Reactions of children to maxillary infiltration and mandibular block injections

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Abstract

Purpose: *The purpose of this study was to assess children's reactions to the administration of local anesthetic injection in the mandible and in the maxilla, and to study their sensation of pain after each type of injection.*

Methods: *Twenty-six children between the ages of 4 to 6 (mean age 5.3 ± 0.7 years), and 34 children aged between 7 to 10 (mean age 8.1 ± 1.1 years,) who were undergoing dental treatment in a pediatric dental clinic, were selected for this study. A random cross-over design was used. Each patient was randomly assigned to receive either maxillary infiltration or mandibular block on the first visit, and the remaining local anesthesia on the second visit. During the injection, the modified Behavioral Pain Scale, was used. It comprised the following parameters: a) facial display, b) arm/leg movements, c) torso movements, and d) crying. Immediately after administering the local anesthesia, children were asked to rate their feeling according to the Facial Affective Scale.*

Results: *The children in each group responded positively to both techniques revealing that there was no difference in either one. Subjective and objective evaluation disclosed no difference when mandibular block was administered during the first or second visit. Regarding the objective evaluation, in all parameters, more children reacted positively during administration of mandibular block than during maxillary infiltration.*

Conclusion: *a) mandibular block and maxillary infiltration are similarly accepted by children when first administered, and b) children may feel inconvenience or pain and react by crying, yet may report a positive feeling in general. (Pediatr Dent 23:343-346, 2001)*

Anxiety is one of the major issues in delivering dental treatment to children. The most anxiety-provoking procedure for both children and adults is the injection [1]. Fear of injection is believed to begin early in life, as anticipatory fears of sharp objects can be seen in children around one year of age [2]. Furthermore, injection has been found to be among the highest anxiety-provoking stimulus in pediatric dental patients, particularly among girls [3]. It is ironic that local anesthesia is both the salvation and the bane of modern dentistry. It allows virtually pain-free treatment, yet is associated with many anxious thoughts and misconceptions in young patients.

Administration of a local anesthetic injection to children is among the most anxiety- provoking tasks for the dentist too [4].

Mandibular block is the local anesthesia technique of choice when treating mandibular primary or permanent molars. The lingual and inferior alveolar nerves are simultaneously anesthetized, allowing for treatment of multiple teeth of the same quadrant during one appointment [5]. Infiltration is chosen to successfully anesthetize maxillary teeth. In this case the needle should penetrate the mucobuccal fold and be inserted to a depth that approximates that of the apices of the buccal roots of the teeth. Since alveolar bone in children is more permeable than in adults, less local anesthetic agent may suffice to produce anesthesia of teeth [6]

A basic approach in giving dental treatment to children, particularly children who have had no previous dental experience, is to begin with simple procedures and gradually advance towards more complicated treatments. The rationale behind this is that starting with the simple procedure acts in a desensitizing manner [7-8], and enables the child to "recruit" more coping skills ability for the complicated treatments [8]. Administration of local anesthetic injection to the maxillary teeth has been traditionally considered less painful than mandibular block for pediatric dental patients, and therefore more easily accepted by them. Thus, it has been suggested to begin dental treatment in children with the maxillary teeth [9]. Little data exists regarding whether children prefer beginning with injections to the maxilla or to the mandible, and the impression of many clinicians, that the traditional approach of injecting to the maxilla is preferable to start with, may not necessarily be based on scientific ground.

Therefore, the purpose of the present study was to assess children's reactions to administration of local anesthetic injection in the mandible and in the maxilla, and to study their sense of pain after each type of injection, with respect to gender and age.

Methods

Twenty-six children between the ages of 4 to 6 (Mean age 5.3 ± 0.7 years, group A), and 34 children aged between 7 to 10 (Mean age 8.1 ± 1.1 years, group B) who were undergoing dental treatment in a pediatric dental clinic, were selected for this study. All patients were ASA Class I with no prior dental treatment, who needed at least two clinical sessions of operative procedures preceded by local anesthetic injection, one in each jaw, none of which was due to emergency.

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Based on a preoperative behavioral assessment using the Frankl Scale [10], all children demonstrated positive or definitely positive behavior during pretreatment evaluation (ranking 3 or 4 in the Frankl Scale), and none of them needed a sedative or other chemical support for receiving dental treatment. All parents were informed about the treatments and treatment procedures, and an informed consent was obtained.

Reframing techniques, i.e. using euphemistic phrases such as "putting the tooth to sleep" were used to describe the injection to all the children.

Topical anesthetic gel (5% Lignocaine) on a cotton-wool roll was applied to the injection site prior to injection.

Administration of the local anesthetic agent was done according to the method described by Peretz and Gluck [11]: for buccal infiltration, the mucosa at the injection site was stretched, and gently placed onto the obliquely beveled edge of the needle. The delivery of the anesthesia to the palatal zone was performed through the already anesthetized buccal papilla.

