Design and preliminary evaluation of an extraoral Gow-Gates guiding device

Jorge Jofré, DDS, Dr Med Dent,[a] and Claudio Münzenmayer, DDS,† Concepción, Chile
UNIVERSITY OF CONCEPCIÓN

Incidence of unsuccessful anesthesia with the Gow-Gates mandibular block may be greater than that for the inferior alveolar nerve block until the administrator gains experience with this technique. The aim of this study was to develop a support instrument for the Gow-Gates mandibular block in an attempt to make the described procedure easier and more precise, especially for beginners. In a preliminary clinical experiment 40 patients were anesthetized with this new device; a control group of 40 patients was anesthetized without the instrument. The operators were 80 dental students without previous clinical experience in the Gow-Gates technique. In the experimental group 39 (97.5%) of the 40 patients were provided with complete anesthesia. In the control group 31 (77.5%) of the 40 patients were completely anesthetized. It appears that the new device allows a great level of success with the Gow-Gates mandibular block, irrespective of the clinical experience of the operator. **(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;85:661-4)**

The inferior alveolar nerve block does not always result in complete pulpal anesthesia. Failure rates of up to 20% are not uncommon with the conventional techniques for mandibular anesthesia.[1] Kaufman et al.[2] found in a survey that 90% of the responding general dentists had anesthetic difficulties, with the greatest number of failures occurring with the inferior alveolar injection.

In an attempt to reduce the rates of unsuccessful anesthesia encountered with the inferior alveolar nerve block, a new approach to mandibular anesthesia was described in 1973 by Dr. George Gow-Gates.[3] He uses extraoral and intraoral landmarks whereby the needle is directed to a higher puncture point. The target area of the needle is the lateral region of the condyle neck, just below the insertion of the lateral pterygoid muscle. The landmarks described by Gow-Gates are as follows:

Extraoral

- The lower border of the tragus of the ear (intertragic notch). The precise landmark is the center of the external auditorymeatus, which is concealed by the tragus; its lower border is therefore adopted as a visual aid.
- The corner of the patient's mouth. The puncture point lies in the plane extending from the lower border of the intertragic notch of the ear through the corner of the mouth.
- The angle of the ear to the side of the face. This is used as a guide for assessing the divergence of the ramus of the mandible from the sagittal plane.

Financed by an Institutional Grant (Project No. 9210109-1) awarded by the Dirección de Investigación of the Universidad de Concepción.
[a]Assistant Professor, Department of Prosthodontics.
†Deceased.
Received for publication June 20, 1997; returned for revision July 24, 1997; accepted for publication Dec. 15, 1997.

1079-2104/98/$5.00 + 0 **7/12/88489**

Intraoral

- The mesiopalatal cusp of the maxillary second molar. Injection height is established by the placement of the needle tip just below this cusp.
- A site just distal to the maxillary second molar at the height established in the preceding step. Penetration of soft tissues occurs at this site.

The Gow-Gates technique is a true mandibular nerve block because it provides sensory anesthesia to virtually the entire distribution of the trigeminal (5th) (inferior alveolar, lingual, mylohyoid, mental, incisive, auriculotemporal, and buccal nerves).[4] Dr. Gow-Gates has used this technique in his practice for approximately 30 years with a success rate of 99%.[3]

The advantages demonstrated for the technique over the inferior alveolar nerve block are as follows:

1. Higher success rates of complete anesthesia of the mandibular teeth: 98% versus 84% for the inferior alveolar block.[5] Levy[6] found a 96% success rate versus 65% for the conventional technique.
2. Lower incidence of positive aspiration: 1.6% to 2% versus 10% to 15% for the inferior alveolar nerve block.[1,7]
3. Complete nerve block in patients who had difficulty obtaining adequate profound mandibular anesthesia because of inflammation[8] or accessory sensory innervation to the mandibular teeth.[3]
4. A possibility that the injection will be less uncomfortable for the patient. It was observed that the pain induced by the injection is lower than that associated with a conventional mandibular nerve block.[9] The mucosa in the superior position, where the Gow-Gates penetration is made, seems to be less sensitive, and less resistance to the needle is felt at this higher point.[6] This technique has been especially recommended for the management of extremely anxious patients.[10]

