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Original Article

EVALUATION OF THE EFFICACY OF TWO DIFFERENT VOLUMES OF 2% LIGNOCAINE WITH GOW-GATES MANDIBULAR ANESTHESIA TECHNIQUE: A PROSPECTIVE STUDY

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ABSTRACT:

A randomized controlled prospective study was carried out to compare the effectiveness of 2 different volumes of anesthetic solution for premolar-molar extraction via Gow-Gates mandibular block. Sample size was 500 nerve blocks with a 27-gauge needle of 28 mm length irrespective of gender. 250 nerve blocks were performed using 1.8 mL (group 1) of lignocaine 2% solution with adrenaline 1:200000, and 250 nerve blocks using 3.6 mL (group 2) of same anesthetic solution. Patch test for allergy to LA solution was done prior to nerve block. Two different parameters frequency of successful anesthesia and onset of complete anesthesia were evaluated and the results were compared and analyzed statically. Resulting in significant differences (P<.005) were observed in the comparison of two volumes. Group 2 (3.6mL) yielded a higher success rate (82.5%) than the group 1 which yielded only 17.5% successful anesthesia. The onset of complete conduction anesthesia was achieved in 8 minutes by 56% of the subjects with 3.6 mL and only 6% subjects with 1.8 mL. This study concludes that a larger volume of anesthetic solution (3.6 mL) is required to achieve satisfactory success rate and the faster onset of action as compared to 1.8 ml of lignocaine solution with 1:200000 adrenaline for a dental extraction in premolar-molars without the use of reinforcement anesthesia.

Key words: Gow-Gates, Mandibular anesthesia, Nerve block

INTRODUCTION:

In dentistry, predictable anesthesia is an essential requirement for both the

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patient and the dentist. The patient's opinion about his dental treatment is closely related to his previous local anesthesia experiences. The proper use of local anesthesia techniques and pain management are indispensable for successful dental treatment. The mandibular nerve block seems to be the best choice to attain successful anesthesia in mandibular molars and premolars. For achieving profound mandibular anesthesia, the techniques available are inferior alveolar nerve block, Varizani-Akinosi, and the Gow-Gates techniques. The Gow-Gates technique, in comparison to other techniques, has the highest success rates in achieving successful anesthesia approximately 99% in Gow-Gate's experienced hands. [1]. This block is very close to a true mandibular nerve block, because it provides sensory anesthesia to the entire distribution of the mandibular nerve. It provides regional anesthesia to all branches of mandibular nerve at the foramen ovale. [1]

MATERIAL AND METHODS:

A randomized controlled prospective study was carried out in PGIDS, Rohtak to compare the effectiveness of two different volumes of lignocaine 2% with 1:200000 adrenaline solution with Gow-Gates nerve block technique. This study is based on the experience gained from 500 patients, 300 male and 200 female, age 14 to 60 years, scheduled for simple lower molar and premolar extractions and who have given their informed consent to participate. Canines and incisors were excluded to avoid the probability of cross innervations in anterior teeth region. The patients selected were healthy patients as classified by American society of anesthesiologist (ASA I) and have never been allergic or toxic reactions to any local anesthetic agent. The patients were randomly selected in 2 groups of 250 subjects each. Patients in group 1 received 1.8 mL of lignocaine solution via Gow-Gates nerve block technique. And second group received 3.6 mL solution using the same technique. In all cases 2% lidocaine with 1 : 200,000 epinephrine solution, and a disposable 27-gauge 28mm needle was used.

In this study 3 time stages were designed (8, 12, and 16 minutes). At 8, 12, and 16 minutes after injection a sharp dental explorer test (sharp stimuli) was used on the buccal mucosa, lingual mucosa and in between premolars. The subject's response was recorded. Onset of complete anesthesia means the period of time required to begin a safe, painless procedure. The test procedures began 8 minutes after the injection, and if pain persisted, additionally every 4 minutes until 16 minutes after injection time. The anesthesia response was recorded as positive or negative as on VAS. Immediately after achieving a positive response for anesthesia in all 3 terminal nerve test areas, the extraction began. In this study Grade A anesthesia was considered completely satisfactory anesthesia by the patient and did not require any kind of reinforcement. Grade B was incomplete anesthesia, which required another injection for the patient. If pain appeared during the extraction before the 16 minutes after injection, additional time was allowed until the next time level (8, 12, or 16 minutes); pain appearance after 16 minutes post injection was considered Grade B category. Postoperatively, anesthesia was classified as successful anesthesia (Grade A) or unsuccessful

anesthesia (Grade B). Results were analyzed statistically.

