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Original Research Article.

Effects of Dexmedetomidine Used as an Adjuvant in Epidural Post-Operative Analgesia: An Institutional based Study

Ratan Pal Singh[1], Megha Arora[2*]

**[1]Associate Professor, [2*]Assistant Professor, Department of Anaesthesia,
Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh, India.**

ABSTRACT

Background: Epidural anesthesia is the most commonly used technique for inducing surgical anesthesia and postoperative analgesia in lower abdominal and limb surgeries. Dexmedetomidine is a highly selective α2-adrenergic agonist which has been used for premedication and as an adjunct to general anaesthesia. Hence; the present study was undertaken for assessing the effects of dexmedetomidine used as an adjuvant in epidural post-operative analgesia.

Materials and Methods: A total of 30 female patients scheduled to undergo total abdominal hysterectomies were enrolled for the study. Complete demographic and clinical profile of all the patients was obtained. Clinical examination of all the patients was carried out and a 10 cm visual analog scale (VAS) (0, no pain and 10, worst pain imaginable) was used for assessing patient pain score. A combined spinal and epidural technique was used for anesthesia and postoperative analgesia. Shifting of the patient to the recovery room was done after completion of the surgery. The first dose of epidural dose was given when VAS score was equal to or more than 3. All patients received a total volume of 10 ml of levobupivacaine 0.125% with dexmedetomidine 1 µg/kg. All the results were analyzed by SPSS software.

Results: Mean duration of surgery in the present study was 98.5 minutes. Mean duration of analgesia was found to be 389.4 minutes. Mean time for onset of analgesia was found to be 6.95 minutes. In 12 cases, rescue analgesia was required.

Conclusion: Dexmedetomidine might be used as an Adjuvant in Epidural Post-Operative Analgesia.

Keywords: Analgesia, Dexmedetomidine.

***Correspondence to:**

Dr. Megha Arora,
Assistant Professor,
Department of Anaesthesia,
Rajshree Medical Research Institute & Hospital,
Bareilly, Uttar Pradesh, India.

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INTRODUCTION

Epidural anesthesia is the most commonly used technique for inducing surgical anesthesia and postoperative analgesia in lower abdominal and limb surgeries. Postoperative pain management is one of the most important areas of anesthesia. Early postoperative mobilization and rehabilitation with minimally associated pain and discomfort is the most desirable quality that has been needed in modern orthopedic surgery.[1, 2] For achieving this effect, large volumes of local anesthetics were used which also increase the possibilities of local anesthetic toxicity and hemodynamic instability.[3]

Dexmedetomidine is a highly selective α2-adrenergic agonist which has been used for premedication and as an adjunct to general anaesthesia. It reduces opioid and inhalational anaesthetics requirements. Intrathecal α2-receptor agonists are found to have antinociceptive action for both somatic and visceral pain. Intrathecal small dose of dexmedetomidine (3 µg) used in combination with bupivacaine in human beings for spinal anaesthesia have been shown to produce a shorter onset of motor block and a prolongation in the duration of motor and sensory block with haemodynamic stability and lack of sedation.[4-6] Hence; under the light of above mentioned data, the present study was undertaken for assessing the effects of dexmedetomidine used as an adjuvant in epidural post-operative analgesia.

MATERIALS AND METHODS

The present study was planned in the Department of Anaesthesia, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh, India and it included assessment of the effects of dexmedetomidine used as an adjuvant in epidural post-operative analgesia. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 30 female patients scheduled to undergo total abdominal hysterectomies were enrolled for the study. Complete

demographic and clinical profile of all the patients was obtained. Pre-operative hematological assessment of all the patients was obtained. All the patients belonged to the age group of 40 to 60 years.

Exclusion Criteria

- Diabetic patients,
- Hypertensive patients,
- Patients with presence of any hematological disorder,
- Patients with presence of any psychiatric disorder

Clinical examination of all the patients was carried out and a 10 cm visual analog scale (VAS) (0, no pain and 10, worst pain imaginable) was used for assessing patient pain score. A combined spinal and epidural technique was used for anesthesia and postoperative analgesia. Shifting of the patient to the recovery room was done after completion of the surgery. The first dose of epidural dose was given when VAS score was equal to or more than 3. All patients received a total volume of 10 ml of levobupivacaine 0.125% with dexmedetomidine 1 µg/kg. Pain was monitored according to following VAS division:

0: "no pain,"
1–3: mild pain,
4–7: moderate pain, and
8–10: severe pain

All the results were analyzed by SPSS software. Chi- square test and Mann-Whitney U test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

Table 1: Demographic profile

Demographic data		Number
Age group (years)	**40 to 45**	8
	45 to 50	10
	50 to 55	5
	55 to 60	7
Mean BMI (Kg/m^2)		26.4
Mean weight (Kg)		60.8

Table 2: Clinical variables

Variable	Number
Mean duration of surgery (Minutes)	98.5
Mean duration of analgesia (Minutes)	389.4
Mean time for onset of analgesia (minutes)	6.95
Need for IM rescue analgesia (n)	12
Mean VAS one hour postoperatively	3.5

Table 3: Patients divided on the basis of pain score

Pain score	Number of patients
No pain	18
Mild pain	6
Moderate pain	4
Severe pain	2

RESULTS

In the present study, a total of 30 female patients within the age group of 40 to 60 years were analyzed. Majority of the patients belonged to the age group of 45 to 50 years. Mean BMI of the patients of the present study was 45 to 50 years. Mean weight of the patients of the present study was 60.8 Kg. Mean duration of surgery in the present study was 98.5 minutes. Mean duration of analgesia was found to be 389.4 minutes. Mean time for onset of analgesia was found to be 6.95 minutes. In 12 cases, rescue analgesia was required.

