

Comparison of Efficacy of Pain Control Using the Interseptal Injection Technique and Inferior Alveolar Block Accompanied by Long Buccal Infiltration in Mandibular Periodontal Flap Surgery

Mohammad Taghi Chitsazi^{1,2} • Reza Pourabbas^{1,3} • Adileh Shirmohammadi^{1,2*} • Saied Nezafati^{1,4} • Amin Mousavi⁵

¹Dental and Periodontal Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

²Associate Professor, Department of Peiodontics, Faculty of Dentistry, Tabriz University of Medical Sciences, Tabriz, Iran

³Professor, Department of Peiodontics, Faculty of Dentistry, Tabriz University of Medical Sciences, Tabriz, Iran

⁴Associate Professor, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Tabriz University of Medical Sciences, Tabriz, Iran

⁵Postgraduate Student, Department of Prosthodontics, Faculty of Dentistry, Tabriz University of Medical Sciences, Tabriz, Iran

*Corresponding Author; E-mail: shirmohamadia@yahoo.com

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Abstract

Background and aims. Pain control ensures patient satisfaction and cooperation. This study aimed to compare the interseptal anesthetic technique (IA) as the initial injection for pain control during periodontal flap surgery with the inferior alveolar nerve block (IANB) accompanied by long buccal infiltration (LBI).

Materials and methods. This single-blind randomized clinical trial included 40 periodontitis patients. Pain intensity was evaluated immediately after injection and at the end of surgery. One side was chosen as the control to receive IANB accompanied by LBI and the other side as the test to receive IA. After the injection, the patients were asked to mark their reaction to the pain immediately after the injection on a visual analogue scale, which was repeated to analyze pain the day after surgery. Data were analyzed with independent-samples t-test using SPSS 13. Statistical significance was set at $P < 0.05$.

Results. The mean pain scores immediately after injection in the control and test groups were 20.62 ± 7.62 and 21.47 ± 8.62 , respectively, with no statistically significant difference ($df = 78$, $t = -0.466$, $P = 0.642$). Pain scores 24 hours after completion of surgery in the control and test groups were 7.97 ± 3.43 , and 9.30 ± 3.24 , respectively, with no significant difference ($df = 78$, $t = -1.775$, $P = 0.080$).

Conclusion. Based on the results, interseptal anesthetic technique was not shown to be superior to conventional injections.

Key words: Anesthesia, injection, pain.

Introduction

Dental treatments rendered without pain and with patient comfort after completion of the procedure have always been important goals for dentists. One of the techniques to achieve this goal is successful anesthesia. Pain management in patients is not only morally important but also gives us patient satisfaction and with that comes patient cooperation, decreasing treatment time.¹ Therefore, success in local anesthesia in dentistry has been continuously researched.² Local anesthesia techniques have been discovered following the discovery of pain control but each of these techniques, in addition to the relative success, have side effects and complications as well.² Also choosing an appropriate technique for anesthesia in the operating field has a main role in determining the success or failure of anesthesia.¹

Inferior alveolar nerve block is one of the most common techniques for anesthetizing the mandible for periodontal flap surgery.¹ Numerous studies have reported a 15-45% success rate for this technique.³ On the other hand, in the mandibular block injection due to anatomic factors such as innervation from the opposite side of the incisors, and secondary innervation of the posterior area of the mandible from the lingual, long buccal, and mylohyoid nerve, the patient may have pain during dental procedures.⁴

Inferior alveolar nerve block can cause permanent numbness in the lingual nerve and inferior alveolar nerve.⁵ In addition, this technique may cause trismus and in some instances oculomotor disorders and loss of vision.⁶

If the mandibular block technique is applied correctly, anesthesia in the hard tissue takes about 3-4 minutes to appear and the duration of anesthesia is between 40 minutes and 4 hours based on the type of vasoactive material used. By using this technique, anesthesia of the long buccal nerve may not occur; therefore, for anesthetizing the buccal soft tissue it is necessary to anesthetize the long buccal nerve along with the inferior alveolar nerve.⁷

Interseptal anesthesia is a dental anesthetic technique in which the injection is made through the interdental papilla into the subperiosteal area of the interproximal alveolar bone. The effects of this injection are similar to those of the periodontal ligament and the intraosseous injections.⁸

Saadoun et al suggested the use of the interseptal anesthesia technique for root planing and minor periodontal surgeries.⁹ This technique has also been reported to be appropriate for bone sounding.⁸

According to research reports, this technique is possible with a variety of syringes and with different nee-

dle lengths and even with different needle diameters; and this shows that the kind of the anesthetic agent used is less important than the technique for the success of anesthesia.^{8,9} This technique provides an excellent hemostasis in the area, obviating the need for another injection in the papilla for providing hemostasis, which is accomplished with the mandibular block technique. Additionally, anesthesia in this technique has been reported to take between 20 and 30 seconds to appear.

