ORIGINAL ARTICLE

"Thaumaturgy"— A Novel Behavior-shaping Technique

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Abstract

Aim: To compare and evaluate the effectiveness of thaumaturgy in alleviation of anxiety in children aged 2–13 years.

Materials and methods: Two hundred and forty children aged 2–13 years, identified as manifesting strong-willed behavior were selected for this study. The children were randomly assigned to be managed by one of the three thaumaturgic distraction techniques. Anxiety was assessed before and after the local anesthetic procedure using the anxiety facial scale.

Results: There was a significant decrease in anxiety with the use of thaumaturgic techniques. Thumb and light trick significantly reduced anxiety in children aged 2–7 years, book trick reduced anxiety in children aged 7–11 years, and item tricks in children aged 11–13 years.

Conclusion: The use of thaumaturgy plays an important role in shaping the behavior of a child in pediatric dentistry. The age and cognitive development of child dictates the technique to be used.

Clinical significance: Thaumaturgy helps to render effective dental treatment in uncooperative children and instill a positive attitude.

Keywords: Behavior management, Dental anxiety, Facial pain rating scale, Local anesthetics, Pediatric dentistry, Thaumaturgy.

International Journal of Clinical Pediatric Dentistry (2020): 10.5005/jp-journals-10005-1781

Introduction

Dental anxiety is a pandemic psychological, instinctual reflex which is exaggerated in the pediatric age group. Uncooperative behavior in the dental setting is most typically attributed to behavioral manifestations of anxiety. Forehand and Long have labeled children who exhibit high levels of uncooperative behavior as being strong-willed.[1]

Major consequences of such strong-willed behavior may include delay in or termination of treatment before completion leading to decrease in the quality of care provided. There are a few behavior management techniques for disruptive behaviors but there is nothing specific for strong-willed children.

Management of strong-willed children is extremely time-consuming. In addition, the overprotective and overindulgent parental attitudes are on the rise, where aversive techniques, such as hand over mouth exercise (HOME) and physical restraints, are difficult to implement.[2] Thereby, pharmacological behavior management techniques have an edge over the conventional techniques.

There is a need for an effective method of dealing with strong-willed children. Thaumaturgy is a new technique that has been used in this study to manage strong-willed children. Thaumaturgy is a tool that distracts and relaxes child and helps the dentist to perform necessary treatment.[1]

The purpose of this study is to evaluate and compare the effectiveness of thaumaturgic techniques with that of the conventional techniques.

Materials and Methods

Two hundred and forty healthy, strong-willed children between the age group 2 years and 13 years requiring local anesthesia for treatment procedures are selected for the study. Only those children with a facial anxiety scale (FAS) score between 3 and 5 were included in this study. Children requiring emergency management and who did not have parental consent were excluded.

The children were categorized into three groups based on their cognitive development, i.e., 2–7, 7–11, and 11–13 years (Table 1). Each of these groups was further divided into four groups, i.e., control group, thumb and light trick, book trick, and item trick. A FAS (Fig. 1) is recorded before and after local anesthetic administration.

Thaumaturgic techniques:

- Thumb and light trick: Two thumb sleeves incorporated with a lighting device were worn on the thumb of the operator, which could be activated/deactivated at the operator's will. Various creative hand movements were performed to sustain the subject's interest (Fig. 2).

Table 1: Sample distribution

	Age group of children		
	2–7	*7–11*	*11–13*
Control group	20	20	20
Light thumb trick	20	20	20
Item prediction trick	20	20	20
Magic coloring book	20	20	20
Total	80	80	80
Total sample size = 240			

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How to cite this article: Konde S, Sumaiyya S, Agarwal M, *et al.* "Thaumaturgy"—A Novel Behavior-shaping Technique. Int J Clin Pediatr Dent 2020;13(4):318–321.

