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RESEARCH ARTICLE

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EFFICIENCY OF INFILTRATIVE ARTICAINE V/S NERVE BLOCK LIDOCAINE IN MANDIBULAR THIRD MOLARS SURGERY

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ABSTRACT

Objective: To compare the efficiency of infiltrative articaine versus nerve block lidocaine in pain management during mandibular third molar extraction.

Material and methods: Randomized clinical trial. 25 patients with symmetrical semi-included third molars were analyzed, to which infiltrative Articaine and Nerve block Lidocaine were randomly applied to each demi-side. The proposed variable was the efficiency of the anesthesia protocol. Results were analyzed with a proportional comparison Z test, analyzed with a confidence level of 95%.

Results: The infiltrative articaine efficiency was 92% for B-group, existing no statistically significant difference to Nerve block lidocaine ($p<0.05$).

Conclusion: Infiltrative articaine achieves pain management comparable to that of nerve block lidocaine.

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INTRODUCTION

Dental Anesthesia is fundamental to achieve painless dental therapies, the patient's opinion concerning the procedure is strictly associated with their previous experiences with anesthesia. Local anesthetics are the most employed drugs in dental attention, for this reason, its study is relevant to expand knowledge about these fundamental medications used in dentistry.

Among the nerve block procedures, Spix-technique is widely used to achieve anesthesia of the inferior alveolar nerve, however, there is an error range that varies from 5 to 15%, or 15% to 20%, reaching even higher percentages when achieving dental pulp anesthesia, being the main reason for this the anatomical differences among patients.

Failure rates of up to 15-20% can be associated with poor technique, caused by the difficulty to accurately localize the neurovascular bundle[1]. Another limitation is the risk of intravascular injections, which can lead to systemic complications such as, cardiovascular and Central Nervous System toxicity, tachycardia, and hypertension[2].

15,3% of inferior alveolar block nerve injections could be related to a positive aspiration, it has been observed intravascular injection in 14.2% of cases when direct Spix-technique was used (where the needle moves directly to the site of contralateral block nerve) and 23.3% of cases when using indirect Spix-technique (where the needle penetrates from the same side of injection)[3].

The introduction of anesthetics with greater fat-solubility, such as articaine, makes one think that it could be a good alternative its infiltrative usage in any zone of the mandible, in contrast to other anesthetics that don't have the ability to penetrate through the compact mandibular bone, also it is metabolized by plasmatic esterases, so its life expectancy is shorter, avoiding systemic or toxic complications[4]. On the other hand, it would be an ideal technique for patients that suffer from blood dyscrasias, hemophiliac patients, or emergency attention in anticoagulated patients, where the use of nerve block techniques could signify a greater risk of complications[5,6].

The aim of this study is to evaluate whether articaine used with infiltrative technique is effective for mandibular third molar extraction that requires osteotomy and odontosection, compared to lidocaine used with nerve block technique.

MATERIAL AND METHODS

In vivo experimental design, parallel non-inferiority. It was conducted in the minor surgery ward of the Faculty of Dentistry of the University of Valparaíso. It was approved by the bioethics committee of the Faculty of Dentistry of the University of Valparaíso in 2015.

Participants were individuals with full mental capabilities who signed informed consent. This study adjusted to ‘‘The Council for International Organizations of Medical Science’’ (CIOMS)[7] research standards, and to the Declaration of Helsinki[8], also, it had the authorizations of the school director and the headquarters of the minor surgery ward.

50 surgical sites were studied, corresponding to 25 patients without comorbidities that attended the Surgical Ward of the University of Valparaíso with an indication of extraction of both inferior third molars, that required osteotomy and odontosection. Patients allergic to anesthetics drugs, lighter than 50kgs, with cholinesterase deficiency or atypical pseudocholinesterase, acute local pathologies or psychiatric disorders were excluded.

The main variable of this study was the effectivity of the anesthetic technique in the management of pain during the procedure. For this, the anesthetic protocol must allow beginning the procedure after 7 minutes of waiting after the injection of the anesthetic, and also, must not exceed the maximum amount of reinforcement determined for each anesthetic protocol. Additionally, age, sex and anxiety score were registered and evaluated by modified Corah test [9]. An anesthetic protocol was administered for the intervention of the right side of the mandible, and another for the right side, assigned randomly.

