Original Article

A Randomised Clinical Trial Evaluating the Clinical Performance of Compomer and Composite Materials in Class II Primary Molar Restorations: 24-Month Results

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Abstract

Introduction: This randomized clinical study aimed to evaluate the clinical performance of composite and compomer materials in primary molars over two years. **Methods:** Children aged five to six years with at least two carious proximal surface primary molars were screened for resin-hybrid composite (Kerr Herculite Classic) and compomer (Dyract XP and R&D Series Nova) restorations. The restorations were clinically evaluated after 3, 6, 9, 12, 15, 18, and 24 months using the modified United States Public Health Service criteria. Statistical analyses were performed using Chi-square, McNemar, z-tests, and Kaplan-Meier survival analysis. $P<0.01$ and $P<0.05$ values were considered statistically significant according to the test used. **Results:** The survival rates were 95.3% for Kerr Herculite Classic resin-based composite, 97.6% for Dyract XP, and 95.4% for R&D Series Nova compomer restorations with no statistically significant differences ($P>0.05$). No significant differences were observed between the three materials concerning retention, color matching, marginal discoloration, anatomic form, marginal integrity, secondary caries, and surface texture ($P>0.05$). No statistically significant differences were also found between the effects of the cavity type, the tooth position in the arch, the age of the patient, the restorative material, and the lining material on the survival rates of the teeth ($P>0.05$). Restoration loss was higher in males than females, and a statistically significant relationship was observed in terms of gender ($P=0.017$). Restoration loss in the first primary molars (8.3%) was greater than that in the second primary molars (6.7%) ($P=0.041$). **Conclusion:** Both composite and compomer restorations were clinically successful over two years.

Keywords: Child, Compomers, Composite Resins, Dental Restoration Failure

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Introduction

The guiding principle in conservative dentistry is to prevent the development and progression of carious lesions. However, if prevention is not possible, and they are able to progress into cavitated lesions, they need to be treated with restorative materials (1).

In pediatric dentistry, there are several conventional restorative materials (amalgam, conventional glass-ionomer cement, resin-modified glass ionomer cement, high-viscous glass-ionomer cement, compomer, and resin composite) to restore primary teeth (2-4). Success rates of the clinical performance of restorative materials used in primary teeth are affected by various factors related to the treatment, such as material selection, isolation method, tooth type, location on the arch, cavity shape, and the number of previous restorations. Success rates are also affected by patient-related factors, including age, caries risk, bruxism, nutritional and oral hygiene habits, as well as socioeconomic status (1, 5-7).

The use of restorative materials with aesthetic and adhesive properties has become a widespread since they enable conservative cavity preparations in minimally invasive dentistry applications (2). As resin-based materials, such as compomers (combination of composite resin and glass ionomer) and composites, bond to the tooth structure by an adhesive system, they can be used for small-to-medium-sized cavities in pediatric dentistry (8). Compomers have a clinical performance comparable to that of the composites in terms of color matching, marginal discoloration, anatomic form, marginal integrity, and secondary caries development (2). Both materials have sufficient biological, mechanical, and

esthetic properties, including low relative thermal conductivity, continuous progress in the stability of the composition, and similar stress distribution patterns (9). These materials require correct isolation procedures and longer-time-consuming techniques (10). The physical and mechanical properties of compomers are lower than that of composite resins, but they can release fluoride (9). The cariostatic property of fluoride is an important reason to prefer compomer over composite in primary teeth (11). However, data from meta-analyses showed that restorative treatments using compomer, resin-modified glass ionomer cement, and composite resin have no advantages (12) and appeared to have no statistically significant differences (moderate level of evidence) (13). As a result, there is insufficient evidence to suggest which restorative material is the most effective filling material during primary dentition (2).

The clinical performance of compomer and composite resin has been evaluated in several studies as Class II restorative material in primary molars (8, 14-16). These studies evaluated the performance of the same compomer materials (Dyract, F2000, Hytac, Compoglass, and Twinky Star) (11, 16-18).

