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Comparison of different distraction techniques on pain perception in children during local anesthesia administration

[1]Dr. Ifzah, Ex Registar, Department of Pedodontics and Preventive Dentistry, Govt Dental College, Srinagar.

[2]Dr. Nazia Lone, Professor and Head, Department of Pedodontics and Preventive Dentistry, Govt Dental College, Srinagar.

Corresponding Author: Dr. Ifzah, Ex Registar, Department of Pedodontics and Preventive Dentistry, Govt Dental College, Srinagar.

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Abstract

Introduction: Effective pain control during dental treatment of a pediatric patient is the cornerstone for successful behavior guidance. Any dentist's main objective in controlling patient behavior is to decrease fear and anxiety while supporting excellent dental health. Hence this study was conducted to compare the efficacy of different distraction techniques on children's pain perception during local anesthesia.

Methodology: Sixty healthy and anxious children aged 4–8 years who had no prior experience of LA administration were included in the study. The children were divided into three groups: control group, audio distraction group and audiovisual distraction group. Pain perception during administration of local anesthesia was assessed by the Sounds, Eyes, and Motor (Sem) scale and Wong Baker Faces Pain Rating Scale.

Results: Children in audio visual distraction group exhibited the greatest percentage (60%) of comfort score, followed by audio distraction group (50%) while control group demonstrated the least percentage of comfort score (43.7%). However, there was no statistically significant difference between the three groups for SEM scale scores.

Conclusion: Audiovisual distraction technique was more effective in managing anxious pediatric dental patients as compared to audio distraction technique and normal dental set.

Keywords: Anxiety, Sounds, Eyes, Motor.

Introduction

Effective pain control during dental treatment of a pediatric patient is the cornerstone for successful behavior guidance.[1] Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.[2] Prevention of pain can nurture the relationship between the dentist and the child, build trust, allay fear and anxiety, and enhance positive dental attitudes for future visits. Any dentist's main objective in

controlling patient behavior is to decrease fear and anxiety while supporting excellent dental health. Local anesthesia forms the backbone of pain control techniques and is necessary for a painless dental procedure. Nevertheless, administering a local anesthetic injection is among the most anxiety-provoking procedures to children.[3]

Distraction is a behavior management technique that successfully reduces pain and behavioral distress by diverting children's attention away from painful stimuli during invasive dental procedures.[4] Hence this study was conducted to compare the efficacy of different distraction techniques on children's pain perception during local anesthesia.

Methodology

Sixty healthy and anxious children aged 4–8 years who had no prior experience of LA administration were included in the study based on the following parameters.

- Child with Frankel's Class III or IV behavior.[5]
- Presence of carious primary mandibular molars for an inferior alveolar nerve block to be administered.
- No history of dental phobia.
- No previous intraoral injections experience.
- No history of pain secondary to or hyperalgesia or allodynia.

Children with systemic diseases, special healthcare needs who require pharmacological behavioral guidance techniques were excluded from participation. Study procedure was explained to the parents and written informed consent was obtained.

The children were then divided into three equal groups of twenty children each. First group: The control group in whom the treatment was done under normal dental operatory setup. Second group: The children listened to audio presentation through headphones throughout the course of the treatment Third group: Children were asked to play video game of their interest on the mobile phone. The level of dental anxiety among the patients was recorded at three intervals of the procedure, which were:

- Before the treatment (on entering the clinic / hospital)
- During the treatment (while injecting local anesthesia)
- After the treatment (after injecting local anesthesia) continuing with the distraction technique.

All the dental tools and equipment needed for extraction were installed. After the patient was subjected to all these armaments according to the group to which the patient was classified, behavior management techniques were implemented before and during the therapy.