DISCUSSION

Epidural administration of α2 agonists in combination with local anesthetics in low doses offers new dimensions in the management of postoperative pain. Levobupivacaine, S (−) enantiomer of bupivacaine, is claimed to have safer pharmacological profile with less cardiac and neurotoxic adverse effects due to its faster protein binding rate.[4- 6] Dexmedetomidine is an imidazole compound. It is 8 times more specific for α2 adrenergic receptors when compared to clonidine. Dexmedetomidine has sedative, analgesic, and sympatholytic effects that blunt many of the cardiovascular responses seen during the perioperative period. Patients remain sedated when undisturbed but arouse readily with stimulation.[7, 8] The selectivity of dexmedetomidine to the α2-receptors is eight times of its prototype, clonidine. Accordingly, dexmedetomidine is a more powerful sedative and analgesic drug than clonidine with less hemodynamic derangements from the α1-receptor activation. Previous studies have declared that dexmedetomidine potentiates local anesthetic effect when administered by neuraxial route. Unfortunately, the aforementioned studies have administered dexmedetomidine as a single injection that could not provide long-lasting analgesia sufficient for the relief of severe pain associated with major abdominal cancer surgery.[9, 10] Hence; under the light of above mentioned data, the present study was undertaken for assessing the effects of dexmedetomidine used as an adjuvant in epidural post-operative analgesia.

In the present study, a total of 30 female patients within the age group of 40 to 60 years were analyzed. Majority of the patients belonged to the age group of 45 to 50 years. Mean BMI of the patients of the present study was 45 to 50 years. Mean weight of the patients of the present study was 60.8 Kg.

Chiruvella S et al compared clonidine and dexmedetomidine as an adjuvant to levobupivacaine for epidural analgesia with respect to onset and duration of sensory block, duration of analgesia, and adverse effects. A total of 80 individuals between the age of 45 and 65 years of American Society of Anesthesiologists (ASA) physical status Classes I and II who underwent total abdominal hysterectomies were randomly allocated into two groups, comprising 40 patients in each group. Group LC received 10 ml of 0.125% levobupivacaine and 2 μg/kg of clonidine while Group LD received 10 ml of 0.125% levobupivacaine and 1 μg/kg of dexmedetomidine through the epidural catheter. Onset of analgesia, time of peak effect, duration of analgesia, cardiorespiratory parameters, side effects, and need of rescue intravenous (IV) analgesics were observed. The demographic profile and ASA physical classes were comparable between the groups. Group LD had early onset, early peak effect, prolonged duration, and stable cardiorespiratory parameters when compared with Group LC. Less number of patients (42.5%) in Group LD required IV rescue analgesics when compared to Group LC (70%) and was statistically significant. The side effects' profile was also comparable. Dexmedetomidine is a better neuraxial adjuvant compared with clonidine for providing early onset and prolonged postoperative analgesia and stable cardiorespiratory parameters.[11]

In the present study, mean duration of surgery was 98.5 minutes. Mean duration of analgesia was found to be 389.4 minutes. Mean time for onset of analgesia was found to be 6.95 minutes. In 12 cases, rescue analgesia was required.

Hetta DF et al assessed the postoperative analgesic efficacy of epidural dexmedetomidine added to bupivacaine infusion for patients undergoing major abdominal cancer surgery. Patients scheduled for major upper abdominal cancer surgery were allocated to group bupivacaine (n =32), in which patients received epidural bupivacaine infusion (6 mL/h bupivacaine 0.1%) for 48 hours postoperatively, or group bupivacaine + dexmedetomidine (n=32), in which patients received epidural dexmedetomidine added to bupivacaine infusion (6 mL/h of bupivacaine 0.1% + dexmedetomidine, 0.5 μg/mL) for 48 hours postoperatively. The cumulative morphine consumption was significantly reduced in group bupivacaine + dexmedetomidine compared with group bupivacaine: mean ± SD of 10.40±5.16 mg vs 23.23±8.37 mg with an estimated difference of −12.83. Epidural infusion of dexmedetomidine added to bupivacaine for patients undergoing major abdominal cancer surgery significantly reduced morphine consumption, delayed time to first analgesic supplementation, and decreased pain intensity during the first 48 hours postoperatively without harmful derangement on hemodynamics.[12]

CONCLUSION

From the above results, it can be concluded that dexmedetomidine might be used as an Adjuvant in Epidural Post-Operative Analgesia. However; further studies are recommended.

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