Research Paper

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A Study of Efficacy of Dexmedetomidine AS An Intrathecal Adjuvant on Spinal Anaesthesia Using Low Dose Bupivacaine in Infraumblical Surgeries

Medical Science

KEYWORDS : Dexmedetomidine, Intrathecal adjuvant, Infraumblical surgeries, Hyperbaric, Insulin syringe.

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ABSTRACT

Background : The Study has been undertaken to evaluate the efficacy of dexmedetomidine as an intrathecal adjuvant for spinal anaesthesia by observing the onset, duration of motor and sensory blockade, level of sedation, post operative analgesia and stability of cardiovascular and respiratory system with hyperbaric bupivacaine plus dexmedetomidine in subarachnoid block.

Method and material :-

Patient were randomly assigned in one of the two groups in a double blind fashion. Group I C (Control) Patient receiving .5% hyperbaric bupivacaine + Normal Saline (2+.05ml) Group II D patient receiving .5% hyperbaric Bupivacaine + preservative free Dexmedetomidine 5 g (2+0.05ml). Smaller volume were taken with insulin syringe and total solution is made 2.05ml.

Result :-

In our study a total of 60 patient were selected, 30 patients in each group randomly assigned in one of two groups. In our study onset of sensory and motor block was earlier with intrathecal dexmedetomidine in comparison to control group. Addition of dexmedetomidine to intrathecal bupivacaine caused prolongation of duration of sensory block, motor block and post operative analgesia. The study showed better block characteristic in bupivacaine + dexmedetomidine group with respect to bupivaicaine + normal saline.

Conclusion :-Addition of dexmedetomidine in spinal anaesthesia produces early onset, prolonged duration of sensory and motor blocks and prolonged pain free post operative period without increasing side effects or complications.

Introduction :- Lower abdominal and lower limb surgeries may be performed under local, regional (Spinal or epidural) or general anaesthesia, but neuraxial blockade is the preferred mode of anaesthesia. Spinal anaesthesia is a form of regional anaesthesia involving injection of a local anaesthetic into the cerebrospinal fluid of the subarachnoid space to anaesthetize the spinal nerve roots running through it. It is one of the oldest pain relief method for the surgical patients. Spinal block is still preferred due to its rapid onset, superior blockade, less failure rate & cost effectiveness, but has drawback of fixed duration of block and lack of post operative analgesia. Hyperbaric, isobaric, hypobaric solution of anaesthetics can be given through the spinal anaesthesia of which, hyperbaric is commonly used[1]. Bupivacaine is the local anaesthetic most commonly used, although lignocaine, tetracaine, procaine, ropivacaine, levobupivacaine are also used[2]. The desired effect is to block the transmission of nerve signals to and fro the affected area. In Recent years, use of intrathecal adjuvants has gained popularity with the aim of prolonging the duration of block and post-operative analgesia. Adequate pain management which is essential to facilitate functional recovery, enabling patients to return to their normal activity quickly.

The quality of the spinal anaethesia has been reported to be improved by the addition of opoids (such as morphine, fentanyl and sufentanil) and other drugs (such as dexmedetomidine, clonidine[3], magnesium sulphate, neostigmine[4], Ketamine and midazolam) but all have merit and demerits.

Dexmedetomidine, a new highly selective α_2 agonist, is under evaluation as neuraxial adjuvant as it provides stable haemodynamic conditions, good quality of intraoperative and prolonged post operative analgesia, sedation with minimal side effects. Compared to clonidine, dexmedetomidine is 8-10 times more selective for α_2 receptors (Anuj Grewal) [5]. Our study assessed the efficacy of dexmedetomidine as an intrathecal adjuvant for spinal anaesthesia by observing the onset, duration of motor and sensary blockade, level of sedation post operative analgesia and stability of cardiovascular and respiratory system with hyperbaric bupivacaine plus dexemedetomidine in subarachnoid block.

Material and Methods :- After approval from ethical committee, the study was conducted at SRN Hospital Associated to MLN Medical College Allahabad, over a period of one year. This prospective study was conducted on 60 adult patients of either sexes belonging to ASA physical status I-II aged 18 to 60 years scheduled for elective lower abdominal surgeries. All cases were explained the purpose of the study along with the procedure and thereafter a valid, informed and written consent was taken from all the patients undergoing study the patient were randomly assigned in one of the two groups, 30 patients in each group, in a double blind fashion.

Group C (Control) – Patient receiving intrathecal spinal anaesthesia with .5% hyperbaric bupivacaine (2ml) + normal saline (0.05ml).

Group D – Patient receiving intrathecal spinal anaesthesia with .5% hyperbaric bupivacaine (2ml) +5 μg dexmedetomidine (0.05ml).

