SCIENTIFIC REPORT

Admira Fusion x-tra – Clinical results after 3 years

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With the introduction of the Admira Fusion product range, VOCO launched the first purely ceramic-based restorative materials on the dental market. Admira Fusion represents the combination of two outstanding innovations: nano-hybrid and ORMOCER® technology. One of the fundamental features of the Admira Fusion products is the pure silicate technology – all of the components are silicate-based. As such, no conventional methacrylate monomers are employed.
Abdalla et al. at Tanta University in Egypt are currently conducting a clinical study with Admira Fusion x-tra over a period of four years, which is investigating the influence of the layer thickness during application on the clinical success of the restorations.[1] This Scientific Report presents the clinical results after three years.

Study design

The study presented here investigates whether the resulting restorations are of differing qualities when the material is applied in increments of 2 mm (conventional) and 4 mm (bulk fill technique).
The study population comprised 75 patients aged between 18 and 50. Each patient was treated with at least two Class II restorations. The cavities were prepared with standard instruments using rubber dam and employing a minimally invasive approach, not involving bevelling of the enamel margins. In addition, extra attention was paid to the fact that the cervical edges were above the gingival margin. Deep cavities close to the pulp were lined with a layer of calcium hydroxide. Cotton rolls and saliva ejectors were used to keep saliva away from the site. Futurabond U (VOCO) (self-etch mode, application in accordance with the manufacturer's specifications) was used for the adhesive.

This was followed by the application of Admira Fusion x-tra. Two groups were defined, each containing 95 restorations. In the first group, Admira Fusion x-tra was applied using the conventional incremental technique with a maximum thickness of 2 mm. In the second group, the bulk fill technique was employed, i.e. increments in a thickness of 4 mm were placed. Deep cavities were treated with one or two increments first and then covered with a final increment of 4 mm. The final steps, finishing and polishing, were performed with diamond tips, rubber tips and flexible discs. Each restoration was assessed in accordance with the USPHS criteria[2] immediately after finishing and polishing (initial). A further evaluation was performed six months after placement of the filling. Regular evaluation check-ups are scheduled until the end of the clinical trial after four years. This Scientific Report presents the results after three years. The parameters investigated were: shade match, anatomical shape, marginal adaptation and marginal discoloration.

Table 1: Recall overview

Restorative material used		Number of assessed restorations			
	Initial	6 months	12 months	2 years	3 years
Admira Fusion x-tra, (4 mm, bulk fill technique)	95	95	90	88	81
Admira Fusion x-tra, (2 mm, increment technique)	95	95	92	91	87
Total restorations	190	190	182	179	168

Results

No loss of retention was observed after three years, with a total of 168 restorations being evaluated. Fig. 1 depicts the results after three years in a bar graph. For reasons of legibility the six months results are not included.

