

## Clinical Evaluation of a Self-Etching Adhesive After Two Years

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### Introduction

Due to the characteristic polymerization shrinkage of resin-based composites, clinical success with composite restorative materials is dependent on effective and durable adhesion to enamel and dentin (1). Flowable resin composites have been reported to adapt well to the cavity wall (2). This optimal adaption may result in an improvement of the adhesive performance of resin composites (2-4). Moreover, a number of new self-etch adhesives have been developed to simplify clinical bonding procedure. The efficiency of these simplified bonding systems is still controversial (5).

### Objectives

The purpose of this prospective randomized clinical study was to compare the clinical performance of the new self-etching adhesive system AdheSE One (Fig. 1) in combination with the composite Tetric Evo Ceram (Fig. 2) and the influence of the additional application of the flowable resin composite Tetric Flow (Fig. 2) after two years.



Fig. 1: The selfetch adhesive system AdheSE One



Fig. 2: The composite material Tetric Evo Ceram and Tetric Flow used in this study

### Material and Methods

In 50 patients 32 class I and 68 class II cavities were placed with at least two restorations per patient. The adhesive system AdheSE One was used for all the restorations: An adequate amount of AdheSE One was directly applied to the cavity. Starting with the enamel portion, all cavity surfaces were thoroughly coated for 30 seconds. Excess amounts of AdheSE One were dispersed with a strong stream of air until there was no longer any movement of the material. Then, AdheSE One was polymerized for 10 seconds at a light intensity of more than 500 mW/cm<sup>2</sup> (bluephase, Ivoclar Vivadent)(Fig. 3-7).

In one of the two fillings in each patient, an additional layer of the flowable resin composite Tetric Flow was applied in the entire cavity and separately light-cured. The fillings were placed under rubber dam. All materials were used as recommended by the manufacturer. Two clinicians evaluated the restorations at baseline, two week following placement, and at the six month, one and two year recall visit according to the modified clinical criteria of Ryge (sensitivity, hypersensitivity, marginal discoloration, marginal adaption, recurrent caries, surface, color match, proximal contact, filling integrity).

For each of the criteria, Alpha was used to indicate the highest degree of clinical acceptability; Beta to Delta were used to indicate progressively lessening degrees of clinical acceptability. The thermic test for sensibility was done by using a cold stimulus (Endofrost, Roeko, Langenau, Germany). In addition, each restoration was photographed at each recall. Statistical analysis was based on Man-Whitney-U-test using SPSS 12.0. The test was carried out at 95% confidence level.

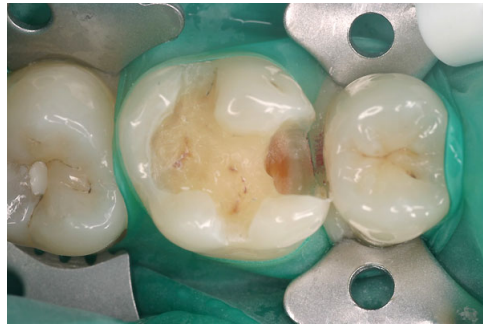


Fig. 3: Example of a filling procedure: Amalgam filling to be renewed.

Fig. 4: Excavated cavity.

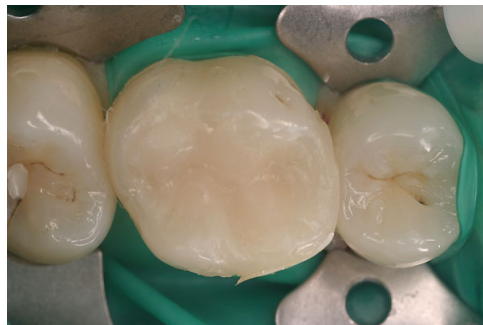


Fig. 5: Application of Adhese One for 30 seconds

Fig. 6: Cavity filled with Tetric Evo Ceram



Fig. 7: Renewed and polished filling

## Results

After two years 44 patients could be re-examined. All teeth remained vital and did not show any signs of postoperative sensitivity. Marginal adaption code Bravo could be evaluated in seven fillings (four with flowable liner, three without). In three teeth a filling integrity was scored as Bravo (two with and one without flowable liner). None of the teeth showed signs of secondary caries. Statistical analysis showed no significant difference between techniques for any of the evaluation criteria ( $p > 0.05$ , Man-Whitney-U-test)(Fig. 8-15).



Fig. 8: Filling on 36 (mesial-occlusal) at Baseline



Fig. 9: Filling on 36 (mesial-occlusal) after two years



Fig. 10: Filling on 26 (mesial-occlusal-distal) at Baseline



Fig. 11: Filling on 26 (mesial-occlusal-distal) after two years



Fig. 12: Fillings on 44 (occlusal-distal) and 45 (mesial-occlusal-distal) at Baseline



Fig. 13: Fillings on 44 (occlusal-distal) and 45 (mesial-occlusal-distal) after two years



