A Novel Distraction Technique for Pain Management during Local Anesthesia Administration in Pediatric Patients

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Aim: *The aim of this study was to assess the effect of an active and novel distraction technique WITAUL (Writing In The Air Using Leg) on the pain behavior observed and reported by children receiving local anesthesia injections prior to dental treatment.* ***Study design****: The study was conducted on 160 children (80 in control and 80 in intervention group) between the ages of 4- 10 years. During the administration of anesthesia the children in the control group were made to relax by means of deep breathing and those in the intervention group were taught to use the WITAUL distraction technique. the behavior of the children aged 4 – 5 years was noted using the Modified Toddler- Preschooler Post operative Pain Scale (TPPPS) and that of children aged above 6 years was measured using the FACES Pain Scale–Revised (FPS-R).* ***Results****: The use of WITAUL was found to be statistically significant (p value < 0.0001) compared to the control method in serving as a distraction and hence in managing pain during local anesthesia administration. The mean Modified TPPPS scores (4 – 5 year olds) for the WITAL group was 2.46 ±1.752 and that of the control was 5.64±2.328. The mean FPS-R scores (6 – 10 year olds) for the WITAUL group was 3±1.748 and that of the control group was 6.26±1.858.* ***Conclusion****: The WITAUL technique therefore appears to be a simple and effective method of distraction during local anesthesia administration in pediatric patients.*

Keywords: *Distraction, Pain control, Local anesthesia, Behavior management*

INTRODUCTION

A common and often primary reason for children seeking dental care in the developing world is pain. The International Association for study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage".[1] The experience of pain in Pediatric dentistry is related to the child's level of anxiety, previous experience, ability to cope and parental influence.[2] Ironically the most common form of pain control used in dentistry, namely the local anesthesia can itself produce anxiety. Therefore there has always been a constant search for ways to avoid the invasive, and often painful, nature of the injection, and to find more comfortable and pleasant means for anesthesia before dental procedures.[3]

A number of methods have been suggested to reduce the pain induced by penetration of local anesthetic agents. These include application of topical anesthetics,[4] suggestion,[5] distraction techniques,[6] TENS,[7] alteration of factors related to injection solutions such as pH and temperature[8] and a reduced speed of injection.[9] Since pain perception is known to have both psychological and physiological components,[10] the above said methods serve to target either or both of these.

Distraction techniques serve to focus the child's attention away from the anxiety provoking procedure and include deep breathing and relaxing; engaging the child in conversation, audio analgesia[11] and the likes. The WITAUL (Writing In The Air Using Leg) technique is one such distraction technique devised by the author. The technique as has been often used by the author in routine clinical practice, involves lifting the right leg and using it to write in the air. Although what is written with the leg is of no significance, the author has often chosen to inform the child to write his/her name, to make it seem more personalized. The technique has been found to be successful in distracting children in several instances. Hence the aim of this study was to assess the effect of an active and novel distraction technique WITAUL (Writing In The Air Using Leg) on the pain behavior observed and reported by children receiving local anesthesia injections prior to dental treatment.

METHOD

160 children falling in the age group of 4- 10 years, undergoing dental treatment at The Narayana Hrudayalaya Dental Clinics, requiring the administration of nerve blocks, participated in the study. Children who had experienced the administration of local anesthesia previously and who based on a preoperative behavioral assessment using the Frankl scale, demonstrated negative behavior during pretreatment evaluation (ranking 2 on the Frankl scale),[12] were chosen for the study. All parents were informed about the treatment procedures, and an informed consent was obtained. The children were randomly assigned to an intervention group or to a control group by flipping a coin. Topical anesthetic gel Precaine (Lidocaine 8% Dibucaine 0.8%, Pascal International, Bellevue, USA) was

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Table 1. Distribution of scores – Modified Toddler- Preschooler Post operative Pain Scale (TPPPS). Children aged 4-5 years

Score TPPPS	Number of children	
	Study	Control
0	4(14.2%)	0(0%)
1	3(10.7%)	1(4.2%)
2	10(35.7%)	2(7.1%)
3	4(14.2%)	5(17.8%)
4	4(14.2%)	0(0%)
5	1(3.5%)	3(10.7%)
6	1(3.5%)	5(17.8%)
7	1(3.5%)	6(21.4%)
8	0(0%)	3(10.7%)
9	0(0%)	3(10.7%)
10	0(0%)	0(0%)
Total (N)	**28(100%)**	**28(100%)**
Mean and SD	**2.46±1.752**	**5.64±2.328**

P value: <0.0001

applied on a cotton-wool roll to the injection site one minute prior to injection in both groups. Children in both groups were made to relax and breathe deeply to a count of ten. The 80 children in the intervention group were then told to raise the right leg and write their name in the air continuously and slowly throughout the anesthetic procedure (WITAUL). The technique was also demonstrated to them. They were also told that writing slowly and neatly will help decrease any discomfort anticipated during the procedure. The 80 control group children were told to continue with the deep breathing. Reframing techniques, ie, using euphemistic phrases such as "putting the tooth to sleep," were used to describe the injection to all children. All injections were administered by a single operator. The anesthetic solution was applied through 26-gauge (38 mm in length) needles. Injection of the local anesthetic was slow, with an average duration of approximately 1 ml per minute.

