Original Article

A Comparative Evaluation of Dexmedetomidine and Clonidine as an Adjunct with Intrathecal Inj. Levobupivacaine in Spinal Anaesthesia

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ABSTRACT

Background: Clonidine and Dexmedetomidine are alpha 2 adrenergic agonists when used intrathecally with local anesthetics, they are known to potentiate the action of local anesthetics as well as have analgesic properties.

Aim: To find better adjuvant in regional anesthesia comparing efficacy and clinical profile of alpha 2 adrenergic agonists Clonidine and Dexmedetomidine with special emphasis on the following parameters 1. Hemodynamic stability and sedative property 2. Onset and duration of sensory and motor block 3. Ability to provide smooth intra operative and post operative analgesia.

Methods: 50 patients of ASA grade I and II, scheduled for lower abdominal and lower limb surgery at our institute satisfying inclusion criteria were selected and divided randomly into two groups C and D. Hemodynamic parameters, onset and duration of sensory block and motor block, duration of spinal anesthesia and sedation scores recorded.

Results: Sensory and motor block times were significantly longer in group D than Group C. The mean duration of sensory block was 205.2 (±25.87) min. in group C and 261.6 (±32.71) min. in group D and mean recovery time of motor block was 251.4 (±40.44) min. in group C and 322.2 (±24.60) in group D. Patient of group D had significantly less and delayed requirement of rescue analgesic i.e. mean duration of spinal anesthesia is 378.6 (±75.49) min. in group C and 492 (±49.99) min. in group D.

Conclusion: Intrathecal Dexmedetomidine with isobaric Levobupivacaine significantly prolongs sensory and motor block and post operative analgesia as compared to Clonidine.

Keywords: Dexmedetomidine, Clonidine, Levobupivacaine, Intrathecal

INTRODUCTION

Subarachnoid block is most common anaesthesia technique used to conduct lower limb surgeries and lower abdominal surgeries among all methods. A regional anaesthetic technique provides intra-operative anaesthesia as well as excellent post operative analgesia without systemic side effects. But only limiting factor is duration of block. To overcome this factor various adjuncts to local anaesthetics tried and studied to prolong post operative analgesia.

Alpha 2 – adrenoceptor agonists prolong the duration of sensory and motor block with local anaesthetics [1]. Most of clinical studies about the intrathecal Alpha2 adrenoceptor agonists are related to Clonidine. Dexmedetomidine is eight times more selective Alpha 2 adrenoceptor agonist emerging as a valuable adjunct to regional anaesthesia and analgesic. Based on earlier human studies, it is hypothesized that intrathecal Dexmedetomidine would produce more post-operative analgesic effect with minimal side effect [2-4].

There are few evidences regarding Dexmedetomidine efficacy as adjuvant to isobaric Levobupivacaine [5, 6]. The current study conducted to test the safety and efficacy of Dexmedetomidine as an adjunct to isobaric Levobupivacaine and also to compare its usefulness with previously established alpha-2 adrenoceptor agonist, Clonidine.

MATERIAL AND METHODS

After obtaining approval from the institution and Ethical committee (Human research) of our institute and written informed consent from the patients, an observational randomized double blinded study was conducted on 50 ASA grade I and II patients aged between 25-55 years undergoing lower limb and lower abdominal surgery under spinal anaesthesia. Patient of ASA grade III and IV, abnormal coagulopathy, psychiatric disorders, neuropathic disorders, and contraindication for spinal anaesthesia, on alpha 2 adrenoceptor agonists or antagonists, A-V block are excluded from the study.

On the previous day of surgery, detailed pre-anaesthetic evaluation and investigations were done. All patients were familiarized with visual analogue scale (VAS) and its use for measuring the post operative pain and advised to keep NPO 8 hrs before surgery.

On the day of surgery, base line heart-rate non – invasive blood pressure recorded and pre medicated with Inj. Glycopyrrolate 0.004 mg/kg i.v., Inj. Ondansetron 0.08 mg/kg, Inj. Midazolam 0.02 mg/kg i.v. In the operation theatre, Electrocardiogram (ECG), non-invasive blood pressure (NIBP), pulse oxymetry (Spo2), attached and monitoring started. All patients preloaded with Ringer Lactate 15 ml/kg. They were randomly divided in to two groups using 'slips in box' technique into following two groups.

