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PAIN PERCEPTION IN DIFFERENT INJECTION TECHNIQUES IN PAEDIATRIC DENTISTRY: AN ORIGINAL RESEARCH

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ABSTRACT:

Introduction Pediatric dentists commonly face with the task of giving the local anesthetic to the children who are dreaded of the procedure. There has been a focus worldwide to make any procedure as less as possible for all be it adult or child patient. There are very few studies regarding the efficacy of the cold and vibration application during the injection techniques. Along these lines, the reason for this examination was to assess the efficacy of a local anesthetic procedure without topical application when contrasted to the conventional insertion technique for alleviating pain in children receiving local anesthesia injections and also to compare the pain perception and comfort of patient between conventional and Buzzy system.

Materials and methods 150 children between the ages 3-12 was selected. Three groups of 50 each were divided as conventional, alternative and buzzy device groups. Pain response was assessed between the groups as comfort and discomfort. The observations were evaluated using Chi- square analysis.

Results There was a significant difference regarding the pain response between the

conventional, alternative and the buzzy device technique. ($P < 0.000$). Significant difference was seen for the mandibular block in the buzzy group. ($P < 0.000$) No significant difference was observed in the response neither between the maxilla and mandible, nor between boys and girls, between the conventional and alternative techniques in a three groups.

Conclusion The alternative and the buzzy device techniques can lower the discomfort in child dental patients and allow the clinician to administer a successful anesthesia.

Keyword: Buzzy device, topical anesthesia, conventional local anesthesia, pediatric dentistry.

Introduction

Pediatric dentists commonly face with the task of giving the local anesthetic to the children who are dreaded of the procedure. There has been a focus worldwide to make any procedure as less as possible for all be it adult or child patient. Dentists are competent in techniques that can minimize pain and anxiety, when giving the local anesthesia to children. Before the local anesthetic is given topical anesthetic is also given in the child patients in particularly the dental procedures. However there has been the reposts of the patients complaining of the pain and discomfort after the successful administration of the anesthesia. Literature supports the view that there was a reduced pain perception after topical anesthesia.[1] However there has been a variable reports that supports the use of the topical anesthetics before local anesthesia that any be both the anesthesia and patient or technique related. [2] A new review in the United States exhibited that most kids loathed the taste, consistency, and warm/consuming impression of topical anesthetics [3] Moreover, the extra time needed to give topical anesthetics may permit the kids to become fearful concerning the procedure, like the issue related with a lidocaine patch.[4] Furthermore, some oral topical anaesthetics can deliver systemic toxicity or localised allergic reactions.[5] In this manner, the need exists to create more up to date or potentially superior topical anaesthetics delivery frameworks or injection procedures to limit the previously mentioned issues in the pediatric dental populace. Buzzy was created by Amy Baxter, MD, an emergency physician who wanted a reusable device to help control needle pain for her patients. The device contains a bee-shaped, vibrating base with an accompanying ice-cold gel compress shaped like wings. Its goal is to mask injection pain by using multiple stimuli.[6] Since the invention of the Buzzy® device, hardly any studies have been conducted to examine its efficacy while delivering local anesthesia (LA) for dental procedures in pediatric patients. A couple of studies have been accounted for in regards to the responses of pediatric patients to dental needle insertion without utilizing topical anesthetics. Along these lines, the reason for this examination was to assess the efficacy of a local anesthetic procedure without topical application when contrasted to the conventional insertion technique for alleviating pain in children receiving local anesthesia injections and also to compare the pain perception and comfort of patient between conventional syringe and Buzzy system.

Materials and methods

In the present study 150 pediatric patients between the ages 3 to 12 years for various dental

procedures that require local anesthetic were selected for this study after taking the approval from the parents and getting the ethical clearance. They were divided to 3 groups: alternative and conventional and Buzzy® device. Ethnicity and gender were not considered in the present study and emergency cases along with the children with behavioral issues were excluded in the present study. Procedures that require the Mandibular block were considered in our study. After reassuring the subjects they were administered local anesthesia by the same pedodontist. Short needles (21 mm, 30-gauge) and 1:100,000 epinephrine were used in all the techniques. The traditional injection technique was performed by means of Buccal infiltration, after the mucosa at the infusion site was dried with dressing. Topical anesthetic gel (5% EMLA cream, AstraZeneca, Sweden) was applied to the infusion site around 30 seconds. The free tissue was extended and the needle tip was gently advanced to the infusion site to gradually deliver the anesthetic. For the elective system, (no topical anesthetic was used) the dental specialist rapidly and tenderly pulled or pushed the dried free tissue at the infusion site over the tip of the needle to a depth of 1 to 1.5 mm. At the point when the needle tip entered the tissue, a couple of drops of anesthesia were delivered, after which the needle was advanced to its proper depth to continue anesthetic release. Information recorded in the tape were appraised utilizing the Sounds, Eyes, and Motor (SEM) scale by 2 independent evaluators.[14] Intra- and inter-rater reliabilities were established at 90%. The discomfort response was divided into the following three subscales: mild pain, moderate pain and severe pain. Pain-behavioral parameters were evaluated using Chi- square analysis.

Results

Each group had 50 subjects. All the groups had subjects with the age groups of 3-12 years. We observed the mean age in group 1, 2, 3 as 6.4 ± 2.2 years, 6.9 ± 2.2 years, and 6.5 ± 2.2 years respectively. Significant variation in the pain response was seen in between the groups ($P < 0.000$). **Table 1** There was no significant difference observed between the boys and girls when the maxilla and mandible were considered for the buzzy device group. However for the mandibular block significant difference was observed in the buzzy device group. **Table 2** Moreover, no significant difference was found in the response between the maxilla and mandible in the alternate group. **Table 3**

TABLE 1: Demographic variables and the pain response in various groups.

