Original Research Article

Study of Dexmedetodine as adjuvant to epidural ropivacaine anesthesia in patients of north Karnataka population

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Abstract

Background: Dexmedetodine is the recent drug which acts as α-2 adrenergic receptors in the dorsal horn of the spinalcord to produce analgesic effect. Hence to evaluate the efficacy and safety of Dexmedetodine as an adjuvant to epidural 0.75% ropivacaine **Method:** Out of 90 patients 45 were grouped in group A, 45 in group B. The aged between 19 to 60 years having physical status of ASA grade I, II, in both sexes, Group A- received epidural ropivacaine where as group B received ropivacaine and Dexmedetodine. Patients of group A received 15 ml of 0.75% ropvacaine+1ml of normal saline and group B patients received 15 ml of 075% ropivacaine +0.6 µ kg1Dexmedetodine in 1ml NS epidurally. Various block characteristics sensory, duration of motor block, complete sensory block. Highest dermatome level of sensory block were noted and compared in both groups. **Results:** Types of surgeries in both groups were- Inguinal hernia 16(35.5%) in group A, 19(42.2%) in group B, TURP 7(15.5%) in group A, 5(11.1%) in group B 19(42.2%) vaginal hysterectomy in group A, 14(31.1%) in group B. Varicose vein stripping 3(6.66%) in group A 7(15.5%) in group B. Comparative study of distribution motor and sensory blockages, onset of sensory block. Complete sensory and motor block. Highest dermatomes sensory block, Duration of analgesic motor block studies have significant P value result (P<0.01). The side effect of bradycardia in group B 5(11%) Hypertension-8(17.7%) in group A, 14(31.1%) in group B, Nausea, 2(4.44%) in group A vomiting 2(4.44%) in group A, 3(6.66%) in group B, shivering only in group A 13(28.8%). **Conclusion:** This empirical study had proved that, Dexmedetodineis effective adjuvant with ropivacaine for epidural block as it prolongs the duration of motor block and analgesia with adequate sedation and minimal side effect.
Key Words: Dexmedetodine, ropivacaine, epidural block, sensory, motor.

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INTRODUCTION

Ropivacaine is a first single enantiomer specific compound which has reduced risk of cardio toxicity, neurotoxicity and rapid recovery of motor function[1,2]. Post operative pain relief is an important issue with ropivacaine. It has been used with many adjuvant for infra-umbilical, lower limb surgeries which has other side effects. Dexmedetodineis highly selective α-2 adrenergic agonistics which has been used for premedication and as an adjuvant to general anesthesia. It reduces opoid and inhalational anesthetic requirements[3]. Intrathecal α-2 receptor agonist are found to have antinociceptive action for bothsomatic and visceral pain[4]. Hence attempt was made to evaluate the efficacy of Dexmedetodineadded with ropivacaine in different surgeries of patients with different age groups and in both sexes and compared the efficacy of ropivacaine alone.

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MATERIAL AND METHODS

90 patients aged between 19 to 60 years admitted at obstetrics and gynecology, general surgery departments at Shri B M Patil medical college hospital and Research centre-586103(Karnataka) were selected for study

Inclusive criteria-

The patients having physical status ASA grade I, II of either sex consented for spinal anesthesia were included

Exclusion criteria: -

The patients refused for spinal anesthesia, ASA grade III, IV. Age less than 18 years and above 60 years. The patients had known history of psychotic disease, hepatic renal or cardiovascular dysfunction were excluded from the study.