When several teeth were treated all of them were anesthetized.

To deliver the mandibular block, the child was requested to open his mouth as wide as possible, and a mechanical mouth prop was used. The operator positioned the ball of the thumb on the coronoid notch of the anterior border of the ramus, and the fingers were placed on the posterior border of the ramus. The needle was gently inserted between the internal oblique ridge and the pterigomandibular raphe. A small amount of solution was injected, and after a negative aspiration, the needle advanced very gently and slowly. The long buccal nerve was then anesthetized.

All the operative procedures both in the maxilla and in the mandibule were similar and were performed using a rubber dam.

A short needle (20 mm, 30 gauge) was used for both techniques: maxillary infiltration and mandibular block. Injection of the local anesthetic was slow with an average duration of nearly two minutes for approximately 1 ml per minute [5]. A random cross-over design was used so that each child served as his/her control.

Each patient was randomly assigned to receive either maxillary infiltration or mandibular block for the first visit, with the other local anesthesia administered during the second visit. During the injection of 2% Lidocaine 1:100.000 epinephrine, the modified Behavioral Pain Scale suggested by Taddio et al [12], was used for objective evaluation of the children. The scale comprised the following parameters: a) facial display, b) arm/leg movements, c) torso movements, and d) crying. The facial display followed Craig's behavioral description of facial actions, which describe pain [13]. Only two of the four of Craig's most descriptive facial actions were evident (eye brow bulge or eye squeeze), because during injection, the mouth was open and the nose was partly covered by the operator's hand.

A trained dental assistant, who did not participate in the treatment, recorded the behavioral parameters. For intra-observer calibration she evaluated, as a pilot study, 15 patients that were not included in this study. All the injections were carried out by the same experienced pediatric dentist.

Immediately after the injections, children were asked to complete the Facial Pain Scale (FPS) for subjective evaluation of feeling after the injection [14]. Verbal instructions were given to the child on how to utilize the FPS. This scale was developed in part because children below ages 7-8 have difficulties with standard visual analog scale (VAS) commonly used for adults [15]. The FPS measures the unpleasantness or affective dimension of a child's pain experience, and is used in children aged 3-17 years old. The child is shown a set of nine cartoon faces with varying facial expressions ranging from a smile/laughter (value 9) to that of tears (value 1) (Fig 1). Each face has a numerical value. The child selects the facial expression that best represents his/her experience of discomfort. The child is asked to select the face "which looks like how you feel deep down inside, not the face you show to the world". The facial pain scale shows good construct validity as a self –report pain measure [14]. Pain-behavioral parameters were evaluated by Chi-Square analysis, significance was set at $p< 0.05$.

Table 1. Groups A and B: Facial Expression, Hands, Legs, Torso Movements and Crying During Administration of Local Anesthetic in the Mandible and in the Maxilla.

4-6 years	Mandible	Maxilla
Face		
no expression	22 (85%)	19 (73%)
eyes squeeze	4 (15%)	7 (27%)
Hands		
no movement	24 (92%)	23 (88%)
slight movement	2 (8%)	3 (12%)••
Torso		
no movement	25 (96%)	25 (85%)
slight movement	1 (4%)	1 (4%)
Legs		
no movement	25 (96%)	22 (85%)
slight movement	1 (4%)	4 (15%)
Crying		
no crying	23 (88%)	17 (65%)
crying	3 (12%)	9 (35%)•
7 – 10 years old	**Mandible**	**Maxilla**
Face		
no expression	25 (74%)	24 (71%)
eyes squeeze	9 (26%)	10 (29%)
Hands		
no movement	34 (100%)	34 (100%)•
slight movement	0 (0%)	0 (0%)••
Torso		
no movement	34 (100%)	33 (97 %)
slight movement	0 (0%)	1 (3 %)
Legs		
no movement	33 (97 %)	32 (94%)
slight movement	1 (3 %)	2 (6%)
Crying		
no crying	29 (85%)	26 (76%)
crying	5 (15%)	8 (24%)

•P=0.048 chi square- crying during maxillary infiltration, ••P=0.0043 chi square- when comparing hands movements between groups A and B during delivering maxillary infiltration.

Results

There were 10 girls and 16 boys in group A, and 18 boys and 16 girls in group B.

Table 2. Distribution of Self-rating Facial Affective Scale by Age

Mandible	4 to 6 years old	7 to 10 years old
1	0	1 (3%)
2	0	0
3	1 (4%)	1 (3%)
4	1 (4%)	0
5	2 (8%)	6 (18%)
6	1 (4%)	3 (9%)
7	3 (11%)	6 (18%)
8	3 (11%)	6 (18%)
9	15 (58%)	14 (40%)
Maxilla	4 to 6 years old	7 to 10 years old
1	0	3 (9%)
2	1 (4%)	0
3	0	0
4	1 (4%)	3 (9%)
5	3 (11%)	3 (9%)
6	0	3 (9%)
7	3 (11%)	9 (26%)
8	6 (23%)	2 (6%)
9	12 (46%)	11 (32%)

No significant difference was found in children's objective and subjective ranking when block or infiltration was performed in the first versus the second visit. Therefore the results are presented together.

