

# Recent Advances in Pediatric Esthetic Anterior Crowns

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## Abstract

Loss of anterior teeth in children can lead to hampered esthetics, neuromuscular imbalance with decreased masticatory efficiency, speech disturbance, development of parafunctional habits, and psychological problems. With the growing awareness of the esthetic options available, there is a greater demand for solutions to unsightly problems such as caries, discolored teeth, hypoplastic defects, fractures, and missing teeth in children. However, the biggest dilemma is choosing the best treatment modality for a particular patient and situation. Thus, this review highlights the various recent advances in the field of anterior crowns in pediatric esthetic dentistry along with their indications, advantages, and disadvantages.

**Keywords:** Anterior crowns, esthetics, pediatric dentistry

## INTRODUCTION

### “A smile of a child is packaged sunshine and rainbows”

This gift of God may be hampered by premature loss of teeth which is, unfortunately, a very common occurrence in children due to the lack of knowledge regarding oral hygiene procedures and negligence toward the maintenance of dental health. While the traditional concept of Jean Piaget stated that a child's perception of self and care about their appearance only developed by the age of 8 years; there have been recent studies in the field of the child psychology that have challenged this concept, showing that, with increased media exposure, children as young as 3-5 years of age have a sense of consciousness of body image.<sup>[1-3]</sup>

The goal of esthetic dentistry should be “bright, beautiful, but believable.”

Today there are many solutions available for aesthetic problems in Pediatric Dentistry. But the biggest dilemma is choosing the best treatment modality for a particular patient and situation which depends on various factors like the age of the patient, motivation of the parents, the child's behavior in the dental clinic, and the socio-economic status of the patient. Early restorations mostly included placement of stainless steel crowns (SSCs) or bands on severely decayed teeth. They were

**Submitted:** 09-Mar-2020 **Accepted:** 03-Feb-2021 **Published:** 17-Mar-2021

unesthetic and their use was limited to posterior teeth. Over the last two decades, a higher esthetic standard is expected by parents for the restoration of their children's carious teeth. Esthetic full coverage restorations are available for anterior and posterior primary teeth, which preserve the functions of primary teeth until their exfoliation in healthy state.<sup>[4,5]</sup>

## CLASSIFICATION OF ESTHETIC CROWNS

### Cemented crowns

1. Metal Crowns with Facing<sup>[6,7]</sup>
2. Zirconia Crowns
3. Nu-Smile Crowns
4. Kinder Crowns
5. Cheng Crowns
6. Pedo Pearls
7. Dura Crowns
8. Figaro Crowns.

### Bonded crowns

1. Pedo Jacket Crowns
2. Polycarbonate Crowns

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**DOI:**  
10.4103/ijpr.ijpr\_8\_20

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**How to cite this article:** Ghosh A, Zahir S. Recent advances in pediatric esthetic anterior crowns. *Int J Pedod Rehabil* 2021;5:35-8.

3. Artglass Crowns
4. Strip Crowns
5. New Millenium Crowns.

### OPEN FACED STAINLESS STEEL CROWN

SSCs can restore anterior teeth with extensive caries but still provide a stable restoration. This type of crown is resistant to fracture and can be easily fitted as well as crimped on all surfaces, even when there is minimal remaining tooth present. The dissatisfying silver color can be improved by the open-face SSC technique which is a chairside procedure to improve the esthetics. However, it is time-consuming, and esthetics is compromised by the metal margin. Hemorrhage control is extremely important when placing the resin, and it is often difficult to control bleeding after the SSC tooth preparation.<sup>[6,7]</sup> SSCs are less frequently used in primary anterior teeth than posterior teeth, but due to the occlusion or extensive caries, they are sometimes used in anterior teeth. SSCs are more commonly applied to the mandibular incisors, where esthetics is less noticeable. The retention rate of SSCs is reported as 93% after 27 months and SSCs appear to be retained significantly longer than preveneered SSCs. After the recommended glass ionomer cement is set, the metal on the facial surface of the crown is removed by a 330 bur. Tooth-colored resin is placed after etching and bonding. This open-face technique is inexpensive and can provide a better esthetic appearance compared to the original silver metal color.<sup>[8-10]</sup>

