One-year clinical evaluation of anterior composite veneered restorations made of the Solidex composite and silver-palladium-copper-gold alloy

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Purpose: The purpose of the current study was to evaluate the clinical performance of composite veneered restorations made of a light-activated composite material and silver-palladium-copper-gold alloy.

Materials and Methods: A total of 52 restorations veneered with the Solidex composite were clinically evaluated using modified USPHS criteria. Color match, veneer-metal interfacial staining, veneer surface texture, wear, and recurrent dental caries were examined. The average observation period was 12 months.

Results: All restorations were judged as Alfa for all categories at baseline. After an observation period of 12 months, the following cases were judged as Bravo: one for color match, two for veneer surface texture, and one for wear. Veneer-metal interfacial staining and recurrent dental caries were not detected.

Conclusion: Within the limitation of the current study, it can be concluded that the Solidex indirect composite is clinically reliable material for use as an anterior veneering agent. (Int Chin J Dent 2006; 6: 105-109.)

Key Words: clinical evaluation, composite, restoration, veneer.

Introduction

The use of composite materials for veneered restorations has increased substantially, mainly due to improvement in material properties. The Solidex material (Shofu Inc., Kyoto, Japan) is one of the highly loaded composites applicable for indirect restorations with or without metal substructure. In vitro evaluation demonstrated that the Solidex composite demonstrated improved or equivalent properties as compared with other indirect composite materials.1-18 Indication of the Solidex composite was therefore extended from single restorations to cast veneered fixed partial dentures (FPDs).

Although in-vitro property-test results have been extensively reported, limited information is available about dental laboratory procedure and clinical results of restorations associated with the Solidex veneer.19 This study reports on the clinical performance of composite veneered restorations made of the Solidex composite and silver-palladium-copper-gold (Ag-Pd) alloy, after an average observation period of 12 months.

Materials and Methods

The Solidex composite was selected for clinical evaluation. The material consists of splintered glass (average 3 µm), colloidal silica, prepolymerized silica composite, and urethane dimethacrylate (UDMA). The total filler loading is 78%, and total inorganic filler loading is 53%.4,6

A total of 36 adult patients (20 females and 16 males), in whom full coverage facing restorations were planned, were successively included. Fifty-two teeth (30 maxillary incisors, 10 maxillary canines, seven mandibular incisors, and five mandibular canines) were restored in the current study. The abutment was prepared according to the conventional design for a composite veneered restoration with approximately 1.0-1.2 mm labial rounded shoulder preparation, lingual chamfer preparation, and 2.5-3.0 mm incisal edge reduction.

An impression was made with a silicone elastomeric material, poured with die stone and lab stone, and a working cast was prepared. A composite veneered restoration or FPD was fabricated with the Solidex composite.
and Ag-Pd alloy according to the manufacturer’s specifications (Figs. 1-15). On the patient’s next visit, the restoration was tried-in, occlusion and articulation were adjusted, and the restoration was seated with a luting agent. The patients entered a check-up program and oral examination was continued once or twice a year.

The restorations were evaluated immediately after seating (baseline) and after one year. On the basis of the modified United States Public Health Service (USPHS) criteria, the following characteristics of the restorations were evaluated; color match, veneer-metal interfacial staining, veneer surface texture, wear, and recurrent dental caries. The modified USPHS guidelines used in the current study are shown in Table 1. \textsuperscript{20-24} The clinical
protocol was approved by the Ethical Committee for Clinical Practice of the Nagasaki University Hospital of Medicine and Dentistry (Approval No. 23) and the Medical Ethics Committee, Nihon University School of Dentistry (2003-22).

Table 1. Modified USPHS criteria for direct clinical evaluations.

<table>
<thead>
<tr>
<th>Category/Rating</th>
<th>Characteristics</th>
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| Color match     | A  The restoration appears to match the shade and translucency of adjacent tooth tissues.  
                | B  The restoration does not match the shade and translucency of adjacent tooth tissues, but the mismatch is within the normal range of tooth shades.  
                | C  The restoration does not match the shade and translucency of adjacent tooth, and the mismatch is outside the normal range of tooth shades and translucency. |
| Veneer-metal interfacial staining | A  No discoloration or incidence of microleakage.  
                            | B  Slight or superficial staining that can be polished away.  
                            | C  Deep penetration of staining that cannot be polished away. |
| Veneer surface texture | A  Surface texture similar to polished enamel as determined by means of a sharp explorer.  
                    | B  Surface texture gritty similar to a surface subject to a white stone or similar to a composite containing supramicron sizes particles.  
                    | C  Surface pitting is sufficiently coarse to inhibit the continuous movement of an explorer across the surface. |
| Wear            | A  The restoration is a continuation of existing anatomic form or is slightly flattened.  
                | B  A surface concavity is evident.  
                | C  There is a loss of restorative substance such that a surface concavity is evident. Replacement is required. |
| Recurrent dental caries | A  The restoration is a continuation of existing anatomic form adjacent to the restoration.  
                        | C  There is visual evidence of dark deep discoloration adjacent to the restoration. |

A, Alfa; B, Bravo; C, Charlie.

Results

Table 2 shows the clinical evaluation of the veneered restorations at baseline and after an average observation period of 12 months. All restorations were judged as Alfa for all categories at the baseline evaluation. The numbers of restorations judged as Bravo rating at the recall visit were; one for color match, two for veneer surface texture, and one for wear. The remaining restorations were judged as Alfa for all categories. In the current study, no restorations were judged as Charlie for any of the categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>Baseline</th>
<th>After ave. 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color match</td>
<td>52 0 0</td>
<td>51 1 0</td>
</tr>
<tr>
<td>Veneer-metal interfacial staining</td>
<td>52 0 0</td>
<td>52 0 0</td>
</tr>
<tr>
<td>Veneer surface texture</td>
<td>52 0 0</td>
<td>50 2 0</td>
</tr>
<tr>
<td>Wear</td>
<td>52 0 0</td>
<td>51 1 0</td>
</tr>
<tr>
<td>Recurrent dental caries</td>
<td>52 -- 0</td>
<td>52 -- 0</td>
</tr>
</tbody>
</table>

A, Alfa; B, Bravo; C, Charlie. N=52.

Discussion

The one-year clinical evaluation of restorations made of the Solidex composite and Ag-Pd alloy demonstrated
favorable results. Of the 52 restorations, only one exhibited change of color during the observation period. Examination revealed that the staining composite material applied to the surface of the veneer has been disappeared. This is probably caused by excessive tooth brushing for this restoration. This phenomenon is also related to Bravo rating of veneer surface texture as well as wear of the veneering agent. The other case that received Bravo rating in the category of veneer surface texture was micro-fracture of maxillary canine with direct traumatic injury. Neither the laboratory procedure nor the material property was responsible for the Bravo rating in this case. The incisal edge was modified with diamond cutting instrument and polished with a rotary silicone instrument containing file diamond particles (Compo Master, Shofu Inc.).

As shown in the clinical results, restorations made of the Solidex composite demonstrated clinical success for all cases after one year without Charlie rating. On the basis of the current evaluation, it can be concluded that the Solidex composite is a clinically reliable material for use as an indirect veneering agent of anterior cast restorations.

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References

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