The aim of the present study, therefore, was to evaluate the clinical performance over two years of two compomers with different filler particle quantity levels and resin-hybrid composite Class II restorations in primary molars. The null hypothesis was that there is no difference between the clinical performance of compomer and resin composite materials in primary molars.

Materials and Methods

Ethics aspects

The study protocol was approved by the Clinical Research Ethics Committee of the Faculty of Medicine, Suleyman Demirel University (Turkey, 2018/338) and was registered at clinicaltrials.gov (NCT04678141). Informed consent was also obtained from all parents of participating subjects. The study was written according to the Consolidated Standards of Reporting Trials guidelines.

Study design and participants

First, the sample size was calculated. According to Papagiannoulis et al. (14), the survival rate after two years was 100% for compomer restorations. An α=5% with a power of 90% and the computed effect size of 0.4 indicated the need for 70 restorations per treatment group. The sample size was calculated using G Power® software (version 3.0.1., Franz Faul, Universität Kiel, Germany). The sample size was increased due to problems that may arise during the study.

The study population comprised 145 children aged five to six years with at least two proximal caries in primary molars. This was a single-center randomized clinical trial with patient allocation to the composite resin and compomer groups. All three materials were used in the vast majority of patients (three quarters) participating in the study. The inclusion and exclusion criteria for the selection of patients and teeth are shown in Table I.

Table I. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Patients who are mentally and physically healthy	Patients with systemic disease or medical complications
Children with Frankl's behavior rating scores of three or four (19)	Children with Frankl's behavior rating score of one or two (19)
Patients who are not allergic to any medications or restorative materials	Patients who have orthodontic treatment need
Patients whose first permanent molars are not erupted	Patients with a history of bad oral habits
Patients who do not have an occlusion disorder	Patients with skeletal and dental malocclusions
Patients who have two to five proximal caries in primary molar teeth	Patients with teeth with periodontal and periapical pathology
Patients whose primary teeth have proximal and occlusal contacts	Patients with the absence of adjacent and antagonist teeth
Patients who have Resi or Res 1/4 scores according to the root resorption level scale (20)	Patients with Bruxism and Xerostomia
Patients with a permanent tooth germ	Patients with the absence of permanent tooth germ

Selected carious teeth of the same child who received at least two types of restorative materials were randomized to restorative material groups by (https://www.random.org/) website. Randomization steps (enrollment of participants and assignment of participants to interventions) of the study were performed by the investigator (E.O.).

Treatment procedure

All treatment stages were performed by the same experienced pediatric dentist (E.O.) to avoid behavioral problems. When necessary, topical anesthesia with 2% Xylocaine® DENTAL was administered, followed by local anesthesia with epinephrine 1: 100.000 (lidocaine HCl and Epinephrine Injection, DENTSPLY Pharmaceutical, USA). Access to proximal surfaces was provided with high-speed diamond bur (FD.D.801, Frank

