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# Clinical performance of a non-rinse conditioning sealant in three paediatric dental practices: a retrospective study

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**Summary.** The present clinical retrospective study describes the retention rates of a compomer sealant (Dyract Seal, Dentsply-De Trey, Germany) with non-rinse conditioning (NRC) placed in three paediatric dentistry practices. Three hundred and seventeen sealants were applied in 220 primary and 97 permanent molars of 176 children aged 2·5–13 years. The tooth surface was freshened with a #1/2 round bur mounted on a slow speed engine, and isolated with cotton rolls. Application of the NRC and Dyract Seal followed the manufacturer's instructions. Sealant retention was classified as A (fully retained), B (partially lost) or C (completely missing).

From a total of 220 sealants placed in primary molars, 38 were in the mouth between 12 and 18 months, 29 functioned between 19 and 24 months and 46 were followed up between 25 and 36 months. One hundred and thirteen (51%) were fully retained (A), 73 (33%) scored B (27 for 12–18 months; 20 for 19–24 months, 26 for 25–36 months) and 34 (16%) were lost and scored C (12 for 12–18 months; 12 for 19–24 months; 10 for 25–36 months).

From a total of 97 sealed permanent molars, 45 (46%) were fully retained (score A). Of these, 25 were followed up for 12–18 months, 10 for 19–24 months and 10 for 25–36 months. Thirty-eight sealed permanent molars (19%) scored B [17 for 12–18 months, 10 for 19–24 months and seven for 25–36 months and 14 (15%) were completely lost (score C: 6 for 12–18 months, seven for 19–24 months and two for 25–36 months)].

Dyract Seal has a lower retention rate than conventional sealants. It may be appropriate for sealing primary molars of very young children for a limited period of time and for permanent molars of children with pronounced gag reflex, where rinsing can become a problem and lead to disruptive behaviour.

## Introduction

Sealants can be a very effective way in the prevention and control of caries in pits and fissures in primary and permanent teeth [1–4]. The American Academy of Pediatric Dentistry recommends sealants should be placed as soon as possible after the tooth erupts, and isolation can be obtained to prevent moisture contamination [1].

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Placement of sealants is a painless and commonly noninvasive technique, which avoids unnecessary loss of tooth structure. However, surface contamination prior to placement is probably the main reason for sealant loss. Proper isolation of the field is usually achieved with cotton rolls, and several studies [5–8] have demonstrated good retention of sealants when using this type of isolation. Rinsing the tooth after acid etching can be unpleasant and become a source of both contamination and disruptive behaviour, particularly in young children [3].

An innovative acid-conditioning procedure, utilizing a nonrinse conditioner followed by a light, cured

compomer sealant has been introduced in recent years. The nonrinse conditioner is applied for 20 s to the surface to be conditioned, and the excess is removed with an air syringe [9]. Owing to the nonrinsing procedure, the change of cotton rolls becomes unnecessary, facilitating the procedure for young children.

The purpose of the present retrospective study was to assess the clinical performance of a nonrinse conditioning compomer sealant placed in primary and permanent molars in three paediatric dental practices.

## Methods

### *Study material*

The study material consisted of 317 Dyract Seal sealants applied in 220 primary and 97 permanent molars of 176 children, aged 2·5–13 years, in three paediatric single operator dental practices. Conventional sealants are routinely applied in all three practices, using the criteria taught at the Department of Pediatric Dentistry of the Hadassah School of Dental Medicine. These criteria call for sealing all teeth with deep pits and fissures as soon as they have erupted enough to have their occlusal surface free from the operculum.

The nonrinse sealants were initially applied in molars of very young children with early childhood caries (ECC) or with a high caries risk receiving restorative treatment under sedation. After observing favourable results in these young children, we assumed that this technique could be useful for older children with exaggerated gag reflex, and started to seal permanent molars in these children. As the number of patients and sealants placed in the three practices were similar (ABF: 59 patients, 120 sealants; DR: 52 patients, 95 sealants; EM: 65 patients, 102 sealants) the material was pooled and is presented together.

Sedation technique: children were starved for 4 h and were sedated with 50 mg of hydroxyzine 1 h before treatment in conjunction with 50% nitrous oxide. All the parents were present in the operatory during treatment, no Papoose Board was used, and when necessary the parents helped physically restrain their children by holding their hands and/or legs.

The restorative treatment was completed under a rubber dam. After removal of the dam, nonrinse Dyract Seal was applied in contra lateral molars using cotton roll isolation.

### *Sealant application technique*

The tooth was isolated with cotton rolls, and the surface was cleaned with a # 1/2 round bur mounted on a slow speed engine, and gently rinsed with water.

