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ORIGINAL RESEARCH

Anesthetic efficacy of the infraorbital nerve block in maxillary incisors and premolars using 2% lidocaine with epinephrine 1:80,000

Eficacia de la técnica infraorbitaria en incisivos y premolares maxilares usando lidocaína al 2% con epinefrina 1:80,000

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ABSTRACT

Objectives: The authors conducted a clinical-trial, uncontrolled study to determine infraorbital nerve block effectiveness. **Material and methods:** Nineteen adult volunteers received 1.8 mL of lidocaine 2% with epinephrine 1:80,000 with an intraoral, infraorbital nerve block. Researchers used an electric pulp tester to measure pulp anesthesia in maxillary incisors and premolars. Participants reported soft tissue anesthesia and discomfort during the injection procedure; anesthesia onset time and its duration were also assessed and analyzed. Authors analyzed data using STATA statistical program 9®. **Results:** Most of the subjects in our trial were 21 years old (30%); the number of female participants (n = 12 - 60%) was greater than that of male participants. Authors evaluated pain perception when injecting anesthesia with a visual analogue scale (VAS), finding that 57.9% of patients (n = 11) categorized the pain as moderate (in a scale of 3-6). When assessing anesthesia success, it was observed that a greater number of canine teeth and first premolars (57.9%, n = 9 - CI 95%) were anesthetized. The authors also observed a significant greater number of non-response (non-anesthetized) cases in central and lateral incisors (100-84.2%, respectively). Anesthesia onset was at 12 to 19 minutes, with canines exhibiting the largest number of anesthetized reports with 47.4%. There was a 100% incidence of subjective feeling of soft tissue anesthesia in lower eyelid skin, skin of the nose and skin of the upper lip. Authors noted that 100% of the subjects rated it as unpleasant (VAS). **Conclusions:** Infraorbital anesthesia technique achieved successful anesthesia in only 57.9% of upper canines and first premolars; it proved ineffective for anesthetizing central and lateral incisors. This was demonstrated after these teeth were evaluated using rigorous pulp vitality testing. Soft tissue anesthesia occurred and it was classified as uncomfortable. Authors consider that usefulness of infraorbital nerve block technique in dentistry was questionable.

RESUMEN

Objetivos: Los autores condujeron un ensayo clínico no controlado para determinar la efectividad de la técnica infraorbitaria, para proporcionar anestesia pulpar profunda en incisivos y premolares maxilares. **Material y métodos:** Diecinueve adultos voluntarios recibieron 1.8 mililitros de lidocaína al 2% con epinefrina 1:80,000 con una técnica infraorbitaria intraoral. Los investigadores usaron un *electric pulp tester* (vitalómetro) para medir la anestesia pulpar en incisivos y premolares maxilares. Los participantes informaron sobre anestesia en tejidos blandos, y molestias durante la inyección además de que valoraron el tiempo de inicio de la anestesia y la duración de la misma. Los autores analizaron los datos usando el programa estadístico STATA 9®. **Resultados:** La mayoría de los sujetos tenía 21 años (30%), el sexo más común fue el sexo femenino (n = 12-60%). Los autores evaluaron con escala visual análoga (VAS), la percepción del dolor al momento de aplicar la anestesia, encontrando que el 57.9% de los pacientes (n = 11) lo catalogaron como moderado (escala de 3-6). Al evaluar el éxito anestésico, observaron un mayor número de episodios en el canino y el primer premolar (57.9%, n = 9 - IC 95%), Los autores observaron un importante número de fallas en la anestesia pulpar de incisivos centrales y laterales (100-84.2%, respectivamente). El inicio de la anestesia fue a los 12-19 minutos, siendo el canino el de mayor número de reportes con un 47.4%. La incidencia de sensación subjetiva de anestesia de los tejidos blandos en piel de párpado, ala de la nariz y piel de labio superior fue del 100%, los autores observaron que el 100% de los sujetos la calificaron como desagradable (VAS). **Conclusiones:** La técnica infraorbitaria produce anestesia exitosa en sólo el 57.9% de los caninos y primeros premolares maxilares; es ineficaz para anestesiar incisivos centrales y laterales, luego de ser evaluada con un riguroso test de vitalometría, se produce anestesia de tejidos blandos que es catalogada como incomoda. Los autores consideran que la utilidad de la técnica infraorbitaria en odontología es cuestionable y se deben considerar otras técnicas para los incisivos y premolares maxilares.

Key words: Infraorbital nerve block, visual analog scale, pulp vitality testing, lidocaine.
Palabras clave: Anestesia infraorbitaria, escala visual análoga, test de vitalometría, lidocaína.

