Research Article

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Efficiency of 3% Non-epinephrine Mepivacaine Application During Intraligamentary Anesthesia With Positive and Negative Aspiration in Pain Sensitivity to Electric Current of Young Subject`s Upper Anterior Teeth Pulp:

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Abstract

Background: *Separation methods of local anesthesia to diffuse and vascular must significantly affect the clinical effect of adrenaline containing local anesthetic (mepivacaine). The aim of this prospective, randomized, controlled studies μAde was to compare the degree of anesthesia of intact upper lateral incisor the cartridge ¼ 3% mepivacain without epinephrine in the group after the infiltration and after intraligamentary anesthesia (ILA) in the experimental group.*

Methods: *Anesthesia performed computer syringe Sleeper One 86 subjects aged 20-23 years. In all cases, aspiration was performed. With pulp tester IVN-01 measured the pain threshold incisors and canines in microamperes during the anesthetic effect.*

Results: *Reference level of all researched teeth (86 subjects) was ranged from 1 to 10 μA. Uniform pain threshold increase to 95 (±20) μA by 5 min. watched during infiltration anesthesia then this value gradually descended to reference level (by 20 min.). Peak single increase of pain threshold to 55 (±8,9) μA occurred immediately after 1st minute of ILA, then this value subsequently drops to reference level (10 μA) by 20 minutes. Difference between groups of infiltration and intraligamentary anesthesia (ILA+ red) and (ILA – green) presented on Chart 6.*

Conclusions: *Infiltration anesthesia with mepivacaine without epinephrine smoothly diffusely increased the pain threshold of the front teeth, reaching a significant, maximum effect by 5 minutes. Intraligamentary injection immediately after administration created a peak increase in pain sensitivity at a lower level, almost without the participation of the diffuse component.*

Keywords: Aspiration, Intra ligamentous anesthesia, Intra vascular injection, Pulpal analgesia.

Introduction

Intraligamentary anesthesia considers as additional or parodental method in classic dental systematics [1-3].

It often put together with variants of infiltration injection. Petrikas A.J. with colleagues demonstrated that mechanism of anesthetic injection distribution during intraossal, intraligamentary (ILA), intraseptal anesthesia consists of the vascular and diffuse connective tissue component [4-8].

Our new classification of local anesthesia methods divides dental anesthesia into diffuse and vascular [11]. Two components highlights in vascular mechanism: presence of positive or negative aspiration during injection (1), and presence of epinephrine in local anesthetic (2). Question about aspiration of ILA was controversial for a long time (Malamed.2004). We belief that epinephrine play a role of turnstile, tourniquet during spongiosus vascular anesthesia. It organizes and creates limited depot in injection area. By blocking arteriole`s α-adrenergic receptors in injection area epinephrine forms spatial and temporary depot in venous section of anesthesia area. Mechanism of vascular anesthesia presented by chart 1.

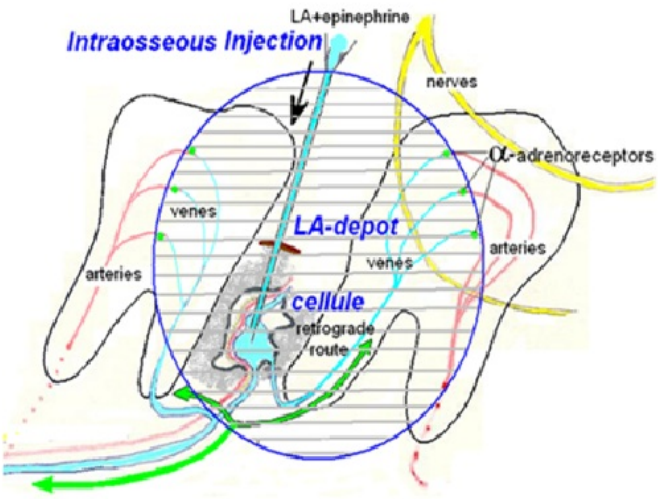

Chart 1: ILA(intraseptal) with positive aspiration [9]

Chart 2: ILA (intraseptal) with positive aspiration [10]

Mepivacaine – one local anesthetic, which can function without vasoconstrictor. So there is a question – how will mepivacaine function without epinephrine during ILA, which has significant vascular effect? Certainly traditional infiltrative anesthesia will be comparable to intraligamentary in similar condition.

Aims, Purposes

1. To get electric pain thresholds of upper canine and incisors after infiltration anesthesia with 3% mepivacaine.
2. To get electric pain thresholds of upper canine and incisors after ILA with 3% mepivacaine (with positive and negative aspiration).

Materials and methods

Prospective controlled study with written concern of volunteers included 86 students (age 20-23 years, 44 men and 42 women with standard of health = 1 (ASA). We used single automatic dose 0, 5 ml of 3% mepivacaine without epinephrine.

Chart 3: Computer syringe Sleeper One (DHT – France: www.dent.ru) [2]

Injection performed by computer syringe Sleeper One (DHT – France) with metered speed – ¼ of cartridge during 30 sec., with pressure and opportunity of aspiration. Infiltration anesthesia was performed in main group (30 subjects). ILA was performed in control group (56 subjects). During infiltration anesthesia positive aspiration was noted only in 2 cases, during ILA: positive aspiration – 33, negative aspiration – 23 cases. Upper anterior teeth (almost always right teeth) was an object of study: 1.1, 1.2 and 1.3. Reference object – upper lateral incisor (1.2) where injection was performed.

