

# Three-year Clinical Evaluation of Different Restorative Resins in Class I Restorations

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## Clinical Relevance

Except for the better marginal adaptation that packable resin composite showed, silorane-based restorative, nanofilled resin, and packable resin composite resulted in similar clinical performance in restoring Class I cavities after 3 years.

## SUMMARY

The aim of the present study was to evaluate the three-year clinical performance of a nanofilled resin composite, a packable resin composite, and silorane-based resin restorations in Class I occlusal cavities. Twenty-eight patients with at least three similar-sized occlusal lesions in molar teeth participated in the study. A total of 84 Class I occlusal restorations were placed: 28 with nanofilled resin composite (Filtek Supreme), 28 with packable resin com-

posite (P60), and 28 with silorane-based resin (Filtek Silorane). Filtek Supreme and P60 were used with their respective etch-and-rinse adhesive system, Adper Single Bond 2, and Filtek Silorane was used with its respective self-etch adhesive, Filtek Silorane Adhesive. All restorations were placed by the same operator. The restorations were evaluated at baseline, at six months, and annually for three years according to modified US Public Health Service criteria by two calibrated examiners who did not know which restorative resin had been used. The three restorative materials for each category were compared using the  $\chi^2$  test at a significance level of 0.05. Cochran's Q test was used to compare the changes across the five time points for each restorative material. McNemar's test followed by Bonferroni adjustment was used when significance differences were found. At the end of the three years, 60 restorations were evaluated in 20 patients, with a recall rate of 71.4%. The retention rate was 100% for all restorative resins. Eight restorations from the P60 group, ten from the Filtek Supreme group, and nine from the Filtek Silorane group were rated Bravo for marginal discoloration. For marginal adapta-

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tion, three P60, five Filtek Supreme, and 11 Filtek Silorane restorations were rated Bravo. No statistically significant differences in overall clinical performance were found between the restorative materials except for marginal adaptation. P60 showed the best marginal adaptation at the end of the three years. No differences were observed between the restorative resins for any of the evaluation criteria tested ( $p>0.05$ ). None of the restorations showed postoperative sensitivity, secondary caries, or loss of anatomic form. All restorative resins performed equally well in clinical conditions during the three-year evaluation, and no significant differences were found among them, except for marginal adaptation, in which P60 showed superior results.

## INTRODUCTION

Patients' increasing demand for esthetic restorations, even in posterior regions, has led to improvements in the mechanical and physical properties of composite restorative materials. Currently, composite resins have been diversified according to chemical composition and particle filler size, with the objective of finding better ones.

Difficulty in restoration placement and establishment of appropriate proximal contacts as well as the sticky form of conventional composite resins prompted producers to introduce packable or condensable composite resins to overcome these handicaps.<sup>1</sup> Packable resin composites are claimed to be suitable for stress-bearing posterior restorations. Although packable resins were developed for better clinical performance, some studies showed that the properties of packable composites are not superior to those of conventional resin composites.<sup>2-4</sup>

A new type of resin composite, so-called nanocomposite, has been developed recently to improve the performance of resins. The use of nanotechnology in resin composite systems offers high translucency and high polish, similar to that of microfilled composites, while maintaining physical properties and wear equivalent to several hybrid composites.<sup>5</sup> However, shrinkage during polymerization is still a major challenge. Different techniques and restoratives have been proposed to overcome this phenomenon. Low-shrinkage silorane-based resins such as Filtek Silorane have been suggested as a means to reduce shrinkage and cuspal deflection.<sup>6</sup> During silorane-based resin composite polymerization, ring-opening monomers connect by opening, flattening, and extending toward each other. This mechanism results in

less volumetric shrinkage compared with methacrylate-based composites. As methacrylate-based composites cure, the molecules of these "linear monomers" connect by actually shifting closer together in a linear response that causes a loss of volume.<sup>7</sup>

Many laboratory studies have addressed bond strength of silorane-based restorative on tooth structure; however, it is of paramount relevance to study the clinical behavior of silorane restorative resin, as information about the clinical performance of this restorative is very limited.<sup>8-12</sup> Moreover, the results of these *in vitro* studies cannot always be directly extrapolated to the performance of restorative materials.