Dental, Germany) under an air-water coolant. The proximal cavity was opened at the occlusal level. Soft carious dentine was removed with a round low-speed steel bur (SS.1A, Frank Dental, Germany). The outline shape of the cavity was limited to the removal of carious lesions. Bevelling was not applied to the cavity because it increases the loss of sound tooth tissue. The cavity preparations did not involve any cusps, and the gingival margins included sound enamel. The depth of cavities was approximately 3-4 mm from the gingival border of the cavity when the mesial or distal marginal ridge was taken as reference. The depth of cavities was measured with a periodontal probe. Restorations were placed under isolation with cotton rolls and a saliva ejector. The $Ca(OH)_2$ cavity liner material (Hydrocal LC, Medicept Dental, India) was used as base material if the distance from the pulp was not safe. A metal matrix band (Matrix band, Hahnenkratt, Königsbach-Stein, Germany) was applied to the tooth with a universal matrix system (Tofflemire, Hahnenkratt, Königsbach-Stein, Germany) and wooden wedges (TDV, N^o 1). Clearfil^{TM} SE Bond (Kuraray Medical Inc, Okayama, Japan) was applied to the cavity according to the manufacturer's instructions. For the polymerization, an LED curing light (Eliapar Freelight, 3M ESPE Dental Products, America) was used with a light power density of 600 mW/cm^2. According to the manufacturer's instructions, A2 composite resin (Kerr Herculite Classic) and two different compomer materials (Dyract/XP and R&D Series NOVA) were applied to the teeth with the incremental technique, and each increment was light-polymerized for 20 s with an LED curing light. The contents of the materials are given in Table II. Occlusal interferences were checked with carbon paper (Accufilm II, Parkell, USA) and corrected using superfine diamond burs (Diatech, Heerbrugg, Switzerland), as well as polishers (Polydentia, Switzerland). During the preparation, if the pulp tissue was exposed, the treatment was performed, and the teeth was excluded from the study.

Table II. Contents of the restorative materials

Materials	Compositions
Dyract XP (Dentsply De Trey, Konstanz, Germany)	Matrix: Bisphenol-A-dimethacrylate (Bis-GMA), urethane resin, triethylene glycol dimethacrylate (TEGDMA), trimethylolpropane trimethacrylate (TMPTA), carboxylic acid-modified dimethacrylate (TCB resin), camphorquinone, dimethylamino benzoic acid ethyl ester, and butylated hydroxytoluene Filler: Strontium aluminosodium-fluoro-phosphor-silicate glass Filler particle: 73%
R&D Series NOVA (Imicryl, Konya, Turkey)	Matrix: Dimethacrylate Filler: silanized ytterbium trifluoride, St-Al- fluorosilicate glass, catalysts, stabilizers, and pigments Filler particle: 81.3%-81.6%
Kerr Herculite Classic (Kerr Corporation, Orange, CA, USA)	Matrix: Bis-GMA, TEGDMA, camphorquinone, amine, pigments, aluminum borosilicate glass, and colloidal silica Filler: Barium glass and silicon dioxide Particle size: 0.6 µm Filler particle: 79%
Clearfil ™ SE Bond (Kuraray Medical Inc, Okayama, Japan)	Primer: 10-Metakriloiloksidodesil dihidrojen fosfat (MDP), 2-hidroksietil metakrilat (HEMA), Hydrophilicdimethacrylate, di-kamforokinon, N,N-Diethanol-p-toluidine, and water Bond: 10-Methacryloyloxydecyl dihydrogen phosphate (MDP), bisphenol A-glycidyl methacrylate (Bis-GMA), 2-hydroxyethyl methacrylate (HEMA), Hydrophobic dimethacrylate, dl-camphorquinone, N,N-Diethanol-p-toluidine, and silanated colloidal silica
Hydrocal LC (Medicept Dental, India)	Calcium hydroxide and calcium hydroxyapatite in a urethane dimethacrylate (UDMA)

Clinical examination

In clinical evaluation, the patients were followed up for 24 months. The restorations were evaluated by an experienced pediatric dentist (E.O.) according to the modified United States Public Health Service (USPHS) Ryge criteria in terms of anatomic form, marginal discoloration, marginal integrity, surface texture, secondary caries, color match, and retention (21). In scoring the restorations, Alpha (A), Bravo (B), and Charlie (C) scores were used. A and B scores were clinically acceptable/successful whereas C scores were unacceptable/unsuccessful restorative treatments. The evaluations were carried out with a mouth mirror and an explorer. At pre-treatment and follow-ups, the clinician evaluated dental caries experience as decayed, filled teeth (dft), and the number of dft was used as an index (22). In clinical evaluations, the consistency of observations was measured twice for the clinician, with "excellent agreement" (Cohen's Kappa value=0.823). In follow-ups, the clinician recorded the data onto new recording forms using the USPHS criteria (21) and never saw the previous data. At the end of the study, all data were combined. For ethical reasons, before the treatment, the existing caries of each patient was restored and topical Fluoride was applied. Oral hygiene education was given to all patients and their parents. If a patient needed any treatment at the follow-up visits, the procedure would be performed by the dentist.

