Inferior alveolar nerve block anesthesia via the retromolar triangle, an alternative for patients with blood dyscrasias

Iván Claudio Suazo Galdames [1], Mario Gonzalo Cantín López [1], Daniela Alejandra Zavando Matamala [2]

(1) Unidad de Anatomía Normal
(2) Departamento de Estomatología, Facultad de Ciencias de la Salud, Universidad de Talca, Chile

Correspondence:
Dr. Iván Claudio Suazo Galdames
Unidad de Anatomía Normal,
Universidad de Talca,
Avenida Lircay s/n, oficina N°104
Chile
E-mail: isuazo@utalca.cl

Received: 20-04-2007
Accepted: 30-09-2007

Indexed in:
-Index Medicus / MEDLINE / PubMed
-EMBASE, Excerpta Medica
-SCOPUS
-Indice Médico Español
-IBECS

Suazo-Galdames IC, Cantín-López MG, Zavando-Matamala DA. Inferior alveolar nerve block anesthesia via the retromolar triangle, an alternative for patients with blood dyscrasias. Med Oral Patol Oral Cir Bucal. 2008 Jan1;13(1):E43-7.

http://www.medicinaoral.com/medoralfree01/v13i1/medoralv13i1p43.pdf

Abstract

One of the most commonly used mandibular anesthesia techniques is the Spix technique, which is very useful in clinical practice, but is risky when the patient is a bearer of blood dyscrasias.

Objective: The aim of this study was to present an alternative to the Spix technique in order to achieve troncular anesthesia of the inferior alveolar nerve. To this purpose, an infiltrative technique was designed to anesthetize the inferior alveolar nerve via the retromolar triangle.

Study Design: This study included 40 patients with an average age of 23.65 years, 22 males and 18 females, who were previously evaluated with a vitalometer control, then subjected to the designed anesthetic technique.

The effectiveness of the technique used to anesthetize the inferior alveolar nerve was evaluated by the results of tests using a vitalometer applied to a molar and a premolar on the anesthetized side after 5, 10 and 15 minutes.

Moreover, the anesthesia was evaluated in mucosa innervated regions by the inferior alveolar, lingual and buccal nerves, and by having the patient relate the duration of the induced feeling of numbness.

Results: The technique proved to be effective in 72.5% of the cases, with a latency of 10 minutes and an average duration of the anesthetic effect for 141.125 minutes. Moreover, anesthesia was obtained in the mucosa innervated regions by the inferior alveolar nerve in 72.5% of the cases, by the buccal nerve in 27.5% and in the innervated areas by the lingual nerve in 55% of the cases.

Conclusions: The proposed technique, even when it proved to be less effective than the Spix technique, can be seen as a lower risk alternative for patients carrying blood dyscrasias and being subjected to dental procedures in mandibular teeth.

Key words: *Anesthetic dental care, blood dyscrasia, Spix technique, retromolar triangle.*

Introduction

Among the anesthetic techniques in dentistry, the one most commonly used for inferior alveolar nerve troncular block is the one directed to the mandibular lingula known as the Spix technique where the anesthetic solution is deposited in the pterygomandibular space, in contact with the medial face of the mandibular ramus before the nerve penetrates the mandibular canal (1-4).

The blockade of the inferior alveolar nerve, the Spix technique, is very useful in clinical practice, presenting a low percentage of failure; Vinckier (5) has estimated that the percentage of failure is located in the range of 10% for this technique, while Wong & Jacobsen (6) have indicated that the percentage of failure ranges from 5 to 15%, with a latency of 10 to 15 minutes.

Regarding complications involved in this anesthetic techni-

que addressed to the mandibular lingula, pain produced by tearing the mucosa, breakage of the needle in the injection, facial paralysis produced by anesthetic infiltration in the parotid region, haematoma produced by the breakdown of blood vessels in the area to be anesthetized, as well as the intravascular injection of anesthetic solution, must be taken into consideration (7-9). Given the above, most of the complications for positive anesthesia puncture are in blocking the inferior alveolar nerve in 10 to 15%, due to the anatomical proximity to the homonym artery; this percentage decreases in the Gow Gates technique from 1.6% to 1.9% (10); it must be pointed out that the diameter of the inferior alveolar artery at level of the mandibular foramen has been described as 1.8 mm (10-14).

