



EFFECT OF ADDITION OF CLONIDINE TO ALKALINIZED ROPIVACAINE 0.2% FOR POSTOPERATIVE PAIN RELIEF.

Anaesthesiology

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ABSTRACT

Introduction: Effective pain management is crucial for successful postoperative recovery. Local anesthetics, such as ropivacaine, are commonly used for postoperative pain relief. The onset of action and duration of analgesia with ropivacaine can be improved by alkalinization of the drug solution. Multimodal analgesia is also known to be more effective for postoperative pain management. This study aimed to evaluate the effect of alkalized ropivacaine 0.2% with or without clonidine as part of multimodal analgesia for postoperative pain relief. **Objective:** The present study aimed to observe the influence of the addition of epidural clonidine to alkalized ropivacaine 0.2% for postoperative pain relief. **Material and Methods:** This was a prospective, randomized, double-blind study that included 90 adult patients scheduled for elective or emergency abdominal surgery. The patients were randomized into three groups: Group A received 0.2% ropivacaine, Group B received alkalized 0.2% ropivacaine with clonidine, and Group C received ropivacaine 0.2% with clonidine. The time to onset of analgesia, duration of analgesia, and sedation scores were recorded, and hemodynamic variables were monitored. Data were analyzed using student t-test and one-way ANOVA test. **Results:** The mean age of patients in Group A, B, and C was 40.76 ± 11.13 , 44.06 ± 13.02 , and 41.4 ± 10.25 years, respectively, and the mean weight was 55.75 ± 4.40 , 55.5 ± 3.74 , and 56.65 ± 4.03 kg, respectively. There were no significant differences in age or weight among the three groups. The addition of clonidine to alkalized ropivacaine resulted in a faster onset of analgesia and longer duration of analgesia compared to conventional ropivacaine. The sedation scores were similar in all three groups, and there were no significant differences in hemodynamic variables. **Conclusion:** The addition of epidural clonidine to alkalized ropivacaine 0.2% provides effective postoperative pain relief with a faster onset of action and longer duration of analgesia compared to conventional ropivacaine. This approach can be safely and effectively used in adult patients undergoing elective or emergency abdominal surgery.

KEYWORDS

INTRODUCTION

Postoperative pain is a common occurrence following surgical procedures, and effective pain management is crucial for the successful recovery of the patient. Surgery produces tissue damage with consequent release of algogenic substances and generation of noxious stimuli that are transduced by A δ and C fibres to the neuraxis and higher cortical centers. The challenging task of postoperative pain relief comes within the realm of the anaesthesiologist.

Local anesthetics are commonly used for postoperative pain relief, with ropivacaine being a preferred choice due to its favorable pharmacological properties. However, the onset of action and duration of analgesia with ropivacaine can be further improved by alkalinization of the drug solution.

The alkalinization of local anesthetics can increase the non-ionized component, allowing for faster penetration of nerves and a quicker onset of action. In addition, the use of multimodal analgesia, which involves the use of two or more analgesic drugs or techniques in combination, is known to be more effective for postoperative pain management than a single drug or method. Therefore, this study aimed to evaluate the effect of alkalized ropivacaine 0.2% with or without clonidine as a part of multimodal analgesia for postoperative pain relief. In adults, epidural R produces effective sensory blockade, but the motor blockade is slower in onset⁽¹⁾, less intense, and shorter in duration^(1,2).

The study aimed to assess the time of onset and duration of analgesia after a single-shot epidural dose of alkalized ropivacaine 0.2% and to compare the results with those of conventional ropivacaine. The study also aimed to assess the safety and efficacy of this approach in adult patients undergoing elective or emergency abdominal surgery.

Objective:

The present study was aimed to observe the influence of addition of epidural clonidine to alkalized ropivacaine 0.2% for postoperative pain relief.

MATERIAL AND METHODS:

Study Design:

The present study was a prospective, randomized, double-blind study.

Ethical Approval:

Ethical approval was obtained from the institutional ethics committee before conducting the study.

Study Participants:

The study included 90 adult patients aged 18 to 60 years with ASA physical status 1 and 2, who were scheduled for elective or emergency abdominal surgery.

Informed Consent:

Patients were fully informed about the study and asked for their written consent before participating.

Randomization:

A random allocation method was used to assign patients to one of the three groups, with 30 patients in each group.

Blinding:

To ensure double-blinding, both the patients and the researchers were unaware of the type of drug solution being used.

Intervention:

Patients in Group A received alkalized ropivacaine 0.2%, Group B received alkalized ropivacaine 0.2% with clonidine, and Group C received ropivacaine 0.2% with clonidine.

Data Collection:

Data was collected on time to onset of analgesia, duration of analgesia, and sedation scores. Hemodynamic variables were also monitored.

Data Analysis:

All parametric data was analyzed using student t-test and one way ANOVA test. A p-value less than 0.05 was considered statistically significant.