Statistical analysis

The IBM SPSS Statistics software for Windows (version 23.0, Chicago, IL, USA) was used for the statistical analyses. Variables, such as the type, arch, and side of the tooth, the type of restorative material, and the lining material were shown as numbers and percentages in a table. The data were subjected to an independent two-proportion z-test to detect differences among the materials for marginal discoloration and retention and to a dependent two-proportion McNemar test to determine differences for each material between recalls ($P<0.05$). The Kaplan-Meier survival analysis was performed to monitor the effect of different materials on the survival of restorations. The Chi-square test was used to determine the relationships between parameters, such as the patient's age and gender, cavity type, restorative material, and the survival of restorations. $P<0.05$ values were considered statistically significant. In determining the difference between the "mean dft" values in the follow-ups in patients, the variance analysis technique with repeated measures was used, and the Bonferroni test was applied among multiple comparison tests. $P<0.01$ values were considered significant. The intra-examiner reliability was assessed through the Kappa coefficient.

Results

This study included restorations in 398 first and second primary molars in 145 patients who visited the Pediatric Dentistry Department of Suleyman Demirel University (Isparta, Turkey) between January and March 2019. Patients who changed their addresses and did not attend their appointments regularly were excluded from the study. Therefore, 383 teeth of 141 patients (89 girls, 52 boys) with Class II cavities were evaluated (Figure 1). The mean patient age was 5.84±0.55 years (girls: 5.91±0.53 years and boys: 5.72±0.58 years). Table III shows the distribution of compomer and composite resin restorations according to the arch, cavity type, as well as restorative and lining material used.