The aim of this clinical study was to investigate whether a low-shrinkage silorane-based restorative resin improves the clinical performance of restorations in Class I cavities. We tested the hypothesis that a low-shrinkage silorane-based restorative resin would show better clinical results than the packable and nanofilled resin composites because of its lower polymerization shrinkage.

## METHODS AND MATERIALS

### Selection Criteria

Approval for this clinical study was obtained from the Human Ethics Committee of Hacettepe University. The subjects were recruited from patients seeking routine dental care at the Department of Restorative Dentistry, Hacettepe University.

For inclusion in the study, the teeth to be restored had to be vital and without pulpal or periodontal disease, pain, and preoperative sensitivity. Teeth with an existing occlusal contact and at least one neighboring tooth were required. Patients with poor oral hygiene, serious health problems, heavy bruxism, or a known allergy to the substances used in the study were not included. Before participating in the study, all patients signed a written consent form after receiving a full explanation of the treatment procedure.

Of the 50 patients evaluated, only the 28 (17 women and 11 men) who had three primary carious lesions that required Class I restorations in their molars (first or second molars) were enrolled in the study. The 28 subjects had a mean age of 29.3 (range = 18-52 years).

### Restorative Procedures

Bitewing radiographs of the teeth to be restored were taken preoperatively. The lesion depth was the

middle or beyond the middle-third of the dentin. The teeth to be restored were first cleaned with a nonfluoridated prophylaxis paste on a slowly rotating rubber cup and then washed and dried. Isolation was accomplished using cotton rolls. The cavity was prepared using a diamond bur (Diatech, Heerbrugg, Switzerland) with a high-speed handpiece. Carious tissue was removed using a slow-speed steel round bur and excavator. Removal of carious tissue was checked with visual and tactile feedback from an explorer. The teeth to be restored were randomly assigned according to a table of random numbers for restoration with a packable resin composite, P60 (3M, ESPE, St Paul, MN, USA); a nanofilled resin composite, Filtek Supreme (3M); or a low-shrinkage silorane-based restorative resin, Filtek Silorane (3M). Filtek Supreme and P60 were used with their respective etch-and-rinse adhesive system, Adper Single Bond 2 (3M), and Filtek Silorane was used with its respective adhesive, Filtek Silorane Adhesive (3M). Enamel and dentin were etched for 30 and 15 seconds, respectively, with 37% phosphoric acid gel (3M) for the P60 and Filtek Supreme groups. The adhesive systems were applied strictly according to the manufacturers' instructions (Table 1). The restorative resins were placed in increments not exceeding 2 mm in thickness, and each increment was cured for 40 seconds with a quartz-tungsten-halogen curing unit (Benlioglu, Ankara, Turkey) at 600 mW/cm<sup>2</sup>. Finishing was accomplished using finishing diamond burs (Diatech) at high speed, and polishing was carried out with silicon points and flexible discs (SwissFlex, Diatech). They were all used under constant water cooling. Occlusion was checked with articulating paper and adjusted. Clinical photographs at 1:1 magnification were also

taken before and after surgery, at baseline, and at each recall with a digital camera (Canon, PowerShot 300HS, Melville, NY, USA).

Evaluation Criteria and Procedures

Patients were recalled at baseline (one week after placement), at six months after placement, and at one, two, and three years after placement. Two calibrated examiners, other than the operator, evaluated each restoration. Modified US Public Health Service criteria described by Cvar and Ryge were used to evaluate the following characteristics: retention, marginal discoloration, marginal adaptation, color match, surface texture, anatomic form, and secondary caries (Table 2).<sup>13</sup> Postoperative sensitivity was assessed by air and/or tactile contact and was recorded as absent, mild, or severe. Sensitivity to air was assessed by blowing a stream of compressed air for five seconds while shielding the neighboring teeth with the fingers. Sensitivity to tactile contact was assessed by moving a probe over the restored tooth surface. Subjects were also questioned regarding sensitivity to cold/hot or other stimuli.

The examiners were calibrated to a predetermined level of inter- and intraexaminer agreement of at least 95% per criterion. The calibrated examiners were blinded to the restorative material used. Any discrepancy in evaluation between the two evaluators was immediately resolved at chair-side. The restorations were scored as follows: Alpha represented the ideal clinical situation, Bravo was clinically acceptable, and Charlie represented a clinically unacceptable situation.

