

# Aesthetic Rehabilitation in Maxillary Anterior Tooth with Early Childhood Caries using ZIRKIZ® Crown: Long-Term Follow-up

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## Abstract

During the last decade, zirconium dioxide (zirconia, ZrO<sub>2</sub>) ceramics, which have superior to mechanical properties and aesthetic advantages, can be used as alternative materials to metal-ceramic systems. The aim of this study was to report zirconia restoration for primary anterior teeth. Patient who took part in had verbal information and was written a consent form. They took radiographic and intraoral assessment for noting a pre-operative status. Tooth was prepared and laboratory procedure had done. Complete zirconia crown was adapt with self-etching adhesive cement. This clinical trial of very young patients provides successful results of aesthetic rehabilitative treatment of both a tooth with early childhood caries and primary anterior teeth. The findings after 6-, 12-, and 18-month follow-up could be useful for improving clinical approaches in subsequent cases. In the result, patient and their care giver were satisfied with zirconia crown as anterior teeth restoration.

**Keywords:** Anterior Aesthetic Restorations, Customized Zirconia Crown, Deciduous Tooth, Early Childhood Caries, Zirkiz® Crown

## 1. Introduction

Caries located in the primary anterior teeth are usually the result of Early Childhood Caries (ECC). Early Childhood Caries (ECC), formerly termed “baby bottle decay”, is the term currently used to express the occurrence of caries in young children’s teeth<sup>2</sup>. Caries in the primary teeth is faster in progression and more serious in symptom compared to permanent teeth. ECC lead to the result of aesthetic and emotional disorder as well as the malocclusion according to the early loss of primary teeth given not curing this early<sup>2,3</sup>.

It is defined by the American Academy of Pediatric Dentistry as “the presence of 1 or more decayed lesions, missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger<sup>4</sup>. The success of restorative dentistry is determined on the basis of functional results and esthetic outcomes. The constant evolution of restorative materials and techniques has made possible the achievement of optimal aesthetics<sup>5</sup>. For ECC anterior primary teeth, the types of full coverage currently available are: stainless steel crowns, open faced steel crowns, pre-veneered steel crowns, composite resin strip crowns, polycarbonate crowns<sup>6</sup>.

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The long-term success of restorations for anterior primary teeth is not merely a matter of removing carious lesions and restoring with aesthetic materials. Maintenance of these restorations by the patients and their parents is critical to prevent failure<sup>7</sup>. ZIRKIZ® crown (HASS company, Seoul, Korea), a ready-made primary zirconia crown, is designed to restore primary anterior teeth with caries or fracture. They are pre-fabricated zirconium-based ceramic crowns that have various size, shape and color. To overcome the shortcomings of other treatment options, it can be selected a ZIRKIZ® crown as alternative treatment option for primary maxillary incisor of child with ECC and high trauma tendency.

This clinical trial of very young patients provides successful results of aesthetic rehabilitative treatment of both a tooth with early childhood caries and a primary anterior teeth. The findings after 6-, 12-, and 18-month and 24-month follow-up could be useful for improving clinical approaches in subsequent cases.

