Original Article

Comparison of efficacy among various topical anesthetics: An approach towards painless injections in periodontal surgery

ABSTRACT

Background and Aims: Local anesthetics (LAs) are most commonly used agents in dentistry. They are used to prevent the pain and nociception generated during dental procedures. Since pain associated at the time of injection of LA is uncomfortable, most of the dentists are on pursuit of painless administration of LA injection and use of topical anesthetics prior to the injection has proven effective in reducing anxiety and pain to the patient. The aim of this study is to compare pain responses after application of three types of topical anesthetics with control in the patients referred for periodontal full mouth flap surgery.

Materials and Methods: A total of 83 patients (42 males and 41 females) participated in the study with age group ranging from 30 to 50 years. The present study is to evaluate the efficacy of three topical anesthetics (Precaine gel, Benzocaine topical paste and Lignocaine spray) before infiltration in altering visual analog scale (VAS) scores of pain during LA injection. The statistical analysis was performed using SPSS version 15.0 software. Repeated analysis of variance was performed to know the effect of each variable and reveal statistical significance.

Results: Results revealed that Precaine gel had least VAS score compared with other topical anesthetics.

Conclusion: From the present study, it can be concluded that procaine gel is a better than other topical LA agents, as the number of studies on this subject is rare and clinical results are mixed, further studies are required with a larger sample before its routine application in our field.

Key words: Anesthetics; lidocaine; local; Precaine

Introduction

Local anesthetics (LAs) are most commonly used agents in dentistry. They are used to prevent the pain and nociception generated during dental procedures. The pain associated at the time of injection of LA is the only uncomfortable part of any dental procedure. For this reason, most of the dentists prefer painless administration of LA injection using topical anesthetics prior to the injection. Various LA are available for topical use such as lidocaine, prilocaine, benzocaine and EMLA (lidocaine 2.5% and prilocaine 2.5%) is an emulsion in which the oil phase is a eutectic mixture of lidocaine and prilocaine in a ratio of 1:1 by weight.

Materials and Methods

The present study is to evaluate the efficacy of three topical anesthetics before infiltration in reducing visual analog scale (VAS) scores of pain during LA injection. Totally 83 patients

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(42 males and 41 females) participated in the study with age group ranging from 30 to 50 years. The study was of 7 months duration from September 2013 to April 2014. Ethical Committee approval was taken from the hospital (IEC number: SSCD/Perio/14/16) and the written informed consent from the patient before the procedure. Patients who were indicated for full mouth periodontal surgery were included in the study. Patients who are allergic to lidocaine and benzocaine, with acute gingival infections, on antibiotics, analgesics and anti-inflammatory drugs, with a history of personality disorders, who required sedation for surgery, who are medically compromised with status greater than the American Society of Anesthesiologists III are excluded from the study.

The three agents used before infiltration were:

- 1st quadrant: Precaine gel (lidocaine 8%, dibucaine 0.8%) strawberry flavor
- 3rd quadrant: Lignocaine spray 15% (nummit spray)
- 4th quadrant: Topical paste (20% benzocaine, 0.1% benzalkonium chloride 0.1%, 0.9% saccharine sodium) strawberry flavor
- 2nd quadrant: Direct needle (guage 30) (control).

A total of 83 (42 males and 41 females) patients among 30-50 years of age and a mean age of 42.5 ± 2.35 years who attended our hospital were selected for the study. A Pilot study was done prior to the main study to avoid constraints. In the pilot study, the duration of 3 min was determined for the onset of anesthetic effect after topical LA was applied. The topical anesthetics according to the study protocol were applied to the gingiva (both free and attached), the buccal vestibule of each quadrant. The mucosa was dried prior to the application of the topical anesthetics, except for the spray, the other two anesthetics were gently applied by a fine cotton on to the mucosa for better absorption. A blinded single operator applied all the three anesthetic agents to all the patients and was not aware of the anesthetics. Onset is measured by probing the free gingiva or attached gingiva and alveolar mucosa every minute.[1] The other objective symptoms such as superficial probing, deep probing and gingival detachment were assessed with a sharp probe. After application, 3 min duration was given before infiltration anesthesia using 2% lignocaine (1:80,000).

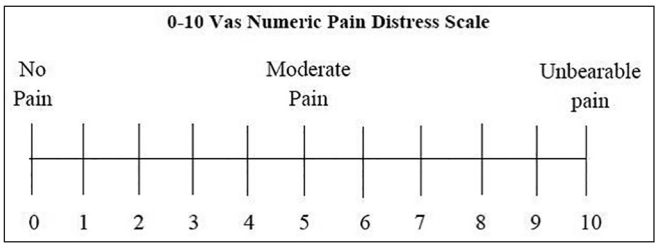

Figure 1: Visual analog scale

Each patient was asked to quantify the pain perception during the LA injection using VAS scale [Figure 1]. Patient was not informed regarding scale prior to the infiltration in order to eliminate the bias of anticipated pain. The pain scores were recorded for all patients and statistically analyzed.

