

Single-visit tooth coloration with enamel bonding system and high-flow composites: A clinical report

Mika Nemoto, DDS, PhD,^{a,b} Hiroyasu Koizumi, DDS, PhD,^{a,b} Hideo Matsumura, DDS, PhD,^{a,b} and Naomi Tanoue, DDS, PhD^c

^aDepartment of Crown and Bridge Prosthodontics, and ^bDivision of Advanced Dental Treatment, Dental Research Center, Nihon University School of Dentistry, Tokyo, and ^cEsthetic Dentistry, Department of Specialized Dentistry, Nagasaki University Hospital of Medicine and Dentistry, Nagasaki, Japan

This clinical report describes a simple technique capable of coloring a tooth surface with a composite adhesive system. The enamel surface to be colored was etched with phosphoric acid and a self-polymerizing bonding agent (Clearfil New Bond) was applied. A high-flow opaque composite (Metafil Flow Opaque) was painted with a brush and light-exposed. The surface shade was then adjusted to the adjacent teeth with a high-flow composite (Estelite LV high-flow). The treatment could be completed in a single appointment. After an observation period of six months, the restoration was functioning satisfactorily.

(Int Chin J Dent 2004; 4: 97-99.)

Key Words: bonding, coloration, composite, enamel etching, opaque.

Introduction

Direct composite veneers are applied to patients with enamel defects, erosion, and discoloration.¹⁻⁴ In addition to tooth-colored materials, opaque resins have been used for increasing brightness of the tooth surface.⁵⁻⁸ It is desirable for the patient that reduction of the tooth substance during coloring or restorative process is minimal. Several bonding agents capable of bonding to enamel, opaque composites for masking the tooth color, and various restorative composites with low viscosity are commercially available. This clinical report describes a simple coloring technique applied to a non-vital canine using an enamel bonding system and high-flow composites.

Clinical Report

A 70-year-old male patient presented with the chief complaint of unaesthetic appearance of the maxillary right canine due to discoloration (Fig. 1). Examination revealed that the canine was one of the abutments of a seven-unit resin-bonded fixed partial denture (FPD). Although the buccal surface of the canine was caries-free, endodontic treatment had been completed. According to the patient, the FPD was placed approximately 15 years ago, and the canine abutment was endodontically treated four years ago. Several treatment options were proposed including replacement of the FPD as well as a walking bleach technique. The patient, however, selected a one-day transitional treatment.

Tooth reduction was not performed. The buccal enamel surface was cleaned with a rotary brush and non-fluoridated pumice (Pressage, Shofu Inc., Kyoto, Japan). The enamel was etched with 40% phosphoric acid gel (K-etchant, Kuraray Medical Inc., Tokyo, Japan) for 30 s, rinsed with water and air-dried. On confirmation of the frosty appearance after enamel etching, a two-liquid self-polymerizing bonding agent (Clearfil New Bond, Kuraray Medical Inc.) was applied to the etched enamel with a small sponge cube. The bonding agent was air-dried gently to form a very thin layer. A high-flow opaque composite (Metafil Flow Opaque, Sun Medical

Co., Ltd., Moriyama, Japan) was painted on the enamel surface with a brush and light-exposed for 60 s with a hand-held polymerizing unit (Optilux 501, sds Kerr, Danbury, CT, USA). Appearance of the opaque material was modified with a high-flow composite. A thin layer of a high-flow composite (Estelite LV high-flow A3.5, Tokuyama Dental Corp., Tokyo, Japan) designed for direct restoration was placed, and the surface shade was adjusted to the adjacent teeth. After the surface coloration, the composite was polymerized for 120 s, and the surface was polished with a silicone-diamond rotary instrument (Compomaster, Shofu Inc.) under water coolant.

The treatment was completed in a single appointment and the patient entered a maintenance program. After an observation period of six months, recurrence of dental caries, tooth fracture, and discoloration were not detected.



1

Fig. 1. Preoperative view of the non-vital canine.



2

Fig. 2. High-flow opaque composite was applied with a brush after enamel etching with H_3PO_4 .



3

Fig. 3. After placement of a high-flow tooth-colored (A3.5) composite.



4

Fig. 4. Six months after masking. Discoloration or detachment was not observed.

Discussion

The technique described here does not require reduction of tooth substance, although enamel etching and application of a bonding agent are indispensable. Tooth reduction is undesirable, especially for a vital tooth. Also, it is advantageous for the patients that the treatment can be completed in a single appointment. After an observation period of six months, the surface color stability as well as surface characteristics of the masking materials appeared to be satisfactory in this patient. The result is probably due to the presence of a hydrophobic phosphate monomer (10-methacryloyloxydecyl dihydrogen phosphate, MDP) contained in the Clearfil New Bond chemically activated agent. Strong bonding between the etched enamel and the phosphate-based bonding agent facilitates color stability and resistance to detachment of the painted composite layers.

The technique reported here, however, has several disadvantages. One is inadequate color-masking ability, especially for patients with severe discoloration. Either superficial tooth reduction or application of considerable thickness of opaque material may be necessary for specific cases. Also, control of the tooth surface shade is difficult for the thin-layered composite materials, and tooth reduction may be required for reproduction of a stereoscopic effect.

In conclusion, the materials and technique described here may be applicable for selected cases with varying extent of discoloration.

Acknowledgment

This work was supported in part by a Grant-in-Aid for Young Scientists (B) 16791210 (2004) from the MEXT-Japan.

References

1. Walls AW, Murray JJ, McCabe JF. Composite laminate veneers: a clinical study. *J Oral Rehabil* 1988; 15: 439-54.
2. Garcia Filho E. An innovative direct technique for resin composite veneers for teeth with color alterations. *Quintessence Int* 1998; 29: 731-5.
3. Felipe LA, Baratieri LN. Direct resin composite veneers: masking the dark prepared enamel surface. *Quintessence Int* 2000; 31: 557-62.
4. Feigenbaum N. Single anterior tooth restoration using a self-etching adhesive system and a reinforced microfill composite. *Compend Contin Educ Dent* 2003; 24(8 Suppl): 21-6.
5. Orlowski JA, Enabe EM. An adhesive paint-on restorative for tooth surface defects. *Aust Dent J* 1975; 20: 355-60.
6. Portnoy LL. Use of paint-on composite to treat enamel erosion. *Dent Surv* 1974; 50(10): 28-30.
7. McInnes-Ledoux PM, Zinck JH, Weinberg R. The effectiveness of opaquer and color-modifier materials: a laboratory study. *J Am Dent Assoc* 1987; 114: 205-9.
8. Felipe LA, Monteiro S Jr, Baratieri LN, Caldeira de Andrada MA, Ritter AV. Using opaquers under direct composite resin veneers: an illustrated review of the technique. *J Esthet Restor Dent* 2003; 15: 327-36.

Reprint request to:

Dr. Hiroyasu Koizumi

Department of Crown and Bridge Prosthodontics, Nihon University School of Dentistry
1-8-13, Kanda-Surugadai, Chiyoda-Ku, Tokyo 101-8310, Japan
Fax: +81-3-3219-8351 E-mail: koizumi@dent.nihon-u.ac.jp

Received November 5, 2004. Revised November 17, 2004. Accepted November 19, 2004.
Copyright ©2004 by the Editorial Council of the *International Chinese Journal of Dentistry*.