Application of the sealant followed the manufacturer's recommendations [9]:

- the non NRC was applied with a thin disposable brush (provided by the manufacturer) and left undisturbed for 20 s;
- excess of NRC was removed with an air syringe *without rinsing*;
- Prime & Bond NT (Nano Technology) was applied to the fissure with another disposable brush and left undisturbed for another 20 s;
- solvent was removed with an air syringe for 5 s;
- Dyract Seal was gently dispensed directly into the fissure using a disposable needle provided by the manufacturer and light cured for 10 s.

### *Evaluation*

Sixty percent of the primary molars were evaluated between 19 and 36 months, while the remaining primary and most of the permanent molars were assessed between 12 and 24 months. Sealant retention was classified as A (fully retained), B (partially lost) or C (completely missing). Distribution of the sealed teeth and follow-up times is presented in Figs 1–3.

## Results

The results are summarized and represented graphically in Figs 1–3.

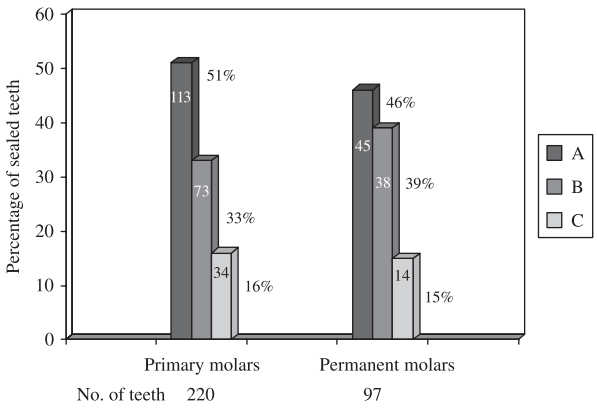


**Fig. 1.** Retention rates of Dyract Seal in primary and permanent molars.

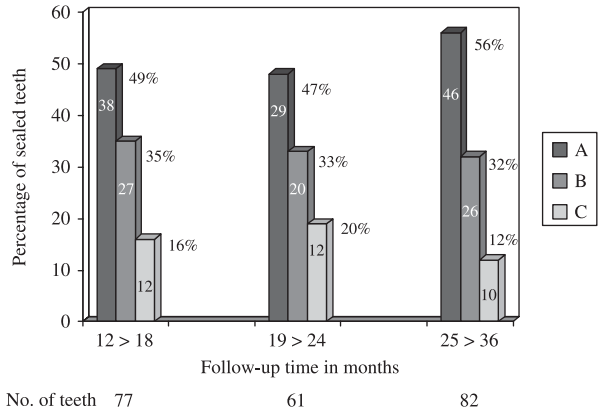


**Fig. 2.** Retention rates of Dyract Seal in primary molars at different follow-up times.

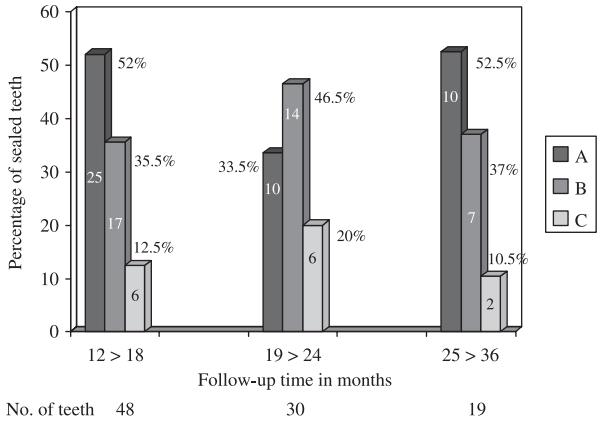


**Fig. 3.** Retention rates of Dyract Seal in permanent molars at different follow-up times.

From a total of 220 sealants placed in primary molars, 38 were in the mouth between 12 and 18 months, 29 functioned between 19 and 24 months and 46 were followed up between 25 and 36 months. One hundred and thirteen (51%) were fully retained (A), 73 (33%) scored B (27 for 12–18 months; 20 for 19–24 months, 26 for 25–36 months) and 34 (16%) were lost and scored C (12 for 12–18months; 12 for 19–24 months; 10 for 25–36 months).

From a total of 97 sealed permanent molars 45 (46%) were fully retained (score A). Of these, 25 were followed up for 12–18 months, 10 for 19–24 months and 10 for 25–36 months. Thirty-eight sealed permanent molars (19%) scored B (17 for 12–18 months, 10 for 19–24 months and seven for 25–36 months) and 14 (15%) were completely lost (score C: six for 12–18 months, seven for 19–24 months and two for 25–36 months.