The first corresponds to nerve block technique using 2% Lidocaine with 1:100.000 epinephrine utilizing 1 tube and a half for the Spix-technique,

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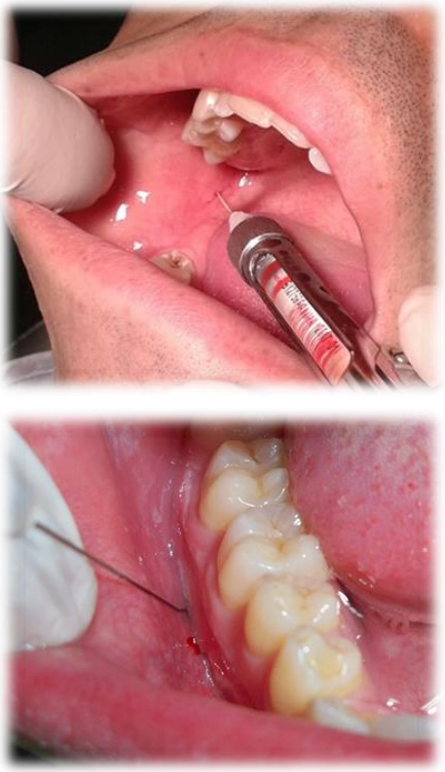
and a half tube for the buccal nerve, preserving maximum 1 tube for reinforcement. The second corresponds to Infiltrative technique using 4% Articaine with 1:100.000 epinephrine, injecting 1 tube and a half at the vestibule at the level of the first molar of the lower hemiarch , and a half tube at the level of the local lingual mucosa of the third molar, preserving maximum 1 tube for reinforcement. (Figure 1)

Figure 1: Anesthesia Tecnique



A

B

Lidocaine Nerve block protocol (A) and Articaine infiltrative protocol (B). Self-made images obtained with the prior informed consent and acceptance of the individual to take photographic records.

In case of not achieving anesthesia of the nerve posterior to 7 minutes after the injection, or in case of exceeding the maximum amount of reinforcement, the "failure protocol", consisting of the anesthetic injection of 2% Lidocaine, was activated, with a nerve block Spix-technique.

After reviewing the medical history, explaining the procedure, and reviewing the informed consent, the Modified Corah Test was conducted, to size anxiety caused by dental attention. Only those with low or mild anxiety could participate in this study.

Following the application of the anesthetic technique, 7 minutes passed and it was verified that there was no painful sensation at the puncture at the level of the mucosa and periodontium of the second molar (buccal nerve and inferior alveolar nerve), nor the canine (inferior alveolar nerve) nor lingual of the third molar (lingual nerve). After the first surgical procedure was completed, the other surgical protocol for the intervention of the contralateral tooth was executed.

Characterization of the sample was performed using means and proportions. The comparison of effectivity among anesthetic protocols was evaluated with a Z test for comparison of proportions, as well as its comparison with literature. Shapiro-Wilk normality test was conducted for the score variable in the anxiety test, where the groups where the protocol used failed were compared with those where it was successful, for which a comparison of means of independent samples was carried out. The results were analyzed with a confidence level of 95%.

RESULTS

The sample consisted of 25 individuals, where the mean age was 22.4, with a range of 16-35. A total of 50 surgical interventions were performed, 25 of those using infiltrative Articaine, and 25 using nerve block Lidocaine (Table I)

Table I: Characterization of the Sample

Sample	Individuals n=25	
Sex	Female 22 (88%)	Male 3 (12%)
Age	Mean 22,4 (16-35)	
	Interventions n=50	
	Tooth 17	Tooth 32
Infiltrative Lidocaine	12	13
Nerve block Articaine	13	12

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When comparing both anesthetic protocols, it was found that the effectiveness of nerve block lidocaine was 76%, meanwhile, infiltrative Articaine was 92%, not existing a significative difference among them. (Table II)

Table II. Comparison of Effectiveness of Anesthesia Protocols

Effectiveness	Anesthesia Protocol		
	Nerve block Lidocaine	Infiltrative Articaine	P Value
Efective	19 (76%)	23 (92%)	0,12
Non Efective	6 (24%)	2 (8%)	

When comparing the proportions of cases where both protocols were effective with what is described in the literature, there were no significant differences. (Table III)

Table III. Comparison of effectiveness with Literature

Anesthesia Protocol	Result	Literature	P Value
Nerve block Lidocaine	76%	85%	0,12
Infiltrative Articaine	92%	93%	0,69

When comparing means of anxiety test scores of cases where the technique was effective, independently of the technique used, there was no significant difference between the scores of those where the technique used failed. (Table IV)

Table IV. Pre-Surgical Anxiety and Effectiveness of the Anesthetic Technique

	Efective	Non Efective	P Value
Anxiety Test Score	10,45	11,6	0,65

DISCUSSION

The main finding of the present study is that the anesthesia protocol was successful in 92% of the infiltrative articaine group, against 76% of the nerve block lidocaine group, equivalent to a difference of (+ 16%) in favor of articaine, which has no significant differences.

The findings of this study are related to those reported by Berlin ((+12%), Mikesell (+9%), Claffeley (+15%), Khoury and Sierra (+6%), who did not report significant differences; however, Costa (0%) and Ruprecht (0%) reported same success rate. Although, this differs from that reported by Kanaa (+26%), Robertson (+30%) [10].