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INTRODUCTION

Many authors have reported and described that intraoral infraorbital nerve block is effective to provide deep anesthesia in upper front incisors and premolars.[1] However, several clinical trials conducted to assess effectiveness of intraoral infraorbital nerve block, showed that the rate of anesthetic success in central and lateral incisors was between 15 and 30%, moreover, 100% anesthesia was not fully achieved in upper canines and premolars. Martínez MAA,[2] Reed KL et al,[3] Gaudy JF[4] described the anatomical distribution and coverage of the infraorbital nerve, considering it responsible for the innervation of the soft tissue, skin, lips and lower eyelid, it does not innervate maxillary incisors and premolars, which are innervated by the anterior-superior alveolar nerve and upper-medial nerve respectively. Heasman PA[5] reported that the origin of the upper-anterior alveolar nerve is located at a distance from infraorbital foramen, which is greater than 5 mm in 70% of specimens and greater than 20 mm in 20%. In conclusion, it can be said that the intraoral infraorbital nerve block will rarely allow diffusion of anesthetic solution to the upper-anterior alveolar nerve; therefore, anesthetic success is not guaranteed. Berberich G et al[6] evaluated in 40 subjects the effectiveness of intraoral infraorbital nerve block, by comparing 2% lidocaine with 1:100,000 and 1:50,000 epinephrine with 3% mepivacaine. The research team reported that anesthesia obtained with intraoral infraorbital nerve block technique was ineffective in providing deep pulpal anesthesia in central and lateral incisors, and first molars. Success rate of anesthesia of the canines and first and second premolar ranged between 75 to 92%, when using 2% lidocaine with 1:100,000 and 1:50,000 epinephrine. Karkut B et al[7] conducted a study in 40 adults to compare effectiveness of extra oral infraorbital nerve block technique and intraoral approach using 2% lidocaine with 1:100,000 epinephrine. They found that both extraoral and intraoral nerve blocks were ineffective in providing deep pulpal anesthesia in central incisors, recording only 15% of successful events; in the lateral incisors anesthesia was successful in 22% of cases, while success rate in canines was 92%; in premolars success rate was 80-90% in the first and second premolars. No statistical differences were observed between extraoral and intraoral nerve blocks. Mason et al[8] evaluated the anesthetic efficacy of Lidocaine 2% with 1:100,000 and 1:50,000 epinephrine in infiltration process of maxillary lateral incisors and in first molars, using an electric pulp tester. They found that when the concentration of epinephrine was increased to 1:80,000, duration of anesthesia for the lateral incisor pulp equally increased. Authors concluded that this effect was not similar in cases of intraoral, infraorbital nerve block.

Katz et al[9] evaluated the anesthetic efficacy of Lidocaine 2% with 1:100,000 epinephrine, prilocaine 4% with 1:200,000 epinephrine and 4% prilocaine in infiltration of the maxillary lateral incisor and the first molar, using an electric pulp tester. Sixty subjects received 1.8 cm^3 of each anesthetic solution. There were no statistically significant differences observed either in anesthetic success or onset of pulpal anesthesia. None of the anesthetics provided one hour of pulpal anesthesia. Authors recommended infiltration of the maxillary incisors to achieve proper blocking of the anterior superior alveolar nerve branch.

The purpose of this clinical trial and uncontrolled study was to determine anesthetic success in maxillary incisors and premolars in the intraoral, infraorbital nerve block using 2% lidocaine with 1:100,000 epinephrine.

MATERIAL AND METHODS

The authors conducted a clinical trial, uncontrolled study in which anesthetic success achieved with intraoral, infraorbital nerve block was determined in maxillary incisors and premolars. Nineteen adult volunteers received 1.8 mL of 2% lidocaine with 1:80,000 epinephrine using an intraoral, infraorbital block. All subjects were healthy and not consuming any medication that would have altered pain perception. Exclusion criteria were the following: patients under 18 and over 65 years of age, with a history of allergies to amide type anesthetics, patients with any kind of restorations in maxillary incisors and premolars or who showed inability to sign the informed consent form. This study was approved by the Committee of Ethics and Research of the University of Cartagena, and informed consent was obtained from each subject.

Each subject received an intraoral, infraorbital block with 1.8 mL of 2% lidocaine with 1:80,000 epinephrine; this injection was administered by the most experienced dental researcher, following along the lines advocated by Malamed SF et al,[1] Martínez MAA[2] y Reed KL et al.[3] Previously, the researchers had conducted a pilot study in five subjects, in order to standardize the technique and methodology proposed in this study.

Each subject randomly received the anesthetic technique, using for this purpose a randomization table made in MC Excel; authors used an electric pulp tester to measure pulp anesthesia in maxillary central