Method:-

Out of 90 patients 45 patients were grouped A and 45 as Group B by lottery method. Pre-anesthetic evaluation of the patients was performed before surgery. Patients were administered tablet Ranitidine 150 mg as premedicant a night before surgery and advised for pre-operative fasting as per latest ASA practice guidelines (NPO of 6 hours solids and 4 hrs for liquids).Group A received Ropivacaine (control group) alone and group B (study group) received Ropivacaine and Dexmedetodineepidurally. Intravenous line with 18 G canula was secured. Monitoring was done using multi parameter monitor. Baseline blood pressure (systolic, diastolic) pulse rate and arterial oxygen saturation was recorded. All patients were preloaded with 10 ml/kg of ringer locate solution, 15 minute before establishment of block. Under strict antiseptic precaution infiltration of skin with local anesthetic (2% lignocaine), at L2-L3 level done. Epidural space was identified with loss of resistance to air technique using 18 G touhy's needle. An epidural catheter was advanced into epidural space for 5 cm and fixed. Test dosage of 3ml of 2% lignocaine, adrenaline 1:200000 was given after negative aspiration of CSF and blood. The patients were monitored for subjective and objective signs of any inadvertent intravascular injection and subarachnoid block. Patients were asked to report any unusual subjective sensation during injection and also monitored for objective signs on electrogram (ECG), non-invasive blood pressure (NIBP) arterial oxygen saturation (SPO2) and respiratory rate (RR). The patients was turned to supine position then administrated 15ml of 75%ropivacaine +1ml normal saline group A (control group)15ml 0.75% Ropivacaine + 0.6 kg' Dexmedetodinein 1 ml NS (group B) Drug was given at the rate of ml/3sec through catheter. The bilateral Pin-Prick method with 23 G hypodermic needle after cleaning with swab was used evaluate and check the sensory level while a modified Bromage scale (0=No block, 1= inability to raise external leg. 2= inability to flex knee 3 inability to flex the ankle and foot) was used to measure the blockade effect level at every 2 minutes. Interval from the time of administration of drug, till 30minutes. Intraoperatively, adequate volume status was maintained with crystalloid solutions with lactated ringer. The following parameters were observed immediately after the administration of epidural block. Every minute until 5 minute and every 5 minute interval till 15 minutes, there after every 15 minutes up to 2 hours and then every 30 minutes till 4 hours and then after 6 hours, 8 hrs, of the block.

1- Heart rate, SBP, DBP, SPO_2.
2- Onset of sensory block- Time interval between the end of the administration of the epidural study drug and beginning of tingling or numbness in the lower limbs
3- Time to achieve complete sensory block time interval between the end of administration of study drug and onset of cutneous analgesia at T_{10}
4- Highest dermatome level of sensory block
5- Time to complete motor blockade
6- Time to two segmental dermatomal regressions to T_{10} assessed every 20 minutes after achieving highest dermatome level of sensory analysis
7- Duration of sensory analgesia – Time from the administration of the drug till the time, when patients demands for additional analgesia
8- Duration of motor block- Time elapsed between the administration of the drug and the regression of motorblockade to zero " Zero" level of the motor block according to modified Bromage scale.
9- Sedation score (5 points scale- 1= alert and wide awake, 2= arouse to verbal command, 3= arousable with gentle tactile stimulation, 4=- arousable with vigorous shaking 5= Un-arousable)

Throughout the procedure, patients were observed for nausea, shivering, pain and any other discomfort or adverse event intra operatively and managed accordingly. The duration of study was about 2 years (March 2014 to March 2016)

Statistical analysis–

The observations findings of both A and group were compared with Z test and P value were noted. The statistical data was studied in SPSS soft ware 2007. The ratio of male and female wee 1:2

OBSERVATION AND RESULTS

Table-1 Types of surgeries in both groups. (1)Inguinal hernia in group A 16(35.5%) and group B 19(42.2%). (2)Trans urethral resection of the prostate 7(15.5%) in group A, 5(11.1%) in group B

(3)Vaginal hysterectomy 19(42.2%) in group A, 14(31.1%) in group B
(4)Varicose vein stripping 3(6.66%) in group A and 7)15.5%) in group B
Table-2Comparative study of distribution of motor and sensory blockages –Mean duration of surgery (in minutes)92.77 (SD±13.91) in group A, 90.78(SD±13.80) in group B, 't' test value was 0.68 and P value was significant (P>0.00) Onset of surgery block (in minutes) 8.01(SD±1.20) in group A, 3.40 (SD±0.77) t= 2.16 and P value was highly significant (P<0.01) Complete sensory block (in minutes) 17.55(SD±2.02) in group A, 16.0(SD±1.60) in group B 't' test was 4.03 and P value was significant (P>0.00) Highest dermatome level of sensory block T4,T6,T8- 20-11 (SD±2.12) in group A, 29.10(SD±1.11) 't' test value was 25.2 and P value was significant (P<0.1) Duration for complete motor block (in minute) 24.80(SD±2.46) in group A, 18.12(SD±3.09) in group B 't' test was 11.3 and P value was highly significant (P<0.1) Duration of analgesia (in minutes) 217.48(SD±24.4) in group A, 430.12(SD±88.32) 't' test value was 15.5 and P value was highly significant (P<0.01) Duration of motor block (in minute) 186.27(SD±21.14) in group A, 363.11(SD±70.91) 't' test value was 16.03 and P value was highly significant (P<0.01) Table-3Study of prevalence of adverse effect in both groups
Bradycardia in group 5(11.1%)
Hypotension-8(17.7%) in group A, 14(31.1%) in group B
Nausea-2(4.44%) in group A,
Vomiting 2(4.44%) in group A, 3(6.66%) in group B
Shivering 13(28.8%) in group A.