Smaller volumes were taken with insulin syringe and total solution was made 2.05 ml.

All 30 patients in each group underwent surgery under spinal anaesthesia and no patient required any sedation or general anaesthesia. Following parameters were assessed in perioperative period :-

Onset of sensory block- it was determined by the time from administration of spinal anaesthetic solution to loss of pin-prick sensation T_{10} (checked every 30 seconds from administration of spinal anaesthetic drug till 15 min)

Onset of motor block was determined by the time from administration of spinal anaesthetic solution to motor block upto modified Bromage scale 3 (checked every 30 seconds from administration of spinal anaesthetic drug till 15 minutes)[6]

Duration of sensory block was defined by the time taken by sensory block to regress upto S_1 dermatome (assessed by pin prick method every 15 minutes following intrathecal injection)

Duration of motor block was defined by time taken by motor block to recover upto modified Bromage scale 0 (assessed every 15 minute)

Duration of analgesia (time from completion) of administration of spinal block to first requirement of analgesic supplement (VAS>4)

Sedation score – it was evaluated at 5, 30, 60 & 90, 120 minutes after spinal block using Ramsay sedation scales –

(1) Anxious, agitated or restless or both.
(2) Cooperative, oriented & Tranquil.
(3) Responding to Commands only.
(4) Brisk response to light glabellar, tap or loud auditory stimulus.
(5) Sluggish response to light glabellar tap or loud auditory stimulus.
(6) No response to light glabellar tap, maximum sedation scale was noted.

Observation :-

Table – 1

Comparison of Age, Weight and Sex in two groups

No = 30	Group C	Group D	Comparison C Vs. D	
			T	P
Age (Yrs) (Mean ± SD) Range Yrs.	32.7 ± 10.57 19-55	36.56 ± 7.35 22-55	1.64	>0.5
Weight(Kg) (Mean ± SD) Range (Kg)	54.46 ± 7.50 44-66	54.46 ± 7.35 40-66	.52	>.05
Sex (M : F)	19:11	20:10	X2=0.7 P > .05	

Table – 2

Comparison of onset time for sensory block and motor block in two groups

No = 30	Group C	Group D	Comparison C Vs. D	
			T	P
Sensory block MEAN+SD (min)	6.07 ± 79	4.18 ± 5.2	10.94	<.05
Range Minute	4.5-7.5	3.5-5.0		
Motor Block MEAN+SD	7.28 ± 7.6	5.02 ± .49	13.69	<.05
Range Minute	6.0-9.0	4.5-6.5		

Table – 3

Comparison of duration of sensory block and motor block in two groups

No = 30	Group C	Group D	Comparison C Vs. D	
			T	P
Sensory block MEAN+SD (min)	162.33 ± 15.69	298 ± 29.67	22.14	<.05
Range Minute	135-190	225-360		
Motor Block MEAN+SD	148 ± 12.29	270.83 ± 28.13	21.92	<.05
Range Minute	135-180	225-345		

Table – 4

Comparison of duration of analgesia in two group

No = 30	Group C	Group D	Comparison C Vs. D	
			T	P
MEAN+SD (min)	29.5 ± 42.49	6.68 ± 55.67	29.17	<.05
Range Minute	240-420	540-750		

Table – 5

Comparison of Maximum sedation score in two groups

No = 30	Group C	Group D	Comparison C Vs. D	
			T	P
MEAN+SD (min)	2.43 ± 0.50	2.46 ± 0.50	.23	>.05
Range Minute	2-3	2-3		

Result :- Demographic data were comparable in respect to age, weight & sex. (**Table 1**) All the parametric data of two groups were analyzed using chi-square & student test by including ASA-I & ASII patients. We found that addition of intrathecal dexmedetomidine (5 μ g) to intrathecal bupivacaine caused earlier onset of sensory (4.18 ± 0.52 min Vs. 6.07 ± 79 min) (**Table 2**) and motor block (5.02 ± 0.49 min Vs. 7.28 ± 0.76min) (**Table 2**) and prolonged sensory (298 ± 29.67 min Vs. 162.33 ± 15.69 min) & motor block (270.8 ± 28.13 min Vs. 148 ± 12.29 min) (**Table 3**) & all these results were statistically significant. (P value < 0.05) Intrathecal dexmedetomidine caused prolongation of post operative analgesia (668 ± 55.67 min Vs. 295 ± 42.49 min) in comparison to control group & statistically significant (P > 0.05) (**Table 4**) In our study we found that intrathecal dexmedetomidine did not cause any significant sedation or haemodynamic instability (**Table 5**) This study showed better block characteristics in bupivacaine+ dexmedetomidine group with respect to bupivacaine + normal saline.