Table 1. Restorative Resins and Adhesive Systems Used in the Study	
Product	Composition
Adper Single Bond 2, 3M, ESPE, St Paul, MN, USA Batch # 51202	Bis-GMA, HEMA, dimethacrylates, polyalkenoic acid, copolymer, initiators, water, ethanol
Filtek Silorane Adhesive Primer, 3M, ESPE, St Paul, MN, USA Batch # N132529	Phosphorylated methacrylates, Bis-GMA, HEMA, water, ethanol, silane-treated silica filler
Filtek Silorane Adhesive Bond, 3M, ESPE, St Paul, MN, USA Batch # N132530	Hydrophobic dimethacrylate, phosphorylated methacrylates, TEGDMA, silane-treated silica filler, initiators, stabilizers
P60, 3M, ESPE, St Paul, MN, USA, Batch # N319331	Zirconia/silica, Bis-GMA, UDMA, Bis-EMA
Filtek Silorane, 3M, ESPE, St Paul, MN, USA Batch # N 128819	Silorane resin, camphorquinone, iodonium salt, electron donor, quartz filler, yttrium fluoride, stabilizers, pigments
Filtek Supreme, 3M, ESPE, St Paul, MN, USA Batch # 44-0023-3903-2AC	Bis-GMA, UDMA, TEGDMA, Bis-EMA
Abbreviations: Bis-EMA, ethoxylated bisphenol-A glycidyl methacrylate; Bis-GMA, bisphenol A diglycidyl methacrylate; HEMA, 2-hydroxyethyl methacrylate; TEGDMA, triethylene glycol dimethacrylate; UDMA, urethane dimethacrylate.	

Table 2. Modified US Public Health Service Evaluation Criteria<sup>13</sup>

Characteristic	Evaluation Criteria
Retention	Alpha: The restoration is present. Charlie: The restoration is absent.
Marginal discoloration	Alpha: There is no visual evidence of marginal discoloration different from the color of the restorative material and from the color of the adjacent tooth structure. Bravo: There is visual evidence of marginal discoloration at the junction of the tooth structure and the restoration that has not penetrated along the restoration in a pulpal direction. Charlie: There is visual evidence of marginal discoloration at the junction of the tooth structure and the restoration but the discoloration has penetrated along the restoration in a pulpal direction.
Marginal adaptation	Alpha: Restoration is closely adapted to the tooth. The explorer does not catch when drawn across the surface of the restoration toward the tooth structure, or if the explorer does catch there is no visible crevice along the periphery of the restoration. Bravo: The explorer catches and there is visible evidence of a crevice, which the explorer penetrates, indicating that the edge of the restoration does not adapt closely to the tooth structure. The dentin and/or the base are not exposed and the restoration is not mobile. Charlie: The explorer penetrates a crevice defect that extends to the dentino-enamel junction.
Color match	Alpha: Restoration matches the shade and translucency of adjacent tooth structure. Bravo: Restoration does not match the shade and translucency of adjacent tooth structure but the mismatch is within the normal range of tooth shades. Charlie: Restoration does not match the shade and translucency of adjacent tooth structure and the mismatch is outside the normal range of tooth shades and translucency.
Surface texture	Alpha: Surface texture is similar to polished enamel as determined by means of a sharp explorer. Bravo: Surface texture is gritty or similar to a surface subject to a white stone or rougher than the adjacent tooth structure. Charlie: Surface pitting is sufficiently coarse to inhibit the continuous movement of an explorer across the surface.
Anatomic form	Alpha: Restoration is continuous with existing anatomic form. Bravo: Restoration is discontinuous with existing anatomic form but missing material is not sufficient to expose dentin or base. Charlie: Sufficient material is lost to expose dentin or base.
Secondary caries	Alpha: No caries is present. Charlie: Caries is present.

### Statistical Analysis

The three restorative materials for each category were compared using a  $\chi^2$  test at a significance level of 0.05. Cochran's Q test was used to compare the changes across the five time points for each restorative material. McNemar's test followed by Bonferroni adjustment was used when significant differences were found.

### RESULTS

Three restorations were placed in each subject, resulting in a total of 84 restorations in 28 patients. The recall rate was 100% at one year. At two years, one patient had moved away and three restorations could not be evaluated (recall rate = 96.4%). At the end of three years, 20 patients (60 of 84 restorations) were evaluated (recall rate = 71.4%).

