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Comparative analysis of intrathecal low dose dexmedetomidine and clonidine as an adjuvant to bupivacaine in gynaecological surgeries

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ABSTRACT

Background: Adjuvants play an important role in the intraoperative and post-operative analgesia. Spinal Anaesthesia is very common among gynaecological surgeries. Bupivacaine is the most common drug used for in gynaecological surgeries. So, addition of Clonidine or Dexmedetomidine as adjuvant can decrease post-operative analgesia.

Materials and Methods: A randomised controlled trial was done to compare the two groups of Dexmedetomidine and Clonidine along with Bupivacaine. A total of 100 patients were divided into 50 each randomly into two groups and intrathecal medication were given as per the group allotted.

Results: Time of onset of sensory and motor block was much faster in Dexmedetomidine group than Clonidine group. The two segment regression was slower in Dexmedetomidine group compared to Clonidine group. The time taken for two segment regression was 590 ±15 minutes and 361± 18 minutes respectively and was found to be statistically significant**.** Onset of motor block according to Bromage grade 3 was 4.3 ±1.2 minutes and 5.14 ±1.4 among Dexmedetomidine and Clonidine group respectively. The mean values of mean arterial pressures and heart rate were similar throughout the inter operative and post-operative time duration.

Conclusion: Planning and managing postoperative analgesia starts from pre anaesthetic evaluation. So Dexmedetomidine when used along with Bupivacaine intrathecally has better postoperative pain relief as compared with Clonidine and Bupivacaine.

1. Introduction

There are many adjuvants which are used for spinal anaesthesia along with the local anaesthetics which provide a good quality of anaesthesia and require less analgesia during the post-operative period. Inadequate postoperative pain relief may affect recovery and increase postoperative complications, which can potentially prolong hospitalization and increase healthcare costs. Recognizing that inadequate acute pain control is a global issue the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has published pain assessment and management standards in the year 2000.[1,2]

Nociceptive pain is often regarded as the key feature of acute postoperative pain. Besides inflammatory, visceral and neuropathic pain mechanisms may contribute to the pain occurring during postoperative period.[3,4] This is caused by release of inflammatory mediators which activate peripheral nociceptors which initiate transduction and transmission of nociceptive information to CNS. There is also release of substance P and calcitonin which produce vasodilatation and extravasation.[5,6]

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Dexmedetomidine is an alpha 2 adrenal receptor agonist and also used as intravenous sedative drug. The mechanism by which the Dexmedetomidine acts is by inhibiting the release of substance p from spinal cord.[7,8]

Clonidine is an alpha to adrenergic agonist which act by binding two alpha 2 receptors.[2] Based on earlier studies, Dexmedetomidine when used with adjuvant produces better long term analgesia during the post-operative time.[9,10] So in this study a comparison was done of intrathecal low dose Dexmedetomidine and clonidine as an adjuvant to Bupivacaine in gynaecological surgeries.

2. Materials and Methods

A randomised control study was done among patients undergoing gynaecological surgeries with subarachnoid block at tertiary care hospital. The study duration was from 1^{st} July 2019 to 31^{st} Dec 2019. The study was approved by institutional scientific committee and also by institutional ethical committee.

2.1. Inclusion criteria and Exclusion criteria

All female patients from age group 30 to 60 years without any comorbidities & all female patients from age group 30 to 60 years with ASA I and II. All female patient age group 30 to 60 years with informed written consent. The Exclusion criteria are patient taking any medications for chronic illnesses, morbidly obese patients, spine deformities and previous history of spine surgeries, clotting or bleeding disorders, patients who do not give informed written consent and known allergy to the trial drugs or local anaesthesia drugs.

A total of 100 patients were selected for the study based on time frame sampling method. Time frame considered was from 1^{st} July 2019 to 31^{st} Dec 2019. All patients who were eligible as per inclusion and exclusion criteria were considered for study.

