The Effect of Isolation Techniques on Behavior During Dental Treatment: Rubber Dam Versus the Isolite System

Kali Gupton, D.M.D. [1], **Cristina Perez,** D.D.S. MS [1], **Morgan Larkin,** D.M.D [1], **Gregory Hawk**, PhD [2], **Debora Scheffel,** D.D.S, M.S, PhD [1]

University of Kentucky College of Dentistry

INTRODUCTION

The American Academy of Pediatric Dentists describes behavior management as "A continual process from basic to advanced techniques, using non-pharmacological and pharmacological options" (Best Practices, 2020, pg 1), and states that treatment of pediatric patients requires effective behavior management. Managing patient behavior is comprehensive including each aspect of treatment such as the isolation system and within pediatric dental treatment, dental isolation is a necessary and constant aspect of care. Rubber dams are generally described as the gold standard of isolation systems in Dentistry. While there are studies that have given data on comparison of patient behavior under different isolation systems, there is a gap in the research comparing behavior with rubber dam vs isolite while completing restorative treatment using nitrous oxide. This study intends to use a modified Venham's behavior scale to analyze the behavior of pediatric patients at different stages of dental treatment and compare that data between two visits, one using rubber dam isolation and the other using isolite isolation.

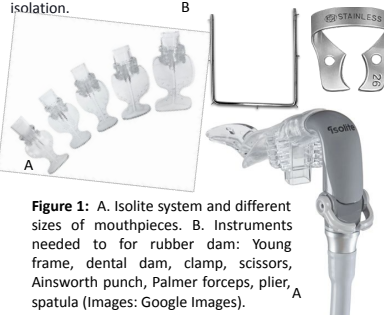


Figure 1: A. Isolite system and different sizes of mouthpieces. B. Instruments needed to for rubber dam: Young frame, dental dam, clamp, scissors, Ainsworth punch, Palmer forceps, plier, spatula (Images: Google Images).

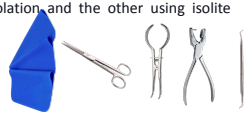
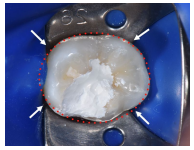


Figure 2: Clamps must present 4 contact points to provide correct anchorage and isolation.



The isolite system was developed in the United States in the early 2000s. This system uses a silicone mouthpiece associated with high-speed suction to provide adequate isolation and both cheek and tongue retraction of two quadrants of the mouth. Some also have built-in LED lights to illuminate the operative field (figure 1).

The RD is considered the standard of care for isolation in pediatric dentistry. It was designed in 1864 by Sanford Christie Barnum, and it provides a dry, clean operative field and prevents bacterial contamination (figure 2). The RD also successfully reduces the risk of transferring infectious microbes between the patient and dentist while protecting the patient against aspiration of dental materials during the dental treatment.

OBJECTIVE

The goal of this study was to analyze the behavior of patients during dental treatment using rubber dam isolation and isolite isolation during restorative treatment.

MATERIAL AND METHODS

A sample size of 10 patients was studied across two treatment visits. Participants were between the ages of 6 and 12, had a previous behavior rating of F3-F4 (Frankel scale), and required two quadrants of dental restorations. Behavioral data was collected using a modified Venham's scale (Figure 1) at 4 different stages of treatment: sitting in the chair, local anesthetic administration, placement of isolation system, and during restorative treatment. The isolation system used during the first treatment visit was determined by a randomized list. All treatment was conducted by the same dentist. This study began after approval by the Research ethics committee of the University of Kentucky (#90437). Consent for data collection during treatment was obtained from the parents of patients before being included in the study.

Rating	Definition
0	Total cooperation, best possible working conditions, no crying or physical protest
1	Mild, soft verbal protest or (quiet) crying as a signal of discomfort, but does not obstruct progress. Appropriate behavior for procedure, i.e.slight start at injection, "ow" during drilling if hurting, etc.
2	Protest more prominent. Both crying and hand signals. May move head around making it hard to administer treatment. Protest more distracting and troublesome. However, child still complies with request to cooperate.
3	Protest presents real problem to dentist. Complies with demands reluctantly, requiring extra effort by dentist. Body movement.