Table 3 presents the data for retention, marginal discoloration, marginal adaptation, color match, and surface texture. As no loss of restorations occurred, a

100% retention rate was recorded for all three restoratives at the three-year recall. At the six-month recall, no statistically significant differences were found between the restorative materials for any of the evaluation criteria tested ( $p > 0.05$ ).

There were no significant differences among the restorative groups in terms of marginal discoloration. After three years, 10 Filtek Silorane restorations, 9 Filtek Supreme restorations, and 8 P60 restorations received Bravo scores. These discolorations occurred at the enamel margin.

For marginal adaptation, there was a significant difference only between P60 and Filtek Silorane at the end of one year. At the two-year recall, Filtek Silorane showed worse marginal adaptation than P60 and Filtek Supreme. Eleven restorations from Filtek Silorane, five from Filtek Supreme, and only three from P60 received Bravo scores for marginal adaptation at the three-year recall; the difference between Filtek Silorane and P60 was significant ( $p < 0.05$ ).



With regard to color match, two teeth, one restored with P60 and the other with Filtek Silorane, received Bravo scores at the end of two years and three years. All restorations from the Filtek Supreme group showed Alpha scores.

In terms of surface texture, only one restoration from the P60 group and one from the Filtek Supreme group received Bravo scores, whereas all restorations from the Filtek Silorane group received Alpha scores at the end of three years. No significant differences were observed in color match or surface texture between the restorative materials. All the restorations were scored as Alpha for anatomic form. None of the teeth showed secondary caries or pulp inflammation. None of the subjects reported postoperative sensitivity.

The results for intragroup comparisons between baseline and each evaluation period were as follows. Regarding marginal discoloration, there was only a significant difference between baseline and three-year results for P60. For Filtek Silorane, statistically significant differences were observed in marginal discoloration between baseline vs two years, baseline vs three years, and six months vs three years. For Filtek Supreme, significant differences were only observed between baseline vs three years and six months vs three years.

In marginal adaptation, there were no statistical differences for any evaluation-period comparisons for P60 and Filtek Supreme. Marginal adaptation significantly worsened over time compared to baseline for Filtek Silorane (baseline vs one year, two years, and three years; and six months vs two years and three years) ( $p < 0.05$ ).

## DISCUSSION

A recent innovation in posterior resin restoratives is the introduction of silorane restorative resin. Many *in vitro* studies have been published regarding silorane's performance. In a recent *in vitro* study, the bonding effectiveness and marginal integrity of a silorane restorative system to dentin were compared with those of a methacrylate-based one, P60/Adper Easy Bond. No difference was noted between the silorane-based system and the methacrylate-based system.<sup>14</sup> The durability of the bond to dentin of the new silorane-based bonding agent, Filtek Silorane System Adhesive, was found to be as good as that of the methacrylate-based composite resin-bonding agent, Clearfil SE Bond.<sup>15</sup> Similar results were obtained in a study that compared the microtensile bond strength of methacrylate resin systems to a

silorane-based restorative system on dentin. The silorane-based system performed similarly to that of methacrylate-based materials on dentin.<sup>16</sup> On the other hand, in another *in vitro* study evaluating the marginal adaptation of a methacrylate-based composite and a silorane-based composite, the silorane-based composite exhibited significantly lower shrinkage forces and better marginal adaptation than did the methacrylate-based composite, Filtek Supreme XT.<sup>17</sup> Although the results of those *in vitro* studies can help to predict clinical effectiveness of restorative resins, the best way is to conduct clinical trials. In the present study, the three-year clinical performances of nanofilled, packable, and silorane restorative resins were compared.

