

Original Contributions

Case Report

Guided tooth preparation for a pediatric zirconia crown



Supplemental material
is available online.

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ABSTRACT

Background and Overview. Unesthetic primary incisors can produce negative self-perceptions in preschool-aged children. In recent years, because of increased esthetic demands, prefabricated zirconia crowns have become increasingly popular. However, zirconia crowns cannot be crimped, and the clinician must prepare the teeth to fit the zirconia crowns. Therefore, extended preparation and fitting times are necessary, especially for inexperienced practitioners. A 1- to 2-millimeter subgingival feather margin also is required. Gingival hemorrhage after subgingival preparation compromises the retention of zirconia crowns.

Case Description. In this clinical report, the author presents a step-by-step description of the clinical and laboratory procedures for restoring a discolored traumatized incisor with a zirconia crown. The author used a polyvinyl siloxane occlusal registration material as an impression material and made 2 identical casts. The author fabricated 3 reduction guides after prospective tooth preparation on the casts. The author rapidly prepared the discolored incisor with the reduction guides and ultrasonic burs. A zirconia crown provided an optimal esthetic result and gingival health.

Conclusions and Practical Implications. Because the reduction guides provided a visibility intraorally, fast tooth reduction, less trial placement, and passive adaptation of the crown were successful. Because the ultrasonic burs prevented gingival injuries, hemorrhage control was not necessary. The presented technique reduced the patient's discomfort and total chair time. Therefore, this alternative technique is helpful for inexperienced practitioners.

Key Words. Pediatric zirconia crown; reduction guide; ultrasonic tip; bioactive cement.

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Unesthetic primary central incisors can produce negative social perceptions of preschool-aged children, and they then can develop negative self-perceptions.¹ Optimal esthetic management of primary anterior teeth is important for the satisfaction of both children and their parents.²⁻⁴ Clinicians can restore discolored incisors that are esthetically unpleasing with full coronal restorations.^{5,6} Clinicians have used strip crowns, open-faced stainless steel crowns, and veneered stainless steel crowns.³⁻¹⁶ However, strip crowns are time-consuming and are the most technique sensitive.^{5,11,12,16} Loss of some or all parts of strip crowns and coronal discoloration resulting from an endodontic paste may lead to esthetic dissatisfaction.^{4,5,11,12,16} More cervical plaque accumulates, and inflammation develops.^{11,13} Open-faced stainless steel crowns also require extra chair time, and peripheral metal compromises esthetics.^{3,5,9,16} Veneered stainless steel crowns exhibit debonding, fracturing, and noticeable wear of the buccal facing.^{3,5,14-16}

Pediatric zirconia crowns were introduced in 2010 and have gained popularity for esthetic considerations.^{4-6,16-22} Zirconia crowns are clinically acceptable and parental satisfaction is higher than with other full coverage restorations.^{4,18,21,22} Zirconia crowns also exhibit high strength, biocompatibility, less wear of opposing primary and permanent teeth, less gingival irritation in primary teeth, and durability.^{5,6,18,23-27} Zirconia crowns have indications similar to those of strip crowns and veneered stainless steel crowns.^{5,16} In addition, the clinician can bond a band to a zirconia crown by using primers and luting agents to manage the developing occlusion.^{27,28}

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Figure 1. The primary maxillary left incisor became discolored after trauma.

However, crimping of zirconia crowns is restricted completely.^{16,19-21,27} The clinician should prepare teeth to adapt to the zirconia crowns rather than adjusting the zirconia crowns to adapt to the preparation, so longer preparation and fitting times are required.^{5,16,19-21,27} Inexperienced practitioners may be prone to increase the axial wall taper and decrease the crown height to achieve a passive fit.²⁹ Consequently, tooth reduction by using guesswork compromises the retention of zirconia crowns.³⁰ In addition, feather-edge subgingival tooth preparation is required.^{17-22,27} If gingival injuries occur during intrasulcular preparation, hemorrhage control is necessary for proper cementation, thus extending operatory time.^{16,27,31}

Croll and Helpin⁹ made an alginate impression at an examination appointment. They prepared the tooth prospectively on a cast and crimped a preveneered stainless steel crown before the scheduled restorative appointment.^{6,9} This technique reduced clinical time and gave the clinicians a better chance to focus on fitting the crowns.^{6,9} This clinical article introduces an alternative technique for restoring a discolored maxillary incisor with a zirconia crown. This alternative technique, which is based on that of Croll and Helpin,⁹ enables a passive but not an intimate fit and an accelerated tooth preparation without gingival hemorrhage.

CASE REPORT

A 5-year-old girl with injuries from a fall came to the department of emergency medicine at Daegu Catholic University Medical Center. She had subluxated maxillary incisors and deep lacerations of the upper lip and forehead. The physicians sutured her lip and forehead and recommended regular examinations of the traumatized teeth. The maxillary left central incisor showed a dark brownish discoloration 2 months later. There were no systemic factors related to the discoloration, so I considered the previous trauma to be the primary cause.³² I did not try pulp therapy because there were no other pathologic signs.³²

At a regular appointment, the patient complained of toothache and periodontal swelling around the left central incisor. I successfully completed a pulpectomy procedure.³² However, the patient was unhappy because the general color was still dark and the discoloration was visible (Figure 1). I discussed treatment plans with her father, who was a prosthodontist. I addressed the ideas of no treatment, resin-based composite restoration, and full coronal restoration.^{3-22,25-27} Because adequate tooth structure remained and esthetics was a great concern, we planned a prefabricated zirconia crown.^{4-6,16-22,25-27}

I made a maxillary impression with a polyvinyl siloxane occlusal registration material (CharmFlex Bite Fast, DentKist) and a mandibular tray (eFigure 1, available online at the end of this article). I poured the impression twice with a dental stone (Neo Plum Stone, Mutsumi Chemical Industries) and fabricated 2 identical casts.³³ I drew a line at the gingival crevice of the maxillary left central incisor in the first cast. I removed the left central incisor along the line and made retention grooves in the basal area by using a laboratory bur (H21L-012-HP, NTI-Kahla). I selected a zirconia crown (NuSmile ZR A2L, NuSmile Pediatric Crowns) of the

ABBREVIATION KEY

R1: First resin coping.

R2: Second resin coping.

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