
Research Article

Comparison of Epidural Anaesthesia Methods Applied With Articaine and Alkalinized Articaine in Transurethral Surgery

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Abstract:

This randomized double-blind study was designed to investigate the onset and termination of sensory and motor block in epidural anaesthesia with alkalinized articaine. Forty-eight patients scheduled for transurethral resection-prostatectomy (TUR-P) were randomly divided into two groups. In Group 1 patients (n = 24) epidural anaesthesia was applied by administering 20 ml solution containing fentanyl 50 µg, articaine 5 mg.kg⁻¹ (Ultracaine® D-S ampul). In Group 2, 8.4% NaHCO₃ 2 ml was added this solution. Sensorial and motor block start times, block end times, block qualities and hemodynamic parameters were recorded. The sensory block start time was 8.54 ± 1.2 min in Group 1 and 5.54 ± 1.10 min in Group 2 (p <0.05). Maximum motor blockade was achieved in group 1 for 10 min and in group 2 for 8 min. Total duration of action was 135.25 ± 17.8 min in Group 1 and 167.08 ± 19.0 min in Group 2 (p <0.05). As a result of our study, it was observed that the shorter block start time and longer duration of block in epidural anaesthesia performed with alkalinize articaine group.

Keywords: Epidural anaesthesia, articaine, alkalinisation.

I. INTRODUCTION

Articaine is an amide-type local anaesthetic containing 4-methyl-3-(2-(propylamino)-propionamido)-2-thiophenecarboxylic acid, methyl ester hydrochloride, thiophene ring in the structure [1]. The amide structure is similar to that of other local anaesthetics, but additionally, the ester structure it contains provides rapid inactivation of esterases to inactive articaine acid conversion. This is responsible for the extremely low toxicity of articaine [2,3]. Articaine is widely used in dentistry [4]. Anaesthesia is available in epidural anaesthesia, spinal anaesthesia, and peripheral blocks [5,6,7]. Articaine's cardio-electrophysiological effects have been shown to be comparable to bupivacaine and lidocaine, with fewer cardio-depressant effects on them [8]. Metabolism is rapid, toxicity is less and this means that articaine can be used more safely in patients at risk.

Pain or uncomfortable anaesthesia can often be seen in intra pelvic interventions performed with epidural anaesthesia. Despite adequate level of sensorial analgesia, visceral pain may be present. Visceral pain may develop by stimulation of organs such as peritoneal structures or bladder. The quality of epidural anaesthesia may increase by addition fentanyl to local anaesthetics [9]. Studies have shown that alkalinisation of local anaesthetics increases the quality of intraoperative analgesia [10,11,12]. There is also evidence that adding bicarbonate enhances opioid activity [13]. In this study, we planned to investigate the effects of alkalinized articaine combined with fentanyl on epidural anaesthesia.

II. METHODS

Forty-eight patients aged between 20 and 80 years who underwent transurethral prostatectomy with ASA II, III criteria were included in the study after obtaining written approval from the patient's ethics committee (20011/8/59) and patients. Patients with neuromuscular disease, peripheral neuropathy in lower extremity, coagulopathy, skin lesions in the lumbar region, local anaesthetic allergy were excluded from the study. All patients were treated with intravenous infusion of crystalloid serum in the premedication chamber and intravenous administration of midazolam 1-2 mg / kg. Non-invasive blood pressure monitoring, ECG, SPO₂ monitorizations were performed, control values were taken, measurements were taken every 5 minutes during the operation, 15 minutes in the postoperative period, and OAKB (mean arterial blood pressure), heart rate (HR), SPO₂ was recorded. Systolic arterial pressure (SAP), hypotension of less than 30% of control value, bradycardia of less than 50 heart rates per minute, and necessary medication. 3 ml 2%

The patient was seated in a position. After skin cleansing, local anaesthesia with lidocaine 3 ml 2% was performed at L4-5. 18 gauge Tuohy needle was inserted into the epidural space and after the site was verified patients separated from the two groups by randomization (using a random number generator). Then, fentanyl 50 µg + articaine 5 mg / kg (Ultracaine® D-S Sanofi Aventis) was completed with 20 ml of saline was added to the first group (Group 1, n = 24). In the second group (Group 2 n = 24), the epidural space was filled with fentanyl 50µg, articaine 5mg/kg + 8.4% milliosmole NaHCO₃ 2 ml and saline as total 20 ml. The anaesthesiologist

who applied epidural anaesthesia did not know the contents of the drugs. The patients who applied epidural anaesthesia were brought to the lying position. Sense and motor block levels were checked by an anaesthetist who did not know which drug was administered. Pinprick test was used for sensory block assessment and Bromage scale for motor block evaluation. Bromage scale 0 = Full motion, 1 = 33% motor block, 2 = 66% motor block, 3 = Full motor block. As the starting time of epidural block; at the end of the epidural injection, the time to reach the T4 sensory block level was accepted. Intraoperative epidural block quality was recorded: 0 = Failed block accepted. 1: Presence of pain requiring additional dose analgesics, 2 = Minimal discomfort that would not require an additional dose, 3 = Complete comfort. Fentanyl was added in the presence of pain. The time to the end of the sensory and motor block was recorded as the total block time. Sensory and motor block start times, block end times, block qualities and hemodynamic parameters were recorded. All patients were followed for possible side effects such as hypotension, bradycardia, nausea, vomiting, pruritus, sedation.

