

**Comparative study of different doses of dexmedetomidine as an adjuvant to intrathecal hyperbaric bupivacaine in lower limb orthopaedic surgeries**

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**Conflicts of Interest:** Nil

**Abstract**

**Background:** This study is aimed to assess the effect of Intrathecal administration of different doses of Dexmedetomidine with hyperbaric Bupivacaine.

**Methods:** A prospective randomized double blind study was conducted with 90 consenting patients of ASA grade I and II, scheduled for lower limb Orthopaedic surgeries. Using the lottery method, the patients were randomly allotted into 3 groups, 50 patients in each group. Group A , Group B & Group C.

**Results:** Post-operative VAS and total analgesic requirement in 24 hours were minimal in group C as compare to B group. All the patients achieved Bromage scale 3 motor block and there was dose dependent prolongation of motor block in B and C groups.

**Conclusion:** Supplementation of spinal Bupivacaine with Dexmedetomidine significantly prolonged both sensory and motor block compared with intrathecal Bupivacaine alone.

**Keywords:** Dexmedetomidine, Bupivacaine, Intrathecal.

**Introduction**

Lower limb injuries are often with multiple fragmented bones and crush injuries of muscle fibres. Repair of such cases may take time which is usually unpredictable, and to prolong the duration of subarachnoid block various intrathecal adjuvants have gained popularity which aim to not only prolong the duration and onset of action, but for better success rate, faster recovery and minimal side effects.<sup>1</sup>

In 1968, Melzack and Wall put forward their ‘gate control theory’ proposing that the spinal cord was a potential target site for modulation of pain signals. This changed our concepts about nociceptive transmission and laid the foundation for further research into dorsal horn opioid pharmacology. This led to the discovery of opioid receptors by Pert and Snyder in 1973 and the subsequent identification of dorsal horn opioid receptors by radioligand techniques in 1977. The first intrathecal administration of opioid in patient was reported by Wang et al, in 1979.<sup>2-3</sup>

Dexmedetomidine is highly selective  $\alpha_2$  adrenergic agonist. Dexmedetomidine has been used as

intrathecally as an adjuvant and no neurological side-effect is reported in humans. It also provides stable hemodynamic condition, good quality of intra-operative and prolonged post-operative analgesia with minimal side effects. Intrathecal  $\alpha_2$  receptor agonists are found to have antinociceptive action for both somatic and visceral pain.<sup>4</sup>

**Material and method**

Type of study- A prospective randomized double blind study.

**Exclusion criteria**

1. Patients with hypotension, coagulation defects, spine abnormalities, heart block, arrhythmias etc.
2. Body weight  $\geq 120$  kg and height  $\leq 150$  cm.
3. Patients on calcium channel blockers, adrenergic receptor blockers, ACE inhibitors.

**Result**

Table 1: Socio-demographic variable

Variable	Group-A	Group-B	Group-C	P-value
Age in Yrs	32.12 $\pm$ 9.23	34.26 $\pm$ 9.29	35.26 $\pm$ 9.29	>0.05
Male : Female	21:9	22:8	23:7	>0.05
ASA (I:II)	25:5	24:6	23:7	>0.05

All three group were comparable.

Table 2: Out come

Variable	Group-A	Group-B	Group-C	P-value
Time of onset of sensory block	7..26 $\pm$ 2.01	8.26 $\pm$ 2.42	8.12 $\pm$ 2.39	>0.05
Time of onset of motor block	9.35 $\pm$ 3.36	9.14 $\pm$ 2.56	9.09 $\pm$ 2.28	>0.05
Duration of sensory block	101.23 $\pm$ 16.24	114.36 $\pm$ 20.35	144.23 $\pm$ 19.26	0.01
Duration of motor block	162.35 $\pm$ 22.31	195.36 $\pm$ 24.41	270.36 $\pm$ 23.36	0.01

Post-operative VAS and total analgesic requirement in 24 hours were minimal in group C as compare to B group. All the patients achieved Bromage scale 3 motor block and there was dose dependent prolongation

A prospective randomized double blind study was conducted with 90 consenting patients of ASA grade I and II, scheduled for lower limb orthopaedic surgeries. Using the lottery method, the patients were randomly allotted into 3 groups, 50 patients in each group.