Anesthesia evaluation was made before and after injection (2, 5, 10, 15 and 20 minutes) with assistance of device "ИВН-01Пульптест - ПРО". Progressive alternating current played a role of stimulator. Subject fixed pain sensation by disconnection of devise scale.

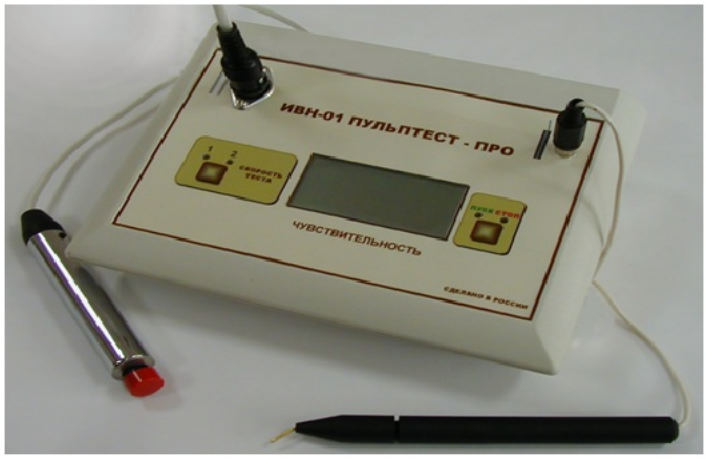

Chart 4: Pulp sensitivity testing devise "ИВН-01Пульптест - ПРО" (Efanov O.I., Volkova A.G. Electroodontodiagnostika, Moscow, MSMSU, 1999, 24 p).

Results

Reference level of all researched teeth (86 subjects) was ranged from 1 to 10 μA. Uniform pain threshold increase to 95 (±20) μA by 5 min. watched during infiltration anesthesia then this value gradually descended to reference level (by 20 min.). Peak single increase of pain threshold to 55 (±8,9) μA occurred immediately after 1st minute of ILA, then this value subsequently drops to reference level (10 μA) by 20 minutes. Difference between groups of infiltration and intraligamentary anesthesia (ILA+ red) and (ILA – green) presented on chart 5. (T-test of the student = 2, 4; p<0, 05)

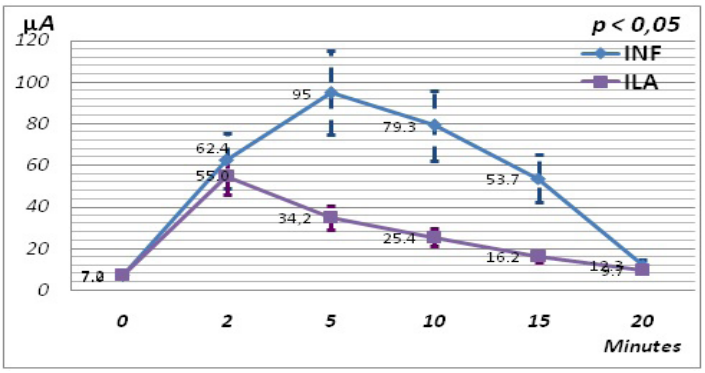

Chart 5: Two compared curves effect/time of pain threshold average value after infiltration and intra intraligamentary injection.

During ILA subjects divided into two groups: with positive and negative aspiration. Achieved results presented on Chart 6:

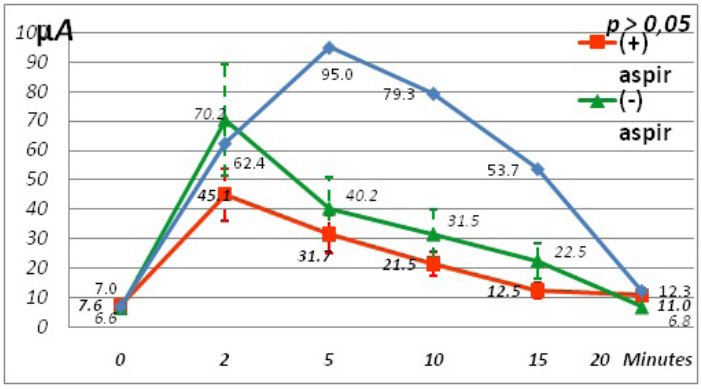

Chart 6: Average values of 1.2 teeth pain thresholds after ILA with aspiration (+) and without (-).

ILA without aspiration was 70, 2 (±19, 6) in average µA, with positive aspiration – 45, 1 (±10,4) µA. Difference between these two scores was negligible according to Student t= 1,4 ; p > 0,05. Therefore infiltration and ILA with negative aspiration have single diffuse mechanism of action. In the 2nd minute when target search for perforation of thin veins is still presented it is possible to combine needle tip with general vascular direction. This combination characterizes anesthetic intrusion in bloodstream (t=2, 4). Simultaneously it is an evidence of cross-cutting inefficient liquid motion not through depot. Vascular injection means that anesthetic pass by effect.

Conclusions

Infiltration anesthesia with mepivacaine without epinephrine smoothly diffusely increased the pain threshold of the front teeth, reaching a significant, maximum effect by 5 minutes. Intraligamentary injection immediately after administration created a peak increase in pain sensitivity at a lower level, almost without the participation of the diffuse component [12].

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