In terms of marginal adaptation, the results of this clinical study do not appear to confirm the hypothesis that a low-shrinkage restorative resin could show better performance than packable and nanofilled resin composite. Eleven restorations from the silorane group received Bravo scores for marginal adaptation at the end of three years. However, significant differences were only seen between P60 and silorane at the end of three years. The reason is probably related to the adhesive system used. Although Filtek Supreme and P60 restorations were performed with the use of an etch-and-rinse adhesive, Adper Single Bond 2, silorane was used with its respective self-etch adhesive system. With a pH of about 2.7, Silorane System Adhesive Self-Etch Primer provides rather ultra-mild etching and demineralization of the tooth structure and, therefore, might produce less pronounced etching patterns than those achieved with phosphoric acid etching.<sup>18</sup> Baracco and others<sup>10</sup> evaluated the one-year clinical performance in Class I and II cavities of three different restoratives: Filtek Silorane with its respective adhesive and Filtek Z250 used either with an etch-and-rinse adhesive or a two-step self-etch adhesive. Although Filtek Silorane showed acceptable clinical performance, these restorations had no advantage over those with methacrylate-based composite combined with etch-and-rinse adhesive. Moreover, Silorane restorations tended to degrade in terms of marginal adaptation compared with baseline values. In their two-year follow-up, the three restorative systems showed statistically similar clinical performances.<sup>12</sup> The same results were obtained in the present study. Although there were no differences between baseline and three-year recall results in terms of marginal adaptation in P60 and Filtek Silorane restorations, silorane restorations worsened over three years.

Table 3: Results for Different Parameters Evaluated in the Study<sup>a</sup>

Parameter Rating	Baseline			6 Mo			1 Y		
	Filtek P60	Filtek Silorane	Filtek Supreme	Filtek P60	Filtek Silorane	Filtek Supreme	Filtek P60	Filtek Silorane	Filtek Supreme
Retention									
Alpha	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)
Marginal discoloration									
Alpha	28/28 (100)	28/28 (100)	28/28 (100)	28/27 (96)	28/26 (93)	28/27 (96)	28/25 (89)	28/23 (82)	28/24 (86)
Bravo	28/0 (0)	28/0 (0)	28/0 (0)	28/1 (4)	28/2 (7)	28/1 (4)	28/3 (11)	28/5 (18)	28/4 (14)
Marginal adaptation									
Alpha	28/28 (100)	28/28 (100)	28/28 (100)	28/27 (96)	28/24 (86)	28/26 (93)	28/27 (96)	28/19 (68)	28/25 (89)
Bravo	28/0 (0)	28/0 (0)	28/0 (0)	28/1 (4)	28/4 (14)	28/2 (7)	28/1 (4)	28/9 (32)	28/3 (11)
Color match									
Alpha	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)
Bravo	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)
Surface texture									
Alpha	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/28 (100)	28/27 (96)	28/28 (100)	28/28 (100)
Bravo	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/0 (0)	28/1 (4)	28/0 (0)	28/0 (0)

<sup>a</sup> Data shown are number of examined restorations/number of ratings (% of ratings). There were no Charlie ratings.

On the other hand, Burke and others<sup>8</sup> evaluated the clinical performance of 100 restorations (30 Class I and 70 Class II) placed with Filtek Silorane. Satisfactory clinical performance was reported with a rate of 84% optimal for marginal integrity and 77% for marginal discoloration at the end of two years.<sup>8</sup> At the two-year and three-year recalls, respectively, Filtek Silorane received 73% and 50% Alpha scores in marginal discoloration and 56% and 45% Alpha scores in terms of marginal adaptation.

In a short-term clinical study, Goncalves and others<sup>11</sup> compared the proximal contact of a silorane-based resin composite with a conventional methacrylate-based resin composite, P60, in Class II restorations. Both restorative resins gave satisfactory results. However, these results were obtained after six months of clinical service. The follow-up period seems very short and differences could develop over longer periods of use; therefore, these results cannot be directly compared with our study's results.

Only three P60 restorations showed Bravo scores in terms of marginal adaptation at the end of three years. The superior behavior of P60 has been demonstrated in a study conducted by Kiremitci and others<sup>19</sup> In their clinical study, the clinical performance of P60 was acceptable after six years of service. Regarding marginal adaptation and discoloration, 95% and 91% of P60 restorations, respectively, received an Alpha rating. In another study, the clinical performance of two adhesive restorative systems (Single Bond/Filtek P-60 and Single Bond/

Filtek Z-250) was assessed in posterior teeth.<sup>20</sup> Marginal integrity for P-60 was scored as 94.3% and 91.4% Alpha at six and 12 months, respectively. All restorations were found to be clinically satisfactory.

