Abstract

Purpose: The purpose of this study was to assess the performance of sealants placed by senior dental students as part of a comprehensive dental care program that included periodic patient recall.

Methods: The dental records of 100 patients ranging in age from 6 to 13 years were selected for review to determine the treatments provided for first permanent molars over time. Criteria for inclusion were: 1) at least five documented recall examinations and 2) all four first permanent molars had to have been treated with an occlusal pit and fissure sealant. The data collected included: 1) the age of the patient at the time of initial sealant placement; 2) the subsequent treatment provided to the first permanent molars, including retreatment with sealant or restoration and the date the services were provided; 3) the last date of follow-up examination in the pediatric dental program.

Results: A total of 400 molars were followed for an average of 54 months. Fifty-two percent of all molars received no further treatment after initial placement of sealant. Approximately 35% received retreatment with sealant only. The total number of molars receiving sealant material only was 343 (86%). The total number of teeth that were judged to require restoration was 57 (14%). No relationship was noted between the patient’s age at placement of the occlusal sealant and sealant performance.

Conclusion: In a dental school clinic, occlusal sealants were effective at preventing caries in a comprehensive care program that included periodic recall. (Pediatr Dent 20:5 341–344, 1998)
ment of the patient to a dental student for primary care, with appropriate referral to dental residents or specialists as required. Patients are recalled periodically for preventive and diagnostic services at time intervals determined by the needs of the patient and the availability of an appropriate student provider.

The dental records of 100 patients ranging in age from 6 to 13 years were selected for review from the population of pediatric patients treated by senior dental students. Criteria for patient selection were that the candidate had at least five documented recall examinations and that all four of the first permanent molars had to have been treated with an occlusal pit and fissure sealant.

The sealant material most widely employed was Delton self-cure pit and fissure sealant. Dental assistants were available on occasion to assist the dental students, however, students generally work without them. Senior dental students placed all sealants with faculty supervision of diagnosis and treatment. The criteria employed in the educational program for the placement of sealants is the presence of deep occlusal pits and fissures with no evidence of decay. At the recall exam the decision to reseal or restore a tooth was made by the assigned dental student in conjunction with the supervising faculty member. Occlusal surfaces were restored if evidence of occlusal caries was present. Sealants were replaced if the occlusal surface of the tooth appeared sound but sealant wear or loss was apparent.

The dental records of the patients selected were reviewed to determine the treatments provided for the first permanent molars over time. The data collected included:

1. The age of the patient at the time of initial sealant placement
2. The subsequent treatment provided to the first permanent molars—including retreatment with sealant or restoration and the date the services were provided
3. The last date of follow-up examination in the pediatric dental program.

**Results**

Dental treatment records of 100 patients, ages 6 to 13 years, were reviewed in order to follow all treatment rendered to previously sealed first permanent molars. The mean age of the patients at initial sealant placement was 92.3 months (range 67 to 135 months). A total of 400 molars were followed for an average of 54 months (range 10 to 134 months). Based upon re-examination by a student and confirmation by a faculty member, 52% (99 maxillary, 108 mandibular) of all molars received no further treatment after initial sealant placement. One hundred and twenty-three molars (61 maxillary, 62 mandibular) were retreated with sealant only once. Thirteen molars (7 maxillary, 6 mandibular) were retreated twice with sealant. The average time interval between reapplication of sealant was 23 months (range 4 to 52 months). The total number of molars receiving treatment with only sealant material was 343 (86%).

Upon re-examination by a student and faculty member, 10% of the molars (21 maxillary, 20 mandibular) were judged to require occlusal restorations (Table 1). This diagnosis was based on the presence of a clinically detectable occlusal carious lesion. The median time after sealant placement before an amalgam restoration was placed was 25 months for maxillary and 31 months for mandibular molars. Four percent of the molars (12 maxillary, 3 mandibular) received two surface restorations, including occlusolingual, distoocclusal, and mesioocclusal restorations, diagnosed from clinically detectable occlusal and/or lingual caries or radiographic evidence of proximal caries. The median time between sealant placement and placement of the two-surface restoration was 35 months for maxillary molars (range 11 to 69 months) and 51 months for mandibular molars (range 26 to 53 months). Based on radiographic

**TABLE 1. TREATMENT TO FIRST PERMANENT MOLARS [N (%)]**

<table>
<thead>
<tr>
<th>Arch</th>
<th>Total teeth</th>
<th>Sealed&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Resealed (x1)</th>
<th>Resealed (x2)</th>
<th>Sealant&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Surfaces restored</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sealed&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Resealed (x1)</td>
<td>Resealed (x2)</td>
<td>Sealant&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Surfaces restored</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maxillary</td>
<td>200</td>
<td>99 (50%)</td>
<td>61 (31%)</td>
<td>7 (4%)</td>
<td>167 (84%)</td>
<td>21 (11%)</td>
</tr>
<tr>
<td>Mandibular</td>
<td>200</td>
<td>108 (54%)</td>
<td>62 (31%)</td>
<td>6 (3%)</td>
<td>176 (88%)</td>
<td>20 (10%)</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>207 (52%)</td>
<td>23 (31%)</td>
<td>13 (3%)</td>
<td>343 (86%)</td>
<td>41 (10%)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Teeth that were sealed one time only.
<sup>2</sup> Total number of teeth that were treated with sealant only.