Group C: - Received Inj. Levobupivac 0.5% (isobaric) 3.0 cc with Clonidine 15 microgram intrathecally

Group D: - Received Inj. Levobupivac 0.5% (isobaric) 3.0 cc with Dexmedetomidine 10 microgram intrathecally

The local anaesthetic solution for spinal anaesthesia was prepared by an anaesthesiologist and then given to another anaesthesiologist who was blinded to the nature of drug. Sub arachnoid block was administered in sitting position at L3-4 space by BD spinal needle under all aseptic precautions. The anaesthesiologist, who has performed block, recorded the data and was blinded to the given drug.

The following block characteristics were observed and recorded onset of sensory and motor block, highest sensory dermatomal level, time to reach highest sensory level, duration of spinal anaesthesia [1, 4]

Sensory level was checked with pin prick method, in the midline, using sterile needle. Modified Bromage Scale (o=no block, 1=inability to raise extended leg, 2=inability to flex knee and 3=inability to flex ankle and foot) was used to measure the motor block. Sensory and Motor block assessed every 2 minutes from the time of injection of intrathecal local anaesthetic up to 20 minutes and the every 15 minutes

Hemodynamic parameters were monitored and recorded every 5 minutes up to 30 minutes with 0 minutes at time of spinal anaesthesia, and then every 15 minutes up to 3 hours. Hypotension (defined as systolic arterial pressure falling more than 20% MMHG) was treated with inj. mephentermine 3-6 mg in bolus doses and heart rate < 50 beats /min was treated with 0.3 mg of inj. atropine(4)

Post operatively, sensory block regression and motor block recovery and VAS scores more than 3. Inj. Diclofenac sodium 75 mg given intravenously and time recorded.

RESULTS

We have selected 50 patients of ASA grade I and II undergoing lower abdominal and lower limb surgeries for our study. Patient demographic profiles in both groups are comparable as per shown in table no 1.

Table 1: Patient demographic profile

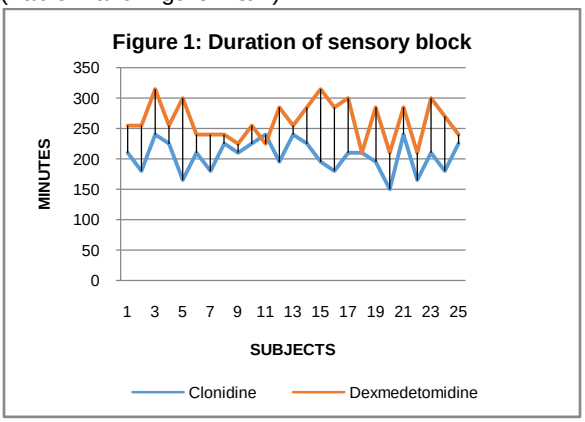
Variable	Group C	Group D	
Age(Years) (Mean±SD)	33.6 (±8.57)	35.08 (±9.67)	0.56
Sex(M:F)	17:8	17:8	1
ASA(I/II)	21:4	21:4	0.5

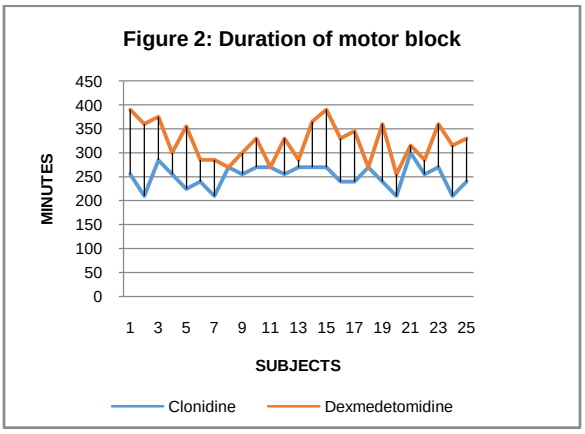
Table 2: Comparison of Block Characteristics in Both Groups (In Minutes)