These last points take on great significance in patients with blood dyscrasias such as haemophiliacs, whose risk in dental care is fairly high and the management of which requires good knowledge on the part of the professional. Regarding anesthetic practice, the use of injections in deep, richly vascularized regions such as in the technique of the inferior alveolar nerve is contraindicated in patients with blood dyscrasias who have not been subjected to a previous prophylactic therapy (11-16); therefore, it is necessary to seek alternatives to minimize the complications in the care of patients, especially those who present coagulation disorders (17). This study presents and analyses a simpler and safer alternative for this kind of patient.

There is a triangular area near the distal of the inferior last molar called the retromolar triangle, which is formed by the fork in the temporal crest, located in the internal face of the mandibular ramus and distal face of the last mandibular molar (8, 18-20).

In this area, the bone presents special characteristics; it is perforated by a variable number of holes of different caliber that are described for the passage of branches of the buccal artery that go to the anastomose with the vasculonervous inferior alveolar package, thereby presenting a communication between the mandibular canal and the zone of the retromolar triangle, through which the dissemination of an anesthetic solution would be possible.

From this background, the purpose of this work is to find whether the anesthetic infiltrating the area of the retromolar triangle generates an anesthetic blockade in the area of the inferior alveolar nerve.

Material and Method

This study included 40 patients who went to the Faculty of Health Sciences Dental Clinics Centre at the Universidad de Talca, and were subjected to restorative procedures in mandibular teeth of groups IV (left mandibular molars and premolars) or VI (right mandibular molars and premolars). Patients were informed of the characteristics of the study and the risks and/or complications that could arise, and acceded voluntarily to participate declaring consent on a specially designed form.

The sample was composed of 18 males and 22 females; the average age was 23.65 years (SD 2.27). Patients whose third molars were half-included, or on the way to eruption, were excluded from this study.

All patients were previously subjected to a test of pulpar vitality as a control, using a Vitalometer Parkell applied in the vestibular face of a premolar and a molar of the quadrant to be anesthetized.

Infiltrative technique to the inferior alveolar nerve via the retromolar triangle.

a.- Recommended needle:

Short needle (21 mm in length and 30 gauge).

b.- Insertion area of the needle:

Mucosa on the area of the retromolar triangle, 5 mm from the distal face of the last molar, searching for the most central part within the limits the lateral retromolar triangle.

c.- Target area:

The area in which the anesthetic solution seeks to be infiltrated would be located in the screening area in the retromolar triangle.

d.- Anatomical zone:

Located intraorally distal of the last mandibular molar (2nd or 3rd), this area is made up of the leading edge of the retromolar triangle, the location of the temporal crest and subsequent fork whose edges originate the lateral and medial limits of the retromolar triangle.

e.- Guidance of the needle bezel:

The bezel of the needle falls perpendicular to the surface of the zone of the retromolar triangle.

f.-Procedure:

1-Position of the patient: The patient must be placed with the pumphead well-adjusted in supine position so that when opening the mouth the mandibular occlusal plane of the patient is parallel to the floor.

2.-Position of the operator: The operator can be standing or sitting. If the anesthesia is to be applied on the right side, the operator is placed in clock position 8-9, with the 12 located at the head of the dental chair. The operator takes the syringe with the right hand and with the thumb of the left hand moves the cheek outward to have a better vision of the puncture site. To anesthetize on the left side, the operator is placed in position 9-10 moving the cheek outwards with the thumb of his/her left hand. In both cases the other fingers of the hand give firm support to the jaw.

g.-Preparation of tissue in the puncture site:

The mucosa must be dried with cotton or sterile gauze; next, an antiseptic (iodized polyvidone) is applied, and then, a topical anesthetic must be applied.

h.- Development of the technique:

Once all the previous steps have been followed, the cheek is moved outwards with the thumb of the left hand. The syringe is drawn parallel to the occlusal madibular level. Then, it is tilted in front to the puncture site, gently inser-

ted, searching for bone contact, after which the anesthetic solution (1 tube of 1.8 ml. Carbocaine 2%) is slowly injected in small amounts, 0.72 ml/min. (2.5 minutes/tube). Once the anesthestic has been applied, the needle is gently removed.

