Comparison of Diagnostic Efficacy of Bitewings and Visual Examination After Temporary Tooth Separation in the Detection of Interproximal Caries

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Memon H, Ramesh A, Loo CY, Meher A, Sprott S, Patel, R, Pagni S, Sunar M (Tufts University School of Dental Medicine, Boston, MA)

Tufts University School of Dental Medicine

Introduction

- Dental caries is a preventable infectious disease that affects approximately 25% of children by 5 years of age. (Nowak A et al., 2018)
- Bitewing radiographs are the standard of care for diagnosis of interproximal caries when surfaces cannot be directly examined.
- The American Academy of Pediatric Dentistry recommends radiographs, ≤ 3 years, every 12 to 24 months (low caries risk) and every 6 months (high caries risk) (AAPD 2019).
- Radiographic examinations have a higher sensitivity when caries extends beyond the DEJ.
- Radiographic examinations are technique sensitive and expose the patient to the hazards of ionizing radiation (Novaes T et al. 2009).
- Attention and adherence to the ALARA principle of radiation protection in pediatric population is essential.
- Young children are more sensitive to ionizing radiation than adults due to longer life expectancy and developing organs. (White S et al. 2014)
- Transient tooth separation (0.3-0.5mm) allows for direct visualization of interproximal surfaces
- Increasing parental concerns over the deleterious effects of ionizing radiation leading to refusal of diagnostic radiographs lead our team to pursue this study.

Objective

To compare the diagnostic efficacy of bitewing radiography with visual and tactile examination of proximal surfaces after temporary tooth separation in the detection of interproximal carious lesions in primary molars.

Methods

33 children (ages 5 to 9 years) presenting for initial or recall examinations, requiring bitewing radiographs, were enrolled in the study. Number of surfaces per participant: 2 ≤ n ≤ 8

Study participants completed 2 visits each:

Table 1. Participant visits	
Visit	Action
#1	• Bitewing radiographs obtained • Radiographic evaluation completed • Thick elastomeric orthodontic separators (1.52 mm) immediately placed at qualifying interproximal sites.
#2	• Elastomeric separators removed with explorer • Interproximal surfaces were cleaned • Exposed interproximal surfaces were inspected for the presence or absence of cavitation using ICDAS scoring system (Figure 1).

The study was blinded with independent examiners completing either visit 1 or 2.

A separate radiographic analysis was completed to then compare the results to those obtained with the visual inspection.

Figure 1. Smooth Surface Characteristics ICDAS stages (Ismail AI, et al. 2007)

Results

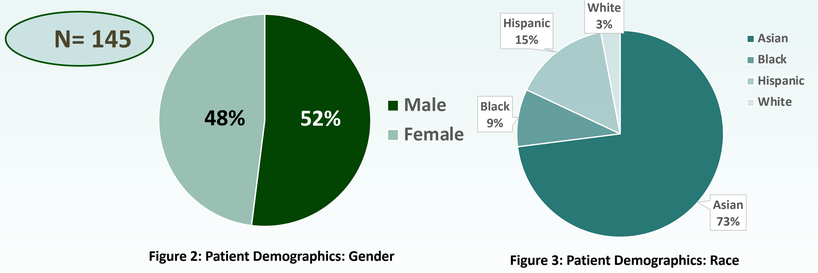

Figure 2: Patient Demographics: Gender

Figure 3: Patient Demographics: Race

Results (Continued)

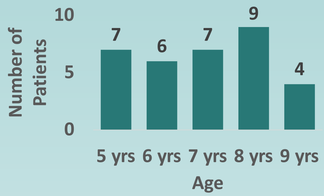

Figure 3: Patient Demographics: Age

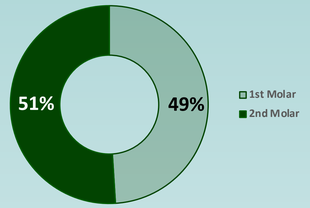

Figure 4: Primary 1st Molars vs. 2nd Molars

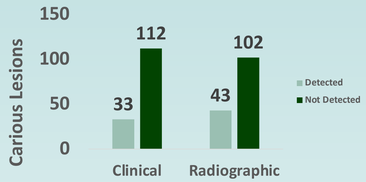

Figure 5: Clinical vs. Radiographic Caries

Table 2. Effectiveness of Radiographic Caries Detection vs. Clinical Caries Detection*	
Sensitivity	75.00 %
Specificity	83.93 %

*Clinical caries is the gold standard

Conclusion

The use of elastomeric separators are effective as means of clinically screening the interproximal area of primary molars for caries. This method is highly effective for patients who do not have caries; however, a larger sample size and confirmation of evaluator reliability is needed to assess its value at confirming the presence of caries.

References

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