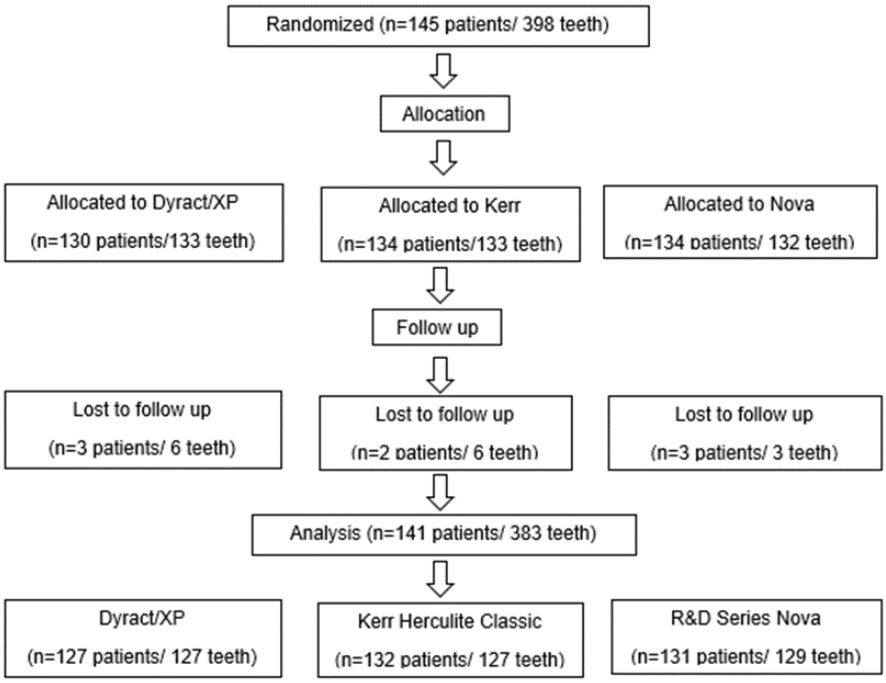

Figure 1. Flow diagram and analysis of patients in the study

Table III. Distribution of compomer and composite restorations

		Primary Molars		Materials			Total
		First	Second	Dyract XP	Nova	Kerr Herculite	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Arch	Upper	87 (46.0)	102 (54.0)	58 (30.7)	62 (32.8)	69 (36.5)	189 (49.3)
	Lower	125 (64.4)	69 (35.6)	69 (35.6)	67 (34.5)	58 (29.9)	194 (50.7)
	Total	212 (55.4)	171 (44.6)	127 (33.2)	129 (33.7)	127 (33.2)	383 (100.0)
Cavity	MO	21 (11.3)	165 (88.3)	64 (34.4)	64 (34.4)	58 (31.2)	186 (48.6)
design	DO	191 (97.0)	6 (3.0)	63 (32.0)	65 (33.0)	69 (35.0)	197 (51.4)
Lining material		85 (56.7)	65 (43.3)	51 (34.0)	41 (27.3)	58 (38.7)	150 (39.2)

MO: mesio-occlusal, DO: disto-occlusal

According to the clinical examination, the baseline assessment showed a mean decayed primary teeth (dt) index score of 5.60±3.16. After each control period, although the teeth with caries were treated, the mean dt values of children were increasing, and the differences were statistically significant during the follow-up periods ($P<0.01$) (3 months: 0.04±0.19, 6 months: 0.08±0.46, 9 months: 0.11±0.33, 12 months: 0.14±0.44, 15 months: 0.25±0.52, 18 months: 0.26±0.53, and 24 months: 0.33±0.64).

In all groups, restorations evaluated in 24 months were clinically acceptable in terms of marginal discoloration, secondary caries, marginal integrity, surface texture, color match, and anatomical form. In the interpair evaluation of materials at all follow-ups, no difference was found in terms of marginal discoloration, secondary caries, margin integrity, surface texture, anatomical form, color match, and retention. The distributions of teeth had the following Bravo scores: anatomical form (1), secondary caries (1), surface texture (1), and marginal integrity (6). In the evaluation of the materials by months, there were statistically significant differences only in terms of marginal discoloration ($P<0.05$) (Table IV).

Table IV. Statistical differences within the materials by months (according to marginal discoloration and retention)

	Marginal Discoloration			Retention		
Mths	Dyract XP	Kerr Herculite	Nova	Dyract XP	Kerr Herculite	Nova
	Dyract XP	Kerr Herculite	Nova	Dyract XP	Kerr Herculite	Nova
3 and 6 mths	--	--	--	--	--	--
3 and 9 mths	--	--	P>0.05	--	--	--
3 and 12 mths	--	--	P>0.05	--	--	--
3 and 15 mths	--	--	P=0.031	--	--	--
3 and 18 mths	--	--	P<0.001	--	--	--
3 and 24 mths	--	--	P<0.001	--	--	--
6 and 9 mths	--	P>0.05	P>0.05	--	--	--
6 and 12 mths	--	P>0.05	P>0.05	--	--	--
6 and 15 mths	--	P=0.016	P=0.031	--	--	--
6 and 18 mths	--	P<0.001	P<0.001	--	--	--
6 and 24 mths	--	P<0.001	P<0.001	--	--	--
9 and 12 mths	P>0.05	P>0.05	P>0.05	--	P>0.05	--
9 and 15 mths	P>0.05	P=0.016	P=0.031	--	--	--
9 and 18 mths	P=0.016	P<0.001	P<0.001	--	P>0.05	--
9 and 24 mths	P<0.001	P<0.001	P<0.001	--	P>0.05	--
12 and 15 mths	P>0.05	P>0.05	P>0.05	--	--	--
12 and 18mths	P=0.031	P=0.001	P=0.002	--	P>0.05	--
12 and 24 mths	P<0.001	P<0.001	P<0.001	--	--	--
15 and 18 mths	P>0.05	P=0.031	P=0.008	--	--	P>0.05
15 and 24 mths	P=0.001	P<0.001	P<0.001	--	P>0.05	--
18 and 24 mths	P=0.031	P=0.016	P=0.039	--	--	--

mths: months, McNemar test, P<0.05 was considered statistically significant. P<0.05 values are shown in bold characters.