Evaluation of the anesthetic technique

After applying the anesthestic to the inferior alveolar nerve via the retromolar triangle, it was evaluated by a vitalometer test after 5, 10 and 15 minutes after the withdrawal of the needle from the puncture site, testing the same teeth as those on which the vitalometer control was conducted.

To evaluate whether there were mucosal territories anesthetized, 20 minutes after the withdrawal of the needle from the puncture site the territories of the buccal, lingual and inferior alveolar nerves were punctured with a curved probe test and evidence of patient pain was recorded.

To evaluate the mucosal territory of the inferior alveolar nerve, the mucosa of the lower lip was punctured in front the inferior canine on the anesthetized side. To determine whether there was anesthesia in the mucosa territory of the buccal nerve, the vestibular mucosa was punctured in front of the first molar on the lower anesthetized side; the anesthesia of the mucosal territory of the lingual nerve was analysed by puncturing the area of reflection of the gingivolingual mucosa in front of the first lower molar on the anesthetized side.

Then, to determine the duration of the anesthetic feeling, in cases where the vitalometer result was negative, the lower lip of the anesthetized side was stimulated by touch and the patient was asked every 5 minutes to indicate any feeling of numbness in the lower lip. He was asked, at the same time, to indicate when there was no longer numbness of the lip. The values obtained were registered on a clinic tab.

Results

Vitalometer response.

In the vitalometer pre test, 100% of the studied cases presented a positive response (Positive: means that there is a response to the vitalometer test / Negative: means that there is no response to the test).

After 5 minutes 70% of the studied cases presented a positive response to vitalometer testing, the remaining 30% introduced a negative response. After 10 minutes 27.5% of the studied cases presented a positive response to vitalometer, the 72.5% remaining presented a negative response. After 15 minutes 27.5% of the studied cases presented a positive response to the vitalometer, 72.5 % of cases presented a negative response. These results are summarized in Table 1.

Mucosal anaesthetized territories.

Twenty minutes after applying the anesthestic technique 72.5% of the patients presented anesthesia in the mucosal territory of the inferior alveolar nerve and in the lower lip, whereas 27.5% presented anesthesia in the territory of the buccal nerve, and 55% in the mucosal territory of the evaluated lingual nerve. These results are shown in Table 2.

	5 min		10 min		15 min	
	N° cases	Percentage	N° cases	Percentage	N° cases	Percentage
Positive	28	70%	11	27.5%	11	27.5%
Negative	12	30%	29	72.5%	29	72.5%
Total	40	100%	40	100%	40	100%

Table 1. Response to the vitalometer after 5, 10 y 15 minutes.

	Inferior Alveolar Nerve		Buccal Nerve		Lingual Nerve	
	N° cases	Percentage	N° cases	Percentage	N° cases	Percentage
Anesthesia	29	72.5%	11	27.5%	22	55%

Table 2. Anesthesia in the mucosal territory of the inferior alveolar, buccal and lingual nerves.

Duration of anaesthestic sensation.
The average duration of the anaesthetic feeling was 141.125 minutes (SD 24.88).