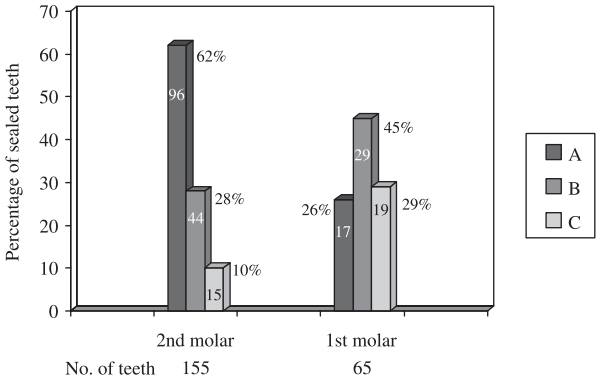


**Fig. 4.** Retention of Dyract Seal in primary molars: first versus second.

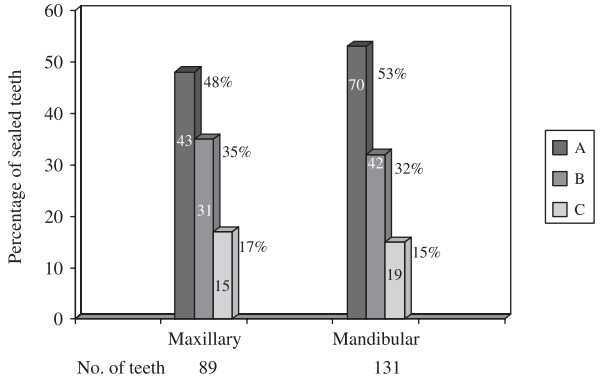


**Fig. 5.** Retention of Dyract Seal in primary molars: maxillary versus mandibular.

The graphic representation of the findings at different follow-up times can be observed in Figs 1–3. Sealants were fully retained (A) in 62% of the second primary molars as opposed to 26% in the first primary molars. This difference was statistically significant (chi-squared, $P < 0{\cdot}0005$), and is represented in Fig. 4. No difference was found between the maxillary and mandibular primary or permanent molars ($P > 0{\cdot}05$); Figs 5 and 6.

## Discussion

The present retrospective study reports the results of the clinical behaviour of Dyract, a nonrinse sealant, in three paediatric single operator dental practices. Although retrospective studies can be less accurate than prospective, controlled university-based clinical studies, they reflect 'real life' and can be of clinical value for practitioners. The three practices, although independent, use similar sedative agents and have comparable treatment philosophy and criteria, probably

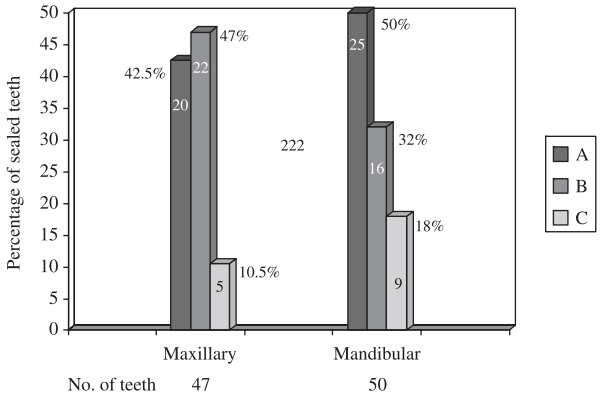


**Fig. 6.** Retention of Dyract Seal in permanent molars: maxillary versus mandibular.

owing to the fact that the operators teach in the same university department. As no deep sedation is employed, the treatment outcome can be affected by the patient's disruptive behaviour [10–13].

Dyract Seal is a light-curing, self-adhesive compomer. The photochemical induced polymerization mechanism is the same for light-curing composite materials and for compomers. The kinetics of the subsequent acid-base reaction of Dyract Seal, however, are different from those of glass ionomer cements. The latter harden quickly (after 10 min) once exposed to moisture. With Dyract Seal, the acid-base reaction cannot occur rapidly, as it does not contain water initially. Only after water uptake, which continues over several weeks, does the carboxylic salts form, and this process is simultaneously accompanied by the release of fluoride ions [9]. It is assumed that these characteristics can be of clinical relevance, particularly in young children with a high caries risk. These children can benefit from the fluoride ions if the sealant is retained.

Although no clinical studies can suggest a benefit of addition of fluoride into fissure sealants, it is certainly appropriate to use fluoride-containing sealants, but one cannot expect an anticaries advantage owing to fluoride in the product. [14].