The aim of the present study was to test this hypothesis: Interseptal anesthesia technique (which can be used as a complementary injection after an inferior alveolar injection) can be used as an initial injection to control pain during periodontal flap surgery and replace the inferior alveolar anesthesia technique accompanied by the long buccal nerve block.

Materials and Methods

Forty subjects (28 females and 12 males) with periodontitis were included in the present single-blind randomized cross-over clinical trial based on inclusion and exclusion criteria. The subjects were examined for the severity of pain immediately after injection and at the end of the surgery. Since past experiences have an effect on feeling of pain, the subjects were divided to two groups of 20 individuals so that the first group had an initial block injection and then the interseptal injection and the second group had an interseptal injection and after that a block injection. Injections and surgeries were performed in all the subjects by one periodontist.

Inclusion Criteria for the Study

1. Absence of systemic disease
2. No use of sedatives or alcohol prior to surgery
3. Moderate to advanced chronic periodontitis with indications for flap surgery
4. Patients in the age range of 35-45 years

Exclusion Criteria for the Study

1. Pregnancy
2. Unwillingness to participate in the study
3. Failure to meet any of the conditions for inclusion

Preliminary treatments included health education, scaling, root planing, and occlusion adjustment (if needed) and the patients were monitored until their O'Leary plaque index was under 20% and remained constant. Then one side of the mandible was chosen randomly as the test and the other side as the control. In the test group, interseptal anesthesia technique and

in the control group inferior alveolar nerve block, with the long buccal infiltration, were used according to The Handbook of Local Anesthesia.¹⁰ In relation to the inferior alveolar technique, after 5 minutes of lip anesthesia, the patient was questioned and for analysis of the success of the long buccal and the interseptal infiltration the pressure of a sharp dental explorer on the gingiva was used and also the pressure of the sharp dental explorer was used to test the lingual nerve anesthesia. In both groups, 2% lidocaine solution containing 1:80000 epinephrine was used in order to induce anesthesia.

The drug regimen after surgery included 500-mg amoxicillin capsules for 1 week, 0.2% chlorhexidine mouthwash twice daily for 2 weeks and if pain persisted ibuprofen 400 mg every 8 hours. The dressing and sutures were removed after 10 days.

The patients were anesthetized with an aspirable injection syringe (Aesculap AG & CO. KGAm Aesculap-Platz, Germany) and a 25-mm 27-gauge needle (Sofijet, France). A topical ointment of 20% benzocaine was applied before the injection and after 1 minute a lidocaine cartridge containing 1:80000 of epinephrine was injected slowly in 60 seconds after aspiration for the inferior alveolar nerve block. Immediately after the injection, the patients were asked to mark their reaction to pain and discomfort on a piece of paper which had a line relevant to the Visual Analogue Scale (VAS). The zero point was interpreted as no pain and the 100 point represented maximum pain. Also 2 days after surgery the VAS test was used for assessment of pain.

Data for descriptive statistical methods (mean \pm SD) were analyzed with independent-samples t-test to compare the differences between the means of the two groups using SPSS 13. Statistical significance was defined at $P < 0.05$.

Results

The mean age of the test subjects in this study was 39.70 ± 3.01 years. In the use of the standard inferior alveolar technique for anesthesia 7 people (17.5%) had positive aspirations. In 2 cases anesthesia of the lip did not occur and the injection was repeated. In the use of the inferior alveolar injection technique with the long buccal nerve anesthesia in none of the samples complications such as hematoma, trismus, damage to the alveolar and lingual nerves and also systemic complications were seen. The minimum and maximum surgery times from the onset of numbness to the time of suturing the last stitch were 22 minutes and 33 minutes, respectively, and the mean of this time was 27.37 ± 3.21 . In both groups, there was no

need during the surgery for another injection because of pain. Based on measurements obtained from pain severity, which the patients had provided by VAS, the means of pain severity immediately after the inferior alveolar anesthesia technique accompanied by the long buccal nerve anesthesia and the interseptal anesthesia technique were 20.62 ± 7.62 and 21.47 ± 8.62 , respectively; the means of pain scores 24 hours after the end of the surgery, with the use of the inferior alveolar anesthesia and the interseptal anesthesia techniques were 7.97 ± 3.43 and 9.30 ± 3.24 , respectively. The comparison of the means of pain scores in the techniques immediately after the injection showed that pain severity in the interseptal anesthesia technique was higher compared to the inferior alveolar anesthesia technique accompanied by the long buccal nerve anesthesia but the difference was not significant ($P = 0.642$, $t = -0.466$, $df = 78$). In addition, comparison of pain severity 24 hours after the end of the surgery showed minor differences between the two techniques, which were not significant ($P = 0.080$, $t = -1.775$, $df = 78$).

