



Simplified primary incisor proximal restoration

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Abstract

Primary anterior teeth with proximal caries lesions can be restored with resin-based composite using a simplified bonding technique. This report describes Class III restoration of primary incisors in a preschooler, using a self-etching adhesive system and a modified-bonding procedure. (*Pediatr Dent.* 2003;25:67-70)

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Class III and Class IV caries lesions in primary incisors often are extensive enough to necessitate full coronal restoration of the infected tooth. Dentists can choose bonded resin-based composite “strip crowns” or stainless steel crowns (SSCs) with bonded tooth-colored facings. Some practitioners also cut labio-proximal “windows” in cemented SSCs and fill the voids with bonded tooth-colored, resin-based composite. A tooth-colored, polymer-coated metal crown is reportedly scheduled for commercial introduction in 2003.

Some primary anterior teeth with proximal caries lesions can be restored with direct application bonded resin-based composite. Certain methods can be used to maximize the retentive potential of the restorative material until the tooth exfoliates. Introduction of self-etching adhesive systems has made direct-application, resin-based composite bonding easier and quicker. This article describes the step-by-step Class III restoration of 2 carious primary incisors using a self-etching adhesive system and a simplified resin-based composite bonding technique.

Technique

A 30-month-old boy had caries lesions on the mesial surfaces of his maxillary primary central incisors (Figures 1a and 1b). After local anesthetic injections and rubber dam application, the teeth were restored as follows:

1. The child's attention was diverted using a compact disc player, personal earphones, and a compact disc

- of children's songs. Using a resin-based, composite shade guide, a suitable color-filled resin was selected.
2. A wooden wedge was positioned to retract the proximal dam material and protect underlying gingival tissues during tooth preparation (Figure 2). Access to the lesion was made from the labial aspect. Debridement of carious substance was completed using a slow-speed round bur, and outline form was cut using a water-cooled, inverted-cone carbide bur at high speed (Figure 2). Outline form included small labial and lingual dovetail preparations to add mechanical interlocking retention form to the cavity design.
3. Peripheral enamel was roughened with a slow-speed tapered diamond bur (Figure 3).¹
4. Thin metal matrix strips were placed and secured with a wooden wedge (Figure 4).
5. A small applicator tip was used to rub self-etching adhesive bonding solution (Prompt L-Pop, 3M ESPE, St. Paul, Minn) within the preparation and upon peripheral enamel surfaces for 20 seconds (Figure 5).^{2,3} Bonding agent curing was initiated with 10 seconds exposure to the light beam (Figure 6).
6. A hybrid type of resin-based composite material was slowly injected via syringe into the preparation, overfilling it slightly from both the labial and lingual directions (Figure 7).
7. A hand instrument was used to compress and shape the resin mass (Figure 8). The instrument can be



Figure 1a. A 30-month-old male with mesial caries lesions of the central incisors.

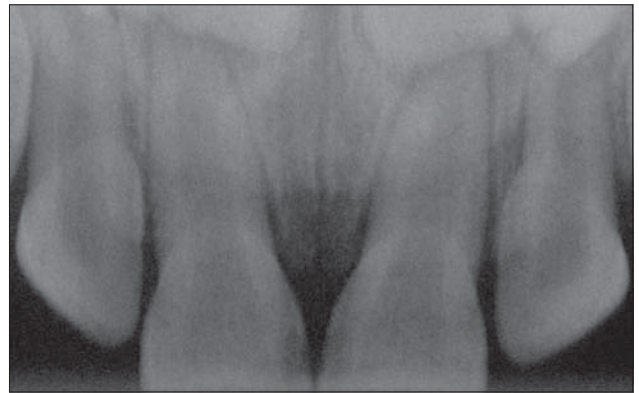


Figure 1b. Preoperative occlusal radiograph.

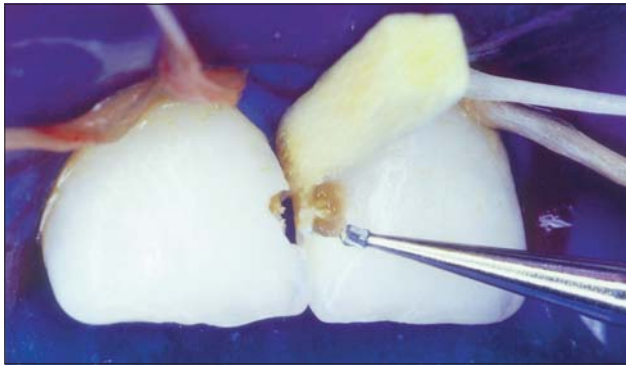


Figure 2. Outline form includes labial and lingual dovetails.