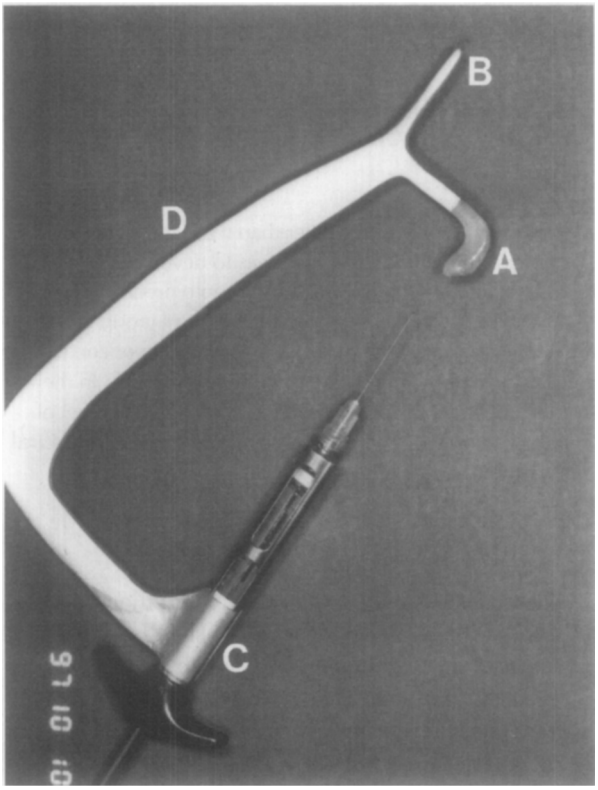

Fig. 1. Support instrument. **A,** Auricular device. **B,** Guide for divergence of tragus to sagittal plane. **C,** Ingot mold. **D,** Self-aspirating syringe.

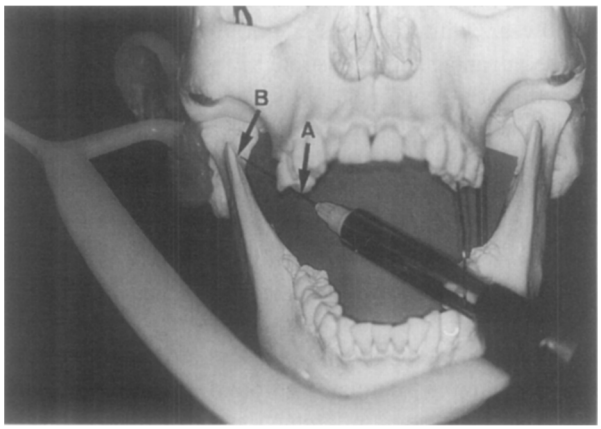

Fig. 2. Integration of intraoral landmarks with instrument. **A,** Mesiopalatal cusp of maxillary second molar. **B,** Neck of condyle.

The only disadvantage found in the literature is that the method is initially somewhat more difficult to learn[6,11,12]; in addition, until the administrator gains experience with the technique, the incidence of unsuccessful anesthesia may be as high as, if not higher than, that associated with the inferior alveolar nerve block.[13]

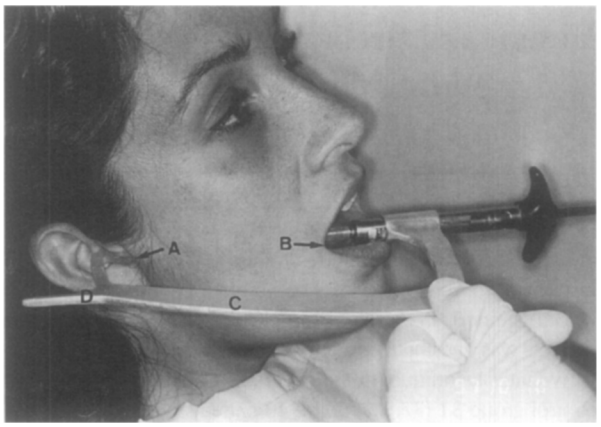

Fig. 3. Integration of extraoral landmarks with instrument. **A,** Lower border of tragus. **B,** Corner of patient's mouth. **C,** Plane from lower border of tragus through corner of mouth. **D,** Divergence of tragus to side of face.

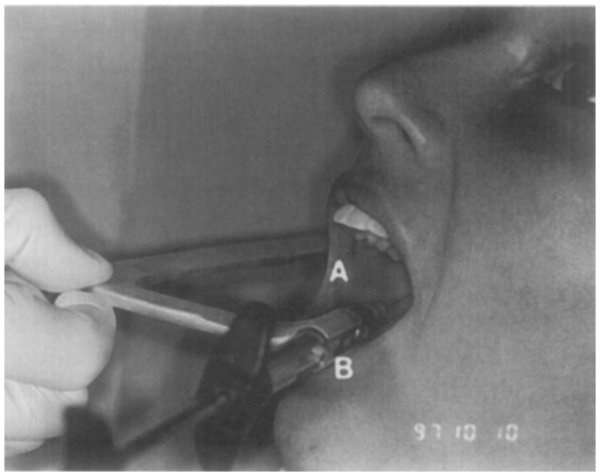

Fig. 4. Contralateral view of Fig. 3. **A,** Corner of patient's mouth. **B,** Ingot mold.