RESULT:

In relation to anesthetic success, (17.5%) of the patients of group 1 were provided with successful anesthesia. Of the 250 patients who received 3.6 mL (group 2), resulted in 82.5% cases of successful anesthesia. The χ^2 test indicated a statistically significant difference (P<.005) between the first group and the second group in relation to anesthetic success. The onset of clinically adequate anesthesia was achieved in 8 minutes by 6.25% in the first group and 56% of the subjects of the second group. At 12 minutes, the second group reported onset of complete anesthesia is 62%. At 16 minutes in the second group,62% subjects confirmed onset of complete anesthesia and 6.25% of the first group. In the first group, the buccal nerve test area had the highest failure rate, 68.75% felt pain. The lingual and inferior alveolar nerve test areas both had a 56.25% failure rate. The second group had only a 12.5% failure rate for the buccal nerve test area; the lingual and inferior alveolar nerve test areas had no failure. The Kruskal-Wallis variance test was used to compare these results. Significant differences were found (P < .005) between the first and second group with respect to the buccal, lingual, and inferior alveolar nerve test area.

DISSCUSION:

This study was undertaken to compare the efficacy of two different volumes of lignocaine 2% with 1:200000 adrenaline with Gow-Gates technique. The majority of the patients confirmed numbness in the auriculotemporal region. The second group achieved anesthesia in 94% of the patients 8 minutes post injection. Anesthesia in the first group was achieved in 75% of the patients. This study achieved an 82.5% incidence of complete anesthesia without the use of reinforcement injections in any nerve when using 3.6 mL of anesthetic solution. 17.5% patients in second group (3.6 mL) failed to achieve buccal anesthesia. This study considered successful anesthesia when all test areas were anesthetized (mandibular conduction anesthesia) and when the extraction procedure was intervened without pain, at maximum time of 16 minutes.

The first group achieved only 17.5% completely satisfactory anesthesia. Of this group successfully passed the explorer test, but failed during the extraction because the patients reported diffuse pain in the ramus near the gonion area. It is possible that supplemental innervation of the cervical transverse nerve gave sensory branches to the buccal periosteum. “Gow-Gates” gave various reasons to explain the small, but significant, failure rates in achieving mandibular anesthesia [2].

Gow-Gates, with his approximately 30 years of experience, achieved a success rate of approximately 99% in his practice [3,5]. Monheim stated that the inability to diffuse throughout the large nerve trunk with an insufficient amount of anesthetic solution and concentrations to block the nerve fibers may result in inadequate local anesthesia [4-6]. Rood stated that an insufficient amount of anesthetic solution could alter an otherwise adequate nerve block. The buccal nerve is commonly blocked (75% of the time) with the Gow-Gates technique along with the other branches of the mandibular

division of the trigeminal nerve [7-9]. The volume of the pterygomandibular space has been estimated by Murphy and Grundy to be approximately 2 mL. From the estimated volume of the pterygomandibular space, a 2.2 mL dose would completely fill in the space and probably diffuse anteroinferiorly from the mandibular neck, which could account for consistent buccal nerve anesthesia, which they have reported [10-12]. Young and D'Aguiam stated that studies have shown a higher success rate of buccal nerve anesthesia when 3.0 mL of solution are used versus 1.8 mL, so a more effective diffusion appears to occur with larger volumes.

Even if signs of subjective numbness appear after 3 to 5 minutes post injection on the lip, tongue and cheek, the block sometimes was not profound enough to begin a dental procedure [11]. The possible cause may be mandibular nerve at that height is of a thicker diameter and the distance from the objective site of anesthetic solution deposition to the main mandibular nerve trunk is approximately 5 to 10 mm [12]. This is the reason of the increased dosage of anesthetic solution in Gow-Gates nerve block technique. But it should be within maximum recommended dosage limits or there may be increased probabilities of drug toxicity.

CONCLUSION:

This study concludes that a greater volume of anesthetic solution is required to achieve the successful anesthesia in Gow-Gates technique. No matter how successful the clinician judges the block to be, if any pain is perceived by the patient, the quantity in that block must be classified as failure.

The subjective results in this study in relation to numbness in the auriculotemporal region indicate that further studies are required to prove objective anesthesia but demonstrate that with this technique a clinician can regularly obtain effective anesthesia in this region.

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