	Group 1 Alternative (N=50)	**Group 2 Conventional (N=50)**	**Group 3 Buzzy Device (N=50)**	**P VALUE**
Sex				
Male	27	20	22	not significant
Female	23	30	28	
The Jaw				
The Maxilla	32	28	36	not significant
The Mandible	18	22	14	

Pain response				
Comfort	45(95%)	27 (59.3%)	46(92%)	0.000 *
Discomfort	5(5%)	23 (40.7%)	4 (8%)	

TABLE 2: Distribution of responses between boys and girls in the buzzy device group

	BOYS	**GIRLS**	**P VALUE**
Jaw			
Maxilla	23 (54.8%)	19 (50%)	not significant
Mandible	19 (45.2%)	19 (50%)	
Pain response			
Comfort	38 (90.5%)	38 (100%)	not significant
Discomfort	4 (9.5%)	0 (0%)	
Mandibular block			
Comfort	5 (83.3%)	5 (100%)	0.000 *
Discomfort	1 (16.7%)	0 (0%)	

TABLE 3: Distribution of responses between the maxilla and mandible in alternate group

ALTERNATIVE	**MAXILLA**	**MANDIBLE**	**P VALUE**
Pain response			
Comfort	40 (95.2%)	36 (94.7%)	not significant
Discomfort	2 (4.8%)	2 (5.3%)	

Discussion

The outcomes showed that subjects who got needle insertion utilizing the alternate strategy exhibited less statistically significant levels of discomfort than those in the conventional group (Table 1). This may have come about because of contrasts in oral mucosa perforation, which included 'rapidly pulling' or 'pushing' the oral tissue onto the needle in the alternative versus 'gradually progressing' in the conventional gathering. In the recommended strategy, the mucosa at the infusion site was extended before it was rapidly and delicately pushed or maneuvered onto the tip of the needle near the mucosal surface. The depth of insertion was comparable to that of the bevel of a 30- gauge needle (around 1-1.5 mm) and a few droplets of local anesthetic were delivered. These activities didn't impede the perceivability of the injection site. The tissue was pulled down and punctured utilizing the needle tip instead of by propelling it upward. In the event that the patient or the tissue at the site of needle infiltration was incidentally moved during injection, uneasiness was noted in few subjects. No significant differences were seen in the three groups between the boys and girls. (Table 2). These discoveries were startling in light of the fact that past investigations have indicated sex

contrasts regarding dental nervousness in general and fear of needle specifically.[7] It has been accounted for that girl subjects exhibited essentially more elevated levels of discomfort over the needle than male subjects. This could be because of past dental experiences. In the current investigation, assessments of kids' responses were taken immediately after needle insertion. The outcomes indicated that torment free response was gotten with the incredible lion's share of mandibular squares (10/11 cases) in the buzzy device technique (Table 2). This finding might be helpful on the grounds that different investigations have demonstrated that topical anesthesia didn't influence the agony experience for the pain experience for the inferior alveolar injection. [8, 9] This alternative procedure might be effective in reducing pain from needle insertion in the Buccal site as well as in the pterygotemporal depression. Interestingly, no huge contrast was seen among maxillary and mandibular inclusions (Table 3). In this investigation, the tissue was penetrated and a few droplets of solution were slowly injected. The outcomes recommended that inconvenience during Trans mucosal infusion may not be a function of the local anesthetic, which is not in accordance with a previous study.[4] Further exploration is expected to affirm this finding. This study assessed pain upon insertion and its results do not suggest discontinuing the use of topical anesthetics. Nevertheless, the findings suggest that discomfort may be reduced if certain factors are well controlled during needle insertion. Topical anesthetics, in addition to their effectiveness, may serve to reduce the anticipatory anxiety associated with an impending dental injection, thus making the injection experience less aversive. Buzzy® is an economical versatile, quickly vibrating plastic device designed like a bee, with cooled wings. It is hypothesized to work based on the gate control theory, which proposes that pain is conducted from the peripheral nervous system to the central nervous system via modulation through a gating system in the dorsal horn of the spinal cord.[10] The vibration component of this device will excite the A-beta fibers (fast nonnoxious motion nerves), which eventually block the A-delta (afferent pain receptive nerves).[11] The cold component on the contrary will excite the C fibers; and if applied prior to the pain stimulus, will block the A-delta pain signal as well. Buzzy® has been shown in some studies to be superior to placebo and to vapocoolants and analgesic creams.[12,13] In the present study we observed that the buzzy device was as good as the two other techniques. There were however few limitations in our study. The scale chosen for study was SEM, that has been shown to have few flaws. The needle used in study was of 30 guage, that may not be used by all for all the dental procedures. Also to measure the pain accurately might be difficult in children and various methods have to be employed to assess pain more accurately. Only one pedodontist administered all the subjects. So the procedure was solely dependent on the operator. In the future, it would be beneficial to compare the suggested procedure among multiple operators. The present study was unique as it measured three variants for the anesthesia. Further exploration is needed to help clinicians in deciding in a variety of clinical conditions, as well as variables that influence technique reliability. This strategy may not be the best methodology for each youngster, despite the fact that it could be valuable in kids with trouble tolerating topical anaesthetics. However, despite its simplicity, these techniques require time and effort by the operator. As such, a ‘modified’ pain-free needle has been designed based on the results of this pain-free insertion technique study for easier application by beginner dental students and less-skilled practitioners.

Conclusion

These techniques using the buzzy device and elective procedure can lessen uneasiness in pediatric dental patients and enable superficial injections of local anesthesia before the needle is advanced into deeper tissue. This technique is simple, quick, devoid of costs, and potentially quite effective, the children were not sleeping.

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