Once experience has been gained, however, success rates over 95% are not uncommon.[1] In a comparative study in which the Gow-Gates technique and the conventional blockade of the inferior alveolar nerve were carried out by young, untrained dentists, it was found that failures and reinjections in the Gow-Gates blockades decrease progressively in number, disappearing altogether after 50 blocks; in contrast, they remain almost constant in the inferior alveolar nerve block.[9] Different approaches have been suggested for becoming proficient in the use of the Gow-Gates mandibular block; one such approach is to use the technique on all patients who require mandibular anesthesia, allowing at least 1 to 2 weeks to achieve proficiency.[13]

The Gow-Gates technique has been employed in the

Table I. Gow-Gates technique with instrument (40 patients)

Parameter	*Result*
Induction time	7-9 min
Complete anesthesia	97.5% (39 patients)
Positive aspiration	0%
Patient discomfort	0%
Complications	None

Table II. Gow-Gates technique without instrument (40 patients)

Parameter	*Result*
Induction time	8-25 min
Complete anesthesia	77.5% (31 patients)
Positive aspiration	0%
Patient discomfort	17.5% (7 patients)
Complications	None

Section of Oral and Maxillofacial Surgery of the University of Concepción since 1984. After evaluating approximately 1500 Gow-Gates mandibular blocks,[14] we found clear advantages with mandibular nerve blocks in comparison with inferior alveolar nerve blocks, particulary in light of the possibilities of supplemental innervation of the mandible. However, during our initial attempt we experienced difficulty achieving complete anesthesia. Only after experience had been accumulated was the effectiveness of this highly successful technique fully realized.

The aim of our study was to develop a support instrument for this mandibular block that would facilitate the procedure described by Dr. Gow-Gates. It may be most useful for beginners.

MATERIAL AND METHODS

The distances between the tragus and the corner of the mouth on the same side of the face and between the two corners of the mouth were measured in 206 subjects at the Department of Oral Surgery of the University of Concepción. These measurements allowed us to design an instrument that could be used on any patient (Fig. 1).

The Gow-Gates extraoral and intraoral landmarks were analyzed, and a device was designed that allows the syringe to be mounted in the direction of the target area, making it almost impossible to miss the described anatomic references (Fig. 2). The auricular device is inserted in the lower border of the tragus, and the instrument is positioned in the plane from the lower border of the tragus through the corners of the mouth. The guide for the divergence of the tragus is placed parallel to the external face of the tragus. The syringe is mounted and displaced gently through the ingot mold. (Figs. 3-5).

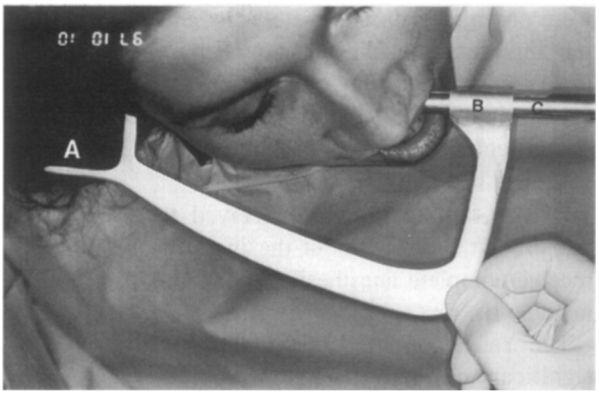

Fig. 5. Overview of Fig. 3. **A,** Guide to divergence of tragus to side of face. **B**, Ingot mold. **C,** Syringe.

In a preliminary clinical experiment, 40 patients ranging in age from 23 to 46 years were anesthetized with this new device in the Emergency Unit of the Faculty of Dentistry at the University of Concepción. The informed consent of all patients who participated in the research was obtained after the nature of the procedure and possible discomforts and risks had been explained. The 40 operators were fifth-year dental students who had no previous clinical experience with the Gow-Gates technique but had received theoretical and audiovisual information concerning it; to participate in the research each student had to obtain a minimum of 90 points on a 100-point test. All patients were anesthetized with 1.8 ml of 2% lidocaine with 1:100,000 epinephrine (Xylocaine with Epinephrine; Astra).

The method made use of a protocol with the following parameters:

- Induction time: use of a gingival probe at the cuspid once each minute
- Complete anesthesia: evaluated according to the method describedby Dobbs and DeVier[15]
- Positive aspiration: use of a self-aspirating syringe (Rønvig Instruments, Denmark)
- Patient perception: each patient was asked to respond to the statement "Please tell me if the injection was uncomfortable for you."
- Complications.