### PREVENEERED STAINLESS STEEL CROWNS

Preveneered SSCs were introduced into the pediatric dentistry market to provide another esthetic option for anterior restorations. These crowns have prefabricated tooth-colored material bonded to SSCs on the facial surface, usually with resin-based composite material. The prefabricated esthetic facial surface enables the crown to be placed in an area with poor hemorrhage control, providing a white appearance. Manufactured as Nusmile Signature Crowns, Cheng Crowns, Kinder Crowns, Flex White Faced Crowns.

The main problem with these crowns is the possible wear on the incisal edge, as well as partial or total fracture of the facial portion. It is difficult to repair the chipped portion and if parents or children are concerned about a portion of metal showing, the replacement of the whole crown is needed. Crimping of the facial preveneered portion will cause esthetic facing to fracture easily. Thus, retention of the crowns relies on crimping the lingual portion of the crown. When applying the crown, it must not be forced over the prepared tooth because the prefabricated resin portion is easily fractured. When cementing these crowns, it is recommended to use glass ionomer cement to hold the crown in place until the cement sets. The retention rate for this type of crown is reported to be above 90% after 6 to 17 months.<sup>[11-14]</sup>

### Strip crowns

This type of crown is composed of celluloid crown forms that act as matrix forms to fill with tooth-colored materials.

Usually, these crowns are restored with resin-based composite to allow for selection of shades to match the adjacent teeth and provide an excellent esthetic outcome. Resin modified glass ionomer cement has been used for the material as an interim restoration in younger children. Placing a strip crown is technique-sensitive because moisture and hemorrhage control are very important to prevent contamination of the resin with blood or saliva. There must be enough remaining tooth structure to allow for adequate bonding. After the polymerization of the resin-based composite, the celluloid form can be easily removed with a dental bur or a sharp blade.

When placing strip crowns over pulpectomy treated teeth obturated with iodoform paste, it is important to use opaque resin or remove iodoform paste below the cervical area so the yellow iodoform paste will not be seen through the strip crown from the facial surface. Similarly, teeth that have been restored with zinc-oxide eugenol after pulpal treatment should have a glass ionomer or resin-modified glass ionomer base placed over the zinc-oxide eugenol so that polymerization upon light exposure is not compromised.<sup>[2,6]</sup>

### RESIN-RETAINED CROWN FORMS

Besides the widely used strip crowns, there are two alternatives that bind to the tooth structure. One is made of tooth-colored plastic. After the tooth is etched and bonded, a crown filled with resin material is fitted to the tooth. There is no need to remove the crown form after polymerization. However, the crown cannot be reshaped with a bur because the plastic material will disform from the heat. The other alternative is made of resin composite material and can be reshaped with a finishing bur to provide a more esthetically pleasing appearance. If the tooth is not reduced adequately, forcing the crown down to the tooth can cause the crown to crack or fracture.

### OTHER NEWER CROWNS

#### Pedo jacket crown

Pedo Jacket crown is made up of tooth coloured polyester material and is filled with resin material. It is left on the tooth after polymerization apart from being removed from celluloid crown form after curing of luting resin cement.

#### New millennium crown

They were introduced in market by the Success Essentials, Space Maintain Laboratory. These crowns are made up of composite resin material that is laboratory enhanced. They are similar to the Pedo jacket crown and strip crown. The advantage being that they can be finished and reshaped with a high-speed finishing bur. However, disadvantages include that they are very brittle and more expensive than other crown forms and cannot be crimped.

#### Pedo pearl

It is a new type of crown in the process of being developed and field-tested. It is a metal crown form similar to a SSC, but it has been completely coated with tooth-colored epoxy paint.

These crowns are made of aluminum instead of stainless steel as the epoxy coating adheres much better to the aluminum. They serve as the ultimate permanent crown in the primary dentition. According to Sahana *et al.*, the various advantages are they are easy to cut and crimp without chipping and the composite can be added afterward also. However, they have less durability and are relatively soft.