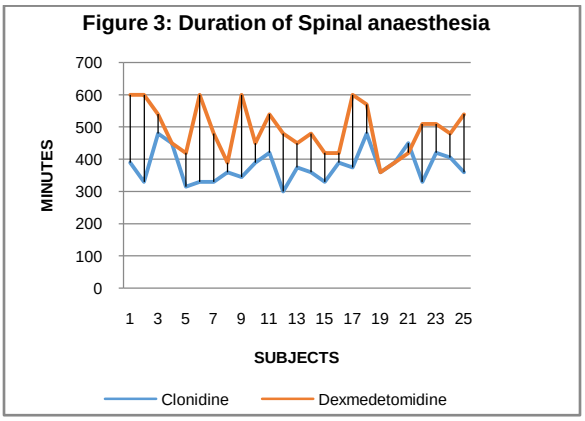
Variable	Group C Mean (±SD)	Group D Mean (±SD)	P value
Time of onset of sensory block	6.24 (±1.87)	5.28 (±1.81)	0.07
Time of onset of motor block	10.88 (±2.00)	10.32 (±2.80)	0.42
Time to reach maximum sensory level	13.04 (±2.77)	11.2 (±2.30)	0.01
Duration of sensory block	205.2 (±25.87)	261.6 (±32.71)	0.001
Duration of motor block	251.4 (±40.44)	322.2 (±24.60)	0.001
Duration of spinal anesthesia	378.6 (±75.49)	492 (±49.99)	0.001

As shown in table no 2, the difference between time of onset of sensory and motor block, which is 6.24 (±1.87) min and 10.88 (±2.00) in group C and 5.28 (±1.81) min and 10.32 (±2.80) min in group D respectively. Time to reach highest sensory level (T6 to T10) was 13.04 (±2.77) min in group C and 11.2 (±2.30) min in group D which was statistically insignificant.

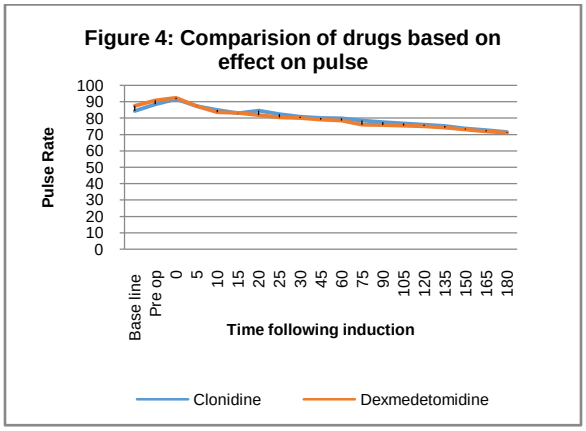
As far as duration of sensory and motor block is concerned Group D has significantly longer duration (Table 2 and Figure 1 & 2).

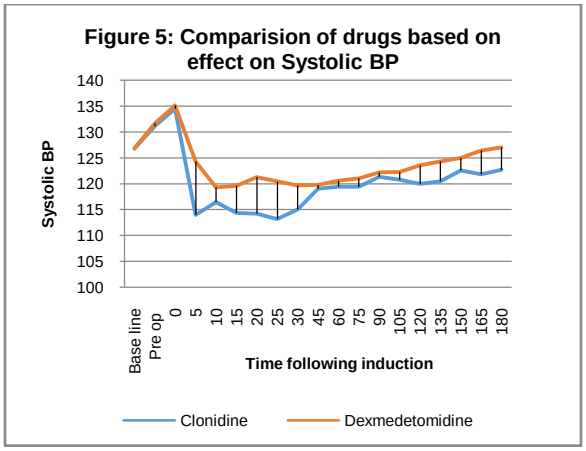


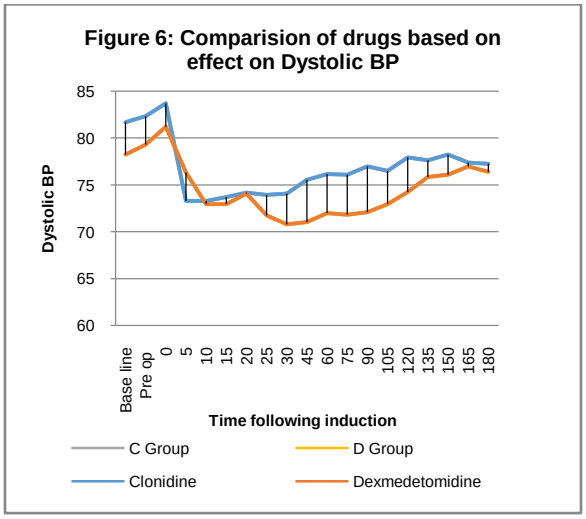




Duration of spinal anesthesia for group C was 378.6 (±75.49) minutes and for Group D was 492 (±49.99) minutes. Difference in the duration was statistically highly significant. ($p<0.001$) trend is also shown in the figure 3.







