Articaine Buccal Infiltration in Mandibular Molars Extraction

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تسرب أرتيكاين الخدي عند خلع الأضراس السفلية

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Abstract:
Background: The most popular technique for successfully anesthetizing maxillary teeth is infiltration anesthesia. However, mandibular molar anesthesia has only recently been accomplished with encouraging outcomes using infusion with an articaine formulation.
Purpose: Evaluation the efficacy of buccal infiltration of articaine in extraction of mandibular molars.
Materials & Methods: This clinical study was conducted on 52 seeking dental extraction, all patients received two cartridges of anesthesia (articaine hydrochloride 4% with 1:200.000 epinephrine) the anesthesia was injected as buccal infiltration to all the patients in the bucco-vestibular region, testing anesthesia after 10 minutes by dental probe to include the patient then The treatment was terminated and the anesthetic was deemed unsuccessful if the patient experienced any pain or discomfort at any point throughout the extraction.
Results: 38 patients had pain that necessitated an inferior alveolar nerve block to proceed with the operation, which had a success rate of 26.7% when articaine hydrochloride 4% with 1:200,000 adrenaline was administered as a buccal infiltration. Fourteen patients did not report any pain.
Conclusion: Infiltration anaesthesia with of articaine cannot be recommended as an alternative to an inferior alveolar nerve block for extraction of mandibular molars.

Keywords: articaine; mandible; anesthesia.

الملخص:
مقدمة: تخدير التسلل هو الطريقة الشائعة المستعملة لتخدير الاسنان العلوية بمعدل نجاح مناسب، حديثا تم استخدام مخدر الارتيكايين لتخدير الضروس السفلية بطريقة التسلل بنتائج مرضية. الغرض: تقييم فعالية الارتشاح الشدقي للارتيكائين في خلع الأضراس السفلية.
المواد والطرق: أجريت هذه الدراسة السريرية على 52 حالة لخلع الأسنان، وتلقوجميع الحالات خرطوشتين من المخدر (أرتيكاين هيدروكلوريد 4% مع 1: 200.000 إبينيفرين) وتم حقن المخدر على شكل تسلل شدقي لجميع الحالات في منطقة الدهليز الشدقي تم اختبار التخدير بعد 10دقائق بواسطة مسبار الأسنان ثم إذا شعر المريض بألم أو أي إزعاج أثناء أي خطوة من خطوات الخلع، يتم إيقاف العملية ويعتبر التخدير فاشلاً.
النتائج : لم تُبلغ 14 حالة عن أي ألم , بينما أبلغت 38 حالة عن ألم يتطلب انسداد العصب السنخي السفلي لمواصلة اجراء الخلع وكان معدل النجاح (26.7%) عند استخدام أرتيكايين هيدروكلوريد 4% مع 1: 200.000 إبينيفرين.
الاستنتاج: لا يمكن التوصية بالتخدير بالارتشاح باستخدام مادة الأرتيكاين كبديل لكتلة العصب السنخي السفلي لخلع الأضراس السفلية.

الكلمات المفتاحية: أرتيكاين؛ الفك السفلي؛ التخدير.

Introduction

One of the most crucial parts of dental care is providing efficient pain management. Infiltration anesthesia is the most widely used technique for successfully anesthetizing maxillary teeth. However, mandibular molar anesthesia has only recently been accomplished with encouraging outcomes using infusion with an articaine formulation..(1-3)
Mandibular molars are usually anesthetized via regional blocking of the inferior alveolar nerve (IAN). Unfortunately, there are often quite significant failure rates for inferior alveolar nerve blocks (IANBs), which could be due to a lack of accurate anatomical markers. (4)
One relatively new type of local anesthetic is articaine. It comes in a 4% solution, which is twice as much as the typical 2% lidocaine concentration.(5)
As a local anesthetic for dental procedures, articaine has gained a lot of popularity among dentists. It can provide profound local anesthesia (LA) for dental procedures and is metabolized quickly, typically within 30 to 60 minutes. Because blood esterases hydrolyze it, its potential for toxicity may be reduced..(6)
The current study's hypothesis was that articaine infiltration in the lower molars' buccal vestibule would be just as successful as IANB after the mandibular molars were extracted.

Aim of the Study
To evaluate the efficacy of buccal infiltration of articaine in extraction of mandibular molars.

Materials & Methods
This clinical study was conducted on fifty-two patients seeking dental extraction at the outpatient clinic of the Medical Center of Tarhouna City.
The patients signed an informed consent agreement after discussing the specifics of the treatment.

Criteria for Choosing Patients:
Inclusion criteria:
•Patients free from any systemic disease.
•Patients seeking for dental extraction of lower posterior teeth.
•Patients with no allergy to local anesthesia.

