Sealant Retention in Permanent Molars Using an Adhesive Bonding System

Aashna Kumar, DMD, Kirkland Fehrman, DMD, Maria Caras, DMD, Shreya K. Desai, DDS, Elizabeth Berry, DDS, MSD, MPH, John H. Unkel, MD, DDS, MPA
Bon Secours St. Mary's Hospital of Richmond, Richmond, VA

PURPOSE

- The purpose of this study was to evaluate the overall efficacy of adhesive bonding agent on sealant performance in first permanent molars by assessing retention, marginal integrity, and caries prevention.

BACKGROUND

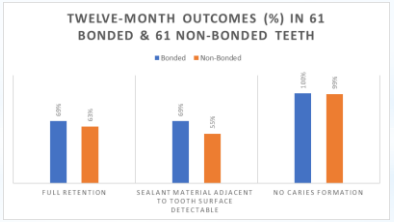
- The anatomic pits and grooves found on permanent first and second molars make it easier for food and bacterial biofilm to get trapped and accumulate. (1)
- The morphology of permanent molars, with their anatomical pits and fissures, creates an environment conducive to bacterial accumulation and subsequent caries formation. (2)
- For decades, pit and fissure sealants have been a standard preventive measure against caries in both primary and permanent teeth. (3)
- The role of bonding agents in sealant retention is not definitively established, as evidenced by the conflicting findings of previous clinical trials. (4,5)
- Updated sealant guidelines confirm the continued effectiveness of sealants in preventing caries in high-risk populations. (3,6)

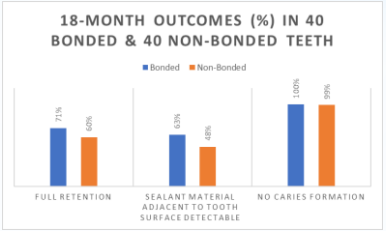
REFERENCES

1. McMurphy A, et al. Effect of Cured Versus Uncured Adhesive Inclusion on the Microtensile Bond Strength of Sealants. Journal of Dentistry for Children, 2017; 84(2):58-64.
2. Wright JT, Tampi MP, Graham L, et al. Sealants for preventing and arresting pit-andfissure occlusal caries in primary and permanent molars: A systematic review of randomized controlled trials-a report of the American Dental Association and the American Academy of Pediatric Dentistry. The Journal of the American Dental Association, 2016; 147(8): 631-645.
3. Wright JT, Crall JJ, Fontana M, et al. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants. Pediatric Dentistry, 2016; 38(5):E120-E36.
4. Mascarenhas AK, et al. Effectiveness of Primer and Bond in Sealant Retention and Caries Prevention. Pediatric Dentistry, 2008; 30(1):25-28.
5. Pinar A, et al. Clinical performance of sealants with and without a bonding agent. Quintessence Int., 2005; 36(5):355-360.
6. Crall JJ, Donly KJ. Dental sealants guidelines development: 2002-2014. Pediatric Dentistry, 2015; 37(2): 111-115.

METHODS

- This randomized control trial recruited children ages 6-10 years old with four fully erupted non-carious permanent first molars in the dental clinic or under general anesthesia.
- A split-mouth study design was used in which occlusal sealants were placed with an isolation system (Isovac or rubber dam).
- Teeth were etched with 35% phosphoric acid total-etch technique. The maxillary and mandibular right permanent first molars were bonded with Scotchbond Universal Bond, while the permanent first molars on the left were not bonded. A 53% resin filled UltraSeal XT HydroTM sealant was placed in a thin layer according to the manufacturer's instructions in the pits and fissures of each molar.
- The sealants were checked for retention, marginal integrity, and caries formation at the 6, 12, and 18-month recalls.





DATA ANALYSIS

- Descriptive statistics were completed to show subject characteristics of retention, marginal integrity and caries prevention of the first permanent molars bonded and not bonded at 6-,12-, and 18-months.

RESULTS

- 170 patients were enrolled, evaluating data for 97 patients at 6-month recall, 61 patients at 12-month recall, and 40 patients at 18-month recall.
- The mean age was 7.8 years of age (range 6-10) with 51% male and 49% female.
- 84% of sealants were fully retained in the bond group and 81% in the non bonded group in 6 months, 69% fully retained in the bond group and 63% in the non bonded group in 12 months, and 71% fully retained in the bond group and 60% in the non bonded group in 18 months.
- 83% of sealants in the bonded group had marginal integrity (sealant material was adjacent to tooth surface) and 78% in the not bonded group at 6 months, 69% of sealants in the bonded group had marginal integrity and 55% in the not bonded group at 12 months, and 63% of sealants in the bonded group had marginal integrity and 48% in the not bonded group at 18 months.
- 100% of teeth in the bonded sealant group did not exhibit caries formation at any recall and 99% of teeth in the non-bonded sealant group did not exhibit caries formation at the 12-month recall.

CONCLUSIONS

- Preliminary analysis suggests that bonding agents may contribute to marginally enhanced sealant retention and marginal integrity

LIMITATIONS AND FUTURE RESEARCH

- Slight differences in in provider technique are possible
- Study will continue to enroll a larger number of subjects and compare long-term retention of sealants placed in the clinic and operating room.