### Artglass crowns

Artglass crown commonly known as Glastech is made up of artglass which is a polymer glass used for the restoration of anterior primary teeth. It is a new multifunctional methacrylate with the ability of forming three-dimensional molecular net-works with highly cross-linked structure. They have micro-glass and silica as filler materials which provide greater durability and esthetics than strip crown. It gives dual advantages which provide the bondability and feel of composites and longevity and esthetics of porcelains.<sup>[6,7]</sup>

### Figaro crowns

Figaro crowns have been recently added to the list of esthetic full coronal crowns that can be used in pediatric patients. These crowns utilize either fiberglass or quartz filaments/fibers embedded with an outer cosmetic composite resin material. The resin composite is made out of medical-grade composite which is also seen in pacemakers, ocular and cochlear implant devices which is very much biocompatible. The strength and biocompatibility with a degree of flexibility are much closer to tooth structure than stainless steel and zirconia crowns. The crowns replicate the true anatomy of a natural tooth. While zirconia and SSC are limited in mimicking the tooth's shape and more closely resemble hills and valleys, the Figaro crown embraces the true tooth's anatomy, producing an aesthetically beautiful result with cusps and grooves. Figaro crowns can be adjusted for cosmetic, grinding and/or eccentric occlusion purposes. This is a feature that no other preformed crown allows. They provide the unsurpassed aesthetics and beauty of an all-white crown while offering superior strength and the highest value available in the market. It saves both time and money. Also:

- It requires less tooth reduction than zirconia crown
- There is no need to wait for cement to set for delivery
- Wall thickness of this crown is 0.5–1 mm which is very close to stainless steel and much thinner than other white crowns due to flex fit technology, preparation for tooth reduction is still similar to stainless steel with no subgingival preparation so the tooth preparation is less aggressive.<sup>[15,16]</sup>

### Zirconia crowns

Prefabricated zirconia crown (EZPedo, Loomis, CA, USA; NuSmile ZR Primary Crowns, Houston, TX, USA; Hu-Friedy Mfg. Co., LLC, Chicago, IL, USA; Kinder Krowns, St. Louis Park, MN, USA; Cheng Crown, Exton, PA, USA; ZirkizHass Corp. Korea) is an exceptionally strong ceramic crown and offers more esthetic and biocompatible full coverage for primary incisors and molars. They are anatomically contoured,

metal free, completely bio-inert, and resistant to decay Zirconia has a unique ability to resist crack propagation by being able to transform from one crystalline phase to another, and the resultant volume increase stops the crack and prevents it from propagating. EZ-Pedo (EZ-Pedo, Loomis, Calif., USA) was the first pediatric zirconia crown commercially available in the United States, originally marketed in 2008.

Advantages of the zirconia crown are the excellent esthetics, full coverage of the treated or carious tooth, no components of the crown that might debond, and a less sensitive technique for cementation compared to a resin strip crown. The disadvantages of the zirconia restoration are the inability to crimp the crown for mechanical retention, inability to change its color, the limited ability to trim the crown or alter its shape, and the need for more tooth reduction than a traditional preformed metal crown.<sup>[17,18]</sup> The zirconia crowns are also more expensive. A prospective study to compare parental satisfaction was conducted using three different tooth-colored anterior crowns. This study showed that parents had the highest satisfaction with zirconia crowns, followed by strip crowns and preveneered SSCs.<sup>[19]</sup>

### CONCLUSION

Through this review, effort has been made to bring together the various options for esthetic anterior crowns in pediatric dental practice. Each of them carries its own advantages and disadvantages. Many options exist to repair carious teeth in pediatric patients as is discussed, from SSCs to its various modifications to other esthetic crowns like strip crowns, Figaro crowns, and zirconium crowns which are rising in their popularity. Operator preferences, esthetic demands by parents, the child's behavior, socioeconomic status, and moisture and hemorrhage control are all variables which affect the decision and ultimate outcome.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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