Discussion

Numerous techniques are used for local anesthesia in dental treatment. It has also been shown that the depth of anesthesia necessary for different dental procedures is different. For example, the anesthesia needed for the extraction of a tooth may not be enough for endodontic treatment of the same tooth.¹¹ In order to carry out a periodontal flap surgery in the mandible the inferior alveolar technique with the long buccal anesthesia is used, followed by supplemental interdental injections.¹²

Due to the complications of inferior alveolar anesthesia⁶ and the percentage of success of this anesthesia technique¹⁰ and given the need to use this technique with complementary techniques, the present research compared the inferior alveolar technique and the interseptal technique, which can be used following inferior alveolar anesthesia as a complementary technique in modified Widman flap periodontal surgeries.

In 2005 Hung et al¹³ did not find a significant difference between the standard technique and the Gow-Gates technique in anesthetizing the mandible. Likewise, Jacobs et al¹⁴ did not find a significant difference between the standard, the Gow-Gates and the Vazirani-Akinosi techniques in anesthetizing the mandible. According to the findings reported by these researchers it may be possible to also apply the results obtained from the present research about the inferior alveolar anesthesia technique to other techniques of mandibular anesthesia (Vazirani-Akinosi and Gow-

Gates).

Delgado-Molina et al¹⁵ showed that by the application of a standard needle (27-gauge, 35 mm) 8.7% were aspiration-positive, while other researchers have reported 22%, 4%, and 18.9% aspiration-positive percentages.¹⁶ In the present research the percentage of aspiration-positive individuals was 17.5%. The differences in the above-mentioned reports might be attributed to the different number of samples in different studies and also to different types of needles used. However, the false negative and false positive results might be involved, too. Danielsson et al¹⁷ attributed such differences to the clinician's experience.

In the present research the success rate of the anesthesia of the lower lip in the inferior alveolar injection was 95%; the success rate of the lingual nerve block was 95% and for the anesthesia of the buccal gingival with infiltration of the long buccal it was 92.5%.

Ni Lai et al¹ in 2006 reported a success rate of 100% for anesthesia of the lower lip and the lingual nerve; the success rate for the anesthesia of the buccal gingiva was 98%. The differences between the results of the present study and other studies might be attributed to the clinician's experience and the number of samples in studies.

In the present study, no permanent or temporary complications were seen after injections in the control and case groups. Pogrel et al¹⁸ reported in numerous studies on the permanent and temporary complications that the permanent complications were scarce and caused by unknown mechanisms.

In other articles little attention has been paid to the feeling of pain in the interseptal technique. In the present study, the average feeling of pain immediately after application of the inferior alveolar technique with the long buccal was 20.62 ± 7.62 and with the application of the interseptal anesthesia technique it was 21.47 ± 8.62 . Meechan et al¹⁹ reported pain scores of 17 ± 8 using the infiltration technique and 28 ± 12 using the interligament technique. These researchers also used VAS technique in their study. Since the interligament technique is similar to the interseptal technique⁸ it is possible that the results of the previously mentioned study could be comparable to that of the present study. Kaufman et al²⁰ uses the VAS technique and reported that pain severity during the use of the inferior alveolar anesthetic technique was higher compared to the mental nerve block, local infiltration, and interligament techniques, while Adawy and Mansour²¹ reported the interligament technique to be less painful compared to other techniques in their study; however, Martin²² reported that interligament technique was the most painful tech-

nique. Ram et al²³ did not find a significant difference between the local infiltration technique and the interligament technique.

Given the conflicting reports, the clinician's experience and possibly the failure to consider some of the confounding variables in feeling and developing of pain, clinicians have reported different results. Among the effective confounding variables in the results maybe the clinician's psychological behavior at the time of the injection, duration of the injection, temperature of the anesthetic agent and the intraoral placement of clinician's finger placement might be involved.

Since the distressing pressure felt during injection of the anesthetic agent in the interseptal technique is higher than that in the inferior alveolar technique and if we were to compare the two techniques but with the same diameter the patient's feeling of pain would be higher in the interseptal technique compared to the inferior alveolar technique so it's possible that by decreasing the diameter the feeling of pain would decrease as well in the interseptal technique in relation to the inferior alveolar technique.

Since the oral mucosa and periodontal ligament have more free nerve endings compared to the submucosal area and studies have shown that the pain caused by the interligament injection is significantly more than the other injections,²⁴ it can be concluded that the results of the present study which reported that the amount of pain in the two techniques was not meaningful, may be related to this issue.

In this study, the amount of pain 24 hours after the injection in the inferior alveolar technique was less than that with the interseptal technique, although the difference was not significant. This slight difference might be attributed to the traumatization of the injection area by the effect of the pressure on the area during injection.

Considering the fact that in the case of the failure of the inferior alveolar technique, the interseptal injection may be used as the complementary technique and since this method cannot be used in flaps after retracting the flap, if the interseptal injection is used at first then in the case that it fails the inferior alveolar injection may be used as a secondary anesthetizing of the area. Considering the results obtained from the present research it is suggested that further research be done in relation to this topic so in the case of the confirmation of the results of this research, the interseptal technique could be an appropriate alternative to the inferior alveolar technique in anesthetizing the mandible in periodontal flap surgery.

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