Section: Anesthesiology

Original Research Article

EVALUATION OF CLONIDINE AND DEXMEDETOMIDINE AS A ROPIVACAINE ADJUVANT FOR EPIDURAL ANESTHESIA IN LOWER ABDOMINAL SURGERIES

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ABSTRACT

Background: When an alpha 2 adrenergic agonist and a local anesthetic are coupled, the analgesic effect's quality and endurance are enhanced. While clonidine's effects on local anesthetics have been thoroughly investigated, there aren't many studies that show how epidural dexmedetomidine affects the same.
Materials and Methods: The patients were randomly assigned to two groups, one receiving ropivacaine with clonidine (RC) and the other receiving ropivacaine with dexmedetomidine (RD), Group RC was administered 15 ml of 0.75% ropivacaine with 1 microgram per kilogram of clonidine, while group RD was given 15 ml of 0.75% ropivacaine with 1 microgram per kilogram of dexmedetomidine epidurally.
Results: The dexmedetomidine group showed significantly improved start (RD-7.53 ± 1.81, RC-10.93 ± 1.96) and duration (RD-317 ± 29.5, RC-285 ± 37) of sensory blockade sedation. Hemodynamic alterations and the start of motor blockage did not differ significantly.
Conclusion: Similar to clonidine, dexmedetomidine works as an efficient adjuvant to ropivacaine for epidural anesthesia at doses of 1 □g/kg.
Keywords: Clonidine, dexmedetomidine, epidural, ropivacaine.

INTRODUCTION

A flexible method for both delivering anesthesia and postoperative analgesia is epidural anesthesia. By reducing postoperative pain, it facilitates early mobilization and lowers the risk of thromboembolic events. Compared to buprivacaine, ropivacaine is being used more frequently because of its comparable analgesic qualities, lower cardiotoxicity, and less motor blockage. It might be necessary to use a somewhat higher dose of ropivacaine, but adding an adjuvant can assist reduce the overall amount of local anesthetic that is needed and improve efficacy, which increases blockade length and severity.[1-3]
The addition of an alpha 2 adrenergic agonist to a local anesthetic enhances the quality and duration of pain relief. Neuraxial administration of clonidine amplifies the effects of local anesthetics, leading to heightened and prolonged pain relief. It possesses sedative qualities and its negative effects include low blood pressure and slow heart rate. Dexmedetomidine exhibits approximately 8-fold more selectivity for the alpha 2 adrenoreceptor compared to clonidine, enabling the administration of bigger dosages with reduced alpha 1 effects. It induces a higher level of motor blockage and cooperative sedation without a higher occurrence of adverse effects.[4-7]

MATERIAL AND METHODS

This was a double-blind, randomized trial that involved 70 participants having procedures on their lower limbs and abdomen. Patients of both sexes, with physical statuses ranging from 18 to 60 years old and meeting the requirements for inclusion and following permission from the hospital's ethics and research committee. Told written agreement was

obtained, and the patients were told about the goal of the study, the benefits and drawbacks of the procedure, and how to demand analgesia as needed during the preanesthetic visit.

RESULTS

The two groups were similar as there was no statistically significant disparity between them in terms of age and sex distribution, as well as height and weight parameters.

The distribution of surgical procedures and the duration of surgeries were found to be similar.

Both cohorts included individuals who were receiving hernioplasty, vaginal hysterectomies, and lower limb operations.

There is a notable disparity in the block characteristics between the two. No substantial disparity was observed between the two groups in terms of the initiation of motor blockage. The sedation levels between the two groups were shown to have a statistically significant difference (P = 0.000). There was a substantial decrease in heart rate (HR) by 20% between 30 and 50 minutes after the epidural injection in both groups. However, there was no notable difference in the decrease of HR between the two groups (P = 0.592).

Additionally, we observed a substantial decrease in mean arterial pressure of 25% between 40 and 50 minutes in both groups. However, there was no notable disparity in the prevalence of hypotension between the two groups (P = 0.796).

Table 1: Demogrphic data with mean duration of surgery

Parameters	Mean ± SD		P
	Group RC	Group RD	
Age (years)	38.33±9.3	43.13±8.0	>0.05
Gender (male:female)	20:7	17:13	>0.05
Height (in cm)	157.97±7.5	165.87±4.87	>0.05
Weight (in kg)	58±7.93	55±6.47	>0.05
Mean duration of Surgery	89.43±25.84	93.52±21.85	>0.05

Table 2: Differences in characteristics between the two groups: Exhibits a notably earlier start and longer duration of sensory block, without any variation in motor blockade

Parameter	Group RC	Group RD
Time to inset at T-10	10.67	7.34
Time to complete motor block	22	22
Time to 2 dermatome regression	135.8	167
Duration of analgesia	285	317.9

DISCUSSION

Epidural anesthesia is frequently employed for surgical operations involving the lower abdomen and lower limbs, especially when the operation is anticipated to be prolonged or as a means of controlling pain after surgery. Ropivacaine is a highly effective local anesthetic belonging to the amide class, known for its long-lasting effects. Administered epidurally, it exhibits a high level of efficacy in delivering both anesthetic and pain relief.[8-12]

The addition of adjuvants to local anesthetics has the potential to augment the efficacy of pain management and muscular immobilization. Epidural administration of local anesthetics has been combined with other adjuvant medicines, such as α2-agonists. Both clonidine and dexmedetomidine are α2-agonist medicines. In their work, Chandran et al. conducted a comparative investigation of the properties of 0.75% ropivacaine and 0.5% bupivacaine. A concentration of 0.75% ropivacaine is sufficient to achieve a satisfactory level of motor and sensory blockage. This concentration is equal to a 0.5% bupivacaine solution, although it provides the advantage of generating less side effects.[13-15]

Consequently, we administered epidural anesthesia utilizing a 0.75% concentration of ropivacaine. Dexmedetomidine exhibits a much greater binding affinity for alpha adrenergic receptors in comparison to clonidine, with a notable 8-fold disparity. However, there is a lack of data that establishes the comparable amounts of epidural dexmedetomidine and clonidine.

An idea has been proposed that giving a dose of 1 microgram per kilogram of epidural clonidine can extend the length of time that pain relief lasts without causing any negative effects. Studies have investigated the effects of epidural dexmedetomidine at doses ranging from 1 to 2 micrograms per kilogram. Studies have shown that administering doses of dexmedetomidine lower than 1 microgram per kilogram does not result in an extended duration of the ropivacaine block.[16-19]

During the perioperative period, they are used to administer sedation, alleviate anxiety, and minimize the pressor response that occurs during laryngoscopy and endotracheal intubation. The researchers concluded that dexmedetomidine outperforms clonidine in terms of its rapidity in providing pain relief, its efficacy in reducing pain after surgery, and its level of sedation it generates. In our study, we administered a dose of 1 µg/kg of either dexmedetomidine or clonidine. Our work is consistent with the previously published findings in terms of haemodynamic parameters. Nevertheless, we noticed a statistically significant occurrence of drowsiness and motor obstruction, but only for a brief

period of time, after which it became statistically insignificant. Neither group had any notable adverse effects.[20-23]

CONCLUSION

According to the findings and the approach used, dexmedetomidine has proven to be a useful addition. It is more effective than clonidine at a dosage of 1 ⌈g/kg because it has a quicker start, longer duration of action, and produces superior sedation.

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