Table 1: The modified Venham Behavior scale was used to assess behavior before, during, and after treatment.

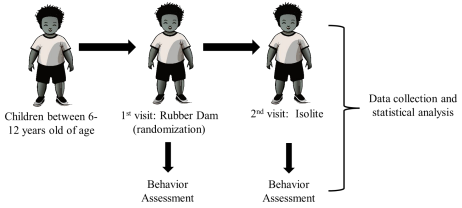
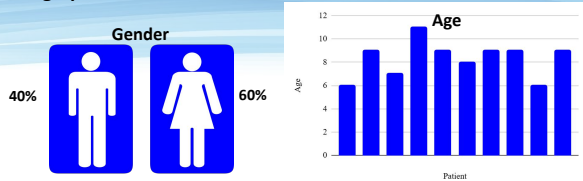


Figure 3. Study design.

RESULTS

No significant differences in patient behavior were observed between Iso and RD at any of the evaluated time points (P>.05). The "anesthesia" stage exhibited the highest percentage of scores greater than 0, indicating increased anxiety or discomfort (77% for Iso and 62% for RD). In contrast, the "sitting in the chair" stage had the lowest percentage of scores greater than 0 (7.7% for Iso and 0% for RD). Gender, visit, and quadrant did not influence the results.

Demographics



Timepoint	Iso > 0 (*n* = 13)	RD > 0 (*n* = 13)	Fisher's exact test *p*-value
Sitting in the Chair	1 (7.7%)	0 (0%)	1
Anesthesia	10 (77%)	8 (62%)	0.673
Isolation Placement	8 (62%)	6 (46%)	0.695
Restorative Treatment	8 (62%)	5 (38%)	0.434

Table 2: Shows differences in mean score between Iso and RD, unadjusted for any other factors, both quantitatively and categorically.

DISCUSSION

One of the most important skills for a successful pediatric dentist is behavior management. Having good behavior management skills helps in all phases of an appointment including placement of the isolation system. When behavior management is under control, then both methods (Iso and RD) are sufficient. The system chosen is dependent on provider preference and which one they feel the most comfortable with in their hands. It is also important to note that behavior is typically less than ideal for the second restorative visit when compared to the first because the patient is aware of what is about to happen, has developed some dental anxiety at home from personal thoughts, peers, etc, and they may have developed some apprehension. This is a definite limitation to this study as each patient had 2 visits. For all patients in this study, delivery of local anesthesia was the lowest score. This is the most challenging aspect of most appointments because it involves pain. This is important as there are new technologies that minimize pain during delivery of local anesthesia, such as electronic injection, that pediatric dentist should consider.

CONCLUSIONS

Patient behavior did not differ significantly between Iso and RD at any stage of treatment. The highest anxiety levels occurred during anesthesia, while the lowest were observed when seated in the chair. Gender, visit order, and treated quadrant had no impact. These findings suggest that the choice of isolation system does not influence patient behavior, highlighting the need for effective management, especially during anesthesia.

[1]Department of Oral Health Science, University of Kentucky College of Dentistry; [2]Department of Statistics, University of Kentucky

References: (1) Alhareky, M. S., et al.. (2014). Efficiency and patient satisfaction with the Isolite system versus rubber dam for sealant placement in pediatric patients. (2) Sharma, A., & Tyagi, R. (2011). Behavior assessment of children in dental settings: A retrospective study.. (4) Narayan, V. K., and S. R. Samuel."Appropriateness of various behavior rating scales used in pediatric dentistry: A Review." J. Glob. Oral. Health 2 (2019): 112-117. (4). Aitken JC, et al. 2002. The effect of music distraction on pain, anxiety and behavior in pediatric dental patients. 8. Current, J. Luke, et al. "Comparing Behavior Outcomes with Rubber Dam or IsoVac Isolation in Patients Undergoing Moderate Sedation." Journal of Dentistry for Children 89.2 (2022): 83-87 9.American Academy of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. The Reference Manual of Pediatric Dentistry.