Figure 3. Diamond bur roughens peripheral enamel.



Figure 4. Matrix strips stabilized with wedge.

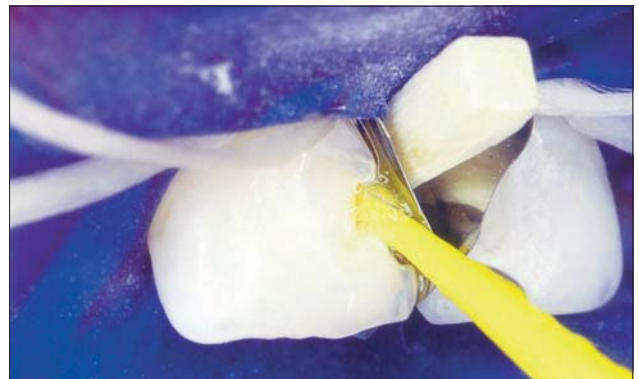


Figure 5. Self-etching adhesive bonding solution applied.



Figure 6. Bonding agent polymerized with 10-second light exposure.



Figure 7. Resin-based composite injected labially and lingually.

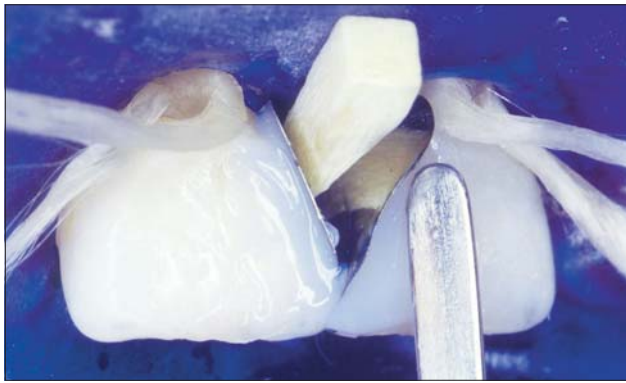


Figure 8. Resin-based composite material compressed into place.

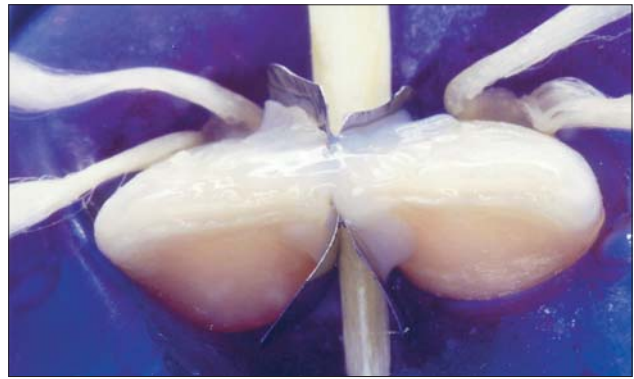


Figure 9. Incisal edge view after light curing.

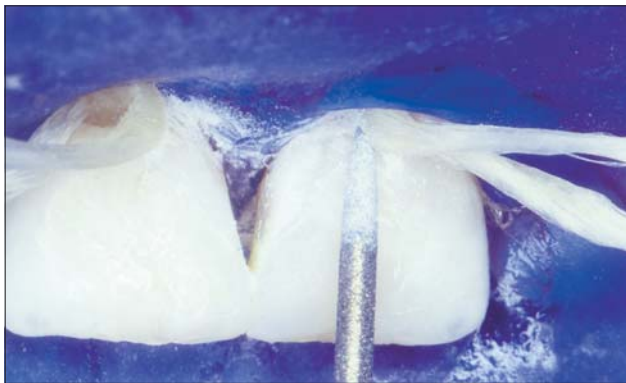


Figure 10. Finishing commences with slow-speed diamond burs.