In all the groups, anxiety levels were recorded 10-15 minutes before local LA administration with a pulse oximeter and Sem clinical anxiety rating scale. The site of the needle prick was dried with sterile gauze, and topical anesthetic gel (20% benzocaine gel; Mucopain, ICPA Health Products Ltd, Mumbai, India) was applied for 30 seconds with a cotton applicator. Anesthetic solution (2% lidocaine with adrenaline 1:80000) was injected using a 23-gauge needle at the rate of about 1 mL/min. In the CS group (n = 20), CS with verbal distraction was performed during LA administration while the children in the VR group (n = 20) played video games of their choice during the course of treatment. Upon achieving profound anesthesia, standard extraction was performed. Pain perception during administration of local anesthesia was assessed by the Sounds, Eyes, and Motor (Sem) scale and Wong Baker Faces Pain Rating Scale (Figure 1 and 2).[6,7] The Sem scale was used by a second dentist who was unaware of the study protocol to measure patient's actions during injections. The Sem

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scale's evaluation criteria include three different types of data: child sounds (verbalizations), eye signs, and body movements. Wong Baker Faces Pain Rating Scale is a self-reported pain scale, and consists of a number of faces ranging from happy to crying. The scale was explained and shown to the children and then they were asked to point out the face which indicated the pain level they experienced during administration of local anesthesia.

Statistical analysis

All the data were entered into Microsoft office Excel Sheet 2007 and analyzed using Statistical Package for the Social Sciences version 20 software.

Results

Physiologic measure (pulse rate) during and after LA administration showed a statistically significant difference. Pulse rates at baseline showed no absolute difference between the three groups (Table 1). Pulse rate showed a decline in all the groups after LA administration however the third group had a significantly higher reduction in pulse rate.

Sem scale findings are presented in Table 2. Children in audio visual distraction group exhibited the greatest percentage (60%) of comfort score, followed by audio distraction group (50%) while control group demonstrated the least percentage of comfort score (43.7%). However, there was no statistically significant difference between the three groups for SEM scale scores at $P = 0.743$ as shown in Table 2 and Fig 2.

There was no significant difference between the three groups for Wong Baker Faces Pain Rating Scale. Audio visual distraction group showed the lowest mean of the face pain scale.

In the inter-group comparisons, a statistically significant difference ($P < 0.05$) was observed between the control group and the audiovisual distraction group. No significant difference was reported between control group and audio distraction group, and between audiovisual distraction group and audio distraction group

Discussion

Pediatric dentists commonly face with the task of giving the local anesthetic to the children who are dreaded of the procedure. The aim of all pediatric dentists, when managing patients is to reduce fear and anxiety through behavior management techniques. The age group of 4 to 8 years was selected for the study because dental problems are difficult to treat in this age group, as they exhibit more disruptive behavior, have dental anxiety, and are most difficult to manage.[8] Children with no previous experience of LA were selected because it is proven that pain perception to LA is influenced by the order of injection. In children, invasive procedures involving LA injection will always be challenging because the fear imagined by the child is related to their level of pain perception and uncooperative behavior.[9] Audio distraction did not have a significant effect on reduction of anxiety. Audiovisual distraction was the most effective in managing pediatric dental patients.[10] Child seeing the audiovisual presentation has multisensory distraction as he/she tends to concentrate on the TV screen, thereby screening out the sight of dental treatment and the sound of the program helps the child to eliminate the unpleasant dental sounds, such as the sound of handpiece.[11] The impressions of distress left by the first dental visit build memories that effect conduct on upcoming appointments.

There has been evidence from medicine that passive distraction, such as watching a film, is not as effective as active distraction (e.g. playing a video game) in reducing patient anxiety as proven by the results of this study. The

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results of this study showed that patient anxiety after using both the techniques while delivering local anesthesia during dental extraction and continuing the distraction techniques after completion of the dental procedure was significantly lower than the pre-operative anxiety.

Pulse rate increase during dental treatments is attributed to stressful situations. Measurement using fingertip pulse oximeter is useful because of the direct measure of physiological arousal.

Conclusion

Audiovisual distraction technique was more effective in managing anxious pediatric dental patients as compared to audio distraction technique and normal dental set.