Statistical analysis; Statistical Analysis: G * Power (G * Power Ver.3.0.10, Franz Faul, University of Kiel, Germany, [http:// www.psyc.uni-](http://www.psyc.uni-) package program was used to determine the number of patients to be included in the study. a total of at least 48 patients should be included in the study, with at least 24 patients in each group so as to provide a 95% safety margin. For statistical analysis, " statistical package for the social science (SPSS Inc, Chicago, IL, USA) version 16.0 " will be used. The Kolmogorov Smirnov test will determine whether the groups fit the normal distribution. Demographic data were compared with Student's t test to determine whether there was any difference between the groups in terms of analgesic methods. Fisher's exact Chi-square test was used to determine the difference between VAS values and consumed analgesic quantities.

III. RESULTS

When the mean values of the demographic characteristics of the 48 cases studied were statistically compared, there was no difference between the groups. (Table 1).

Table I. Patient Characteristics

	Group 1 (n=24)	Group 2 (n=24)
Age	72.56 ± 11,93	71.45 ± 13,55
ASA (II/III)	10 / 14	11 / 13
Weight (kg)	82,02 ± 13,48	80,7 ± 14,75

The pH values of the local anaesthetic solutions used in our study were measured. The value of pH for Group 1 was found to be 5.00 ± 00 and the value of pH for Group 2 was found to be 7.00 ± 00 (using articaine + HCO₃). The mean time of onset of the sensory block was 8.54 ± 1.2 minutes in Group 1,

5.54 ± 1.0 minutes in Group 2. The difference was statistically significant (p <0.05). Maximal upper-level dermatome of the sensory block was T4 in both groups. Motor block onset time was significantly lower in Group II compared to Group I (6.01/8.97 min). The difference between the two groups in terms of motor block grades was statistically insignificant (Table II). Total duration of action was 135.25 ± 17.8 min in Group I and 167.08 ± 19 min in Group II. The difference was statistically significant (p <0.05). (Table II).

Table II. The comparison of block variables between groups (Mean ± Std. Dev.)

	Group 1 (n=24)	Group 2 (n=24)
Onset of sensory block time (min)	8.54±1.2	5.54 ± 1.0 *
Onset of motor block time (min)	6.01 ± 1.8	8.97± 0.9 *
Duration of block (min)	135.25 ± 17.8	167.08 ± 19*
Epidural motor quality	2.66	2.79
Intraoperative fentanyl consumption(µ/kg)	0.208µg/kg	0.291 µg/kg

*p<0.05

Group 1: Epidural articaine,

Group 2: Epidural articaine+HCO₃

The difference between the groups in terms of sensorial and motor block quality was not significant. Mean arterial blood pressure (OAGB) was significantly lower in Group II compared to Group I at 5,15 and 20 minutes (p <0.05). There was no difference between the groups in terms of heart rate (HR) and SPO₂ (p> 0.05).

IV. DISCUSSION

A short onset of efficacy in epidural anaesthesia is a desirable feature [14]. In TUR-P operations; we evaluated the effects of motor and sensorial block onset times, duration of action and block quality by adding articaine bicarbonate, a local

anaesthetic with short duration of action, in epidural anaesthesia. Benhamou et al. have shown that alkalinized bupivacaine in epidural anaesthesia administered in caesarean cases is not effective for the onset of sensorial block [15]. Studies have shown that bupivacaine alkalinisation does not affect spinal block onset time in epinephrine or epinephrine-free groups [16]. In an animal study, there is an indication that the pregnancy shortens the onset time in the nerve block made with bupivacaine [17]. Its mechanism is not clear, although it can be attributed to a change in permeability due to hormonal factors. On the other hand, the period from preparation to use of the solution can cause pH increase and precipitation [18]. Bonhomme and colleagues have shown that even in the presence of precipitation, the mixture maintains stability for 6 hours [19].

Tackley and Coe added faster alkalinized bupivacaine epinephrine to block start time [11]. Epidural blotting with alkaline lidocaine showed a statistically significant shortening of the block start time and an increase in the motor block depth [3]. There are many studies comparing epidural anaesthesia with articaine and bupivacaine, and a faster onset time is shown in the articaine group [20] as a superiority for short-term operations. In our study, we prefer to use articaine, which is a local anaesthetic with a shorter duration of action and less cardio-depressant effects, in epidural anaesthesia cases that we prefer in short-term operations such as TUR prostate. By achieving a shorter start-up time and a longer block time with alkalinisation, we obtained a block of the ideal length for the operation.

There was no difference between the groups in terms of sensorial and motor block quality.

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