

Single Buccal Infiltration for Extraction of Upper Teeth- Original Study

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Abstract:

Introduction: Palatal injection still remains a painful experience for patients, and this pain is attributed to the presence of rich nerve complement and displacement of palatal mucosa during anesthesia.

Objective: The aim of the present study was to demonstrate if lidocaine HCl could provide palatal anesthesia if given buccally during maxillary tooth removal without the need for a palatal injection.

Materials and Methods: The study group consisted of 70 patients, and 30 were controls. All the patients in the study group had unilateral extractions. In 70 patients, 2 ml of 2% lidocaine HCl with 1:65,000 epinephrine was injected into the buccal vestibule of tooth indicated for extraction without palatal injection. After 8-10 min, the extraction of maxillary tooth was carried out. Thirty subjects in the control group underwent same protocol with palatal injection. All the patients completed a 100 mm visual analog scale (VAS) after extraction.

Results: According to VAS, when comparison was carried out between permanent maxillary tooth removal with and without palatal injection, the difference in the pain levels were not statistically significant ($P > 0.05$).

Conclusion: The extraction of permanent maxillary tooth is possible by depositing 2 mL of lidocaine to the buccal vestibule of the tooth without the need for palatal anesthesia.

Keywords: Infiltration, latency period, lidocaine 2%, pain, palatal injection, visual analog scale,

I. Introduction

The palatal mucosal binding to its underlying periosteum and its abundant nerve complement, makes injections in the palate extremely painful.^[1] The pain is caused by the displacement of the mucoperiosteum rather than the needle piercing the mucosa. A number of techniques may be used to reduce the discomfort of intraoral injections, including transcutaneous electronic nerve stimulation (TENS),^[2] topical anesthetic application,^[3] topical cooling of the palate,^[4] computerized injection systems,^[5] pressure administration, and eutectic mixture of local anesthetics (EMLA). Among local anesthetics, it has been claimed that articaine, which belongs to the amide group is able to diffuse through soft and hard tissues reliably.^[6] This property of articaine makes it possible to obviate the need for a palatal injection when infiltrated buccally, if maxillary teeth are indicated for extraction. There is sparse literature with regard to the diffusion property of lidocaine HCl, hence the aim of this present innovative study was to demonstrate if lidocaine HCl could provide palatal anesthesia in maxillary tooth removal without the need for a palatal injection.

II. Materials And Methods

The study group consisted of 70 patients, 40 women and 30 men with mean age, 42.6 years who attended the department of oral and maxillofacial surgery for extraction of permanent maxillary teeth due to various reasons. All the 70 patients underwent extractions of teeth only on one quadrant of the maxillary arch. None of these patients had any severe systemic diseases contraindicating tooth extraction. The following procedure was carried out in 70 patients:

(a) the mucobuccal fold near the concerned teeth was dried with cotton gauze

(b) 2.00 mL lidocaine (2% lidocaine HCl with 1:80,000 adrenaline) was injected at the site with aseptic precautions. A similar protocol was followed in the control group, consisting of 30 patients, except that after drying the mucosa with cotton gauze, 1.75 mL lidocaine was injected buccally, and 0.25 mL of palatal injection was given. The extraction technique employed was a combination of elevation and forceps technique where palatal gingiva was reflected minimally. Study was done on all firm maxillary teeth and all the authors have performed the study. In all the patients, the teeth extraction was carried out 8-10 min after the injection. During extraction, the patients were periodically questioned about pain intensity on a 100 mm visual analog scale (VAS) after extraction. The patients indicated the extent of pain by correlating the amount of pain perceived by them, using VAS. The descriptors on each end of the 100 mm VAS were NO PAIN and ABSOLUTE PAIN. VAS score was given by the patients after careful explanation about the scoring to the patients

III. Results

According to VAS score of all 100 patients, the pain elicited when permanent maxillary teeth removal with palatal injection and without palatal injection were compared by unpaired t test and chi-square tests. The difference was not statistically significant between the control and study groups > 0.05 [Figure 1] and [Figure 2]. The value for VAS scores by unpaired t test was calculated to be as 0.584, and for FPS scores as 0.801 by chi-square test. Because the study was a preliminary study, we found no significance statistically in taking the same number of control and study subjects.