Figure 1: Sem scale.

Parameter	Comfort	Mild discomfort	Moderate discomfort	Severe discomfort
Sound	No sound	Nonspecific sound (probable pain)	Verbal complaint, louder sound	Verbal complaint, shouting, crying
Eye	No sign	Dilated eyes without tears (anxiety sign)	Tears, sudden eye movements	Crying, tears covering the face
Motor	Relaxed body and hand status	Muscular contraction, contraction of hand	Sudden body and hand movements	Hand movements for defense, turning the head to the opposite side

SEM: Sound, eye, motor

Figure 2:Wong Baker FACES pain rating scale.

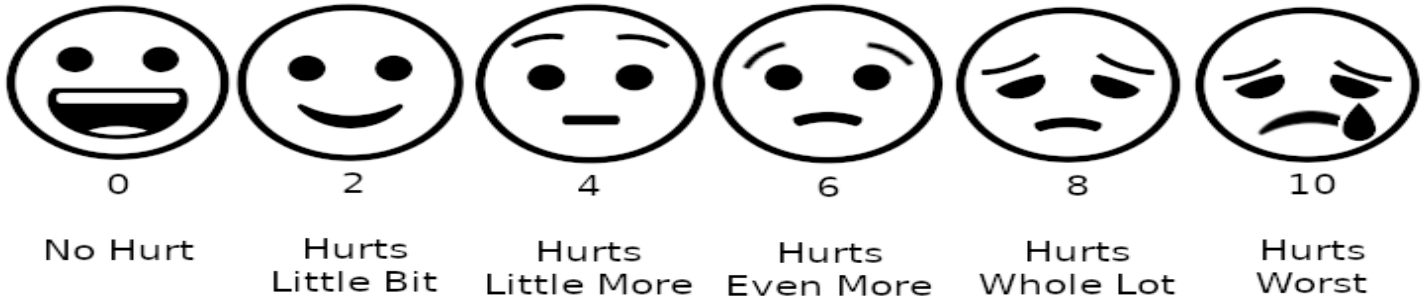

Table 1:Puse rate.

	Before treatment	During treatment	After treatment
Control group	100.9 ± 7.1	103.2 ± 5.2	95.2 ± 3.1
Audio group	97.8 ± 3.9	93.2 ± 6.4	91.2 ± 2.3
Audio visual group	96.5 ± 4.3	90.2 ± 1.4	87.2 ± 6.3

Table 2: Sound, Eyes, and Motor (SEM) Scale score for three distraction groups.

SEM (n %)	Control Group	Audio Group	Audio visual group
comfort	14(43.7%)	15(50%)	18(60%)
Mild pain	10(31.1%)	9(29.7%)	5(15.3%)
Moderate pain	4(12.8%)	4(12.8%)	7(23.3%)
Severe pain	1(3.7%)	1(2.1%)	0(0.0%)

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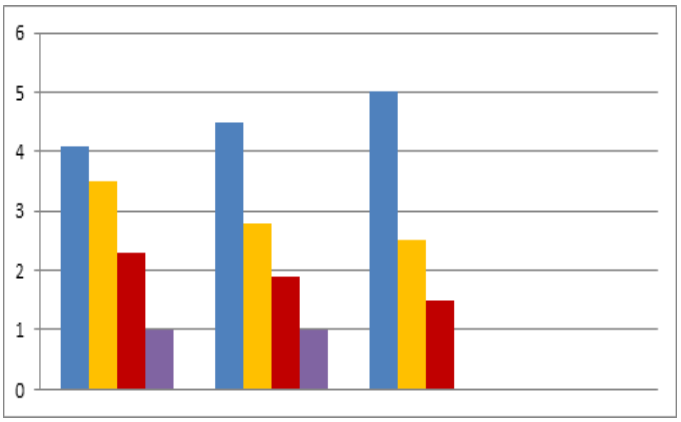

Figure 2: Comfort Mild pain Moderate pain severe pain.

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