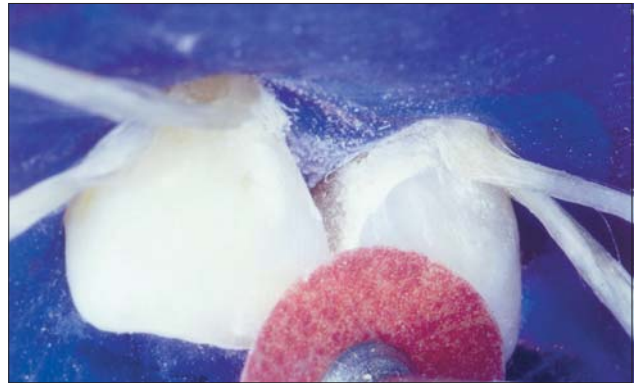


Figure 11. Aluminum oxide disks complete finishing and polishing.

wiped with clear resin sealant or isopropyl alcohol to prevent sticking. Contamination or dilution of the resin surface are not of concern because the outermost layer will be removed during finishing procedures.

8. The high-intensity visible light (halogen) beam was applied for 30 seconds from both the labial and lingual aspects, polymerizing the restorative material thoroughly (Figure 9).
9. Using diamond burs at slow speed and aluminum oxide disks, excess resin was removed and the restorations were cut to desired contour, finished, and polished (Figures 10-12). A final 20-second light application from both the labial and lingual directions assured sufficient resin polymerization and surface hardness.
10. The bonded, resin-based composites are shown 1 year after placement (Figures 13a and 13b).

Discussion

It is difficult to decide when a glass ionomer liner should be placed when restoring primary teeth with resin-based composite. When permanent teeth are restored with significant dentin loss due to caries infection and tooth preparation, a resin-modified, glass ionomer base is an important step to avoid postoperative tooth sensitivity.⁴ In addition, a resin-modified glass ionomer liner/base, with its high fluoride content, chemical bond to dentin, hydrophilic nature,



Figure 12. Finished restorations.

“cushioning” effect from resin polymerization dimension dynamics, and biocompatibility all make this material an ideal direct-application dentin replacement.⁵⁻¹¹ However, primary teeth with moderate dentin exposure can be restored successfully using a resin-based composite or compomer restorative material directly bonded to enamel and dentin. Because such teeth will eventually exfoliate, long-term pulpal protection against eventual microleakage and resin deterioration is not of concern like it would be in a permanent tooth restoration. In addition, complaints from children about tooth sensitivity from bonded, resin-based composite restorations are extremely rare.



Figure 13a. One year postoperative appearance.

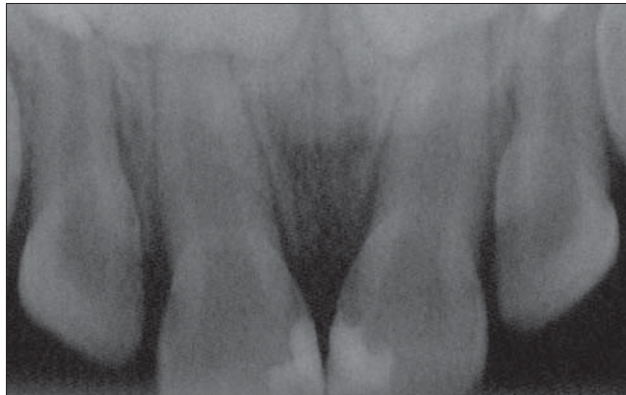


Figure 13b. Occlusal radiograph, 1 year after treatment.

The self-etching, resin-adhesive agent used in this case saves time.^{2,3} There is no need to separately apply phosphoric acid followed by water rinsing and drying. Self-etching adhesive systems are known for improving the resin/dentin hybridization bond and decreasing postoperative tooth sensitivity. Since this child was treated, the manufacturers of Prompt L-Pop have added some filler to the etching/bonding system. According to the manufacturer, that has decreased the incidence of sensitivity in permanent teeth even more.

Additional treatment time was saved by applying the resin-based composite en masse. The authors usually apply resin-based composite incrementally to control material shrinkage during polymerization. Because primary incisors are relatively thin teeth and mechanical interlocking retention form was included in the preparation, the amount of polymerization shrinkage (in cases such as pictured here),

is small enough that the resin mass does not pull away from the tooth structure significantly during the light curing phase. Stresses created are apparently dissipated without detrimental effect to retention of the restorative materials. There are no published studies examining bulk fill vs incremental filling methods for Class III or Class IV resin-based composites in primary incisors. Such studies would be useful to elucidate the exact mechanisms involved and perhaps reveal differences inherent in resin bonding involving primary tooth occlusal surfaces vs axial tooth surfaces. Comparing results of primary tooth studies with those derived from evaluating analogous restoration of permanent teeth would also be enlightening and useful.

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