Group A , Group B & Group C. The surgeon, patient and the observing anaesthesiologist were blinded to the patient group.

**Data analysis**

Data was recorded as per Performa. The data analysis was computer based; SPSS-22 was used for analysis. For categoric variables chi-square test was used. For continuous variables independent samples's *t*-test was used. *p*-value <0.05 was considered as significant.

of motor block in B and C groups. Similarly regression of motor block to Bromage 0 was significantly prolonged in group C than B and A group. Complete

recovery of sensory and motor functions was observed in all the patients.

### Discussion

**Van Tuijl I**<sup>5</sup> added various doses of Clonidine (0, 15 or 30 µg) to 5 mg hyperbaric Bupivacaine and evaluated their effect on the duration of the motor block, analgesic quality and ability to void. They opined that addition of 15 and 30 µg of Clonidine increased the motor block duration by 25 and 34 min, respectively and also resulted in better analgesic quality.

**Hutschala D, Mascher H et al**<sup>6</sup> added Clonidine to Bupivacaine and found that it enhances and prolongs analgesia after brachial plexus block via a local mechanism in healthy volunteers.

**Niemi L et al**<sup>7</sup> studied effects of intrathecal Clonidine on duration of Bupivacaine spinal anesthesia, hemodynamics, and postoperative analgesia in patients undergoing knee arthroscopy and found that intrathecal Clonidine significantly prolongs the anesthetic and analgesic effects of Bupivacaine. Kalso A(4) reported that as compared to Clonidine, the affinity of DXM to [alpha] 2 receptors is ten times greater. Results of our study showed that addition of Dexmedetomidine to Bupivacaine although delays onset but, significantly prolongs the duration of sensory and motor block.

### Conclusion

Supplementation of spinal Bupivacaine with Dexmedetomidine significantly prolonged both sensory and motor block compared with intrathecal Bupivacaine alone.

### References

1. Van Tuijl I, Giezeman MJ, Braithwaite SA, Hennis PJ, Kalkman CJ and van Klei WA (2008). Intrathecal low-dose hyperbaric bupivacaine-

clonidine combination in outpatient knee arthroscopy: a randomized controlled trial. Publication date and source Acta Anaesthesiol Scand 52 (3) 343-349

2. Marx, GF (1994). "The first spinal anesthesia. Who deserves the laurels?" Regional Anesthesia. 19 (6): 429-30.
3. Wang, Josef K. M.D.; Nauss, Lee A. M.D.; Thomas, Juergen E. M.D. Pain Relief by Intrathecally Applied Morphine in Man. Anesthesiology(1979);50; 149-151.
4. Kashif M. Madani, Mohit Somani, Khyyam Moin, Sudhir Sachdev, Durga Jethava, Vijay Mathur Comparative study of different doses of Dexmedetomidine in spinal anaesthesia in lower limb orthopaedic procedures. J of Evolution of Med and Dent Sci, 2014;3(62):13723-26.
5. Van Tuijl I, Giezeman MJ, Braithwaite SA, Hennis PJ, Kalkman CJ and van Klei WA (2008). Intrathecal low-dose hyperbaric Bupivacaine-Clonidine combination in outpatient knee arthroscopy: a randomized controlled trial. Publication date and source Acta Anaesthesiol Scand 52 (3) 343-349.
6. Hutschala D, Mascher H, Schmetterer L, Klimscha W, Fleck T, Eichler HG, Tschernko EM (2004). Clonidine added to Bupivacaine enhances and prolongs analgesia after brachial plexus block via a local mechanism in healthy volunteers. European Journal of Anaesthesiology 21 (3) 198-204.
7. Niemi L (1994). Effects of intrathecal Clonidine on duration of Bupivacaine spinal anesthesia, hemodynamics, and postoperative analgesia in patients undergoing knee arthroscopy. Acta Anaesthesiol Scand 38724-728.