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Table 2. Treatment to First Permanent Molars by Age and Number of Patients

<table>
<thead>
<tr>
<th>Age (in patients)</th>
<th>Number of Teeth Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sealed</td>
</tr>
<tr>
<td>&lt; 8 (61)</td>
<td>244</td>
</tr>
<tr>
<td>&gt; 8 (39)</td>
<td>156</td>
</tr>
</tbody>
</table>

evidence of interproximal caries, one tooth was treated at recall with a mesiocclusodistal restoration 96 months after a sealant had been placed. Complete results are presented in Table 1. There was no statistically significant relationship between the patient’s age at placement of the occlusal sealant and the follow-up restorations placed. The complete grouping of patients by number of restorations and age is found in Table 3.

Table 3. Number of Restorations by Age

<table>
<thead>
<tr>
<th>Number of restorations</th>
<th>Number of patients</th>
<th>Mean age (mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>65</td>
<td>92.4</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>94.5</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>94.9</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>81.9</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>**</td>
</tr>
</tbody>
</table>

dental students in a study by Walker et al.11 Eighty-six percent of the molars in this study were treated with only sealant material compared to 92% of the teeth in the Walker study.11 The difference may be that in the Walker study, not all the teeth with sealant received a follow-up examination and those teeth were judged to require no further treatment. In our review, the patient had to have received a minimum of five documented recall exams. Therefore, the need for additional treatment was assessed over a longer period of time.

In the Walker study,11 children younger than 8 years of age received sealant replacement significantly more frequently than did children 8 or older. Table 2 illustrates that in this review, there was no significant difference in sealant replacement between the age groups, but children younger than 8 years old were judged to require more follow-up restorations. Thirty-four percent of the molars we reviewed received reapplication of sealant material at least once. In the Walker study,11 13% of the molars evaluated were judged to require rescaling. In another sealant study, the rate of reapplication of sealant material was 44%.12 Therefore, it appears reapplication of sealant material is often considered desirable by clinicians. The decision to reapply sealant material is likely a result of perceived sealant wear, loss, or breakage, all conditions that must be based on the clinical judgment of the dentist.

Discussion

The results demonstrate that the predoctoral educational program was effective in preparing dental students to apply occlusal sealants. The results also demonstrate that occlusal sealants applied to first permanent molars by dental students as part of a comprehensive care program with periodic patient recall were an effective preventive procedure. This retrospective clinical evaluation of performance demonstrated results similar to those reported by Mertz-Fairhurst et al.10 in a 7-year clinical trial of occlusal sealants. In the clinical trial, 13% of the molars were judged to be carious/restored 3 years after the initial placement of occlusal sealant compared to 14% of the molars sealed by dental students. In another clinical trial of sealants, Simonsen found 7% of sealed teeth judged to be carious/restored after 5 years.8

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The results of this evaluation indicate that periodic recall for the patient recall examination and identify factors that will enable the practitioner to target the children with the highest degree of caries susceptibility for more frequent examination. The timing of the recall should be based on the needs and risk factors of the individual patient. The results of this evaluation indicate that periodic recall is a necessary component of a comprehensive dental care program. However, further study with a larger patient pool is needed to identify risk factors that can be used to develop optimal time intervals for recall examinations.

In addition to the occlusal sealants, the patients received other preventive measures such as topical fluoride application and oral hygiene instructions. However, this review was not designed to assess the effects of the other preventive procedures in the overall results.

This review suggests that dental education can demonstrate evidence of effectiveness for its educational programs and patient care using data obtained retrospectively from dental records of patients receiving comprehensive dental care in a dental school clinic. The results demonstrated that the dental students received appropriate educational experiences that prepared them to provide sealants for their patients, and that the patients received similar benefits from the sealants as did patients in clinical trials.

Conclusions

1. The performance of sealants placed by dental students indicates that students were educationally prepared to provide occlusal sealants for their patients.
2. In a dental school clinic, occlusal sealants were an effective part of caries prevention in a comprehensive care program that included periodic recall.
3. The performance of sealants placed by dental students was similar to those of sealants applied under controlled experimental conditions.

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References