

Comparative Study of the Effects of Fentanyl and Dexmedetomidine as an Adjuvant to Epidural Bupivacaine

Dr. Priyanka Hansda¹, Dr. Bibha Kumari², Prof. (Dr) Kameshwar Biswas³

1&2 Senior resident, Department of Anaesthesiology PMCH Dhanbad.

3. Professor & HOD, Department of Anaesthesiology, PMCH, Dhanbad

Corresponding Author: Dr. Priyanka Hansda

Abstract:

1. INTRODUCTION Pain by far is one of the most common and distressing effect of any disease. Epidurally administered narcotics are associated with much lesser incidence of respiratory depression than their intrathecal administration. Also, extradural administration allows the use of repeated doses via a catheter. **2. OBJECTIVE** Compare the effects of addition of fentanyl or dexmedetomidine as an adjuvant with Bupivacaine 0.5% in Epidural block in terms of – 1. Onset time of sensory and motor block 2. Level of sensory and motor block achieved 3. Duration of sensory and motor block.

3. Methods Present study was carried out on 75 patients scheduled for elective major surgery on lower limb, perineum, pelvis and lower abdomen.

Total 75 patients included in the study were divided in three groups of 25 patients, and received medication as under:-

Group C: (control group) Inj. 20 ml of Bupivacaine 0.5% solution along with 2ml water for injection.

Group D: (Dexmedetomidine group) Inj. Dexmedetomidine 1 mcg/kg in 2 ml water along with Bupivacaine 0.5% of 20 ml solution.

Group F: (Fentanyl group) Inj. Fentanyl 100 mcg (2ml) along with Bupivacaine 0.5% of 20 ml solution.

Thus each patient received 22 ml of solution in epidural space

4. SUMMARY AND CONCLUSION

Thus the observations and finding of above study allow us to conclude that dexmedetomidine, an alpha 2 agonist is a better alternative as an adjuvant than fentanyl, an opioid; for conduct of lumbar epidural block as it prolongs postoperative pain free period but it also prolongs the motor blockade by Bupivacaine which may hamper early mobilisation of patients.

Key words: Dexmedetomidine, hyperbaric 0.5% bupivacaine, intrathecal

Date of Submission: 10-06-2019

Date of acceptance: 26-06-2019

I. Introduction

Pain by far is one of the most common and distressing effect of any disease. Pain relief is regarded as a prime duty of an anaesthesiologist.

Identification of specific opiate receptors in the substantia gelatinosa of spinal cord by Synder (1973), Pert (1976) Yaksh and Ruddy (1976) and has created a new vista for the treatment of pain.³ The use of intrathecal / epidural opioids for relieving postoperative pain has gained tremendous popularity. Epidurally administered narcotics are associated with much lesser incidence of respiratory depression than their intrathecal administration.⁵ Also, extradural administration allows the use of repeated doses via a catheter. Hence, epidural opioid administration is now a widely employed technique.

Numerous studies have been carried out on epidural fentanyl for relieving post-operative pain.

Presence of alpha 2 adrenoceptors in spinal cord have been described in superficial lamina of dorsal horn and are important in modulation of nociceptor impulses by inhibiting Norepinephrine dependent descending pain pathways and thus close the gate for nociceptive transmission so central neuroaxial administration of these drugs should result in decreased dorsal horn firing and therefore resulting in analgesia.

Dexmedetomidine is a highly selective alpha 2 agonist with a receptor affinity eight times greater than clonidine. Post-operative analgesic requirement get reduced to a large extent by the use of this adjuvant with bupivacaine in epidural block..

Present study compares the effectiveness of two drugs, fentanyl with dexmedetomidine, acting by different mechanism in providing analgesia administered by lumbar epidural route with 0.5 % bupivacaine and complications associated with their use.

II. Material And Method

Present study was carried out on 75 patients scheduled for elective major surgery on lower limb, perineum, pelvis and lower abdomen. All patients included in study underwent thorough pre anaesthetic check up comprising of detailed history, clinical examination including airway and spine examination. Each patient had following investigations:-Complete Haemogram, BT/CT, Fasting Blood glucose, Serum creatinine, Urine analysis, HIV & HBs Ag, Local anaesthetic sensitivity test, Chest X- Ray and ECG were taken as and when indicated in light of clinical history. The patients were explained about the epidural technique in vernacular language. They were nil per orally from 10 pm onwards of the previous night of surgery. All the patients were premedicated with tablet alprazolam 0.5 mg and ranitidine 150 mg on the night before surgery. Intradermal sensitivity test for local anaesthetic was done on previous day. The patients were randomly assigned to any of the three groups using "closed envelope method". As it was a double blind study, preparation, administration of drug and observations on patients were done by two different individuals.

Total 75 patients included in the study were divided in three groups of 25 patients, and received medication as under:-

Group C: (control group) Inj. 20 ml of Bupivacaine 0.5% solution along with 2ml water for injection.

Group D: (Dexmedetomidine group) Inj. Dexmedetomidine 1 mcg/kg in 2 ml water along with Bupivacaine 0.5% of 20 ml solution.

Group F: (Fentanyl group) Inj. Fentanyl 100 mcg (2ml) along with Bupivacaine 0.5% of 20 ml solution.

III. Observation And Results

Table No. 1 (a) – (d) show the mean onset time of sensory block in each group tested by pin prick method and defined as time taken to reach insensitivity to pin prick at T10 dermatome level after the injection of local anaesthetic solution with or without study drug, recorded in seconds. Mean time for onset of sensory block in group C patients was 679.2 ± 86.11 seconds with a range of 540 to 780 seconds where as in group D and F patients it was 627.6 ± 58.04 second and 628.8 ± 65.08 second respectively with range of 540 -720 second in both groups. The mean time for onset of sensory block was less in both group D and F than group C and was statistically significant (<0.05), but there was no statistically significant difference between group D and F (>0.05).

