Isolation Techniques in Pediatric Dentistry: A Literature Review on Rubber Dam Versus the Isolite System

Luke Smith, D.M.D.[1] **Cristina Perez,** D.D.S. MS [1], **Debora Scheffel,** D.D.S, M.S, P.hD [1]

[1]Department of Oral Health Science, Division of Pediatric Dentistry, University of Kentucky College of Dentistry

INTRODUCTION

Efficient isolation of the operative field is one of the most important factors for the success of many restorative dental procedures, including resin-based restorations and sealants.[1] Although several techniques can be used to isolate a tooth during dental treatment, rubber dam (RD) is considered the gold standard method to provide isolation.[2] RD was designed in 1864 by Sandford Christie Barnum and provides a clean and dry operative field and prevents saliva and microbial contamination (Figure 1). Additionally, RD reduces the risk of transferring infective microbes between the patient and dentist and protects the patient against the ingestion or aspiration of burs, endodontic files or other instruments during dental treatment.[3] Despite these advantages, many dentists believe RD is unnecessary, time consuming and not well accepted by patients. In the early 2000s, the Isolite System (IS) was developed in the United States (Figure 2).[2,4]. The IS uses a silicone mouthpiece associated with high-speed suction to provide isolation and cheek and tongue retraction of two quadrants at the same time. Besides that, a built-in LED offers partial illumination of the operative field.[5]

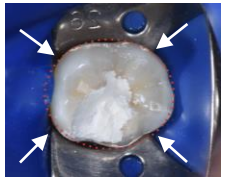

Figure 1. Clamped primary molar. Clamps must present 4 contact points to provide correct anchorage and isolation.

Figure 2. Isolite system and different sizes of mouthpieces (Images: zyris.com).

OBJECTIVE

This narrative literature review critically presents the existing literature on comparison between rubber dam and the isolite system to help dentists decide on the most appropriate isolation method for their patients.

MATERIAL AND METHODS

A search on PubMed (MEDLINE) and the Cochrane Library was conducted using the terms "pediatric dentistry", "rubber dam", "isolite", and "children". Papers were included or excluded based on the following criteria.

Inclusion criteria: papers published between 2010 and 2024, clinical studies comparing RD and IS.

Exclusion criteria: papers published in any language other than English, studies that did not involve pediatric patients.

RESULTS

Thirty-seven papers were found via the literature search. After duplicates were removed and the inclusion and exclusion criteria applied, 3 papers remained (Figure 3) and are presented on Table 1.

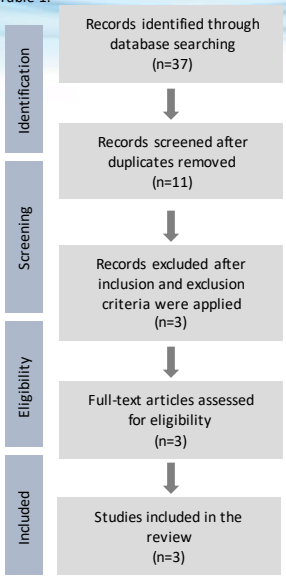

Figure 3. Flow diagram of study selection.

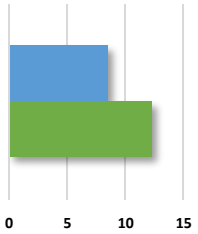

Figure 4. Mean age (years) found in studies 1 and 2.

Table 1. Summary of the studies included in the literature review.

Author, Year	Study design	Participants	Intervention comparison	Results
1. Alharek et al., 2014[8]	Randomized clinical trial (Split mouth).	Children between 7-16 y.o. (n=42).	Pit and fissure sealants placed on first permanent molars using RD* or IS.	-Chair time was lower for IS (10 min) when compared to RD (19.36 min) (p<0.001). - 69% of participants found IS more comfortable against 32% that preferred RD (p=0.02).
2. Mattar et al., 2021[7]	Randomized clinical trial (Split mouth).	Children between 6-15 y.o. (n=48).	Pit and fissure sealants placed on first or second permanent molars using RD or IS or CR.	-Chair time was statistically similar for CR (243.29 sec) when compared to IS (248.14 sec) and RD (255.89 sec) (p>0.05). - 79% of participants found CR more comfortable. 71% were less likely to use RD.
3. Mattar et al., 2023[6]	Randomized clinical trial (Single blinded, Split mouth).	Children between 6-15 y.o. (n=48).	Pit and fissure sealants placed on first or second permanent molars using RD or IS or CR.	No significant difference was observed between the three isolation techniques regarding sealant retention after 12-22 months (p>0.05).

* RD=Rubber Dam; IS=Isolite System; CR=Cotton Roll

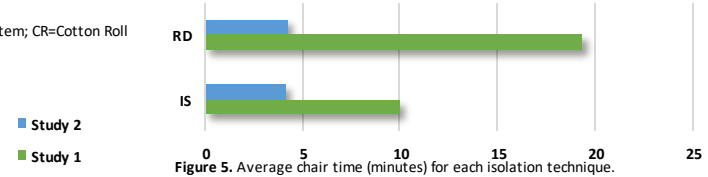

Figure 5. Average chair time (minutes) for each isolation technique.

CONCLUSION

Isolite is a viable alternative to rubber dam. Pediatric patients seem to find IS more comfortable than RD. RD may require longer chair time. RD and IS are similar regarding sealant retention over time. It is also important to highlight that IS do not require infiltrative anesthesia. Continued research is needed on the effects of RD and IS on pediatric patients and dental treatment.

References:1. Beauchamp J et al. Evidence-based clinical recommendations for the use of pit-and-fissure sealants: a report of the American Dental Association Council on Scientific Affairs. J Am Dent Assoc 2008. Hill EE, Do dental educators need to improve their approach to teaching rubber dam use? 2008. Kuo S,. 4. Slawinski D, Rubber dam use: a survey of pediatric dentistry training programs and private practitioners. Pediatr Dent 2010. 5. Collette J A study of the Isolite system during sealant placement: efficacy and patient acceptance. Pediatr Dent 2016. 6. Efficiency and patient satisfaction with the Isolite system versus rubber dam for sealant placement in pediatric patients. Alhareky MS, 2014. 7. Comparison of Fissure Sealant Chair Time and Patients' Preference Using Three Different Isolation Techniques. Mattar RE. 2021. 8. Evaluation of fissure sealant retention rates using Isolite in comparison with rubber dam and cotton roll isolation techniques: A randomized clinical trial. Mattar RE, 2023.