Dual cured composite resin as a potential bulk fill restorative material for class II restorations

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PURPOSE
The aim of this in vitro study was to evaluate the marginal adaptation before and after cyclic thermo mechanical fatigue of class II restorations with cervical margins in dentin realized with Fill-Up!, a dual curing bulk composite, with and without occlusal coverage with SYNERGY D6.

MATERIALS AND METHODS
Standardized class II box shaped cavities were prepared in extracted human molars. Samples were divided into four equal experimental groups:

Gr. A: Fill-Up!, ParaBond, no H3PO4 enamel etching;
Gr. B: Fill-Up! with SYNERGY D6 occlusal layer, ParaBond, no H3PO4 enamel etching;
Gr. C: Fill-Up!, ParaBond, H3PO4 enamel etching;
Gr. D: Fill-Up! with SYNERGY D6 occlusal layer, ParaBond, H3PO4 enamel etching.

SEM marginal analysis based on gold coated replicas was performed before and after thermo mechanical fatigue in a chewing simulator.

RESULTS
At the total marginal length, significant differences were observed for percentages of “continuous margin” (CM) between groups, both before and after loading. The highest %CM (mean ± SD) was observed in group D: 94.9± 5.3 before loading and 90.9 ± 6.0 after loading, followed by group C: 84.2± 5.8 before loading and 72.8 ± 6.9 after loading.

CONCLUSION
Under the conditions of this in vitro study, the bulk fill dual cure composite Fill-Up! with and without an occlusal layer of SYNERGY D6 in combination with ParaBond adhesive system and H3PO4 enamel etching showed promising results in respect to marginal adaptation in class II cavities subjected to thermo mechanical fatigue. These findings make these restorations a potential metal free, "amalgam substitute".

Marginal adaptation before and after chewing simulation 1,2,3

1 Krejci et al. 2014, Marginal adaptation of bulk filled dual cured composites, publication prepared for ADM meeting
2 Krejci et al. 2014, Marginal adaptation of class II cavities restored with bulk-fill composites, Journal of Dentistry
3 Besek et al., zahnfarbene adhäsive Füllungen, PPK Zürich 2004
Quality of cure in depth of commercially available bulk-fill composites

Dr. Julian G. Leprince et al.
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PURPOSE

The objective of this work was to compare the quality of cure in depth of most currently available bulk fill composites to those of two conventional composite references, one highly filled and one flowable nanohybrid composite.

MATERIALS AND METHODS

- Tetric EvoCeram Bulk Fill (Ivoclar-Vivadent) *
- Venus Bulk Fill (Heraeus-Kulzer), SDR (Dentsply) *
- X-tra Fil (Voco) *
- X-tra Base (Voco) *
- Sonic Fill (Kerr) *
- Filtek Bulk Fill (3M-Espe) *
- Xenius (GC) *
- Fill-Up! (as Col DCBF, COLTENE)
- Control1 Grandio (Voco) *
- Control2 Grandio-Flow (Voco) *

The materials were light-cured for 20s in a Teflon mold of 5x5mm aperture and 10mm depth. Vickers microhardness (VHNdry) were measured at every millimeter along the sample side (n=3) using Vickers microindentation. VHN measurement was repeated after 24 hours ethanol storage (VHNethOH), to evaluate crosslinking density.

RESULTS & CONCLUSIONS

Fill-Up! is perfectly suitable for filling deep to very deep cavities in one layer. Thanks to its dual curing properties, material properties in the depth remain almost on the same level as on the surface.

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EXT STUDY RESTORATION

Influence of polishing procedure on surface roughness of Fill-Up! compared to reference restorative materials

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PURPOSE

To investigate the influence of four different polishing systems on the surface roughness of different restorative materials (resin composites and glass ionomer cement).

MATERIALS AND METHODS

240 samples have been prepared in custom-made acrylic resin molds with circular cavities (Ø4 mm). The molds were filled with one of the following restorative materials:

• Fill-Up! (COLTENE)
• Synergy D6 (COLTENE)
• Tetric EvoCeram Bulk Fill (Ivoclar Vivadent)
• X-trafil (Voco)
• Ketac Molar (3M ESPE)

The restorative materials have been cured according to their IFU. For light curing, an LED curing light Coltene S.P.E.C® 3*, 11mm light guide, 1600mW/cm² has been used.

RESULTS & CONCLUSIONS

Independent of polishing procedure the roughness of Fill-Up! after polishing is insignificantly higher compared to the roughness of the light-curing Nanohybrid Composite Synergy D6. Consequently Fill-Up! is polished with little effort. Therefore, Fill-Up! is suitable to be used at the surface of a restoration.

Furthermore, SwissFlex discs achieved the lowest surface roughness result, even compared to SofLex. With the simple 2-step system Composite/Composite Plus a smooth surface is obtained, close to the 4-step polishing system SofLex.

Surface Roughness after Polishing

<table>
<thead>
<tr>
<th>Surface Roughness in µm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill-Up!</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>SYNERGY D6</td>
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<tr>
<td>0.2</td>
</tr>
<tr>
<td>Tetric EC BF *</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>X-tra fil *</td>
</tr>
<tr>
<td>0.2</td>
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<tr>
<td>Ketac Molar *</td>
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