Exclusion criteria:
•Patients with known hypersensitivity to amide type of local anesthesia.
•Pregnant females.
•Neurological disorders.
•Infection evidence close to the suggested injection site.
•Patients younger than 18 years.

Materials:
•Articaine hydrochloride 4% with 1:200.000 epinephrine, local anesthetic injectable solution, cartridges of 1.8 ml*.
•Lidocaine hydrochloride 2% with 1:100.000 epinephrine, local anesthetic injectable solution, cartridges of 1.8 ml**.

Method:
Case history taking:
•Personal information about every patient including name, age and sex was recorded.
•Medical and dental history were taken.
•Chief complaints of the patients were recorded.

Clinical examination:
All patients were subjected to careful intraoral examination by the operator then the patients were accepted according to the inclusion and exclusion criteria.

Anesthesia protocol:
All patients received two cartridges of anesthesia (Articaine hydrochloride 4% with 1:200.000 epinephrine), loaded in an aspiration syringe equipped with a 27-gauge 1.5-inch needle, the anesthesia was injected as buccal infiltration to all the patients in the bucco-vestibular region in front of the target tooth.

Testing anesthesia:
After 10 minutes dental probe was used to test the anesthesia by probing the buccal gingiva of the target tooth, patients who reported pain were excluded from the study.

Extraction protocol:
The operator began luxating and extracting the target tooth after testing the anesthesia. If the patient experienced pain or discomfort at any point during the extraction process, the procedure was stopped and the anesthesia was deemed unsuccessful. Additional anesthesia was then administered by IANB using lidocaine to finish the extraction procedure.

After extraction:
The patients were instructed by the operator to keep the cotton pack in their mouth with firm pressure for 1 hour. And for the first 24 hours, no hot drinks, no smoking, not to spit and not to rinse, from the next day the patients were asked to rinse with warm salt water at least 3 times for 48 hours.

Statistical analysis:
Data for this study were collected and statistical analysis was conducted using SPSS to obtain the arithmetic mean, standard deviation and percentages.

Results

Fifty-two patients were included in the present study, the patients consisted of 31 men and 21women with an age range, from 20 to 68 years.

The extracted teeth consisted of 19 first molars, 14 second molars and 19 third molars, profound caries was the most common reason for extraction.

In the present study the local anesthesia technique used was the buccal infiltration by articaine hydrochloride 4% with 1:200000 epinephrine.

During the extraction 14 patients did not report any pain, while 38 patients reported pain which required IANB to continue the procedure which gave a success rate (26.7%) when articaine hydrochloride 4% with 1:200000 epinephrine used as a buccal infiltration. Fig(1) shows the success rate of using articaine hydrochloride 4% with 1:200000 epinephrine as a buccal infiltration for extraction of mandibular molars.

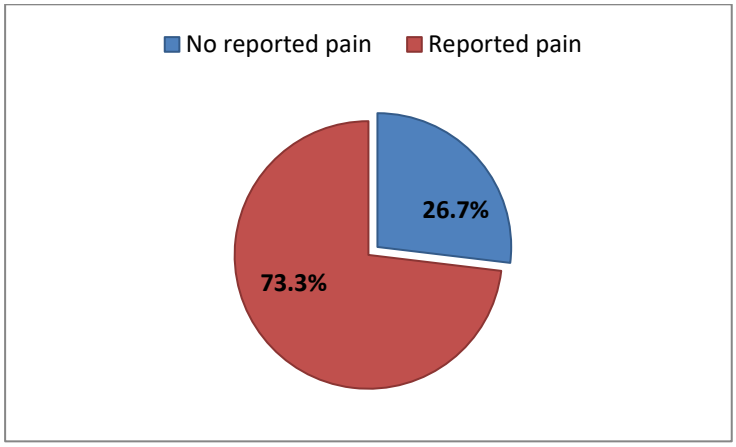

Fig (1): The success rate of articaine in the present study.

All the patients in the present study reported no pain during testing the anesthesia which was done by probing the buccal gingival.

The collected data in the present study was distributed on the basis of (age, gender and the number of tooth):

1- On the basis of age:

All the patients were grouped into 5 groups the first group from age 20 to 29 consisted from 20 patients, 5 patients reported no pain during extraction with a percentage 25%, the second group from age 30 to 39 consisted from 16 patients, 3 patients reported no pain during extraction with a percentage 18.75%, the third group from the age of 40 to 49 consisted from 6 patients, 2 patients reported no pain during extraction with a percentage 33.33%, the forth group from age 50 to 59 consisted from 6 patients, 1 patient reported no pain during extraction with a percentage 16.66%, and the fifth group from age 60 to 69 consisted from 4 patients, 3 patients reported no pain during extraction with a percentage 75%, table (1) shows these results.