Following induction by both groups vitals like pulse and Systolic and Diastolic BP was taken at baseline, Pre operative, 0, 5, 10, 15, 20, 25, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165 and at 180 Minutes. Figure 4, 5 and 6 are showing the effect of drugs respectively on the study subjects pulse, systolic and diastolic BP respectively. Lines for C and D are showing the Mean differences among both the group. As far as pulse is concerned there is no statistical significant difference p=0.75). Whereas in case of systolic BP p=0.05 (NS) and in case of diastolic BP P =0.02 (SS). Incidence of bradycardia and hypotension was not there.

Sedation score was 1 in all patients in both groups according to Ramsay's sedation score. Respiratory depression, nausea, vomiting, pruritus, urinary retention was not seen in any patients which is common with intrathecal opioids.

DISCUSSION

Alpha 2 adrenergic agonists potentiate neuraxial local anaesthetics without producing opioids related side effects. The analgesic property of intrathecal or epidural Clonidine was first demonstrated in 1984 [7]. Clonidine is very well evaluated, established and widely used alpha 2 agonist as an adjunct to regional anesthesia in last decade. But there has been need for clinical studies related to intrathecal Dexmedetomidine to prove its safety, efficacy and suitable dose for intrathecal administration. Kanazi GE et al found out in his study that the mean time of sensory regression to the S1 segment was 303 +/- 75 min in group D, 272 +/- 38 min in group C. while in current study it was 261.6 (±32.71) and 205.2 (±25.87)respectively which was statistically significant (p<0.001). [8] Especially with newly emerging and safer local anesthetic agent Levobupivacaine which is levorotatory isomer of bupivacaine having safer pharmacological profile with less cardiac and neurologic adverse effects [4]. Studies show that equal doses of Levobupivacaine and bupivacaine provide similar onset of sensory block, maximum cephalic spread and duration of analgesia. The regression time of motor block to reach modified Bromage 0 was s 240±60 [9] and 421±21 [10] min in group D. Whereas in present study it was Duration of motor block with Dexmedetomidine was 322.2 (±24.60). In case of group C it was 251.4 (±40.44) (P<0.001).

The present study is undertaken to compare the analgesic efficacy and block characteristics among two alpha 2 agonists with newer local anesthetic agent Levobupivacaine. Alpha 2 agonists act by additive or synergistic effect secondary to different mechanisms of action of the local anaesthetics. Local anaesthetics act by blocking sodium channels. Alpha 2 adrenoceptor agonists act by binding to pre synaptic C fibers postsynaptic dorsal horn neurons. Dexmedetomidine is 8 times more specific and highly selective alpha 2 adrenoceptor agonist compared to Clonidine, thereby making it a useful and safe adjunct in diverse clinical application Dexmedetomidine is a better neuraxial adjuvant to Ropivacaine when compared to Clonidine for providing early onset and prolonged post-operative analgesia and stable cardio respiratory parameters. MS Saravana Babu et al in his study found that there was no significant difference of heart rate and mean arterial blood pressure (P>0.05) in both the groups at the time of administration of drugs, but it started to decrease as evident at 30 min post-injection, there was a fall in both groups. There was a decreasing trend of heart rate and mean arterial pressure post-injection in both groups and this decrease was significant in the RC group compared with RD group (P<0.05) but none of the patient showed bradycardia or hypotension at any time. Same way in present study we noticed that there was no statistical significant difference in pulse rate and both type of BP [11].

The results of our study clearly indicate that intrathecal Dexmedetomidine significantly prolongs duration of sensory and motor block and duration of spinal anesthesia in comparison to Clonidine which is in consonance with other authors.

Our study shows that there is no difference in time of onset of sensory and motor block between intra thecal Clonidine and Dexmedetomidine but Sukhwinder singh et al [4] showed that intrathecal Dexmedetomidine resulted in earlier onset of sensory analgesia and profound sedation as compared to Clonidine but that can be attributed to higher dose of Dexmedetomidine as compared to us.

CONCLUSION

Our conclusion is intrathecal Dexmedetomidine with isobaric Levobupivacaine is better and safe combination for spinal anaesthesia and provides longer sensory and motor blockade for longer surgeries and provides excellent post operative analgesia without producing significant adverse reactions. But its safety in high risk and cardiac patients is yet to be established. And due to its longer

duration of motor blockade it is not useful for day care surgeries.

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