The most common reason for failure among the three groups was the loss of retention. The overall failure rate after up to two years of follow-up was 3.9%. The 24-month mean cumulative survival rate of Kerr Herculite was 95.3%, while in the compomer groups, the survival rate was 95.4% for R&D Series Nova and 97.6% for Dyract XP (Figure 2). No significant differences were observed between the groups for either material according to the Kaplan-Meier analysis (P>0.05). A loss was observed in 2.7% of the restorations that used lining material, with the restorative materials in the teeth used in the lining material belonging to all three groups (4/150). According to the cavity type, retention failures were observed in 7.3% of mesio-occlusal (MO) and 7.7% of disto-occlusal (DO) cavities. In total, 6 (7.4%) of the upper jaw restorations and 9 (7.6%) of the lower jaw restorations were lost. Retention loss was detected in 2.4% of teeth restored with Dyract XP, 4.7% of teeth restored with Kerr Herculite, and 4.6% of teeth restored with R&D Series Nova. In total, 6.5% of the restored teeth of five-year-old patients and 8.5% of the restored teeth of six-year-old patients were lost. No statistically significant differences were found between the effects of the cavity type (MO/DO) (P=0.355), the tooth position in the arch (upper/lower) (P=0.766), the age of the patient (P=0.171), the restorative material (P=0.352), and the

lining material on the survival rates of the teeth (P>0.05). Restoration loss was found to be higher in males than females; therefore, a statistically significant relationship was observed in terms of gender (P=0.017). Restoration loss in the first primary molars (8.3%) was greater than that in the second primary molars (6.7%) (P=0.041).