## 2 Materials and Methods

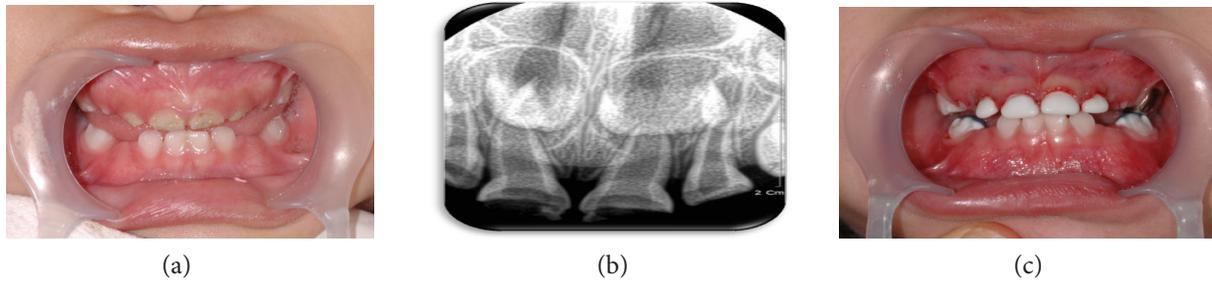
### 2.1 Materials

A 18-month-old girl who had suffered from painful symptoms in her anterior maxilla visited the Dept. of Pediatric Dentistry at the dental hospital of Wonkwang University. ZIRKIZ® crown (HASS company, Seoul, Korea), a ready-made primary zirconia crown was used (Figure 1a, 1b). On clinical examination, the tooth was ECCs in the maxillary primary incisors (Figure 2a). A periapical radiograph revealed that tooth #61 had a

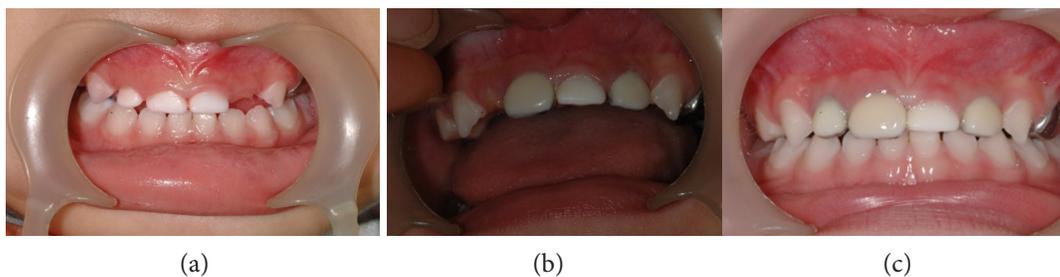
peri- radicular radiolucency around the tooth (Figure 2b). Due to the extensive crown loss, a pulpectomy of #61 tooth, and oral rehabilitation of the four maxillary incisors using composite strip crowns (Figure 2c) were performed under conscious sedation and local anesthesia. After 8 months, she was reexamined for a fractured left lateral incisor caused by a traumatic fall. The composite strip crown was fractured (Figure 3a); therefore, a pulpectomy was performed, and an open-faced steel crown was implanted. However, she experienced repeated fractures of the restorations due to mastication and falls. Pulpectomies were performed on the two failed teeth under sedation and local anesthesia, and the teeth were restored with open faced steel crowns (Figure 3b, 3c). After 5 months, October 20<sup>th</sup> in 2011, the composite strip crown at #61 was fractured (Figure 4a). In addition, her parents were dissatisfied with the unappealing appearance of the open faced steel crown and requested a more aesthetic rehabilitation. Thus, a ZIRKIZ® crown, which is both more aesthetically appealing and quite strong, was recommended. The abutment tooth was prepared using a diamond-coated bur under conscious sedation and local anesthesia (Figure 4b). The gingival margin of the abutment tooth was shaped into a feather-edged margin. A ready-made primary zirconia crown of the appropriate size and shade was selected (Figure 4c). A Signum Zirconia Bond® (Sigma, Heraeus Company, Germany) containing 10-MDP was then applied to the inner surface of the crown as a pre-surface treatment; the ZIRKIZ® crown was then cemented to the abutment tooth with a self-etching adhesive resin cement (Rely X™ Unicem, 3M ESPE, St Paul, MN, USA).