In a recent study, the clinical performance of Filtek Supreme used with either etch-and-rinse or self-etch adhesive in Class I cavities was evaluated.<sup>21</sup> At the end of one year, composite resin restorations using either adhesive system showed equally satisfactory results. In another study, the performance of Filtek Supreme was found to be satisfactory even when used with a self-etch adhesive, Adper Prompt-L-Pop, over 15 months of clinical service.<sup>22</sup>

In a one-year clinical study, the performance of a nanofilled resin composite for posterior restorations was compared with that of two microhybrid composites and one packable composite.<sup>23</sup> Similar to our findings, the nanofilled resin composite showed a performance similar to that of the other packable and microhybrid resin composites. Sadeghi and others<sup>24</sup> evaluated the clinical performance of microhybrid, packable, and nanofilled resin composite restorations placed in Class I cavities in molar teeth and found no difference between the restorations over 18 months.

In the present study, no significant differences were found between the restorative materials in terms of marginal discoloration. It is known that if the bond between the resin and tooth structure is

Table 3: Results for Different Parameters Evaluated in the Study (ext.)						
Parameter Rating	2 Y			3 Y		
	Filtek P60	Filtek Silorane	Filtek Supreme	Filtek P60	Filtek Silorane	Filtek Supreme
Retention						
Alpha	27/27 (100)	27/27 (100)	27/27 (100)	20/20 (100)	20/20 (100)	20/20 (100)
Marginal discoloration						
Alpha	27/22 (81)	27/19 (73)	27/22 (81)	20/12 (60)	20/10 (50)	20/11 (55)
Bravo	27/5 (19)	27/8 (27)	27/5 (19)	20/8 (40)	20/10 (50)	20/9 (45)
Marginal adaptation						
Alpha	27/22 (81)	27/15 (56)	27/22 (81)	20/17 (85)	20/9 (45)	20/15 (75)
Bravo	27/5 (19)	27/12 (44)	27/5 (19)	20/3 (15)	20/11 (55)	20/5 (25)
Color match						
Alpha	27/26 (96)	27/26 (96)	27/27 (100)	20/19 (95)	20/19 (95)	20/20 (100)
Bravo	27/1 (4)	27/1 (4)	27/0 (0)	20/1 (5)	20/1 (5)	20/0 (0)
Surface texture						
Alpha	27/26 (96)	27/27 (100)	27/26 (96)	20/19 (95)	20/20 (100)	20/19 (95)
Bravo	27/1 (4)	27/0 (0)	27/1 (4)	20/1 (5)	20/0 (0)	20/1 (5)

less than the polymerization shrinkage force, microleakage and marginal failure will occur.<sup>1</sup> Marginal discoloration is generally related to microleakage. All the restorations showed quite similar results in terms of marginal discoloration despite having different thermal expansion coefficients and polymerization shrinkage rates. These discolorations were superficial and localized. Although silorane system adhesive is self-etching, chemical bonding to the hydroxyapatite crystals occurs with the silorane's primer.<sup>25</sup> Moreover, the primer and adhesive resin of this system are separately cured, which means a twofold bonding layer<sup>25</sup> that might also act as an elastic buffer.<sup>26</sup> This might be a reason for the similar results obtained with nanofilled and packable resin composite restorations.

Postoperative sensitivity is one of the most common complaints of patients with posterior resin restoratives. Class I resin composite restorations are more prone to postoperative sensitivity and marginal failure because of the higher cavity configuration factor (C=5). However, in the present study, none of the subjects reported postoperative sensitivity. This might have been related to the insertion of resin. As incremental placement was used, polymerization shrinkage stress might have been decreased. Other evaluation criteria, such as anatomic form, color match, and surface texture remained optimal over the three-year period.

In the present study, no restoration loss was observed during the three years of clinical functioning. All the restorative resins presented an almost

excellent clinical performance with a 100% retention rate and no statistically significant difference between them except in marginal adaptation. However, this clinical trial was conducted in Class I cavities with a retentive cavity shape and margins lying on enamel. Different cavity types, such as Class II extending to the dentin, might have yielded significant differences. Therefore, further clinical studies addressing different cavity types should be conducted.

Conclusion

Within the limitations of this clinical study, it is concluded that low shrinkage silorane-based restorative, packable, and nanofilled composite resin showed similar clinical results with the exception of packable resin composite, which showed a better performance in terms of marginal adaptation.

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Conflict of Interest

The authors of this manuscript certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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