RESULTS

Table 1: Group Wise Distribution Of Patients

Groups	Epidurally Instilled Drug	Number Of Patients
Group A	0.2% Ropivacaine	30
Group B	Alkalized 0.2% Ropivacaine	30
Group C	Alkalized 0.2% Ropivacaine + Clonidine	30

The three groups were considered with 30 patients in each group as mentioned above.

Table 2 : Sex Distribution Amongst The Three Groups:

Group A		Group B		Group C	
Male	16	Male	16	Male	15
Female	14	Female	14	Female	15

The distribution of male and female patients in the three study groups was as follows: Group A had 16 male and 14 female patients, Group B had 16 male and 14 female patients, and Group C had 15 male and 15 female patients.

Table 3 : Comparison Of Age & Weight In Three Groups

Demographic Profile	Group A	Group B	Group C	p value (ANOVA)
Age(yrs) (Mean±SD)	40.76±11.13	44.06±13.02	41.4±10.25	0.508
Range (yrs)	23-60	20-60	21-60	
Wt.(kg) (Mean±SD)	55.75±4.40	55.5±3.74	56.65±4.03	0.645
Range (kg)	50-62	50-62	50-62	

There were no significant differences in age ($p=0.508$) or weight ($p=0.645$) among the three groups. The mean age of patients in Group A, B, and C was 40.76±11.13, 44.06±13.02, and 41.4±10.25 years, respectively. The mean weight of patients in Group A, B, and C was 55.75±4.40, 55.5±3.74, and 56.65±4.03 kg, respectively. The range of age and weight was also reported in the table.

Table 4: Comparison Of Level Of Satisfaction In Three Groups

N = 30	Satisfied	Mildly Satisfied	Not Satisfied
Group A	28	1	1
Group B	29	1	0
Group C	29	1	0

The number of patients who were satisfied, mildly satisfied, and not satisfied are listed for each group. In Group A, 28 patients were satisfied, 1 was mildly satisfied, and 1 was not satisfied. In Group B, 29 patients were satisfied, 1 was mildly satisfied, and none were not satisfied. In Group C, 29 patients were satisfied, 1 was mildly satisfied, and none were not satisfied.

DISCUSSION

Effective pain management following surgery cannot be attained by a single drug or technique without imposing a significant burden on equipment or monitoring systems. The use of two or more analgesic drugs or techniques in combination, known as multimodal or balanced analgesia, is currently the most efficient treatment for postoperative pain. The principle of balanced analgesia is to achieve optimal pain relief through the additive or synergistic effects between different analgesics, while simultaneously minimizing side effects.

Achieving optimal pain relief after surgery is a complex task that cannot be accomplished by a single drug or method without significant burden on equipment or surveillance systems. To address this issue, multimodal or balanced analgesia, which involves the use of two or more analgesic drugs or techniques in combination, is currently considered the most effective treatment for postoperative pain.

The rationale behind the balanced analgesic approach is to achieve adequate pain relief through additive or synergistic effects between different analgesics while reducing side effects. Local anesthetics are commonly used for regional anesthesia and postoperative analgesia, and their efficacy can be enhanced by using adjuvants such as opioids, α_2 agonists, and alkalization.

In the present study, we investigated the effects of adding clonidine to alkalized 0.2% ropivacaine for single-shot epidural postoperative analgesia in abdominal surgeries performed under general anesthesia.

The same amount of drug was administered to all groups. Previous research on other local anesthetics has demonstrated that the onset of analgesia was significantly reduced with the alkalization of 0.2% ropivacaine (Group B & Group C). Taeko Fukuda et al.[3] had discovered that pH-adjusted 1% lidocaine had the advantage of a faster onset of sensory blockade, with no effect on motor blockade and anesthesia distribution during epidural anesthesia.

A previous study by Tackley RM1 and Coe AJ(4) also demonstrated rapid onset of action of 0.2% ropivacaine, which is consistent with our results. In their study, they compared alkalized 0.5% bupivacaine with plain 0.5% bupivacaine in epidural caesarean section and found that patients receiving alkalized 0.5% bupivacaine experienced rapid onset of analgesia.

We found that there was a significant increase duration of analgesia when alkalized ropivacaine was combined with clonidine (37.5mcg). These findings were in concurrence with those of João Florêncio de Abreu Baptista, Renato Santiago Gomez et al (2014)[32]. They also observed increase in duration of analgesia when the added clonidine at the dose of 4mcg/kg to 0.75% ropivacaine in haemorrhoidectomy patients.

CONCLUSION

The study found that alkalized ropivacaine reduced the time to onset of analgesia in patients (Groups B and C), but the addition of clonidine did not further reduce onset time. The combination of alkalized ropivacaine and clonidine increased the duration of analgesia. None of the groups experienced significant sedation, and hemodynamic variables were similar across groups. The quality of analgesia was better in the study group (Group C) than the other two groups, with significantly lower VAS scores during the first 8 hours of the postoperative period.

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