

Effectiveness of Intellectual Distraction on Management of Gagging during Impression Making in Children Aged 5-11 Years - A Randomized Control Trial

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Abstract: *Gag reflex remains a significant challenge in Pediatric dentistry, particularly during impression - making procedures, often leading to discomfort, anxiety, and failed attempts. In my view, traditional management methods, including pharmacological and behavioral techniques, have varying degrees of success, but they may not always be practical or well - received by young patients. This study examines the effectiveness of intellectual distraction—specifically, the use of a puzzle - based game—as a non - invasive approach to reducing gag reflex and anxiety in children aged 5 to 11 during maxillary impression - taking. It is evident that engaging children in a cognitively demanding task can shift their focus away from the clinical setting, thereby reducing gagging episodes. The randomized controlled trial revealed a significant improvement in impression success rates among children engaged with the puzzle, as opposed to those in the control group. This suggests that intellectual distraction is more than just a diversion; it actively alters sensory perception and neurological processing of the gag reflex. While this technique is promising, the study also highlights the need for customization based on a child's cognitive capacity and temperament. Ultimately, integrating intellectual distraction into pediatric dental practice could offer a simple, cost - effective, and child - friendly alternative to traditional gag management techniques.*

Keywords: Gag reflex, Pediatric dentistry, Intellectual distraction, Anxiety management, Impression – making

1. Introduction

Gag reflex (GR) is a natural defense mechanism that keeps people healthy and aids in keeping foreign objects out of the trachea.¹ Patient response to gagging can range from moderate choking to violent, profuse, uncontrollable retching that can cause emesis.² Gagging has reportedly been observed during several dental procedures, including making of impressions, radiography, placing restorations in posterior teeth, and in some cases, even when a finger is inserted for examination. Moreover, gagging is significantly influenced by dental fear. When gagging gets worse, receiving effective therapy becomes almost impossible.³ The base of the tongue, the palate, the uvula, and the posterior pharyngeal wall are all considered to constitute 'trigger zones' within the mouth.⁴ Gagging can make the dental treatment more taxing and instill fear in children and at the same time Pediatric Dentistry is also more concerned as repeated impressions have to be made. So, this calls for an innovation in the method to manage child's reflex and make the procedure uneventful.

A wide range of management techniques have been practiced till date, including pharmacological techniques like local anesthesia (Murthy et al.2011), conscious sedation (Yoshida et al.2007), and general anesthesia; behavioral modification techniques like relaxation (Bassi et al.2004), distraction (Krol 1963), systemic desensitization (Singer 1973), as well as complementary therapies like acupressure (Lu et al.2000), (Noble 2002) ⁵.

Of the different behavior management strategies used to overcome the problem of gagging, distraction plays a pivotal role in overcoming gagging as child cannot focus on multiple things at a time. So distraction is a type of reframing where the child's attention, perception and focus is deviated away

from the site of problem. Of all the techniques been used, dental impressions have successfully been taken for a very long time using distraction techniques. The mechanism of action of distraction is quite simple, natural and easy to perform. Due to neuronal connections, the cerebral cortex can partially control the medullary center of the gag reflex. Hence, distraction can help to some extent in controlling gagging.³

In Pediatric dentistry, there are different types of distraction techniques used including audio visual aids, virtual reality games, magic, play therapy etc and out of these intellectual distraction has an edge over the other techniques because it takes more mental effort and concentration for the child. A good distraction will focus child's thoughts away from the clinical scenario and more into the technique used so that success of the treatment increases a level up.

The objective of this study is to ascertain the impact of mental diversion utilizing the intellectual - colored game (ICG) on the intensity of GR and anxiety in children during dental impression.

2. Materials and Methods

Sample size and study design

In this randomized control trial, 34 children those rated as positive (cooperative but reserved) or definitely positive (interested and happy) on a Frankl rating scale aged between 5 - 11 years (19 girls and 15 boys) with gag reflex who visited department for the first time and with no history of previous impression record were employed in this study. The assessment of GR was performed in a calm environment by one Pediatric dentist having >10 years of experience.

The GR grade was evaluated before the impression procedure using the classification of gagging problem index as proposed by Saita et al⁶.

