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Comparative study of clonidine vs dexmedotomidine as an adjuvant to intrathecal hyperbaric bupivacaine for lower abdominal surgeries

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Abstract
Background of the study: Spinal block is the technique of choice for surgeries in lower abdominal regions. Bupivacaine is defined as the commonly utilized local anesthetic. Several adjuvants have been utilized to enhance the standard of analgesia over the time of post- surgery. In this research, we utilized α2 –agonists such as clonidine and dexmedetomidine.
Objectives: The goal of the research analysis is to compare the consequences of dexmedetomidine as well as clonidine as adjuvants to intrathecal hyperbaric 0.5% bupivacaine concerning the sensory and motor onset time and duration of post operative analgesia for surgeries in lower abdominal region.
Methods: In this research, a total of 100 number of patients belonging to both sexes of ASA grade I as well as II were randomly allocated into two groups. Group BC injected with 0.5% hyperbaric bupivacaine along with 30µg of clonidine and Group BD each injected with 0.5% hyperbaric bupivacaine along with 5 µg of dexmedetomidine.
Data Analysis: Statistical data were depicted as mean±SD as well as the data was evaluated by SPSS software. This study utilizes two type of statistical analysis include Chi-square test as well as independent t-test for unpaired samples were used to find the significant value. Value of 'P' is low than (<0.05) was measured as implication value.
Results: Average sensory onset duration in Group BC was1.5 ±0.4 min whereas in Group BD was 1.3±0.5 min. Time for rescue analgesic in Group BC was 366±26.8 minutes in Group BC and Group BD was 398.8±32.5 which was statistically significant.
Conclusions: Dexmedetomidine as compared to clonidine with hyperbaric bupivacaine injected in subarachnoid space have a quicker initiation of sensory and motor block. In addition to, it lengthens the time period of analgesia.

Keywords: Hyperbaric bupivacaine, clonidine, dexmedetomidine, lower abdominal surgeries

Introduction
Surgeries in lower abdominal region may be performed with the use of general or regional anesthetics [4]. Spinal block has extensive popularity, as well as sufficient post-surgery pain control is necessary to avoid unfavorable outcome of surgical abuse. The perfect spinal anesthetic would offer quick and sufficient surgical anesthetic, facilitating early movements in body and the capability to permit quick discharge [9].
Bupivacaine is defined as majorly utilized local anesthesia for spinal block but the time period of action of anaesthesia in the body is found as low and confined. To minimize the issue of shorter period of activation as well as to enhance peri-operative hemodynamic stability and analgesia standard, several adjuvants are now utilized in subarachnoid space along with bupivacaine [7]. Numerous subarachnoid adjuvants, include ketamine, fentanyl, midazolam and morphine, are utilized to enhance the standard as well as time period of analgesia [10].
Primary alpha-2 adrenoceptor agonists include dexmedetomidine as well as clonidine has been used as adjuvants to act as a local anesthesia due to their properties of analgesic and tranquilizer effect and also the hemodynamic stabilizing effect. Both the adjuvants have been observed to lengthen the time period of spinal block after the subarachnoid space injection [11]. Dexmedetomidine is a novel major choice α-2 adrenoreceptor agonist that was permitted by means of FDA in the year of 1999, for enable in human beings as a immediate treatment for the purpose of analgesia or tranquility in the ICU [8, 14], as well as acquires anxiolytic,

tranquilizing, sympatholytic, analgesic, opioid-sparing and hypnotic properties devoid of generating considerable respiratory issues [16]. It performs by hindering the nor-epinephrine discharge at the location of locus coeruleus. Adjuvant such as dexmedetomidine administered in various dosages has been utilized with hyperbaric 0.5 percent bupivacaine in intrathecally to generate early initiation and lengthened sensory block time period as well as motor block time period with preserved hemodynamic stability and nominal associated issues [1, 12]. Adjuvant such as clonidine is a major choice alpha-2 adrenoreceptor agonist mediator, regularly utilized as pre-operative medication for general anesthesia. It lengthens motor as well as sensory blockade in spinal nerve block and also offers extended post-surgical analgesia. It plays by circuitously hindering the action of wide dynamic range neurons [7]. It is devoid of opioid-associated consequences like urinary problems, pruritus, as well as vomiting [13].