Source of support: Nil

Conflict of interest: None

Fig. 1: Facial anxiety scale

Fig. 2: Thaumaturgic aid—thumb sleeves

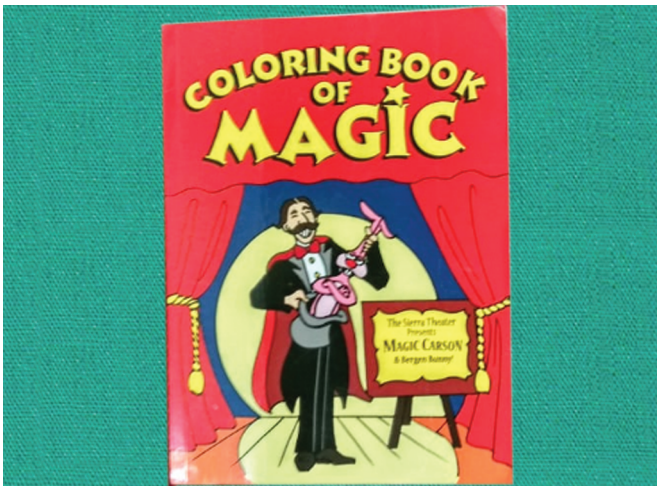

Fig. 3: Thaumaturgic aid—magic book

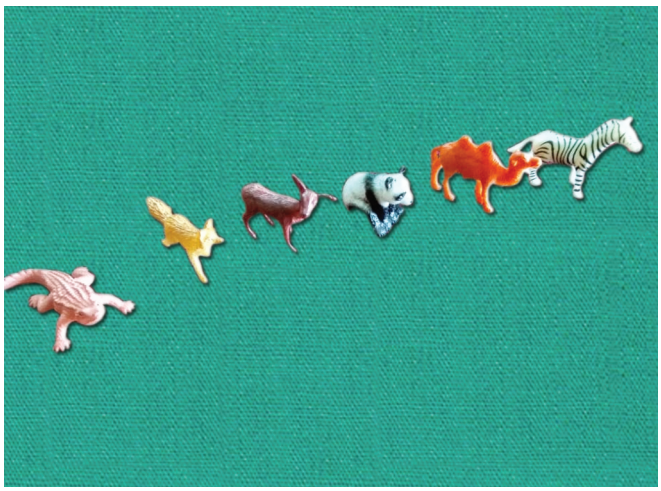

Fig. 4: Thaumaturgic aid—animal figurines

- Book trick: A coloring book which could display blank pages, black and white images, and colored images sequentially on the same leaf was displayed to the subject to sustain the subject's interest and negotiate with the subject's reasoning capability (Fig. 3).
- Item trick: Six different items (child safe toys) were displayed in front of the subject. A cue card with the name of one of the items is given to subject before the game. Item elimination formula was used to periodically eliminate one of the items in every round of the game until one item remained, which is the same item as on the cue card (Fig. 4).

Results

Student paired *t* test was used to compare the mean anxiety scores between preoperative and postoperative time periods in different age group children. One-way ANOVA test followed by Tukey's honestly significant difference (HSD) *post hoc* analysis was used to compare the mean anxiety scores between different thaumaturgic techniques in pre and post time intervals in each age group. The level of significance (*p* value) was set at $p < 0.05$.

As shown in Table 2, there has been a significant decrease in anxiety on usage of the thumb and light trick and book trick in the 2- to 7-year-old age group, the book trick and item prediction trick in the 7- to 11-year-old age group, and only the item prediction trick in the 11- to 13-year-old age group.

Discussion

The graphical representation of results of the study (Figs 5 and 6) demonstrates that there was a significant positive behavioral change of the subjects toward dental treatment with the use of thaumaturgic techniques. The cognitive development of the children played a major role in the technique used.

Brain is composed of two hemispheres, the left and the right, and specific functions have been attributed to each. The left hemisphere in right-handed people is characterized with verbal and voluntary skills. Language, speech analysis, and problem-solving are mediated on this side. The right side can be associated with non-verbal skills and emotions. Skills, such as art and music, are right hemisphere activities. Imagination is also thought to be associated with right hemisphere.[3] Thus, the right hemisphere of the brain plays a major role during the use of thaumaturgic techniques. Isaac Bonewits defined thaumaturgy as "the use of magic for non-religious purposes; the art and science of wonder-

Table 2: Comparison of mean anxiety scores between different thaumaturgic distraction techniques during pre- and post- time intervals in each age group using one-way ANOVA test

		Control		*Thumb trick*		*Book trick*		*Item prediction*		
Age	*Time period*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*p value*
2–7 years	Pre-op	4.5	0.5	4.4	0.7	4.5	0.5	4.0	0.8	0.06
	Post-op	4.4	0.5	1.5	0.6	1.3	0.5	3.3	0.6	<0.001*
7–11 years	Pre-op	4.6	0.5	4.3	0.6	4.3	0.6	4.4	0.5	0.12
	Post-op	4.5	0.5	3.8	0.6	1.5	0.6	1.7	0.6	<0.001*
11–13 years	Pre-op	4.5	0.5	4.3	0.6	4.3	0.6	4.4	0.5	0.79
	Post-op	4.3	0.6	4.0	0.6	4.0	0.6	1.6	0.5	<0.001*