Statistical analysis

The statistical analysis was performed using Statistical Package for the Social Sciences version 15 (SPSS Inc., Chicago, Illinois, USA). The sample selected was independent of race, sex, and ethnic physiognomies. As no former research on this topic was obtainable, and hence influence size variable to compute sample size did not exist; therefore, sample size prior to study could not be verified for the present study. Our results will provide these values for any upcoming projects planned on the subject. Repeated analysis of variance was performed to know the effect of each variable and reveal statistical significance. The confidence level of the study was proposed to be 99% as the $P < 0.001$ which is highly significant.

Results

The mean VAS score for 1st quadrant (Precaine) was 1.03 ± 1.01, 2nd quadrant (direct needle) was 6.07 ± 1.09, 3rd quadrant (lidocaine spray) was 3.83 ± 0.677 and 4th quadrant (topical paste) was 3.38 ± 0.69 [Table 1].

Table 2 shows the comparison of pain perception among 4 quadrants which shows the statistically significant difference in VAS scores. Quadrant 1 has least VAS score while quadrant 2 had the highest VAS score among all the quadrants [Figure 2] that is, quadrant 2 > quadrant 3 > quadrant 4 > quadrant 1.

Discussion

In the present study, we evaluated and compared the efficacy of three topical anesthetics before infiltration in reducing pain during LA injection during full mouth periodontal flap

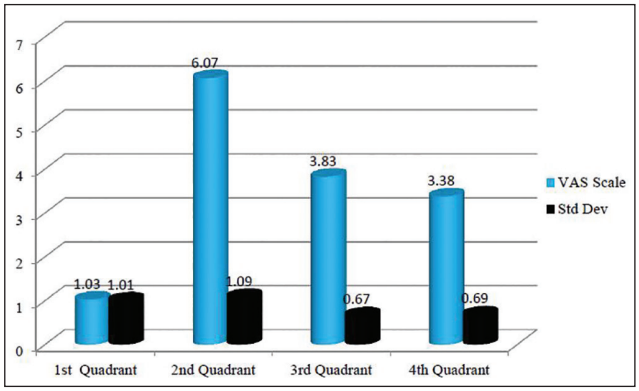

Figure 2: Graphical representation of visual analogue scale scores among various quadrants

Table 1: Mean ± SD VAS scores of each quadrant

Quadrant	VAS score (mean ± SD)
1	1.03±1.01
2	6.07±1.09
3	3.83±0.677
4	3.38±0.69

SD: Standard deviation; VAS: Visual analogue scale

Table 2: Comparison of pain perception among four quadrants

Interquadrant comparison	*P*
Q1 versus Q2	0.001*
Q1 versus Q3	0.001*
Q1 versus Q4	0.001*
Q2 versus Q3	0.001*
Q2 versus Q4	0.001*
Q3 versus Q4	0.051#

*$P < 0.001$ statistically highly significant. #$P > 0.05$ statistically not significant

surgery. Painless administration of LA injection during any procedure is an important consideration. Topical anesthetics have been used for number of years for reducing pain during injections. In the present study compared the efficacy of three topical anesthetics (Precaine gel, benzocaine topical paste and lignocaine spray) before infiltration in altering VAS scores of pain during LA injection. Results revealed that Precaine gel had least VAS score compared to other topical anesthetics. Possible reasons could be that the lidocaine and benzocaine are absorbed at slightly different rates when applied topically. Benzocaine is somewhat less water soluble than lidocaine, meaning that it crosses through the tissue of the mouth less readily when it is directly applied.[2]

On the other hand, lignocaine spray also demonstrated more VAS score compared to gels. This could be attributed to its unfavorable bioadhesion and poor possibility of the solution to confine at the preferred site. It also has deferred onset of action of 112 sec due to its relatively weak surface anesthetic activity. Therefore 1-2 min of contact with the mucosa is essential.[3] Benzocaine gel has a low dissociation constant (pKa = 3.4), which may result in a high drug concentration in the local area compared to spray.[3] This is in accordance with Nayak and Sudha[3] and Jelvehgari *et al*.[4] The results of the present study are in accordance with Grover *et al*. study.[2]

Conclusion

The present study is one of the few studies which compared the efficacy of topical application of the LA gel or spray before the administration of LA against pain and possibly the only study which evaluated the efficacy of topical anesthetic effect in periodontal flap surgery and from the present study it can be concluded that procaine gel is a better topical LA agent compared to lignocaine spray and topical paste, which may be used as preanesthetic gel to reduce the anxiety, discomfort, pain and nociception to the patient which may occur during the infiltration. As the number of studies on this subject is rare and clinical results are mixed, further studies are required with a larger sample before its routine application in our field.

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Nil.

Conflicts of interest

None.

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