The 40 patients in the control group were anesthetized by the same number of new students. The same method of evaluation was used in conjunction with the Gow-Gates mandibular block without the instrument.

Anesthetic success and failure were analyzed nonparametrically by means of the Yates corrected test. Comparisons were considered significant at $p < 0.05$.

RESULTS

In the experimental group 39 (94.5%) of the 40 patients who received the Gow-Gates mandibular block

were provided with complete anesthesia. One subject felt slight pain but did not require reinforcement. No patient experienced any clinical discomfort during the application of the technique. No positive aspiration was encountered in this sample. The results are described in Table I.

Of the 40 patients who received the Gow-Gates mandibular block without the instrument, 9 did not receive complete anesthesia. The results can be seen in Table II.

The Yates corrected test indicated a statistically significant difference ($p < 0.05$) between the experimental group, with whom the instrument was used, and the control group with respect to anesthetic success.

DISCUSSION

The Gow-Gates mandibular block offers a more effective anesthesia than that provided by the inferior alveolar nerve block; its effective use is hindered only by the necessity for a "learning phase." The learning phase is an obstacle easily overcome by dentists working at or learning in a university or research center. However, private practitioners often find it difficult to learn new techniques because of lack of contact with an experienced support network. Presumably this lack of contact is the main reason that the Gow-Gates mandibular block has not been widely adopted in private practice as an alternative to mandibular anesthesia.

It appears that the instrument that we developed for the administration of the Gow-Gates mandibular block not only facilitates the procedure while retaining its effectiveness but also eliminates or at least significantly reduces the length of the learning phase.

The patient discomfort associated with the nonuse of our device could be due to the fact that a neophyte often repositions the needle to find a target area; this is frequently uncomfortable for the patient. When the support instrument is used, it allows the syringe to be mounted exactly in the direction of the target area, and just one injection is required; there is no need for repositioning or reinjections.

These results, which are preliminary, must be validated by further research along the same lines, and a repeated-measures design that would allow for a rigorous definition of complete pulpal anesthesia will have to be used. However, the results presented in our study may be indicative of the clinical effectiveness of these methods.

REFERENCES

1. Malamed SF. Handbook of local anesthesia. 3rd ed. St. Louis: C.V. Mosby; 1990. p. 202-7.
2. Kaufman E, Weinstein P, Milligram P. Difficulties in achieving local anesthesia. J Am Dent Assoc 1984;108:205-8.
3. Gow-Gates G. Mandibular conduction anesthesia: a new technique using extraoral landmarks. Oral Surg Oral Med Oral Pathol 1973;36:321-77.
4. Gow-Gates G, Watson JE. Gow-Gates mandibular block: applied anatomy and histology. Anesthesia Progress 1989;36:193-5.
5. Watson JE, Gow-Gates GAE. A clinical evaluation of the Gow-Gates mandibular block technique. N Z Dent J 1976;72:220-3.
6. Levy P. An assessment of the Gow-Gates mandibular block for third molar surgery. J Am Dent Assoc 1981;103:37-41.
7. Watson JE, Gow-Gates G. Incidence of positive aspiration in the Gow-Gates mandibular block. Anesthesia and Pain Control in Dentistry 1992;1:73-6.
8. Traeger KA. Hematoma following inferior alveolar injection: a possible cause for anesthetic failure. Anesthesia Progress 1979;26:122-3.
9. Manani G, Charanda M, Benatti M, Narne S, Zanardi L, Rusca F, et al. Gow-Gates block for beginners. G Anest Stomatol 1989;18:7-17.
10. Young ER, D'Aguiam G. Succesful mandibular anesthesia following numerous unsuccessful attempts: a case report. J Can Dent Assoc 1993;59:845, 848-50.
11. Jastak JT, Yagiela JA. Regional anesthesia of the oral cavity. St. Louis: C.V. Mosby; 1981. p. 163-4.
12. Gustainis JF, Peterson LJ. An alternative method of mandibular nerve block. J Am Dent Assoc 1981;103:33-6.
13. Malamed SF. The Gow-Gates mandibular block: evaluation after 4,275 cases. Oral Surg Oral Med Oral Pathol 1981;51:463-7.
14. Münzenmayer C, Tima M. La técnica de Gow-Gates, una alternativa para la tercera rama del Trigémino. Anuario Hospital las Higueras 1989;6:96-7.
15. Dobbs EC, DeVier C. L-arterenol as a Vasoconstrictor in local anesthetic. J Am Dent Assoc 1950;40:433-6.

Reprint requests:
Jorge Jofré, DDS, Dr Med Dent
Department of Prosthodontics, University of Concepción
Roosevelt 1550, Casilla: 286
Concepción
Chile