Discussion

The utilization of the anaesthetic technique addressed to the mandibular lingula for temporary blocking of the inferior alveolar nerve is of first choice in the event that some invasive dental procedure should be done in the area of the mandibular teeth, especially molars and premolars. Many authors have reported that this technique presents a high clinical effectiveness; the goal of the so-called Spix technique is to produce the reversible block of the inferior alveolar nerve conduction when it is in the pterygomandibular space before entering through the higher hole of the mandibular canal (21-25).
Within the risks and complications of the Spix technique, haematoma in the pterygomandibular space and intravascular injection of anesthetic have been described. Garcíaet al. (21) and Brodsky & Dower (26) indicate that the Spix technique is superior to the Gow Gates technique in percentages of intravascular puncture; this is related to the large quantity of vascular elements present in the pterygomandibular space (8, 27). For this reason, it is stated that the Spix technique is risky for patients who carry some kind of blood dyscrasias (12, 25, 27, 28). In patients with blood diseases, the nerve block requires a minimum clotting factor of 20 to 30 %, so a coagulation test is recommended prior to any dental surgery procedure (29).
In the present study, an anesthetic technique applied to the inferior alveolar nerve via the retromolar triangle is introduced, proving to be effective in 72.5% of the cases, with a latency of 10 minutes. This technique proved to be of simple implementation due to the ease of tracing the site of puncture, which can be observed at all times while depositing the anesthetic, where virtually no bleeding was seen, (which has been corroborated by the description of Figún and Garino (19) who say that the area has limited vascularisation and a very well adhered mucoperiostium. These features are relevant if this technique will be used in patients whose coagulopathy requires special treatment (25).
The results show that anesthesia of the area of the labial mucosa was obtained which is located opposite the inferior canine in all cases, in which the vitalometer result was negative, which was as expected because the inferior alveolar nerve innervate both the pulp of the mandibular teeth and the mentioned mucosa as well. On the other hand, anesthesia was obtained in the vestibular mucosa in front of the first mandibular molar in the sample (27.5%), which was not an objective of the technique, but it can be explained by the anatomical background, since the buccal nerve runs near the site of the puncture at the time of interacting with the leading edge of the mandibular ramus, before generating the mucosal nerves branches which cross the buccinator muscle. It was also obtained in 55% of the cases of anesthesia in the area of reflection of the gingivolingual mucosa in front of the first mandibular molar on the anesthetized side, innervated by the lingual nerve, which, although it was not within the objectives of the technique, it was expected due to the anatomical characteristics of the site of puncture, primarily the proximity of the lingual nerve to the retromolar triangle region, when it accesses the paralingual space via the submandibular hiatus (21, 23).
When analysing the duration of the anesthesia, it must be noted that the times are similar to those reported for the troncular techniques, which reinforces the idea that in the proposed technique the anesthetic solution disseminates from the site of puncture to the mandibular canal, where the inferior alveolar nerve is.
The failure rate was 27.5% which can be attributed to the anatomical characteristics in the area, being variations in the density of the trabeculated bone in the retromolar triangle, an element that would prevent the spread of the mandibular anesthetic towards the mandibular canal. It is also necessary to consider the variability of dimensions and the architecture of the retromolar triangle such as its width, or its movement towards the lingual region, which can cause errors in the puncturing area and subsequent infiltration into other areas such as the paralingual space. This situation could also explain why there was a greater percentage of anesthesia towards the region innervated by the lingual nerve compared to the anesthethia of the region innervated by the buccal nerve.
These considerations allow us to affirm that the infiltrative anesthetic technique to the inferior alveolar nerve via the retromolar triangle is no more effective than other mandibular troncular techniques, such as the Spix or Gow Gates techniques, but due to its low risk of vascular injury, it is suggested as a technique of first choice for patients with blood dyscrasias.

References

1. Sicher HI, Tandler J. Anatomía para Dentistas. 2ª ed. Barcelona: Editorial Labor; 1950.
2. Niels BJ. Anestesia Odontológica. Ed. Interamericana; 1970.
3. Hollinshead WH. Anatomía para Cirujano Dentistas. 1ª ed. México: Editorial Harla; 1983.
4. López JS. Cirugía Oral. 1ª ed. Ed. Interamericana: Mc Graw Hill; 1991.
5. Vinckier F.Local anesthesia in children. Rev Belge Med Dent. 2000;55(1):61-71.
6. Wong MK, Jacobsen PL. Reasons for local anesthesia failures. J Am Dent Assoc. 1992 Jan;123(1):69-73.
7. Testut L. Tratado de Anatomía Humana. 3ª ed. Barcelona: Salvat; 1951.
8. Testut L. Tratado de Anatomía Topográfica. 8ª ed. Barcelona: Salvat; 1981.
9. Tomazzoli-Gerosa L, Marchini G, Monaco A. Amaurosis and atrophy of the optic nerve: an unusual complication of mandibular-nerve anesthesia. Ann Ophthalmol. 1988 May;20(5):170-1.
10. Blanton PL, Roda RS. The anatomy of local anesthesia. J Calif Dent Assoc. 1995 Apr;23(4):55-8.
11. Replogle K, Reader A, Nist R, Beck M, Weaver J, Meyers WJ. Car-