Table 1 shows the facial expressions, hands, legs and torso movements, and crying, during the administration of the local anesthetic injection in the maxilla and the mandible in both groups. No significant difference in either group was found between boys and girls. Children's reactions to injection in the mandible or the maxilla regarding facial expression, hands, legs and torso movements were similar, with no statistical significant difference. The majority of the patients (40 out of 52) did not cry at all during the procedure. However, in group A, significantly more children cried while receiving the injection to the maxilla than to the mandible (9 and 3 respectively) (p=0.048).

Comparison of the various parameters between groups A and B for maxillary infiltration and mandibular block separately, revealed that only 3 out of 26 children in the younger group and none out of the 34 in the older group moved their hands during the administration of maxillary local anesthesia. This difference was significant (p=0.004). No difference was found in the objective and subjective evaluation in either group when maxillary infiltration or mandibular block were administered in the first, or in the second visit.

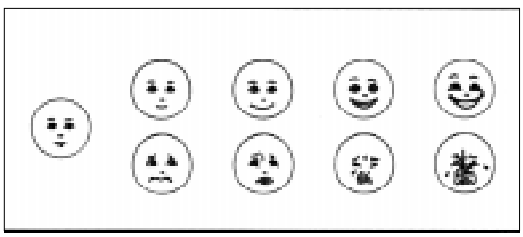

Fig 1. Facial affective scale (Bieri, 1990).

Table 2 shows the children's self - rating of their pain sensation. No difference was found in rating sensation after mandibular or maxillary injections in either group. Most children in both groups rated both injections as a positive, non-painful experience.

Discussion

The challenge for clinicians is to provide an environment that allows technically complex dental treatment, starting with the injection of local anesthesia, to be delivered without inflicting an adverse psychological impact on the child, or physical harm to him.

In our study, patients were randomly assigned to receive one of the two techniques (maxillary infiltration mandibular block) on the first visit with the alternate technique on the second visit. No difference was observed on the second versus the first visit with regard to children's reactions and their self- rating of the techniques.

No significant difference was found between boys and girls in either group. This finding is to some extent unexpected, since previous studies have shown gender differences with respect to dental anxiety in general, and fear of the needle in particular. It has been shown that girls significantly demonstrated higher levels of fear of the needle than boys [3]. The reason for the different findings may be that in the previous study, data was obtained from a self- report of the patients in the waiting room before the dental treatment, and based on previous dental experiences. In this study, recording of the self -reports was made in the operatory, immediately after the injection. Also, the children had a good rapport with the practitioner; the anesthetic was delivered very slowly; they did not see the needle, and all conventional, non- pharmacological behavioral management techniques were used.

This study demonstrated that the younger patients cried significantly more during maxillary infiltration than during mandibular block, and moved their hands during the administration of maxillary local anesthesia. With regard to crying, the statistical significance may bear no clinical meaning due to the paucity of children who cried (9 in maxillary and 3 in mandibular injections). Similarly, there seems to be no clinical meaning to the statistical significance regarding hand movement during maxillary infiltration to groups A and B since only 3 out of 26 children in the younger group and none in the older group moved their hands. The similar reaction to maxillary infiltration and mandibular block is not in accordance with what is implied from the findings of Jones et al. [16], who showed that inferior dental nerve blocks were rated significantly more painful than buccal infiltrations.

Our study showed that the vast majority of children in both groups rated the injection experience as positive, although there were objective signs of pain like facial expression and crying. This may be explained by the fact that in a good dentist-child rapport the child may want to satisfy the care - giver.

Twenty-six percent of the children in group B squeezed their eyes while receiving a mandibular block injection, whereas 29% did so while receiving a maxillary infiltration local anesthesia.

Although these children displayed a facial expression associated with pain, there were no hand or leg movements. This may be explained in part by coping strategies they used [18], enabling them to remain still despite a sensation of some pain.

No significant difference was found between the self-report of the children during administration of mandibular block and maxillary infiltration, and in all cases they ranked the injection as a positive experience. This finding demonstrated that the clinician may expect a child to accept mandibular block in the first treatment. These findings challenge the traditional view that it is preferable to start treating maxillary rather than mandibular teeth because of the possible adverse reaction of the child to the inferior alveolar injection.

Conclusions

1. Mandibular block and maxillary infiltration are accepted similarly by children when first administered.
2. Children may feel inconvenience or pain and react by crying, yet may report a positive feeling in general.

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