The patients were randomly divided into two groups by table of random numbers.

Group A : N = 50, Dexmedetomidine 15 mcg and hyperbaric Bupivacaine 15 mcg. Group B : N =50, Clonidine 60 mcg and hyperbaric Bupivacaine 15 mcg. The both drugs were given along with Bupivacaine intrathecally.

Both the Group A and Group B volumes were made to 3.5 ml with normal saline. after pre anaesthetic evaluation the patients were kept overnight fasting on the previous day of surgery. Anxiolytic medication and other medication to prevent hyper acidity was also given previous night of surgery. Before surgery in the pre-operative procedure room an intravenous line was taken and all the patients where loaded with 10 to 20 ml per kg body weight of ringer lactate in 20 to 30 minutes. ECG, oxygen saturation and non-invasive blood pressure were connected and the baseline values were taken before inducing the patients with spinal anaesthesia. the spinal anaesthesia procedure was performed in L3 – L4 space in lateral position in all patients with 25 or 26 spinal needle under aseptic precautions. the time at which the spinal injection was given was considered as zeroth time for the study the further measurements were recorded time to time. The patients were assist for sensory and motor blocks. For sensory, pin prick sensation 23 G sterile hypodermic needle was used from the time of onset and dermatome was tested every one minute for first 5 minutes. After five minutes was over the sensory block was assessed at regular intervals till the surgery was over. Motor block was assessed using Bromage scale at regular intervals. The sedation of intra operative and post-operative was assessed by Ramsay sedation scale at every 10 minutes throughout the surgical procedure. The other parameters like hemodynamic, intraoperative or post-operative adverse effects were recorded. If there was any hemodynamic abnormalities during the perioperative like bradycardia or hypertension, intravenous Mephentermine and Atropine were used with appropriate dose. From the time of block, the hemodynamic variables where recorded at one minute and then every 5 minutes for first 15 minutes and then for 5 minutes for the next half an hour and every 10 minutes thereafter up to 120 minutes.

The statistical analysis was done using SPSS 21 evaluation version. Student t test was done to identify the significance off study parameters on a continuous scale within two groups and chi square test was done to compare the categorical data between the two groups.

3. Results

Both the groups A and B were comparable and there was no significant difference between the two groups with respect to the basic characteristics of demography and anthropometry. (Table 1)

As from the Table 2, it was clear that the time of onset of sensory and motor block was much faster in Dexmedetomidine group than Clonidine group. The two segment regression was slower in Dexmedetomidine group compared to Clonidine group. The time taken for two segment regression was 590 ±15 minutes and 361±18 minutes respectively and was found to be statistically significant.

Similarly the onset of motor block according to Bromage grade 3 was 4.3±1.2 minutes and 5.14±1.4 among Dexmedetomidine and Clonidine group respectively. The mean values of mean arterial pressures and heart rate were similar throughout the inter operative and post-operative time duration. The sedation score among both the groups was less and was limited to grade 3 based on Ramsay scale. The post-operative analgesia was much higher in Dexmedetomidine group as compared to Clonidine group. The rescue analgesia was rarely used in Dexmedetomidine group as compared to Clonidine group. The patients were

Table 1: Showing the demographic and anthropometric distribution among dexmedetomidine and clonidine group

Variable	Group A (Dexmedetomidine)	Group B (Clonidine)	P value
Age (in Years)	37.4 ± 2.7	39.6 ± 3.2	0.731
Weight (in Kg)	61.4 ± 1.4	60.7 ± 1.6	0.681
Height (in mts)	5.2 ± 0.4	5.3 ± 0.5	0.703
ASA 1: 2	21: 8	22: 9	0.813
Duration of Surgery (min)	125 ± 30	128 ± 30	0.791

Table 2: Showing the sensory, motor blocks, sensory regression time and time of rescue analgesia, regression to bromage among dexmedetomidine and clonidine group

