Application to mandibular incisor fixation of an adhesive 4-META resin with sodium fluoride: a case report

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An adhesive resin containing sodium fluoride (Super-Bond F3) has been released. This clinical report describes bonding technique and clinical performance of the new adhesive. The material and procedure reported here are applicable as a conservative treatments option for patients suffering from varying types of periodontal diseases.
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Introduction

A growing number of enamel bonding systems has been developed over the last decade. This is probably due to progress in treatment of periodontal diseases. During or after the initial preparation of periodontal treatment, the remaining teeth are frequently splinted for the stabilization of dentition. It is desirable for resin adhesives that the material is capable of releasing fluoride to prevent recurrence of dental caries after splinting. Kawabata et al.[1] reported the influence of additives on bond strength to enamel of a 4-META/MMA-TBB resin. According to their results, the influence of incorporation of calcium fluoride (CaF_2) into the Super-Bond powder on the bond strength to enamel of the 4-META/MMA-TBB resin was not significant, when the added CaF_2 ratio was 10 wt% or less. However, none of the three additives improved the original or proper bond strength of the 4-META/MMA-TBB resin. Su et al.[2] evaluated properties of an acrylic resin containing 10% sodium fluoride (NaF) in the powder component. The results showed that fluoride release from the acrylic resin was comparable to that from a conventional glass ionomer.

A modified 4-META/MMA-TBB resin that contains NaF (Super-Bond F3, Sun Medical Co., Ltd., Moriyama, Japan) has been released. The manufacturer claims that the material is applicable as a filling, luting, splinting or sealing agent. Laboratory evaluation demonstrated that the Super-Bond F3 resin released fluoride more than 100 ppm within 3 weeks, and inhibited activity of *Streptococcus mutans*.[3,4] This article presents the adhesive techniques of the Super-Bond F3 resin applied for splinting mandibular anterior dentition.

Clinical Report

Table 1 summarizes the difference between the Super-Bond C&B and Super-Bond F3 resins. The Super-Bond F3 powder contains 70,000 ppm (7%) NaF. Unlike the Super-Bond C&B resin, the Super-Bond F3 resin employs butoxydibutylborane, which is a partially oxidized tri-*n*-butylborane (TBB), as a main component of the initiator (Catalyst V). The catalyst V also contains hydrocarbon as a stabilizer.

A 57-year old female patient was seen for the treatment of chronic marginal periodontitis. Since the mobility of mandibular incisal teeth was moderate, splinting with an adhesive resin was planned. Prior to the splinting, initial periodontal treatment was performed. Mobility of the teeth for the patient appeared to be derived from bone loss around the incisors.

Table 1. Adhesive resins initiated with tri-*n*-butylborane (TBB) derivatives

Material / Trade name	Manufacturer	Composition
Super-Bond C&B	Sun Medical Co., Ltd.	
Monomer		MMA, 4-META
Polymer		PolyMMA, Pigment
Catalyst		TBB, TBB-O
Super-Bond F3	Sun Medical Co., Ltd.	
Monomer		MMA, 4-META
Powder F3		PolyMMA, NaF (70,000 ppm; 30,000 ppm as fluoride)
Catalyst V		TBB, TBB-O, Hydrocarbon

MMA, methyl methacrylate; 4-META, 4-methacryloyloxyethyl trimellitate anhydride; TBB, tri-*n*-butylborane; TBB-O, partially oxidized tri-*n*-butylborane

The tooth surface was cleaned with rotary brushing instrument with water coolant. The surface to be bonded was etched with 20% phosphoric acid gel (Red Etchant) for 10 s, rinsed with water, and air-dried (Fig. 1). The Teeth Primer agent was applied to the etched surface and air-dried (Fig. 2). The Super-Bond F3 resin was next applied to the enamel surface with a brush-dip technique (Fig. 3). The excess material was removed and the surface was polished with silicone rotary instruments. The mandibular incisors were stabilized with the adhesive (Fig. 4). After an observation period of 6 months, the splinted teeth are functioning satisfactorily.

Fig. 1. Etching enamel with phosphoric acid gel

Fig. 2. Application of the Teeth Primer

Fig. 3. Bonding enamel with Super-Bond F3

Fig. 4. Post-operative view

Discussion

This report presented a case of splinting mandibular dentition with the Super-Bond F3 resin. Lingström et al.[3] reported that the Super-Bond F3 resin resulted in a lower degree of demineralization compared to the

Super-Bond resin, and concluded that Super-Bond F3 is well suited for patients undergoing orthodontic treatment with fixed appliances in order to reduce the risk of dental caries in enamel. Lingström et al.[4] also reported that the Super-Bond F3 seems to inhibit demineralization of dentin compared with the conventional Super-Bond resin in their in situ model.

One of the advantages of the Super-Bond F3 resin is that the color of the polymerized material is translucent. As shown in Fig. 4, the so-called black triangle between the exposed roots will be minimized by application of the translucent Super-Bond F3 resin. Clinicians must keep it in mind that modified 4-META/MMA-TBB resins should be used when the merit of application of the modified resin exceeds the demerit of inapplication.

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