- G1: Normal gagging but not desensitized (the child tolerates a basic periodontal examination with a probe)
- G2: Mild gagging (the child does not tolerate the basic periodontal examination with a probe)
- G3: Moderate gagging (the child does not tolerate molar region examination with a dental mirror)
- G4: Severe gagging (the child does not tolerate anterior teeth examination with a dental mirror)
- G5: Very severe gagging (the child does not tolerate momentary insertion of dental mirror).

All children presenting with a G4 or G5 GR were excluded from the study for advanced technical difficulties.

Children with special health care needs (physically and mentally challenged patients) and children suffering from any nasal obstruction or upper respiratory tract infection were also excluded from the study.

Procedure

Children selected according to the inclusion criteria were seated upright in the chair such that the maxillary occlusal plane is parallel to the floor. A perforated metal stock tray was selected by visual assessment of the arch width and length. The child was allowed to handle the impression tray and the procedure of impression taking was explained with the help of euphemisms such as ‘clay’ for alginate. Maxillary alginate impression was recorded using an unflavoured fast - setting alginate (Dpi Chromatex Chromatic Alginate Powder Impression Material) and optimum loading of the tray. In the present study, a multi colour, food - grade plastic 3D maze building blocks puzzle ball was used as an Intellectual distraction technique, with blocks of 6 different colours and of same size and shape (Fig.1). Children assigned to the Test group were first demonstrated the game. Child holds the blocks and was asked to assemble the pieces into a ball.



Figure 1

Maxillary impression was taken, while the child is engaged in the game. For children assigned to the Control group, maxillary impression was recorded without the use of Intellectual distraction technique. In both the groups, a video of the entire procedure (of the mouth region only) was recorded by an assistant. Gag reflex during alginate impression making in both the groups was evaluated by a calibrated and blinded outcome assessor using Gagging - related impression success scale (GISS) after watching the video.⁵

Score 1 was assigned when impression could not be obtained due to severe gagging.

Score 2 was assigned when impression is obtained in spite of gagging.

Score 3 was assigned when impression is obtained successfully without gagging.

Statistical analysis was done to compare the intervention group and conventional group.

3. Statistical Analysis and Results

To investigate the effectiveness of Intellectual distraction technique using puzzle ball, this single - blind, randomized controlled trial enrolled 34 children aged 5 to 11 years. The mean age ± SD of the study population was 8.3 ± 1.7 years with 19 (44.1%) females and 15 (55.9%) males. The baseline characteristics of the test and control group have been described in Table 1.

Table 1: Baseline Characteristics of Test and Control Group

Characteristics		Test Group (n=17)	Control Group (n=17)
Age ± SD (in years)		8.29 ± 1.649	8.35 ± 1.766
Sex	Males n (%)	7 (41.2%)	8 (47.1%)
	Females n (%)	10 (58.8%)	9 (52.9%)

Figure 1 shows the proportion of children with different categories of GISS Score between the test and control group. Maxillary alginate impressions were successfully recorded in 82.3% (n=28) of children in the study, while it could not be obtained in 17.6% (n=6) (Table 2). Notably, within the test group, impressions were successful for all children. 88.2% (n=15) experienced no gagging, while the remaining 11.8% (n=2) achieved successful impressions despite gagging. This success rate stands in stark contrast to the control group, where 35.3% (n=6) of children experienced failed impressions due to severe gagging. A statistically significant and very strong association with a medium effect size (p = 0.018, Cramer's V = 0.464) was found between the use of the interactive distraction technique and the GISS score. The mean GISS score in the test group was 2.88, which was also significantly higher (p = 0.017) compared to the control group (M = 2.24) on an independent samples t - test (Table 3).