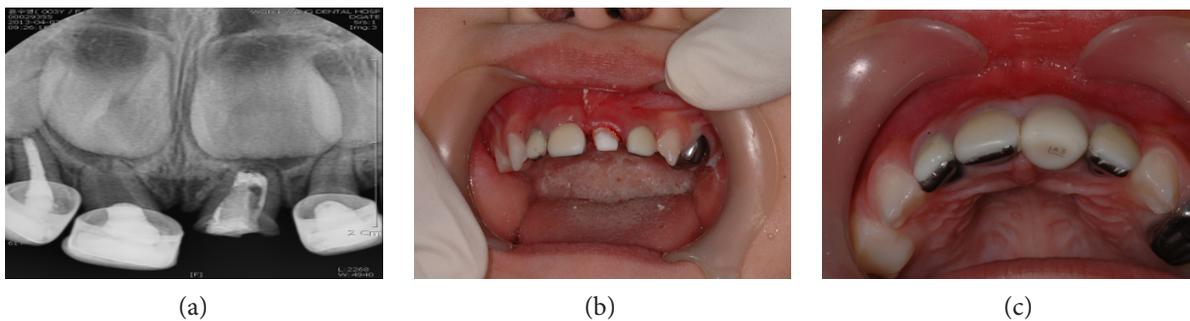
**Figure 1.** Photographic images captured by ZIRKIZ® crown. (a) Various size crowns of primary maxillary central incisors. (b) Composition of manufacture.



**Figure 2.** Clinical photograph and periapical radiograph of case at first visit. (a) Intra-oral photograph showing a severe caries on the primary maxilla. (b) Radiographic image showing an open apex. (c) Postoperative intraoral photograph showing a composite strip crown restorations.



**Figure 3.** (a) Clinical photograph of strip crown fracture of upper left lateral incisor induced from dental trauma. (b) Clinical photograph of strip crown fracture of upper right lateral incisor induced from dental trauma. (c) Photograph showing an openfaced crown except upper left central incisor.



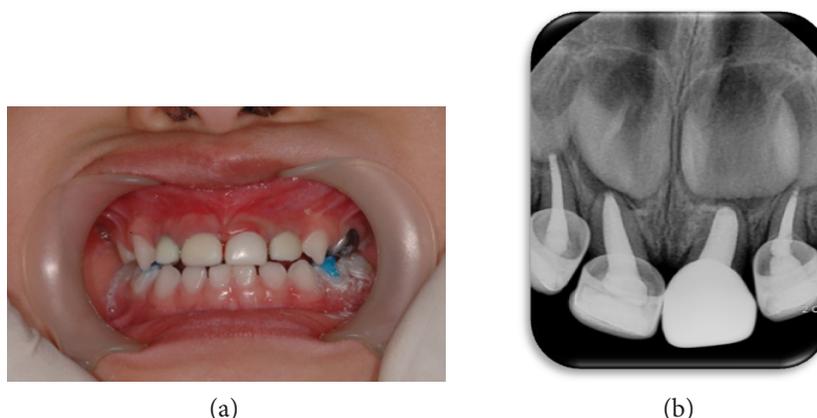
**Figure 4.** Clinical photograph and periapical radiograph of case. (a) Radiographic image after traumatic injury showing an upper left central incisor fracture. (b) Abutment preparation. (c) Intra-oral photograph of crown selection.

### 3. Results

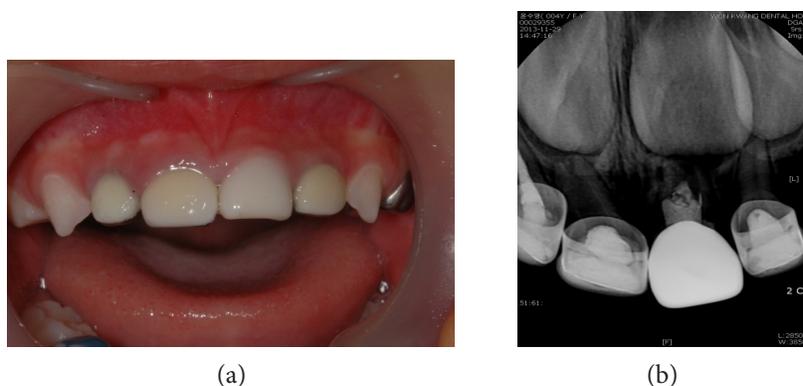
After treatment (Figure 5a, 5b), the tooth showed a good esthetic result when it was compared to the adjacent teeth, and her parents were very satisfied with the outcome. At the 6-, 12- and 18-months follow-up, the patient continued to be asymptomatic and the restoration was successfully retention in clinical and radiographic examinations (Figure 6a, 6 b).