Table (1): The age distribution of the sample.

Groups	Age	Number of patients	Patients reported no pain	%
First group	20-29	20	5	25%
Second group	30-39	16	3	18.75%
Third group	40-49	6	2	33.33%
Forth group	50-59	6	1	16.66%
Fifth group	60-69	4	3	75%

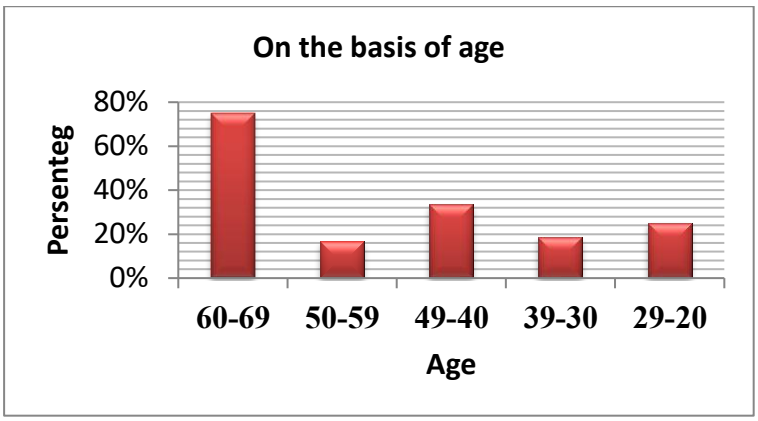

Fig (2): The study on the basis of age.

2- On The Basis Of Gender:

31 men patients were included in the present study, 4 patients reported no pain during the extraction with a percentage 12.9% and 21 women patients were also included in the present study, 10 patients reported no pain during extraction with a percentage 47.6%, table (2) shows these results.

Table (2) The study on the basis of gender.

Gender	Number of patients	Patients reported no pain	%
Men	**31**	**4**	**12.9%**
Women	**21**	**10**	**47.6%**

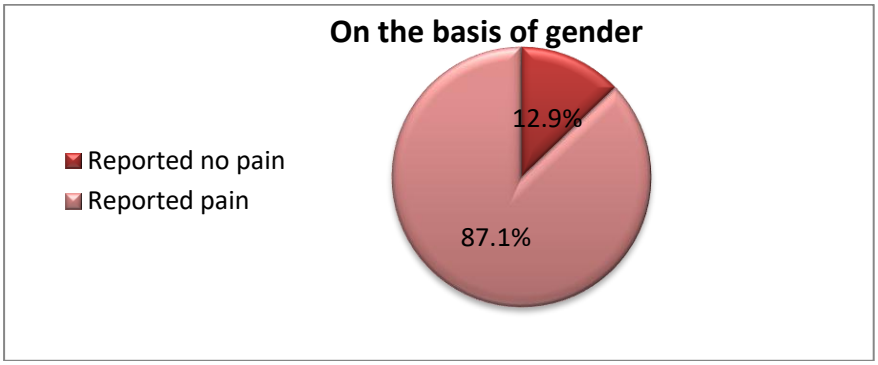

Fig (3): The study on the basis of gender.

3- On the basis of number of the tooth:

Based on the number of teeth, each patient was divided into three groups. The first group included 19 first molars, 5 patients reported no pain during extraction with a percentage 26.30%, the second group consisted of 14 second molars, 4 patients reported no pain during extraction with a percentage 28.50%, the third group consisted of 19 third molars, 5 patients reported no pain during extraction with a percentage 26.30%, table (3) shows these results.

Table (3): The study on the basis of number of the tooth.

Groups	Tooth	Number	Patients reported no pain	Percentage
First group	**First molar**	**19**	**5**	**26.30%**
Second group	**Second molar**	**14**	**4**	**28.50%**
Third group	**Third molar**	**19**	**5**	**26.30%**

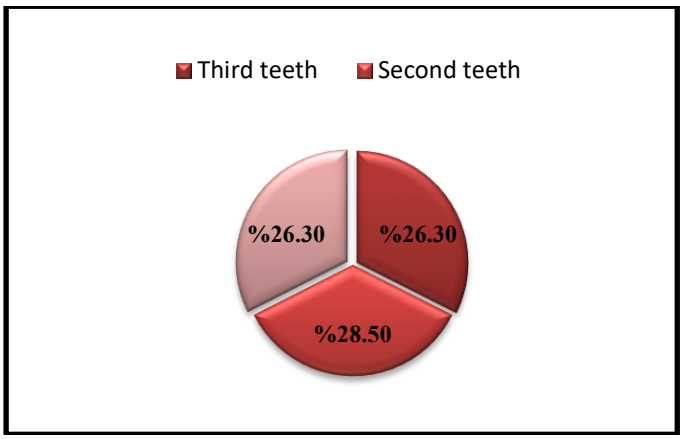

Fig (4): The study on the basis of number of the tooth.