Table 1: Comparison of types of surgery in both groups

Sl.No	Particulars	Group A		Group B	
		No of the patients (45)	Percentage (%)	No of the patients (45)	Percentage (%)
1	Inguinal Hernia	16	35.5	19	42.2
2	Trans urethral resection of the prostate.(TURP)	7	15.5	5	11.1
3	Vaginal hysterectomy	19	42.2	14	31.1
4	Varicose vein stripping	3	6.66	7	15.5

Table 2: Comparative study of distribution motor and sensory blockage

Sl.No	Particulars	Group A (45)	Group B(45)	t-test value	P value
1	mean duration of surgery (in minutes)	92.77 (SD±13.91)	90.78(SD±13.80)	0.68	P>0.01(Insignificant)
2	Onset sensory block (in minutes)	8.01(SD±1.20)	3.40(SD±0.77)	21.6	P<0.01
3	Complete sensory block (in minutes)	17.55(SD±2.02)	16.0(SD±1.60)	4.03	P<0.01
4	Highest dermatome level of sensory block T_4,T_6,T_8(in minutes)	20.11(SD±2.12)	29.10(SD±1.11)	25.2	P<0.01
5	Duration of complete motor block(in minutes)	24.80(SD±2.46)	18.12(SD±3.09)	11.3	P<0.01
6	Duration of analgesia block (in minutes)	217.48(SD±24.45)	430.12(SD±88.32)	15.5	P<0.01
7	Duration of motor block (in minutes)	186.27(SD±21.14)	363.11(SD±70.91)	16.3	P<0.01

Table 3: Study of prevalence of adverse effect both groups

Sl.No	Particulars	Group A		Group B	
		No of the patients (45)	Percentage (%)	No of the patients (45)	Percentage (%)
1	Bradycardia	-	-	5	11.1
2	Hypertensive	8	17.7	14	31.1
3	Nausea	2	4.44	-	-
4	Vomiting	2	4	3	6.66
5	Shivering	13	28.8	-	-

DISCUSSION

In the present study Dexmedetodine as adjuvant Types of surgeries in both groups, Inguinal hernia in group A 16(35.5%) and group B 19(42.2%). Trans urethral resection of the prostate 7(15.5%) in group A, 5(11.1%) in group B, Vaginal hysterectomy 19(42.2%) in group A, 14(31.1%) in group B. Varicose vein stripping 3(6.66%) in group A and 7)15.5%) in group B(Table-1). Comparative study of distribution of motor and sensory block, Highest dermatome level of sensory block (T4,T6,T8). Duration for complete motor block, duration of analgesia, duration of moor block in both groups were analyzed statistically and obtained highly significant P value (P<0.01)(Table-2). The adverse effect were

Bradycardia in group 5(11.1%), Hypotension-8(17.7%) in group A, 14(31.1%) in group B, Nusea-2(4.44%) in group A, Vomiting 2(4.44%) in group A, 3(6.66%) in group B, Shivering 13(28.8%) in group A(Table-3) These findings were more or less in agreement with previous studies.[5,6,7] It is reported that Dexmedetodine (µg) used in combination of Ropivacaine in human being for spinal anesthesia have shown to produce a shorter on set of motor block and a prolong action in the duration of motor and block with hemodynamic stability and lack of sedation.[8] Moreover dexmedatoninedoes not cause any neurological complication when administration epidural.[9] Dexmedetodine has affinity to α-2- adrenoreceptor agonist is Ten times as compared to clonidine. Hence mg Dexmedetodine is safer and efficient.[10] It was observed that Dexmedetodine associated with Bradycardia and hypotension but when it is combined Ropivacaine there would not be any cardio vascular, complication because ropivacaine drug has efficiency to maintain cardio vascular and hemodynamic control.[11] The mechanism of action, by which epidural α-2 adrenoreceptor against prolong the motor and sensory block of local anesthetic is not clearly known. The local anestheticact by blocking sodium channels where as α-2 adernoreceptor against acts by binding to pre-synaptic C-fibres and post-synaptic dorsal horn neurons. The analgesic action of inrathecalα-2 adreno receptor agonists is by suppressing the release of C-fiber transmitters and by hyper- polarization of post-synaptic dorsal horn neurons.[12]. Which cause prolong sensory and motor blockage with analgesic effects.

SUMMARY AND CONCLUSION

5µdexmedatomidine seems to be attractive alternative as adjuvant to spinal ropivacine in surgical procedure. It has excellent quality of post operative analgesia with minimum side effect But this combination study demands further pharmacological patho-physiological, neurological, genetic and nutritional studies because the exact mechanism of action by which epidural alfa-2 adrenorecepter agonist prolong the motor and sensory block by anesthetic is still un-clear.

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