Discussion :- Spinal anaesthesia, The choice of lower abdominal and lower limb surgeries has rapid onset, superior blockade, less failure rates & cost effective, but has drawback of sharter duration of block & lack of adequate post operative analgesia, G.E. Kamazi et al[7] (2006) found that when Dexmedetomidine (3 μg) or clonidine (30 μg) when added to intrathecal bupivacaine produces a similar prolongation in the duration of motor & sensory block with preserved haemodynomic stability. We also found that addition of intrathecal dexmedetomidine (5 μg) to intrathecal bupivacaine caused earlier onset of motor & sensory block without change in haemodynamic stability.

Al- Mustafa et al[8] studied effect of dexmetetomidine added to

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spinal bupivacaine for urological procedures and found that Dexmedetomidine has a dose dependent effect on the onset and regression of sensory & motor block when used as an adjuvant to bupivacaine in spinal anaesthesia. In our study we also found that addition of dexmedetomidine causes earlier onset of sensory & motor block. Hala E A Eid et al[9] found that intrathecal dexmedetomdine in dose of 10 μg & 15 μg significantly prolonged time to two segment sensory to S_1 regression to motor block to modified Bromage 0 in a dose dependent manner. In our study also showed that addition of dexmedetomidine (5 μg) to intrathecal bupivacaine caused prolonged recovery from sensory & motor block along with significant earlier onset of sensory and motor blocks. Walfiya Ramadan Mahdy et al[10] found that Dexmedetomidine seems to be an attractive adjuvant to spinal bupivacaine in caesarean section giving good quality of spinal anaesthesia with minimal side effect & no adverse effects on bodies. In our study addition of intrathecal dexmeditomidine (5 μg) to intrathecal bupivacaine caused earlier onset of sensory & motor block.

Alka Shah et al[11] found that patients showed excellent haemodynamic stability & postoperative analgesia to ropivacine + dexmedetomidine. In our study we also found that intrathecal Dexmedetomidine caused prolongation of post operative analgesia & no significant sedation or haemodynamic instability.

We conclude that addition of dexmedetomidine to bupivacaine in spinal anaesthesia produces early onset, prolonged duration of sensory and motor blocks & prolonged pain free post operative period without increasing side effects or complications.

References :-

1. Lambert D. Covino B : Hyperbaric, hypobaric and isobaric spinal anaesthesia. Re staff Phys, 1987, 33:7.
2. Luck Jf, Fetters PD, wildsmith JA : Spinal anaesthesia for elective surgery : a comparison of hyperbaric solution of racemic bupivacaine, Levobupivacaine and ropivacaine. Br J Anaesth, 2008, 101 (5) : 705-10.
3. Stebel S, Gurzeler J, Schnedier M, et al – Small dose intrathecal clonidine and isobaric bupivacine for orthopedic surgery : a dose response study Anaesthesia and Analg, 2004, 99 : 1231-8.
4. Yogin A, Yilmaz M, Karsli B, Erman M : Analgesic Effect of intrathecal neostigmine in perianal surgery, Eur J Anaesthesia 2003, 20 : 404-408.
5. Anju Grewal : Dexmedetomidine new avenues. Journal of Anaesthesiology clinical pharmacology, 2011 : 27 (3) 297-302.
6. Bromage PR : Practice of Spinal narcotic analgesia – Basic consideration, Anaesthesia Analgesia 1981 : 60 : 461.
7. Kanazi GE, Aouad MT, Jabbour – Khoury SI : Effect of law dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block in TURP. Anaesthesia and pain management 2006, 50 (2), 222-227.
8. Al- Mustafa MM, Awwad ZM, Semi A, et al : Effect or dexmedetomidine added to spinal bupivacaine for urological procedures. Saudi Med J, 2008-30 : 365-70.
9. Hala E A Eid, Mohamed A Shafie : Hend 4, : Dose related prolongation of hyperbaric bupivacaine spinal anaesthesia by dexmedetomidine : Ain Shams Journal of Anaesthesiology, 2011 : 4(2) 83-95.
10. W Ramadan Mahdy, Abdullah SI : Effect of adding dexmedetomidine Versus Fentanyl to intrathecal bupivacaine Versus Fentanyl to intrathecal bupivacaine on spinal block charachteristic neonatal outcome in uncomplicated caesarean. Menoufiya Medical Journal 2011 : 24 (1) : 221-232.
11. Shah A, Patel I, Gandhi R : Haemodynamic effects of intrathecal dexmedetomidine added to ropivacaine intrapoeratively and for post operative analgesia. International J. Basic and clinical Pharmacol, 2013 : 2 (1) : 26-29.