diovascular effects of intraosseous injections of 2 percent lidocaine with 1:100,000 epinephrine and 3 percent mepivacaine. J Am Dent Assoc. 1999 May;130(5):649-57.
12. Kaufman E, Goharian S, Katz Y. Adverse reactions triggered by dental local anesthetics: a clinical survey. Anesth Prog. 2000 Winter;47(4):134-8.
13. Pogrel MA, Thamby S. Permanent nerve involvement resulting from inferior alveolar nerve blocks. J Am Dent Assoc. 2000 Jul;131(7):901-7.
14. Meechan JG, Day PF, McMillan AS. Local anesthesia in the palate: a comparison of techniques and solutions. Anesth Prog. 2000 Winter;47(4):139-42.
15. Ah Pin PJ. The use of intraligamental injections in haemophiliacs. Br Dent J. 1987 Feb 21;162(4):151-2.
16. Spuller RL. Use of the periodontal ligament injection in dental care of the patient with hemophilia--a clinical evaluation. Spec Care Dentist. 1988 Jan-Feb;8(1):28-9.
17. Djulbegovic B, Goldsmith GH Jr. Guidelines for management of hemophilia A and B. Blood. 1995 Jan 15;85(2):598-9.
18. Paturet G. Lé Traité de Anatomie Humaine. Tome I. Paris: Masson; 1951
19. Figún ME, Garino RR. Anatomía Odontológica. 5ª ed. Buenos Aires: Editorial El Ateneo; 1971.
20. Latarjet-Ruiz Liard. Anatomía Humana. Tomo I. México: Editorial Panamericana; 1994.
21. García Peñín Apolinar, Guisado Moya Blanca, Montalvo Moreno Juan José. Risks and complications of local anaesthesia in dental office: Current situation. RCOE. [serial on the Internet]. 2003 Feb [cited 2007 July 09] ; 8(1): 41-63. Available from: http://wwwscielo.isciii.es/scielo.php?script=sci_arttext&pid=S1138-123X2003000100004&lng=en&nrm=iso.
22. Pogrel MA, Schmidt BL, Sambajon V, Jordan RC. Lingual nerve damage due to inferior alveolar nerve blocks: a possible explanation. J Am Dent Assoc. 2003 Feb;134(2):195-9.
23. Martínez González JM, Benito Peña B, Fernández Cáliz F, San Hipólito Marín L, Peñarrocha Diago M. A comparative study of direct mandibular nerve block and the Akinosi technique. Med Oral. 2003 Mar-Apr;8(2):143-9.
24. Pipa-Vallejo A, García-Pola-Vallejo MJ. Local anesthetics in dentistry. Med Oral Patol Oral Cir Bucal. 2004 Nov-Dec;9(5):440-3; 438-40.
25. Boronat López A, Peñarrocha Diago M. Failure of locoregional anesthesia in dental practice. Review of the literature. Med Oral Patol Oral Cir Bucal. 2006 Nov 1;11(6):E510-3.
26. Brodsky CD, Dower JS Jr. Middle ear problems after a Gow-Gates injection. J Am Dent Assoc. 2001 Oct;132(10):1420-4.
27. Piot B, Sigaud-Fiks M, Huet P, Fressinaud E, Trossaërt M, Mercier J. Management of dental extractions in patients with bleeding disorders. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002 Mar;93(3):247-50.
28. Carrera I, Mestre R, Berini L, Gay-Escoda C. Alterations in monitored vital constants induced by various local anesthetics in combination with different vasoconstrictors in the surgical removal of lower third molars. Bull Group Int Rech Sci Stomatol Odontol. 2000 Jan-Apr;42(1):1-10.
29. Gupta A, Epstein JB, Cabay RJ. Bleeding disorders of importance in dental care and related patient management. J Can Dent Assoc. 2007 Feb;73(1):77-83.