*$p < 0.05$

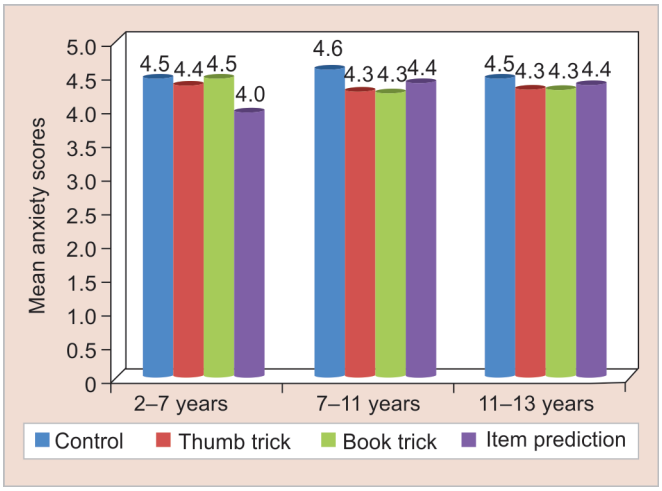

Fig. 5: Preoperative mean anxiety rating

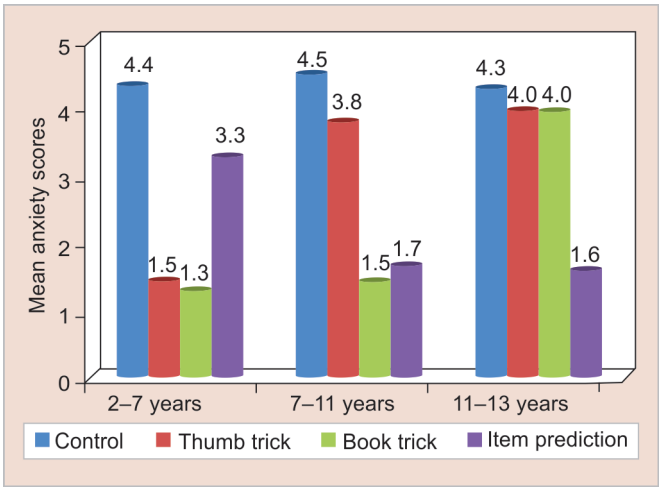

Fig. 6: Postoperative mean anxiety rating

working".[4] The thaumaturgic techniques were specifically designed for a cognitive age group and when used appropriately the subjects comprehended effectively.

In the 2- to 7-year-old age group, thumb and light trick and the book trick significantly reduced anxiety. This could be attributed to the right hemisphere of the brain being more developed in children of this age group. Children in this age group visualized light appearing and disappearing as a magical phenomenon. The sequential image development in the book trick also had a similar effect. The thaumaturgic effect had the child pondering over the trick when the local anesthetic procedure was done. These tricks instilled a cooperative behavior in the subjects.

In the 7- to 11-year-old age group, the book trick and item trick significantly decreased anxiety as compared to the thumb trick. In this age group, the left hemisphere of the brain begins to develop which is responsible for semi-logical reasoning, analytical thinking, and verbal skills. Subjects in this age group were keen to know the logic behind the trick performed but were still unable to reason it. Inability to reason out the trick kept the subjects occupied and fascinated during the dental procedure.

In the 11- to 13-year-old age group, both the right and left hemispheres of the brain are well developed. Hypothetical reasoning has been achieved can be projected to any situation presented to them. Hence, only the item tick was effective in reducing anxiety. The cognitive level and the corresponding trick used to divert the subjects played a major role in instilling a positive attitude and rendering a cooperative behavior in the subjects.

This study employed the FAS, where subjects reported the score of anxiety in the first person, which eliminated chances for operator bias and yielded more reliable results. Nevertheless, it was also observed that the younger age group, i.e., 2–4 years, the children had a decreased attention span; they were cooperative during local anesthetic procedure but thumb and light trick had to be sustained for extended periods to maintain desirable behavior.

Peretz and Gluck assessed behavior modification in children between the ages of 3 and 6 years using a magic book for noninvasive dental examination procedures. They quantified anxiety through the Frankel rating scale. In contrast to their study, here three thaumaturgic techniques were used at three different stages of cognition; more reliable subjective assessment tools were employed for the quantification of anxiety.

Therefore, this study delivers a more situational and realistic behavior management and assessment in a routine dental setup.

Conclusion

Thaumaturgic techniques have been beneficial in managing the behavior of children at various age groups. However, the choice of technique is pivotal in the outcome of treatment.

Thaumaturgy is used as a definitive method of behavior management in conventional pediatric care. Thaumaturgic techniques can be employed for both invasive and noninvasive maneuvers to control and convert negative behavioral patterns to more desirable behavior patterns.

Thaumaturgy has proven to be a novel behavior shaping technique carefully tailored to improve the clinical outcome of

dental treatment irrespective of the child's attitude toward dental procedures.

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