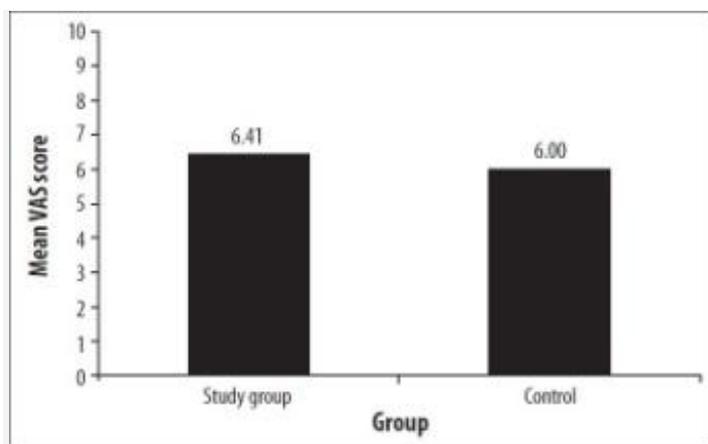


Figure 1: Comparison of mean VAS score of study and control group. As illustrated in the graph, there is no statistical significance between control and the study groups by values of 6.00 and 6.41, respectively, graphed over VAS scores

IV. Discussion

A number of techniques, such as suggestion, alteration of factors related to the injected solutions, such as pH and temperature, reduced speed of injection, and preparation of the surface tissues before needle penetration, have been used to reduce the discomfort of intraoral injections, of which application of topical anesthetic being a frequently used option.^[3] However, it is effective only on surface tissues (2-3 mm) and tissues deep to the area of application are poorly anesthetized. Surface anesthesia does allow for traumatic needle penetration, but because of the density of the palatal soft tissues and firm adherence to the underlying bone, palatal injection is still painful. Palatal mucosa is more resistant to the effects of topical anesthetics than other intraoral sites investigated.^[3] EMLA was developed in the 1980s and produces surface anesthesia of the skin; it has been shown to be more effective than conventional topical anesthetics when used on attached gingivae.^[7] EMLA has been used effectively intraorally; however, it is not designed for intraoral administration, and so contains no flavoring agent and is bitter tasting.^{[8],[9]} Similarly, TENS has been advocated as a means of alleviating the pain of intraoral injection.^[10] These techniques are useful but they are expensive, complex, and time consuming in nature and patients still experience discomfort during palatal injection. When local anesthetics are considered, articaine, which belongs to the amide group of local anesthetics, has been believed to exhibit the property of diffusibility through soft and hard tissues. This property of articaine makes it superior to all other techniques when used for alleviation of the pain. In a similar study by Uckan et al, conducted on 53 patients using articaine, it was proved that the difference in success rates was not statistically significant when permanent maxillary tooth removal with and without palatal injection were compared.^[6] Lima-Júnior et al determined that maxillary third molar removal could be performed with only 4% articaine HCl buccal infiltrative anesthesia in the majority of cases, with no need for supplemental palatal injections.^[11] Fan et al determined that the deposition of 1.7 mL of 4% articaine HCl with 1:100,000 epinephrine into the buccal vestibule provides similar clinical efficacy to the routine type of anesthesia with palatal injection for maxillary tooth removal.^[12] Shahid et al in a study on 20 patients concluded that Articaine can be used as an alternative to lignocaine in extraction of maxillary premolars for orthodontic reason avoiding palatal injections which are painful^[13]. But contrarily, in a study conducted by Ozeç et al, they could not find any evidence to confirm the hypothesis regarding vestibule-palatal diffusion of 4% articaine or the presence of 4% articaine at palatal tissues after buccal injection. The results of their study contradict the results of the previous studies on this topic, which advocated the presence of vestibule-palatal diffusion.^[13] In a comparative study between articaine and lidocaine, superiority of articaine over lidocaine could not be statistically corroborated by a clinical study. Both solutions presented a similar behavior, and both were not entirely efficient in controlling pain during the treatment of irreversible pulpitis, which reveals their similar properties. In the present study, deposition of lidocaine HCl to the buccal vestibule and 8-min latency period showed similar statistical results as that of the previous studies done using articaine.

V. Conclusion

As this particular study is preliminary in nature, further studies of this kind on more number of samples should be done to substantiate the results of preliminary studies. As the sample size in our study was less, we believed that the results would not deviate much from similarity even when control and study groups were different patients. Here in this study, it is the difference in the pain levels experienced by the patients in the 2 groups, that was assessed by statistical processing. But however, Study results showed that ideal infiltration of lidocaine HCl with a prolonged latency period of 8 min could bypass the need of palatal injection, by its property of diffusibility through tissues. When implemented, it can be considered superior to all other previously mentioned techniques in permanent maxillary tooth extraction.

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