This research was carried to compare the consequence of clonidine and dexmedetomidine as a adjuvant to intrathecal hyperbaric bupivacaine in patients performing surgeries in the region below the abdomen.

Objectives of the study

The goal of this research is to compare the consequence of administering clonidine and dexmedetomidine to bupivacaine in subarachnoid space block in surgeries performed in region of lower abdomen about,

- To assess the sensory onset duration.
- To assess the motor onset duration.
- To assess the duration of postoperative analgesia

Materials and Methods

A total of 100 number of patients belonging to both sexes of ASA grade I as well as II were randomly allocated into two groups. Patients in between the age group of 18-60 years posted for abdominal surgeries included in the study. The patients were separated into two trial sets subsequent to random separation which was performed utilizing simple sealed envelope method. Study conducted in Mallreddy medical college for women, Hyderabad after obtaining institutional ethical committe approval during the time period of July 2018 to April 2019.

Sensory as well as motor block onset durations, sensory regression, vital parameter such as arterial pressure and duration of postoperative analgesia were examined.

Data collected were stored into Ms-Excel data sheet and evaluated utilizing SPSS software. Chi-square analysis was utilized to find the implication value. Constant data were illustrated as mean and SD. Independent t-test analysis was the significance assessment to recognize the average difference involving 2 groups. Patients were randomized to 2 groups of 50 patients to administer the followings injections:

Group BC– Intrathecal injection includes 3.5 ml of hyperbaric0.5% bupivacaine and 30µg clonidine (volume made 0.5 ml by adding normal saline). Total volume 4 ml.

Group BD– Intrathecal injection includes 3.5 ml of hyperbaric 0.5% bupivacaine and 3µg dexmedetomidine (volume made 0.5 ml by adding normal saline). Total volume 4 ml.

Results

Table 1 depicts the demographic profile of the research. All parameters such as age, gender, height and weight are not statistically significant involving Group BC and Group BD. The values are illustrated as in the form of mean± SD in the parameters such as age, height and weight.

Table 1: Demographic profile of the study

Parameters	Group BC	Group BD	P-Value
Age	45.47±1.18	48.80±2.76	0.438
Gender	29:21	30:19	0.588
Weight	71.30±9.85	69.66.±8.65	0.911
Height	161.14±6.12	159.18±5.36	0.909

In table 2, the mean sensory onset duration in Group BC and Group BD was 1.5 ±0.4 and 1.3±0.5minutes respectively, with a statistically significant difference involving the both groups. While the average motor onset duration was 2.1±0.5and 1.8±0.4 minutes in Group BCand in Group BD correspondingly, with a statistically significant difference involving the both groups. The average sensory regression time period by two segments in Group BC was 136.7±10.7 minute, whereas in Group BD was 146.4±11.7 minute. This differentiation within the average sensory regression time period by two segments involving two groups was statistically considerable. Moreover, the average time for rescue analgesia within Droup BC was 366.4±26.8 min, whereas in Group BD was 398.8±32.5min. This variation in time period for rescue analgesia involving two trial sets was statistically considerable.

Table 2: Comparison for sensory block and motor block

Parameters	Group BC	Group BD	P-Value
Sensory Onset Duration	1.5 ±0.4	1.3±0.5	0.02
Motor Onset Duration	2.1±0.5	1.8±0.4	<0.001
Sensory Regression by Two Segments	136.7±10.7	146.4±11.7	<0.001
Time for rescue analgesia	366.4±26.8	398.8±32.5	<0.0001

Table 3 describes the arterial pressure. There was a drop in the systolic pressure below 90 mm Hg in 10 and 11 patients in group BC and group BD correspondingly, with a statistically insignificant difference involving the two groups. There was a drop in pulse rate below 60 bpm in 3 and 2 patients in group BC and group BD correspondingly, with a statistically insignificant difference involving the groups.

Table 3: Hypotension and bradycardia occurred in number of patients and their percentage.

Parameters	Group BC (No and Percent of patients)	Group BD (No and Percent of patients)	P-value
Fall in systolic pressure below 90mm Hg	10 (20%)	11 (22%)	0.8998
Fall in heart rate below 60 bpm	3(6%)	2(4%)	0.654

Discussion

Post-operative analgesia should be efficient with decreased side effects. In favor of spinal block, 0.5% hyperbaric bupivacaine is most widespread local anesthesia utilized.