Discussion

One of the most crucial elements in a successful treatment is providing a sufficient level of anesthesia. Adults' substantial buccal cortical bone makes it difficult to accomplish this using infiltration anesthesia in the jaw.(7) For this reason, an inferior alveolar nerve block is frequently necessary for anesthesia of the mandibular pulp and lingual soft tissue. This method is somewhat intricate and has limitations, as well as consequences like paraesthesia, trismus, and hemorrhage.(8)

Another drawback is the needless anesthesia of every nerve branch when only a small portion of the nerve needs to be anesthetized. To avoid unintentional biting, some patients' doctors also prefer not to anesthetize their bottom lip. Therefore, researchers have been looking for anesthetics that work well enough to deliver a sufficient depth of anesthesia by mandibular buccal infusion.(9,10)

Articaine hydrochloride is an amide anaesthetic agent and has a thiophene ring instead of a benzene ring, which differs from other anaesthetic agents. It penetrates the tissues to a greater depth, which is thought to be the result of its thiophene ring.[11] Its clinical advantages include the fact that its effect is longer-lasting and its superior penetration into bone.[12] Because of these, some think that articaine may be used for mandibular buccal infiltration anaesthesia as an alternative to an inferior alveolar nerve block. Although some evidence supports this hypothesis not everyone agrees.[3,8,13-15]

In this study the buccal infiltration of articaine in the extraction of mandibular molars had lower success rate 26.7% which is agree with ***Nydegger et al*** [14] who reported that articaine could not be regarded as an alternative to IANB, for infiltration anesthesia of mandibular first molars.

Maruthingal et al [13] showed that the buccal infiltration of articaine could not provide sufficient anesthesia of the lingual tissue of the mandible which is agree with the results of this study and correspond with the high failure rate 73.3% of the anesthesia.

The supplementary lingual infiltration could increase the success rate of this technique and that what ***Sawadogo et al***.[16] showed in his study the extraction of mandibular third molars using buccal infiltration of articaine and lingual infiltration has success rate of 87%, ***Meechan et al***, demonstrated in his review that bilateral buccal and lingual injections were more effective than articaine, despite the latter's ability to penetrate the cortex and cause numbness in the lingual region.(51) We demonstrated that articaine could not readily penetrate the brain to anesthetize the lingual tissue, which was consistent with his findings..

In his article on infiltration anesthesia in the mandible, **Meechan et al. (13)** listed several advantages, such as the fact that infiltration is technically straightforward, more comfortable for patients, capable of hemostasis when necessary, frequently eliminates the need for collateral innervations, and less likely to cause damage to nerve trunks. In order to prevent undesired internal bleeding, infiltration procedures may also be preferable in some patient groups, such as those with coagulation abnormalities. A buccal infiltration with articaine does have certain drawbacks, though, as a second injection will be required for lingual anesthetic in the event of extraction or any other surgery involving the manipulation of lingual soft tissues**.**Achieving local anesthesia by infiltration of articaine in the posterior mandible may also depend on the thickness of the buccal cortex, ***Flanagan, et al.***[17] observed that effective local anesthesia could be provided in patients with thin cortices and when there is facial cortical bone thicker than 2.0 mm, as measured on Cone-Beam Computed Tomography (CBCT), adequate anesthesia may not occur, their findings were in line with our results, although we did not use a CBCT in this study.

In contrast to our results, ***Bataineh and Alwarafi*** (18) reported a successful, painless extraction of mandibular first molars after buccal and lingual infiltration anesthesia. Additionally, they contrasted the discomfort felt during mandibular molar extractions after infiltration anesthetic and IANB. Unlike us, they used both buccal and lingual infiltration, and they evaluated just mandibular first molars.. The current study's findings praise the availability of articaine infiltration anesthesia as a last choice when conventional injections have not been able to produce a sufficient level of anesthesia, even though they do not suggest it as a substitute for IANB for mandibular teeth.

Conclusion

For the extraction of mandibular molars, infiltration anesthesia with articaine is not a viable substitute for an inferior alveolar nerve block due to its low success rate.

Recommendation

Further research is required to investigate the effectiveness of buccal articaine infiltration anesthesia with supplemental lingual anesthesia in extraction of mandibular molars.

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