### 4. Discussion

In the past, the only option would have been to extract the affected teeth and replace them with prosthetic substitutes. However, the availability of natural crowns and roots would allow the use of biologic restorations to preserve the integrity of patient's natural dentition<sup>8</sup>. In many cases of restoration of primary maxillary incisors, successful outcome depends on the ability to practitioner's



**Figure 5.** Clinical photograph and periapical radiograph of postoperative view. (a) Intraoral photograph. (b) Periapical radiograph.



**Figure 6.** Clinical photograph and periapical radiograph of case at 18 months follow-up visit. (a) Intraoral Photograph. (b) Periapical radiograph.

precise decision about restorative method and material selections. Most cases are observed in children with early childhood caries. It is a commonly faced problem in dental clinic. Some authors have reported successful outcomes of the Restoration of primary maxillary incisors of severely destroyed cases by trauma or caries<sup>9-12</sup>. It may enhance the clinician's ability and materials to restorative anterior teeth compared to the past.

However, the restoration of primary anterior teeth presents complicated aesthetic and retention problems to the clinician. The choice of the most appropriate restoration for anterior teeth is often a difficult decision. Numerous clinical and technical factors play an important role in selecting the treatment option that best suits the patient and the restorative team. Experienced clinicians have developed decision processes that are often more complex than may seem. Less experienced professionals may find difficulties making treatment decisions because of the widely varied restorative materials

available and often numerous similar products offered by different manufacturers<sup>13</sup>. The use of the full-coverage crowns for primary anterior teeth is recommended for teeth with multiple carious surfaces, incisal edge involvement, extensive cervical decalcification, pulp therapy, hypoplasia, and poor moisture or hemorrhage control<sup>14</sup>. In the 1994, Waggoner suggested that indication of full coronal restoration of carious primary incisors: 1. caries is present on multiple surfaces, 2. the incisal edge is involved, 3. there is extensive cervical decalcification, 4. pulpal therapy is indicated, 5. caries may be minor, but oral hygiene is very poor (high-risk patients), or 6. the child's behavior makes moisture control very difficult, creating difficulties in placing Class III restorations<sup>15</sup>.

Croll reported that SSCs were easy to place, fracture proof, wear resistant, and attached firmly to the tooth until exfoliation<sup>16</sup>. The main disadvantage is its unsightly, silver metallic appearance. As the population has become

more esthetically conscious, SSCs have become less desirable. One method to enhance the appearance of these implants is the placement of a resin or composite material in a labial fenestration of an SSC (open-faced stainless steel crowns)<sup>17-19</sup>. Although this technique is a dramatic improvement over the plain metallic appearance of stainless steel, the procedure is time consuming, and the metal margins are still visible<sup>20</sup>.

Recently, there has been a paradigm shift for the treatment of primary anterior teeth, from the 'traditional' metallic crowns to ceramic crowns. Many studies have described that the selection of adequate materials and techniques is important to reaching an optimal aesthetic results as close to the natural dentition<sup>21,22</sup>. Considering the prospects of physical, emotional and social, it is important to rehabilitate the aesthetics and function of child with ECC. The ZIRKIZ<sup>®</sup> crown can be considered alternative treatment option for primary maxillary incisors of child with early childhood caries and high trauma tendency. However, because of the lack of clinical data with a long-term observation, further clinical evaluations and studies are required.

## 5. Conclusions

In the result, patient and their care giver were satisfied with zirconia crown as anterior teeth restoration.

## 6. References

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