In the present study, the nonrinse sealant was initially applied in the teeth of very young children with a high caries risk receiving restorative treatment under sedation. After completion of the restorations and removal of the rubber dam, application of a conventional sealant in another quadrant frequently originated disruptive behaviour, particularly after rinsing of the acid used for etching. We thought that eliminating the water in the mouth, the unpleasant taste of the acid and the noise of the high-power suction would allow the child to continue in a sedated state, preventing moisture contamination and improving the adhesion. After observing favourable results after 1 year in these young children we assumed that these results could be extrapolated to children with an exaggerated gag reflex, and we started to seal young permanent molars in these children.

As seen in the present report, the retention rates observed in the present study were not high when compared with those of conventional sealants [5–8], and the sealant was lost during the first year in some children whereas in others it was fully retained for more than 3 years (Figs 2 and 3).

Luca-Fraga and Freire Pimenta [15] reported a higher retention rate of Dyract (95·9%) after 1 year compared with Vitremer (85·5%) in children aged 7–8 years. It should be emphasized that these figures, which are better than those presented in the present study, could be owing to the difference in the type of patients. These authors applied sealants in school children, with no mention of their behaviour. In the present study, Dyract Seal was applied in permanent molars of children presenting the gag reflex, which certainly could have influenced the moisture control.

Another aspect to take into consideration is that the results of some conventional acid etch-rinse sealant studies were too optimistically considered successful [4]. Some of the teeth with 'partial loss' of the sealants left the tooth as equally susceptible to caries as in the unsealed control tooth [16,17]. Feigal [4] emphasizes that it is important to remember that all sealants exhibit partial loss in the strict sense of the term, because all show reduced volume over time. Conry and coworkers [18,19] have documented the extent of sealant changes in volume and area *in vivo*. They observed that sealant loss of some types is continuous. Changes become clinically significant when sealants have lost sufficient material to leave a deep fissure uncovered, or when sealants fracture and the sharp margin defect may lead to caries.

This is in agreement with the criteria utilized by Deery *et al*. [20], which considered adequate only A sealants that covered all pits and fissures.

In face of these observations the adhesion of the NRC sealant can be sufficient to achieve proper retention. These findings were corroborated by Feigal and *Quelhas* [14], who demonstrated a similar retention of sealants placed with Prompt-L-Pop (3M ESPE Dental Products) and phosphoric acid-etch and bond. This new self-etching primer/adhesive

will effectively bond the sealant to the enamel and will simplify the procedure in patients for whom the standard etching methods pose a compliance problem.

One may conclude that Dyract Seal has a lower retention rate than that of conventional sealants. It may be appropriate for sealing primary molars of very young children for a limited period of time and for permanent molars of children with pronounced gag reflex, where rinsing can become a problem and lead to disruptive behaviour.

**Résumé.** Cette étude clinique rétrospective évalue les taux de rétention d'un compère de scellement de sillons (Dyract Seal) et de Non Rinse Conditioning (NRC) placés dans 3 sites de dentisterie pédiatrique. 317 scellants ont été appliqués sur 220 molaires temporaires et 97 molaires permanentes chez 176 enfants âgés de 2,5 à 13 ans. Les surfaces des dents ont été préparées à l'aide d'un fraise boule n°1/2 montée sur contre-angle lent et a été isolée par des rouleaux de coton. L'application du NRC et du Dyract Seal a été effectuée selon les instructions du fabricant. La rétention du scellant a été classée en A (maintien total), B (perte partielle) ou C (perte totale).

Sur un total de 220 scellants placés sur dents temporaires, 38 étaient en bouche depuis 12 à 18 mois, 29 depuis 19 à 24 mois et 46 depuis 25 à 36 mois. Cent treize (51%) ont été totalement maintenus (A), 73 (33%) notés B et 34 (16%) notés C (12 pour 12–18 mois; 12 pour 19–24 mois; 10 pour 25–36 mois).

Sur un total de 97 molaires permanents scellées, 45 (46%) ont été totalement maintenues (score A). Parmi celles-ci, 25 ont été suivies sur 12–18 mois, 10 sur 19–24 mois et 10 pour 25–36 mois. Trente-huit premières molaires permanents scellées (19%) ont été notées B (17 pour 12–18 mois, 10 pour 19–24 mois et 7 pour 25–36 mois et 14 (15%) ont été totalement perdus (score C – 6 pour 12–18 mois, 7 pour 19–24 mois et 2 pour 25–36 mois).

