first 24 hours. Rescue analgesia needed in Abdula hamid et al. (5mcg) and Ranjani guptha et al. (5mcg) study was after 381 and 433 min respectively, almost similar to our study [8,9].

Rescue analgesia was needed after 362.84 min as reported by Muniraj et al. with 50mcg of clonodine [5]. We observe 408mins of rescue analgesia with 60mcg of clonodine and is statistically significant. Intrathecal dexmeditomidine produces its analgesic effect by blocking the release of adrenaline from afferent nerve terminals in spinal cord Dexmeditomidine is 8 times more potent than clonodine.

The minimal side effects like nausea, vomiting and shivering observed in group D due to antinociception action of dexmedetomidine in the spinal cord.

Shagufta naaz et al. noted that nausea and vomiting less with intrathecal dexmeditomidine due to higher grade of sedation. Bajwa et al. concluded that intrathecal dexmeditomidine also has an anti-shivering property [10].

Conclusion

Dexmedetomidine can be an alternative to clonidine when administered with bupevicane as adjuvant for spinal anesthesia provides faster onset and longer duration of sensory and motor block with prolonged postoperative analgesia with comfortable sedation.

Prior publication: NIL

Support: NIL

Conflicts of interest: NIL

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