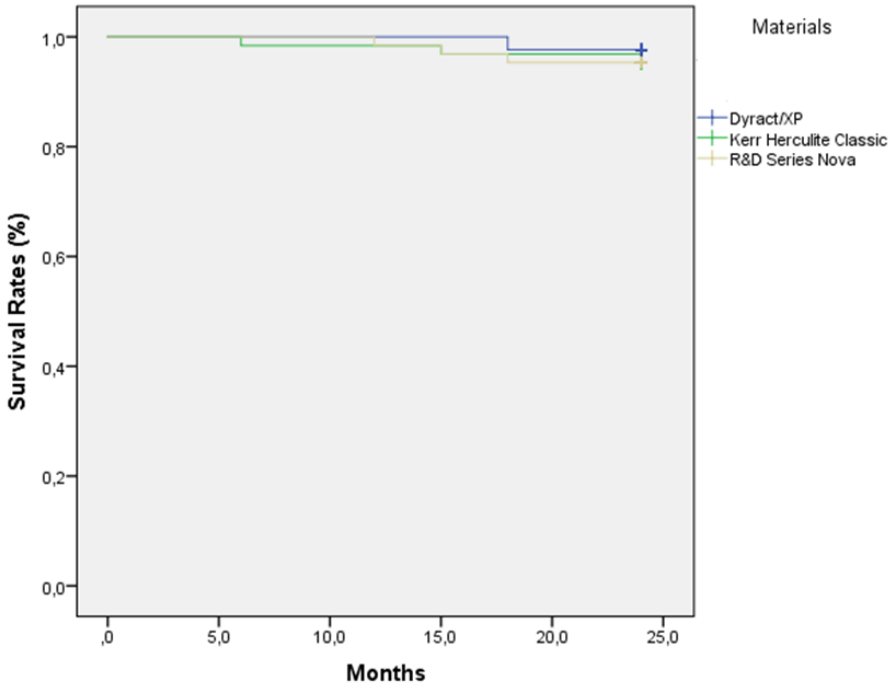

Figure 2. Survival rates of the materials according to the Kaplan-Meier analysis

Discussion

The short survival duration of primary teeth makes it difficult to monitor the effects of the restorative materials over a long period of time. It has been noted that most of the restored primary teeth still function at the end of the second year after restoration; therefore, the average follow-up period should be based on clinical studies of at least 24 months (23). The importance of the study group, including children under six years of age was emphasized to ensure the maximum follow-up period (24). In this study, patients aged five to six years were followed up for 24 months after their primary molar teeth were restored. Restorations and controls were performed by the same pediatric dentist to eliminate the difference.

It has been shown that the use of composite resin and compomer materials is effective in Class II restorations of primary teeth, and the clinical evaluation of these restorative materials is mostly performed by comparing the materials (8, 15, 18, 25). In order to evaluate the clinical performance of restorative materials, modified USPHS criteria, which are preferred in the majority of clinical studies, were used as follow-up criteria; these include marginal integrity, marginal discoloration, surface texture, anatomic form, retention, secondary caries, and color match (6, 21). In studies using these criteria, no statistically significant differences were observed related to the effects of secondary caries, color matching, marginal integrity, marginal discoloration or anatomic form of compomer, and resin-based hybrid composite restorations in primary molars after one- and three-year follow-up periods (15, 18). These results are similar to the present study findings for a two-year follow-up period.

In this study, after two years, only three compomer restorations with Dyract material (97.6% success), six compomer restorations with R&D Series Nova material (95.4% success), and six composite resin restorations with Kerr Herculite Classic material (95.3% success) were lost. The overall success rate was 96.1%. Studies on survival rates of restorations in primary teeth reported that the overall success and the annual failure rate for composite resin ranged from 79.3%-90.5% and 1.7%-12.9%, respectively (1, 6, 26, 27).

In practice-based studies with long follow-up periods, the primary reason for the failure of compomer restorations was the loss of retention. In this study, the loss of retention was the primary reason for the failure of restorations. Less retention loss has been reported when conditioning was used (28) and when not separately etching with phosphoric acid before placing the compomer material into Class II cavities (14, 18). Restoration failure caused by retention loss was also affected by cavity design (29). The clinical success rate of Dyract in Class II restorations of primary teeth was 90% after two years, a high retention rate that has been explained by cavity designs conforming to Black principles (14). In this study, it was thought that the increased retentiveness of the cavities across all three groups was because they contained an auxiliary cavity on the occlusal surface. In addition, the application of materials to the cavity with incremental techniques might have reduced polymerization shrinkage and caused a

lower rate of retention loss. The strontium glass content of Nova compomers, meanwhile, causes stronger bonding than barium glass materials in the oral environment, and the hybrid composite resins containing 60%-65% volume filler of silica and glass can considerably contribute to retention (30).

The other important reason for failures in resin composite restoration was shown to be secondary caries (31). Polymerization shrinkage that causes leakage at the margins of the restoration creates the potential for secondary caries formation. The thin and aprismatic surface layer of the cervical enamel of primary molar teeth causes difficulty in attaching the composite material to the cavity in interface restorations, resulting in potential marginal leakage (32). Concerning the development of secondary caries, statistically significant differences were recorded between compomer and composite restorations after the one-year evaluation (8). In studies with a two-year follow-up period, secondary caries were observed in 13% of the restorations made with composite resin and 6% of the restorations made with compomer (14, 31). In this study, X-rays were not taken from children who had no clinical complaints or any pathology in their teeth, while they were taken from patients who voiced complaints and whose teeth were evaluated for secondary caries. Parents whose children had any complaints did not allow their children to receive additional radiation doses.