Dyract Seal a présenté un taux de rétention plus faible que celui du scellant conventionnel. Il peut être approprié pour le scellement des molaires temporaires de très jeunes enfants pour une période limitée dans le temps et pour les molaires permanentes d'enfants avec réflexe nauséeux prononcé, chez lesquels le rinçage est un problème et provoque un comportement gênant.

**Zusammenfassung.** Die vorgestellte retrospektive klinische Studie beschreibt Retentionsraten von Kompomerversiegelungen (Dyract Seal) mit einem selbstkonditionierenden adhäsiv (NRC), die in drei Kinderzahnarztpraxen gelegt wurden. 317 Versiegelungen wurden an 220 Milchmolaren und 97 bleibenden Molaren bei insgesamt 176 Kindern (Alter 2.5 bis 13 Jahre) appliziert. Die Zahnoberfläche wurde mit einem Rosenbohrer in einem langsam laufenden Winkelstück angefrischt und mit Watterollen trockengelegt. Die Applikation von NRC und Dyract Seal erfolgte gemäß Herstellervorschrift. Die Versiegelungsretention wurde klassifiziert als A (komplette Retention) B (Teilverlust) oder C (Totalverlust).

Von den 220 Versiegelungen der Milchmolaren waren 38 zwischen 12 und 18 Monaten in der Mundhöhle, 29 bis 24 Monate, 46 wurden bis zu 36 Monate nachverfolgt. Insgesamt 113 (51%) waren komplett 73 waren teilretiniert (33%) und 34 (16%) waren verloren, davon 12 bis 18 Monate Nachbeobachtungsdauer, 12 bis 24 Monate und 10 bis 36 Monate.

Von insgesamt 97 versiegelten Molaren wiesen 45 (46%) eine komplette Retention auf, 25 davon waren zwischen 12 und 18 Monaten in Beobachtung, 10 bis 24 Monate und 10 bis 36 Monate. Achtunddreißig wiesen einen Teilverlust auf (19%), (17 bis 18 Monate, 10 bis 24 Monate, 7 bis 36 Monate), 14 waren Totalverluste (je 6, 7 und 2 für die drei unterschiedlichen Nachbeobachtungszeiträume).

Dyract Seal weist eine geringere Retentionsrate auf als konventionelle Versiegelungsmaterialien. Es kann angemessen sein für die Versiegelung von Milchmolaren bei sehr jungen Kindern oder die frühzeitige Versiegelung von bleibenden Molaren, falls das Abspülen von Säure nicht möglich ist und Abwehrverhalten auslösen kann.

**Resumen.** Este estudio clínico retrospectivo describe los porcentajes de retención de un sellador compómero (Dyract Seal) con Acondicionador Sin Lavado (ASL) colocado en 3 clínicas odontopediátricas. Se aplicaron 317 selladores en 220 molares primarios y 97 permanentes de 176 niños, de entre 2,5 y 13 años. Se preparó la superficie del diente con un fresa redonda #1/2 montada en un contrángulo a baja velocidad y aislada en rollos de algodón. Para la aplicación del Acondicionador Sin Lavado (ASL) y del Sellador Dyract se siguieron las instrucciones del fabricante. La retención del sellador se clasificó como A (retención completa), B (pérdida parcial) o C (desaparición completa).

De un total de 220 selladores colocados en molares primarios, 38 estaban en la boca entre los 12–18 meses, 29 funcionaron entre 19–24 meses y 46 fueron seguidos entre 25–36 meses. Ciento trece

(51%) estaban retenidos completamente (A), 73 (33%) se valoraron B (27 entre 12–18 meses, 20 entre 19–24 meses, 26 entre 25–36 meses) y 34 (16%) se perdieron y se valoraron C (12 entre 12–18 meses; 12 entre 19–24 meses; 10 entre 25–36 meses).

De un total de 97 molares permanentes sellados, 45 (46%) estaban completamente retenidos (valoración A). De estos, 25 fueron seguidos durante 12–18 meses, 10 durante 19–24 meses y 10 durante 25–36 meses. Treinta y ocho molares permanentes sellados (19%) se valoraron B (17 entre 12–18 meses, 10 entre 19–24 meses y 7 entre 25–36 meses) y 14 (15%) se perdieron completamente (valoración C – 6 entre 12–18 meses, 7 entre 19–24 meses y 2 entre 25–36 meses). Dyract Seal tiene un porcentaje de retención menor que los selladores convencionales. Puede ser apropiado para sellar molares primarios de niños muy pequeños por un periodo de tiempo limitado y para molares permanentes de niños con pronunciado reflejo de náusea, donde el lavado puede ser un problema y conducir a dificultades de conducta.

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