Regarding the failure rate of the nerve block technique, literature has reported an error rate that varies between 5 and 15%[11], and 10 to 15%[12]. In this study, the failure rate was 25%, greater than those reported in the literature, although this is not statistically significant. Of the 6 cases in which the technique failed, 4 failed anew when repeating the technique.

Regarding the infiltrative technique failure rate, literature has reported a failure of 7%[13]. In this study, the failure rate was 8%, with no significant difference.

There are diverse reasons that explain why a local anesthetic technique could fail when in dental treatment, among them are: Patient's anxiety, incorrect technique, anatomic variations, and bone density[14].

Amid those patients classified as anxious, 30% could state that the anesthesia is not enough when in fact it has been successful[14]. However, in this study, there was no significant difference in the rate of success of the technique between those individuals with the highest score on the anxiety scale.

Anxiety could be related to lack of depth of the anesthesia or the anesthetic block sensitivity, according to the type of fiber: motor, touch, pressure, pain, and its characteristics[15]. As a non-methodological observation, it was found that many patients are unsure or find it difficult to discriminate the sensation of pain or pressure they are feeling.

There were no immediate complications reported such as intravascular injection, or in the posterior appointments, which could be related to the little variability of age, the sterile surgical environment in the ward, and surgeons with experience regarding the anesthetic technique, which reduces risks.

Among the limitations of this study, the sample size was adjusted to the number of patients cared for in the ward. Sex was determined by the profile of the patients treated in the minor surgery ward at the University of Valparaíso. The investigation was carried out with a single-blind,

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given that the surgeon knew anatomical sites and where infiltrative lidocaine is contraindicated.

Amongst the methodological suggestions, it is recommended to carry out the test with larger physical spaces that allow patient comfort posterior to the intervention; It would be ideal to keep the patient in a place to clinically evaluate the attenuation of the anesthetic effect over time. Additionally, it is recommended to use specific pain scales for a deeper understanding of the subjective feeling of pain.

CONCLUSION

Infiltrative articaine achieves pain management comparable to that of nerve block lidocaine.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest with respect to this article.

REFERENCES

[1] Kaufman E, Weinstein P, Milgrom P. Difficulties in achieving local anesthesia. The Journal of the American Dental Association. 1984;108(2):205-8

[2] Montserrat-Bosch M, Figueredo R, Nogueira-Magalhaes P, Arnabat-Dominguez J, Valmaseda-Castellón E. Gay-Escoda C. Efficacy and complications associated with a modified inferior alveolar nerve block technique. A randomized, triple-blind clinical trial. Med Oral Patol Oral Cir Bucal 2014 Jul; 19(4):391-7

[3] Ali Taghavi Zenouz M.The Incidence of Intravascular Needle Entrance during Inferior Alveolar Nerve Block Injection. J Dent Res Dent Clin Dent Prospects. 2008; 2(1): 38–41.

[4] Becker, DE. Local Anesthetics: Review of Pharmacological Considerations. Anesth Prog. 2012; 59(2): 90–10

[5] Quintero Parada E, Sabater Recolons MM, Chimenos Kustner E, López López J. Hemostasia y tratamiento odontológico. Av Odontoestomatol . 2004 Oct 20(5): 247-61

[6] Lanau N, Mareque J, Giner L, Zabalza M. Direct oral anticoagulants and its implications in dentistry. A review of literature. J Clin Exp Dent. 2017;9(11):1346-54.

[7] van Delden JJM, van der Graaf R. Revised CIOMS International Ethical Guidelines for Health-Related Research Involving Humans. JAMA. 2017;317(2):135-36

[8] A fifth amendment for the Declaration of Helsinki. The Lancet 2000; 356: 1123

[9] Corah NL. Development of a dental anxiety scale. J Dent Res 1969;48(4):596

[10] Paxton K, Thome D. Efficacy of Articaine Formulations: Quantitative Reviews. Dental Clinics of North America. 2010; 54(4):643-53.

[11] Beiner, J. Argandoña, V. Díaz, C. Díaz. Study between the Anaesthetic Techniques Spix and Gow – Gates. Revista Dental de Chile. 2010; 101(3) 26-30

[12] Malamed S. Handbook of local anesthesia. St. Louis, Mo.: Elsevier/Mosby; 2006

[13] El-Kholey K. Infiltration Anesthesia for Extraction of the Mandibular Molars. Journal of Oral and Maxillofacial Surgery. 2013;71(10):1658.e1-1658.e5

[14] Boronat-López A, Peñarrocha-Diago M. Failure of locoregional anesthesia in dental practice. Review of the literature. Med Oral Patol Oral Cir Bucal 2006;11:E510-3. © Medicina Oral S. L. C.I.F. B 96689336 - ISSN 1698-6946

[15] Gay Escoda C, Piñera M, Velasco V, Berini L. Tratado de Cirugía Bucal. Editorial G y C, 2004

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