Table No. 1 (a) MEAN TIME OF ONSET OF SENSORY BLOCK

OSB	Group C (n=25)	Group D (n=25)	Group F (n=25)	P Value (n=25)
Mean time(sec)	679.2 ± 86.11	627.6 ± 58.04	628.8 ± 65.08	0.016($p < 0.05$)

Table No. 1 (b): MEAN TIME OF ONSET OF SENSORY BLOCK (group C vs. group D)

OSB C/D	Group C (n=25)	Group D (n=25)	T	P Value (n=25)
Mean time(sec)	679.2 ± 86.11	627.6 ± 58.04	2.48	0.016($p < 0.05$)

Table No. 1 (c): MEAN TIME OF ONSET OF SENSORY BLOCK (group C vs. group F)

OSB C/F	Group C (n=25)	Group F (n=25)	T	P Value (n=25)
Mean time(sec)	679.2 ± 86.11	628.8 ± 65.08	2.33	0.023($p < 0.05$)

Table No. 1 (d): MEAN TIME OF ONSET OF SENSORY BLOCK (group D vs. group F)

OSB D/F	Group D (n=25)	Group F (n=25)	T	P Value (n=25)
Mean time(sec)	627.6 ± 58.04	628.8 ± 65.08	0.0688	0.94($p > 0.05$)

IV. Summary And Conclusion

Observations were made on 75 patients receiving epidural block through lumbar route for surgical procedures, divided in three groups control(C), dexmedetomidine (D) and fentanyl (F) of 25 each. Various values obtained were tabulated and subjected to appropriate statistical tests to arrive at the significance of observations.

Thus the observations and finding of above study allow us to conclude that dexmedetomidine, an alpha 2 agonist is a better alternative as an adjuvant than fentanyl, an opioid; for conduct of lumbar epidural block as it prolongs postoperative pain free period but it also prolongs the motor blockade by Bupivacaine which may hamper early mobilisation of patients. Epidurally administered narcotics are associated with much lesser incidence of respiratory depression than their intrathecal administration.⁵ Also, extradural administration allows the use of repeated doses via a catheter. Hence, epidural opioid administration is now a widely employed technique.

These considerations led to the use of more lipophilic drugs than morphine, such as Fentanyl, Sufentanyl and others, which are more potent and has advantages over Morphine such as rapid uptake by nerve tissue with short duration of action and low CSF concentration. Limited rostral spread of lipophilic narcotic cause less respiratory depression and early motor recovery compared to Morphine.

Reference

- [1]. Rajiv Lahotia, Tanwar GL, Sadhana Jain, Vyas KP. Epidural tramadol for postoperative pain relief. *Ind J Anaesth* 1998; 42: 38.
- [2]. Sakuntala Chakraborty, Banarjee D, Gobinda Saha. Buprenorphine in Epidural analgesia for post-operative pain. *Ind J Anaesth* 1984; 32.2: 243.
- [3]. Snyder SH. Opiate receptors in the brain. *The New Eng J Medicine* 1977; 296: 266-71.
- [4]. Narinder Rawal and Ulf H. Sjöstrand. Clinical application of epidural and intrathecal opioids for pain management. *International Anaesthesiology Clinics* 1986; 24(2): 44.
- [5]. Gunnar Nordberg. Epidural versus intrathecal route of opioid administration. *International Anaesthesiology Clinics* 1986; 24(2): 93.
- [6]. Grieff and Cousins MJ. Subarachnoid and extradural anaesthesia. *Anaesthesia*, 2nd edition, Blackwell Scientific Publications: London, 1994; pp. 1440-46.
- [7]. Cousins MJ, Mather LE, Glynn CJ, Wilson PR, Graham JR. Selective spinal analgesia. *Lancet* 1979; 1: 1141.
- [8]. Cahill J, Murphy D, O'Brain D, Mulhall J. and Fitz Patrice G. Epidural buprenorphine for pain relief after major abdominal surgery. *Anaesthesia* 1983; 38: 760-64.
- [9]. Wolfe MJ, Davies GK. Analgesic action of extradural fentanyl. *Br J Anaesth* 1980; 52: 357.
- [10]. Quirion R. Pain, nociception and spinal opioids receptors. *Prog Neuropsychopharmacol Biol Psychiatry* .1984;8(4-6):571-9.
- [11]. KAMIBAYASHI T, Maze M. Clinical uses of alpha-2 adrenergic agonists. *Anaesthesiology* 2000;93:1345-9.
- [12]. SCAFATI A. Analgesia and alpha agonists 2. *Medens Rev* 2004; 4
- [13]. MAURO VA, ANTONIO et al. Clonidine and dexmedetomidine through epidural route for sedation in a cholecystectomy. *Rev Bras Anestesiol* 2004; 4:11-40.
- [14]. GABRIEL JS, GORDIN V. Alpha 2 agonists in regional anaesthesia and analgesia. *Curr Opin Anaesthesiology*.
- [15]. HALL JE, UHRICH TD, BARNEY JA, ARIAN SR, EBERT TJ: Sedative, amnestic, and analgesic properties of small-dose dexmedetomidine infusions. *Anesth Analg*; 90:699-705, 2000.

Dr. Priyanka Hansda. "Comparative Study of the Effects of Fentanyl and Dexmedetomidine as an Adjuvant to Epidural Bupivacaine." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 6, 2019, pp 08-10.