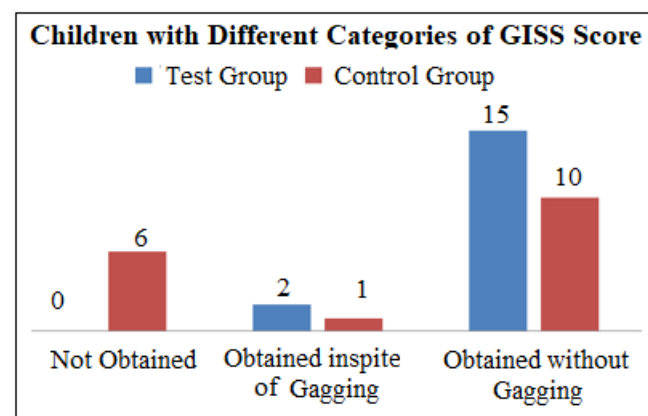


Figure 1: Children with different categories of GISS Score between the test and control group

Table 2: Comparison of percent of children with different categories of GISS between the test and control group

		Test Group (n=17)	Control Group (n=17)	Total	Chi square	Fisher's Exact p	Cramer's V
GISS	Not Obtained	0 (0%)	6 (35.3%)	6 (17.6%)	7.458	0.018	0.464
	Obtained In spite of Gagging	2 (11.8%)	1 (5.9%)	3 (8.8%)			
	Obtained Without Gagging	15 (88.2%)	10 (58.8%)	25 (73.5%)			
Total		17	17	34			

Correlation between GISS and the building block intellectual distraction game

A statistically significant and very strong association with a medium effect size ($p = 0.018$, Cramer's $V = 0.464$) was found between the use of the interactive distraction technique and the GISS score. The mean GISS score in the test group was 2.88, which was also significantly higher ($p = 0.017$) compared to the control group ($M = 2.24$) on an independent samples t - test (Table 3).

Table 3: Comparison of mean GISS score in Test and Control Group

	Groups	Mean	Std. Deviation	t	p
GISS	Test Group	2.88	.332	2.602	0.017
	Control Group	2.24	.970		

4. Discussion

Making maxillary impressions on young patients might be difficult because of their possible fear, anxiety, and uncooperative behavior. During the process, children frequently feel uncomfortable, which could lead to resistance or sudden movement. This not only degrades the impression's quality but also could lead to a bad experience that deters people from going to the dentist in the future. Intellectual distraction tactics are one of the behavioral management strategies used to address these issues, and they are essential in helping kids have a better experience.

Redirecting the child's focus from the dental operation to something more interesting or pleasurable is known as intellectual distraction. This method makes use of the child's imagination and cognitive skills to distract them from the pain or anxiety that comes with the process. In a clinical context, intellectual diversions can be easily adopted, inexpensive, and non - invasive.

In our study we used a puzzle ball as an intellectual distraction technique to shift the child's focus away from the physical sensations that may trigger gagging. This demanded their thought, imagination, and creativity, which helped reduce the child's awareness of the sensation of the impression tray in their mouth.

Table 2 shows a significant statistical association between GISS and intellectual distraction technique. Singh et al. state that behavioral techniques are the most successful long - term methods in gagging management. It reduces anxiety and helps "unlearn" the behaviour that provokes gagging.⁷ Unlike pharmacological methods like sedation, intellectual distraction does not require medications or injections, making it a non - invasive option for pediatric dental care. Intellectual distractions help keep the child engaged and still, which is important during the impression - making process. When children are mentally absorbed in an activity, they are less likely to move or resist. This technique does not require

additional resources or equipment. It is simple, cost - effective, and can be easily implemented in most dental practices.

While intellectual distractions can help prevent gagging, it's crucial to remember that not all children will respond equally well to these tactics. Younger children or those with very strong gag reflexes may require extra behavioral management tactics, such as relaxation techniques, desensitization, or sedation. Furthermore, the clinician's expertise in delivering these distractions is critical—engaging the youngster with a calm, confident, and enthusiastic approach will increase the distraction's effectiveness.

The child's temperament and cognitive capacity must also be addressed. Some youngsters may have a more vivid imagination and thrive on storytelling or role - playing, whilst others may struggle to remain involved.

5. Conclusion

Intellectual distraction tactics can help prevent youngsters from gagging when making maxillary impressions. These strategies serve to retain the child's participation and reduce fear by diverting his or her attention away from the physical sensations of the process. While intellectual diversions may not fully remove the possibility of gagging in all circumstances, they are a gentle, cost - effective, and non - invasive way to improve the child's experience and provide a positive impression. When paired with other behavioural management tactics, intellectual distraction techniques can greatly minimize the likelihood of gagging and improve the entire children dental experience.

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