During the injection of 2% Lignocaine (Xylocaine 2% Adrenaline 1:200,000, Astra Zeneca Pharma India Limited), in 4- 5 year old children (28 in study group and 28 in control group) the Modified Toddler-Preschooler Postoperative Pain Scale[13] (initially described by Tarbell *et al* in 1992) was used for objective evaluation of the children. The scale comprised the following parameters: 1)Verbal complaint/cry, 2)Groan/moan/grunt 3)Facial expression 4)Restless motor behavior and 5)Rub/touch painful area. Each parameter could be scored a 0, 1 or 2 with a highest score of 10. A trained dental assistant, who did not participate in the treatment, recorded the scores for both groups.

Children in the age group of 6- 10 years were asked to complete the FACES Pain Scale Revised (FPS - R)[14] for subjective evaluation of feeling after the injection. The FPS - R includes a set of 6 cartoon faces with varying facial expressions ranging from a smile/laughter to that of tears. Each face has a numerical value from 0 to 10. The child selects the facial expression that best represents his/her experience of discomfort. Verbal instructions were given to the children on how to utilize the FPS- R.

The student t test was performed to compare the means of the TPPPS and FPS- R scores. Significance was set at $P<0.05$.

Table 2. Distribution of scores – FACES Pain Scale Revised (FPS-R). Children aged 6-10 years

Score FPS- R	Number of children	
	Study	Control
0	6(11.5%)	0(0%)
2	20(38.4%)	4(7.6%)
4	21(40.3%)	5(9.6%)
6	4(7.6%)	25(48%)
8	1(1.9%)	16(30.7%)
10	0(0%)	2(3.8%)
Total	**52(100%)**	**52(100%)**
Mean and SD	**3±1.748**	**6.26±1.858**

P value: <0.0001

RESULTS

44 boys aged 7.8±3.2 years and 36 girls aged 7.6±3.5 years were included in the intervention group; and 41 boys aged 7.6±3.4 years and 39 girls aged 7.2±3 years participated in the control group. No statistically significant difference in scores between the sexes was seen.

Table 1 represents the TPPPS scores. The use of WITAUL was found to be statistically significant compared to the control method with a p value of 0.0001

Table 2 shows the distribution of the FPS- R scores. The comparison of the means of the FPS – R scores of the 2 groups by the t test was statistically significant (p value - 0.0001).

89% of children between the ages of 4- 5 years in the intervention group were scored a score of 5 or less on the TPPPS, with maximum number of children being scored a score of 2 (35.7%). 60.6% of children in the control group scored 6 and above, with 21.4% being scored a score 7. This difference between the groups was found to be statistically significant.

90.2% children in the WITAUL group chose score below 4 on the FPS - R scale as opposed to just 17.2% in the control group. Only 1 (1.9%) child in the WITAUL group selected a score of 8, which was selected by 16 (30.7%) of the children from the control group. No child from the intervention group scored the procedure a score 10, as opposed to 2 (3.8%) of them from the control group.

DISCUSSION

Children in the age group of 4- 10 years were selected for the study as this is the age group that is associated with the most disruptive behavior. Children aged 4 – 5 years are considered quite young to effectively use scales that rely on self report of pain or discomfort. Observational scales like the Modified TPPPS have been found best for this age group (valid, reliable, specific, sensitive and clinically applicable)[15] and was therefore used in the study.

For research use, the FPS-R has been recommended on the basis of utility and psychometric features. The FPS – R has been found to be quick and simple to use, requiring minimal instruction. This revised scale has no smiling face and no tears, which may be advantageous in avoiding the confounding effect of affect and pain intensity. Although intended for the age group of 4- 12 years data are sparse for children below the age of 5 years and hence has not been validated[14]. Therefore in this study the FPS- R scale was used only in children aged 6 years and above.

Various distraction techniques have been used previously with the first being in 1999 by Peretz B, Gluck GM[6] who used deep breathing during administration of local anesthesia. The deep breathing served to relax the children and their study showed a positive effect of using this technique in children. The results of this study showed that the WITAUL technique combined with relaxing by way of deep breathing was significantly better than deep breathing alone when used as a distraction technique during administration of nerve blocks in children aged 4- 10 years.

A combination of verbal distraction and counterstimulation when compared to counterstimualtion alone has been found to better than the latter[16]. But a limitation of this technique could be that the child's attention is diverted to an area that is very close to the area being treated in the oral cavity, and could be reverted back to the primary area easily. Also the child here only plays a passive role. This seems to be addressed by the WITAUL technique as the child is made to divert his/her attention to a part of the body that is most distal (leg) to the oral cavity. Also the child is made to perform an activity with the leg which engages the child and necessitates focus of concentration. Additionally it was noticed that all children who performed this technique had their eyes focused on their leg during the procedure and hence away from the dental equipments, specially the syringe. All the 80 children enjoyed the technique and were agreeable to repeating the procedure again during the second visit.

Audio distraction by means of music has also been attempted previously[11,17] but was not found to be of statistical significance. Audiovisual distraction technique using television was found to be more effective than audio analgesia[17] but would necessitate extra equipment. The WITAUL technique on the other hand is easy for children above 4 years to comprehend and perform, simple to explain, and primarily requires no additional equipment. This makes it versatile for use both in clinical and field settings.

CONCLUSION

The WITAUL technique appears to be a simple and effective method of distraction and can be routinely used during administration of local anesthesia in pediatric patients.

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