Nevertheless, its post-surgery analgesic time period is confined. Therefore, a chemical addition to this local anesthesia is a consistent method to extend the time period of anesthesia. A basic method has been broadly established. Many adjuvants like (1) benzodiazepines include midazolam, (2) opioids includenalbuphine, buprenorphine, pethidine, and fentanyl, (3) ketamine, and (4) neostigmine have been utilized. Opioids are considered as the foundation for post-operative analgesia [6]. Opioids injected in subarachnoid space extend the time period of analgesia but can have overdue as well aserratic respiratory problems, urinary retention, nausea, pruritus, and vomiting [15]. Thus, it has necessity for improved adjuvants that lengthens analgesia lacking the opioids associated consequences. Subarachnoid alpha-2 adrenoreceptor -agonists are observed to have anti-nociceptive act for primitive as well as somatic ache. Consequently, these are utilized as secondary agent to bupivacaine for spinal nerve block. Clonidine is defined as a partial alpha-2 adrenoreceptor adherent reinforces motor as well as sensory block of local anesthesia. Clonidine's analgesic consequences are arbitrated by the stimulation of post-synaptic alpha-2 adrenoreceptors in the area of substantia gelatinosa located in the spinal cord. This lowers the discharge of nociceptive materials from the area of substantia gelatinosa by stimulating the downward inhibitory medullary spinal pathways [3]. Several researches showed that clonidine was injected in subarachnoid space. It has been found to be an ultimate adjuvant to extend the analgesia's time interval. As well as, Dexmedetomidine is defined as an alpha-2 -receptor adherent more particular as compared to clonidine. In general anesthetics, it is generally utilized as a pre-medicant. It decreases the need of opioid and inhalational anesthesia. There are especially few researches accessible for the adjuvant such as dexmedetomidine and its subarachnoid block effectiveness [4]. Therefore, it has a requirement to evaluate its efficiency as a spinal cord secondary injective agent to bupivacaine. Thus, we carried out this research to assess as well as contrast the consequence of incorporating dexmedetomidine and clonidine with 0.5 percentage of hyperbaric bupivacaine in spinal nerve block for optional surgeries in lower abdominal areas. In this research, we relate the adjuvants such as dexmedetomidine and clonidine. This was planned not just to identify the effectiveness of alpha-2 agonists set on an entire as well as to recognize which between the two were more proficient. Several researchers have utilized Ndiverse dosages of clonidine for subarachnoid block initiating from 15µg-100µg as well as dexmedetomidine for subarachnoid block initiating from 3µg-15µg administered with local anesthetics. Furthermore, the researcher in the study [2] said that binding affinity to spinal alpha-2 adrenoreceptors of adjuvant such as dexmedetomidine related with the adjuvant 'clonidine' is around the ratio of 1:10. This study showed that the dissimilarity in mean sensory onset duration between the two groups was statistically significant. Initiation time duration of sensory block was quicker within the Group BD whereas slower within the Group BC. Average sensory regression time period by two segments displayed that statistically significant variation. The study [6] evaluated the consequences of low-dosage of dexmedetomidine/clonidine along with bupivacaine in spinal nerve block [6]. The researcher examined that the duration for sensory regression by two-segment was extended with dexmedetomidine set, after that clonidine set as compared to the control set that relates with this research analysis. The study of [6] the researcher found that injection of low-dosage of dexmedetomidine or clonidine in subarachnoid space with bupivacaine created considerably short time period of motor as well as sensory onset duration as compared to bupivacaine alone. Average time for rescue analgesia in this research analysis had a variation that was statistically considerable. Maximum period of time was observed within the Group BD when compared to Group BC. This research agrees with the study performed by the research [5] and here, the researcher examined that the average analgesia time period is 3.8 ± 0.7 hour within the control set as well as 6.3 ± 0.8 hour whereas utilizing 1µg/kg clonidine with a average mass of 60.6 ± 19.4 kilogram. Average motor block initiation duration was quicker within the Group BD whereas slower within the Group BC as well as variation between these two groups was statistically significant.

Conclusion

Dexmedetomidine provide faster onset of sensory and motor block and when compared to clonidine as an adjuvant to Bupivacaine. Dexmedtomidine prolongs the postoperative analgesia with minimal side effects.

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