Fig. 14: Fillings on 24 (occlusal) and 25 (occlusal) at Baseline

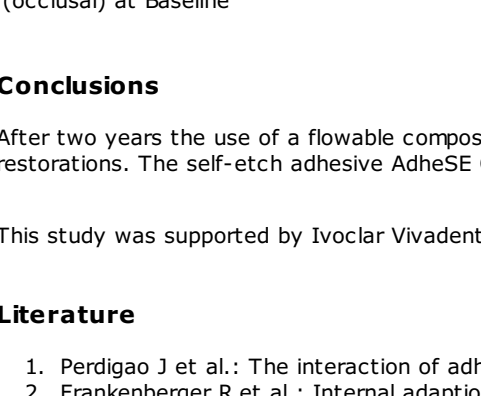
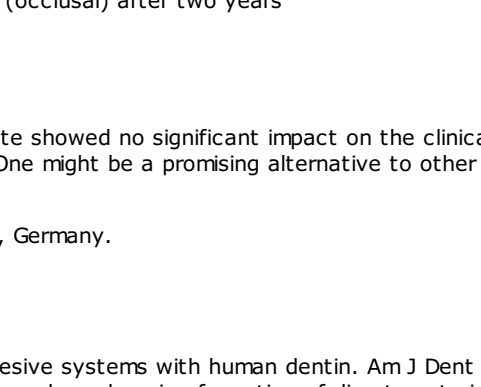


Fig. 15: Fillings on 24 (occlusal) and 25 (occlusal) after two years



## Conclusions

After two years the use of a flowable composite showed no significant impact on the clinical performance of class-I and -II restorations. The self-etch adhesive AdheSE One might be a promising alternative to other systems.

This study was supported by Ivoclar Vivadent, Germany.

## Literature

1. Perdigao J et al.: The interaction of adhesive systems with human dentin. *Am J Dent* (1996) 9:167-73.
2. Frankenberger R et al.: Internal adaption and overhanging formation of direct posterior resin composite restorations. *Clinic Oral Investig* (1999) 3:208-15.
3. Ferdianakis K: Microleakage reduction from newer esthetic restorative materials in permanent molars. *J Clin Pediatr Dent* (1998) 22:221-9.
4. Frankenberger R et al.: The use of flowable composites as filled adhesives. *Dent Mater* (2002) 18:227-238.
5. Frankenberger R et al.: Self-etch vs etch-and-rinse adhesives: effect of thermo-mechanical fatigue loading on marginal quality of bonded resin composite restorations. *Dent Mater* (2005) 21:397-412.

## Abbreviations

MPa = megapascals

Fig.= figure

Tab.= table

This Poster was submitted by PD Dr. Christian R. Gernhardt.

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### Introduction

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Fig. 1, 2: The self-etch adhesive system AdheSE One and the composite material Tetric Evo Ceram and Tetric Flow used in this study.

### Material and Methods

In 50 patients 32 class I and 88 class II cavities were placed with at least two restorations per patient. The adhesive system AdheSE One was used for all the restorations.

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One were dispersed with a strong stream of air until there was no longer any movement of the material. Then, AdheSE One was polymerized for 10 seconds at a light intensity of more than 500 mW/cm<sup>2</sup> (bluephase, LOP-Modus; Ivoclar Vivadent)(Fig. 3-7).

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**Modified clinical criteria of Ryge**

- hypersensitivity
- marginal discoloration
- marginal adaption
- recurrent caries
- surface
- color match
- proximal contact
- filling integrity

For each of the criteria, Alpha was used to indicate the highest degree of clinical acceptability; Beta to Delta were used to indicate progressively lessening degrees of clinical acceptability. The thermic test for sensibility was done by using a cold stimulus (Endofrost, Roeko, Langenau, Germany). In addition, each restoration was photographed at each recall. Statistical analysis was based on Man-Whitney-U-test using SPSS 12.0. The test was carried out at 95% confidence level.

### Results

After two years 44 patients could be re-examined. All teeth remained vital and did not show any signs of postoperative sensitivity. Marginal adaption code Bravo could be evaluated in seven fillings (four with flowable liner, three without). In three teeth a filling integrity was scored as Bravo (two with and one without flowable liner). None of the teeth showed signs of secondary caries. Statistical analysis showed no significant difference between techniques for any of the evaluation criteria ( $p > 0.05$ , Man-Whitney-U-test)(Fig. 8-15).




Fig. 8: Filling on 36 mo at Baseline.




Fig. 9: Filling on 36 mo after two years.




Fig. 10: Filling on 24 mo at Baseline.




Fig. 11: Filling on 24 mo after two years.




Fig. 12: Fillings on 44 and 45 mo at Baseline.




Fig. 13: Fillings on 44 and 45 mo after two years.




Fig. 14: Fillings on 24 and 25 mo at Baseline.




Fig. 15: Fillings on 24 and 25 mo after two years.


### Conclusions

After two years the use of a flowable composite showed no significant impact on the clinical performance of class-I and -II restorations. The self-etch adhesive AdheSE One might be a promising alternative to other systems. This study was supported by Ivoclar Vivadent, Germany.

### References

1. Pongthong et al.: The interaction of adhesive systems with human dentin. Am J Dent (1998) 11:167-73
2. Frankenburg R et al.: Intoxic adaption and overhanging formation of direct posterior resin composite restorations. Case Rep Dent (1996) 9:208-13
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5. Frankenburg R et al.: Self-etch vs etch-and-rinse adhesives: effect of fibrous-mechanical failure leading on marginal quality of bonded resin composite restorations. Dent Mater (2002) 21:337-412

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