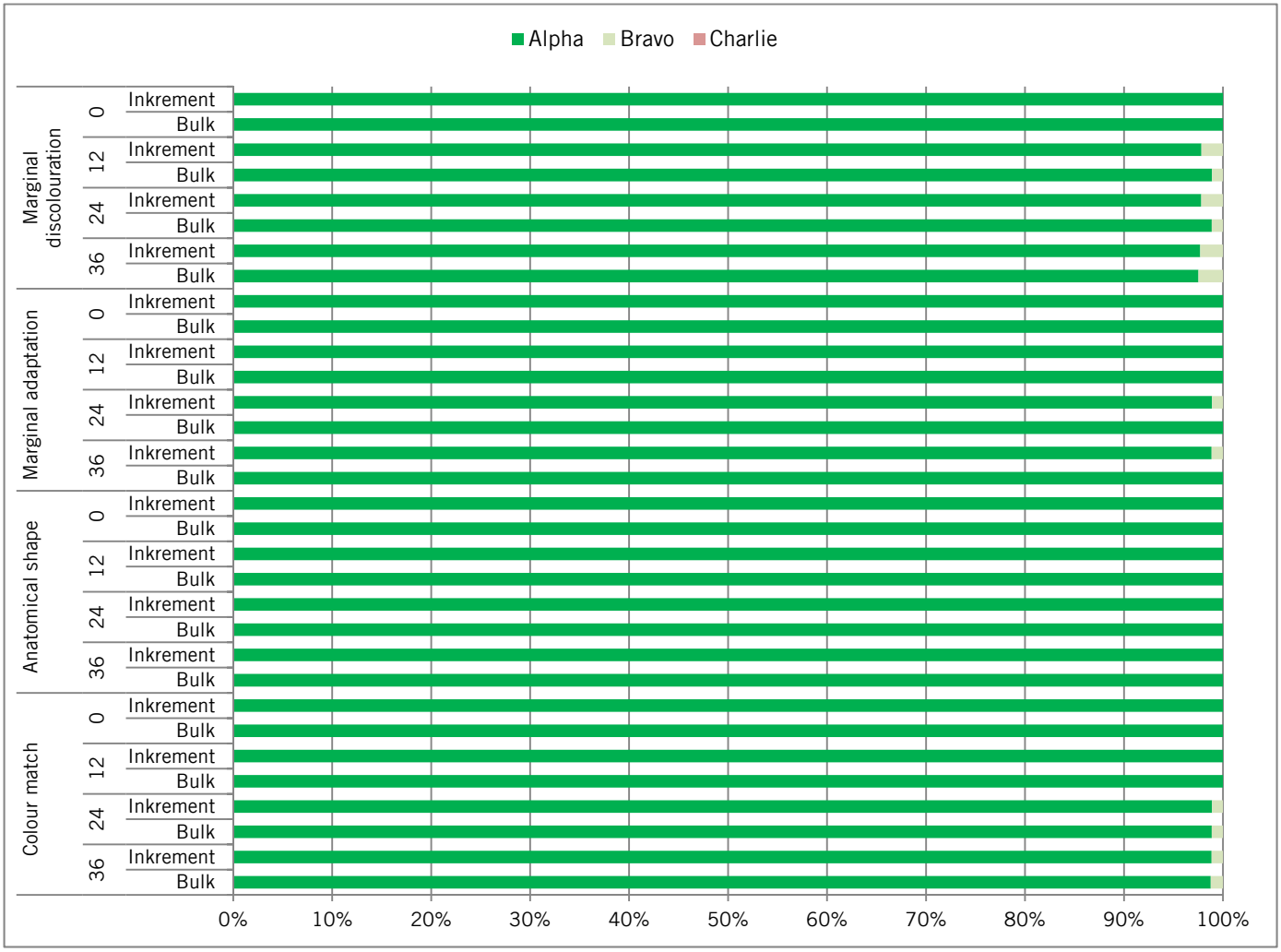

Figure 1: Clinical evaluation of Admira Fusion x-tra (bulk fill and increment technique) initially, after 12, 24 and 36 months.

After two three, there were no significant differences observed between the different restorative techniques. In the bulk fill group, one restoration displayed minimal shade deviation and two restorations showed minimal marginal discolouration. All other 78 restorations were in excellent condition and awarded an Alpha rating. In the group of conventionally placed restorations, two fillings also displayed minimal discoloration and another restoration showed a slightly limited marginal adaptation. Two restorations displayed slight marginal discolouration and were awarded a Bravo rating. The other 83 restorations placed in 2 mm increments were all in perfect condition and awarded an Alpha rating.

Conclusion: The excellent assessments of Admira Fusion x-tra confirm that the material is outstandingly suited to use in the bulk fill technique. Not least due to the low shrinkage of 1.25 % by volume and the very low shrinkage stress of 3.9 MPa, Admira Fusion x-tra achieves identical results when applied in a 4 mm layer to those obtained in conventional application in 2 mm increments.

[1] Abdalla A *et al.*, *Clinical Evaluation of Ormocer Bulk Fill Materials in Class II cavities restored by either incremental or bulk-fill techniques*, Tanta University, Egypt, report for VOCO, 2018.

[2] Cvar JF, Ryge G, Clin Oral Investig, **2005**; 9: 215 - 32.