Variable	Group A (Dexmedetomidine)	Group B (Clonidine)	P value
Onset of Sensory Block (min)	3.9 ± 0.8	5.1 ± 0.5	0.001
2 Segment Regression (min)	590 ±15	361± 18	0.001
Time of Sensory regression to S1 (min)	601 ± 26	338 ± 35	0.001
Onset of Motor Block According to modified Bromage 3(min)	4.3 ±1.2	5.14 ±1.4	0.001
Time of Rescue analgesia (min)	508 ± 26	343 ± 30	0.001
Regression to Bromage 0 (min)	421 ± 19	238 ± 29	0.001

hemodynamically stable In both the groups and there were no side effects.

4. Discussion

For most of the gynaecological surgeries spinal anaesthesia is used. The outcomes of use of hyperbaric Bupivacaine with respect to the quality of analgesia during the post-operative time duration is poor. So an added adjuvant along with bupivacaine will provide better analgesia.

Hence in the current study Dexmedetomidine and clonidine have been used as adjuvants.

Samina Ismail et al[11] did a study on post-operative pain management after caesarean section among 120 patients with age group of 23 to 31 years in pethidine (PCA) group and pethidine (continuous IV group) respectively**.** The mean pulse was 80.2 ± 12.4 in the continuous narcotic infusion and 82.5 ± 13.1 with patient controlled analgesia. Similarly the studies done by Stapleton JV et al,[12] Mitsuhata H et al,[13] Altindis NT et al,[14] Waleed M et al[15] the mean pulse was ranging from 81.7 ± 13.4 to 85 ± 14.2 in pethidine and 82.6 ± 11.4 to 86.5 ± 13.8 in Dexmedetomidine group. In all these studies, there was no significant difference seen for pulse rate at 0 min (baseline). In the current study the mean pulse rate was 84.6 ± 10.8 in Clonidine group and 83.4 ± 10.6 in Dexmedetomidine group throughout the study. Hence, no significant difference was seen between two groups similar to the reference studies and the two groups were comparable. These are similar to studies done by Altindis NT et al[14] where mean and standard deviation are 1.73 ± 0.527 in pethidine and 1.81± 0.518 for Dexmedetomidine group at 0 min. Similarly in the study done by Waleed M et al[15] the mean and standard deviation was 1.6 ± 0.52 in pethidine and 1.8 ± 0.47 in Dexmedetomidine group at 0min. Hence no significant difference was seen in sedation score at 0min in both the groups and the two groups were comparable. The above studies had a similar onset of sensory as well as motor block and the Bromage scale as compared to current study. The Dexmedetomidine group had better analgesia as compared to Clonidine group and this was found to be statistically significant.

Shahbaz R. Arain et al[16] conducted a randomized study on 34 patients undergoing elective inpatient who received either dexmedetomidine (initial loading dose of 1 microgram/kg over 10 min followed by 0.4 microgram/kg(-1) h(-1) for 4 h) or morphine sulfate (0.08 mg/kg) 30 min before the end of surgery. They determined heart rate (HR), mean arterial blood pressure (MAP), respiratory rate (RR), sedation and analgesia (visual analog scale), and use of additional morphine in the postanesthesia care unit (PACU) and up to 24 h after surgery. They too found that there was a decrease in heart rate, mean arterial pressure in dexmedetomidine group as compared to morphine group and required less morphine(PACU dexmedetomidine group, 4.5 +/- 6.8 mg; morphine group, 9.2 +/- 5.2 mg). There was also better analgesia and sedation scores in dexmedetomidine group. All these results are similar to the current study results.

5. Conclusion

For better intra operative and post-operative analgesia the adjuvants play an important role. This also reduces the use of rescue analgesia and has better acceptance rate by the patients. Dexmedetomidine is better than clonidine as an adjuvant and must be used regularly in gynaecological surgeries.

6. Source of Funding

None.

7. Conflict of Interest

None.

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