Poor marginal adaptation is also a key cause of failure in composite resin restorations (33, 34). As a result of the two-year follow-up of this study, no restoration with a C score was found in margin integrity. Santos et al. (25) reported that compomer restorations showed better marginal adaptation than composite restorations. This result may be due to the chemical structure of the compomer material, which undergoes more hygroscopic expansion than the composite and the differences in the wear characteristics of the two materials. The failure rate of composite resin restorations applied to Class II cavities was reported at 4.9% after three years, with all failures being caused by marginal loss of the ridge integrity (35).

In another study, one of the primary reasons for failure was marginal discoloration (34). In this study, no differences were observed between materials in terms of marginal discoloration. On the contrary, Hse et al. (15) reported a statistically significant difference in marginal discoloration between Dyract and Prisma TPH restorations in primary teeth. Due to the lower wear properties of the compomers than that of the composites and their better ability to bond to dentine than to enamel, the marginal coloration of compomers is higher (36). Marginal discoloration in compomer restorations in primary teeth has been associated with non-acid etching (33). Etching and bonding of enamel and dentin significantly reduce the marginal discoloration of composite restorations (2). In addition to these factors, it should not be forgotten that poor oral hygiene may cause marginal discoloration in restorations.

When evaluating restoration success, the material must match the color of the tooth (37). In this study, there was no failure in the color matching criteria. The small size of the filler particles in composites increases polishability and results in better finishing qualities, compared to compomers (37). This can eliminate the color mismatch that may occur between the material and the tooth. Difficulty working in the posterior teeth and isolation problems in pediatric patients can result in the anatomical forms failing to acquire the desired shape. In this study, there was no restoration with a C score in the anatomical form criterion. Moreover, it was shown that the anatomical form criterion was not an important factor for primary teeth in the clinical success of restorations, whilst physiological wear was shown to balance out the changes (29).

Survival of restorations is affected by various factors, such as the patient's age, gender, caries risk, type of tooth, position in the arch, and cavity shape, as well as the material used (26). It has been stated that the younger the patient during the placement of the restoration, the shorter the survival of the restoration (38). It has been suggested that gender does not affect the selection of restorative materials or the success of restorations (39). In this study, gender did prove to be an important factor in the survival rate of restorations. This outcome may be coincidental or related to the girls' better oral hygiene practices.

While the patients' caries activity does not have a significant effect on the success of the restoration, the lower caries risk level may have positively affected the survival of restoration (6). In Class II restorations of primary molars, in which two different compomer materials were applied, a low failure rate was noted in the restorations of children in the high caries risk group during the two-year follow-up (17). In this study, although the restorations of decayed teeth of patients were completed before the treatment, it was observed that the mean dt scores in the follow-ups increased at a statistically significant level ($P>0.05$). Due to the anatomical forms and pulp volumes of the first primary molars, the failure rates in restorations have been recorded more frequently (36). This finding is consistent with the present study results. The DO compomer restorations showed significantly higher failure rates than MO restorations in primary teeth. Difficulties with DO restoration applications may be more significant than difficulties in accessibility procedures, such as caries removal, matrix band placement, and conditioning, compared to MO cavity (40). However, in this study, the cavity type had no significant effect on restoration loss ($P>0.05$).

The strengths of this study were as follows: (1) all restorations were performed in an university clinic by an experienced pediatric dentist, which seemed to explain the lower failure rates of restorations, and (2) the rate of the patient dropout was low, although long-term follow-ups did reveal difficulties. The limitations of the study were as follows: (1) cavity dimensions of the primary molars to be restored were non-standard, and (2) patients

were not evaluated according to caries risk groups prior to the treatment.

Conclusion

The resin-hybrid composite and compomers did not show different clinical performance in the treatment of primary molars. Both compomer and resin-hybrid composite restorations were clinically successful in primary molars showing cumulative survival rates of more than 90% during two years.

Conflict of Interest

The authors declare no conflict of interest.

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