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# Anterior esthetic crown in pediatric dentistry: A review

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**Abstract**
Primary maxillary anterior teeth dominate the physical appearance and their structural loss affects not only esthetics but also leads to compromised mastication, poor phonetics, development of aberrant oral habits, neuromuscular imbalance, and difficulty in social and psychological adjustment of the child. Primary teeth often get destructed either due to caries or traumatic injuries. Teeth need to be rehabilitate due to loss of crown structure following caries or traumatic injury. Present review highlights the various recent advances in the field of pediatric esthetic dentistry along with their indications, advantages, and disadvantages.

**Keywords:** primary anterior teeth, esthetic crown, zirconia crown

## Introduction

Primary maxillary anterior teeth dominate the physical appearance and their structural loss affects not only esthetics but also leads to compromised mastication, poor phonetics, development of aberrant oral habits, neuromuscular imbalance, and difficulty in social and psychological adjustment of the child. Primary teeth are important for mastication, as natural space maintainer and to establish proper occlusion; loss of which can result into space loss, malocclusion and impaction of succedaneous teeth. Hence, maintenance of primary teeth is mandatory. However, these issues are overlooked by most of the parents resulting in to difficulties in eating, establishing social contacts and speaking. Even though primary teeth are temporary dentition, they should be retained in the oral cavity in nonpathologic state until exfoliation. Primary teeth often get destructed either due to caries or traumatic injuries. Teeth need to be rehabilitate due to loss of crown structure following caries or traumatic injury.[1] A primary objective of placing crown is to achieve an esthetic improvement. A remarkable change is also seen in the patient's self-image after correction of the texture, shade and shape along with good physiological form and function which helps in preventing further deterioration of the mouth by prevention of tooth migration, bone loss and arch collapse.[2] Present review highlights the various recent advances in the field of pediatric esthetic dentistry along with their indications, advantages, and disadvantages.

## Historical developments in pediatric crowns [1]

**Table 1:** Historical developments in pediatric crowns

| Year | Developments in pediatric crowns |
|---|---|
| 1947 | Preformed crowns (PMC) were introduced by Rocky Mountain company |
| 1950 | Stainless steel crown (SSC) was described by Engel and popularized by Humphrey to Pediatric dentistry |
| 1970 | Polycarbonate crowns were introduced |
| 1971 | Mink and Hill advised SSC modification for over and undersized crowns. |
| 1977 | McEvory advised modification of SSC technique for SSC with arch length or space loss |
| 1980 | Pedo Pearls crowns were introduced |
| 1987 | Cheng crowns were introduced by Peter Cheng |
| 1989 | Kinder crowns were introduced |
| 1995 | Hall technique was introduced by Dr Norna Hall for SSC adaptation on carious tooth without tooth preparation |
| 2010 | EZ zirconia crowns were introduced by Hansen JP and Fisher JP as pediatric esthetic crowns. |

## Classification

**According to Sahana S *et al* (2010) [3]**

**a. Crowns that are luted to the tooth**

1. Resin veneered stainless steel crown
2. Facial cut out crown
3. Polycarbonate crown
4. Pedo pearls

**b. Crowns that are bonded to the tooth**

1. Strip crowns
2. Pedo jacket crowns
3. New millennium crowns
4. ART glass crowns

**Open Faced Stainless steel crown: Hartmann CR and Helpin ML (1983):** suggested that in children with rampant carious lesions, open-faced stainless steel crowns can be used. The stainless steel crowns can be modified in anterior teeth by a open faced stainless steel crown with the labial surface trimmed away to leave a crown perimeter, which is then restored with a resin veneering/tooth colored restorative material.[4]

**Procedure**

The preparation begins by first the slicing the mesial and distal surface and removing 1.0 to 1.5 mm incisal edge. Little reduction is needed on the lingual surface. The crown is then extended 0.5 to 1.0 mm beneath the gingival crest and a hole is cut in the labial surface of the crown. By using No.114 pliers lingual portion of the crown is adapted to the tooth. The crown is polished and cemented with zinc phosphate or glass ionomer cement and when the cement sets, a window is cut using No.58 bur. A composite resin is used to restore the facing of the primary incisor [2].

**Strip Crown**

Composite strip crowns are composite filled celluloid crowns forms. They have become a popular method of restoring primary anterior teeth because they provide superior esthetics as compared to other forms of anterior tooth coverage. Bonded composite strip crowns are most esthetic restorative option for carious primary incisors. This is the first choice of many clinicians due to the superior esthetics and the ease of repair if the crowns chips or fracture frequently. However, it is most technique sensitive. Composite strip crowns rely on dentin and enamel adhesion for retention. Therefore, the lack of tooth structure, the presence of moisture or haemorrhage contributes to compromised retention. There is need of sufficient tooth structure after caries removal to ensure sufficient surface area for bonding [5].

**Procedure**

**Selection of crown Form**

Strip Crown can be selected by placing the incisal edge of the crown against the incisal edge of the tooth or by measuring the mesiodistal dimension of the tooth to be restored with caliper and matching it with required crown form [1].

**Tooth Preparation**

Administer appropriate anesthesia, Reduce incisal edge approximately 1 to 1.5 mm using fine tapered diamond bur, Reduce the interproximal surfaces by 0.5 to 1 mm with a tapered diamond bur to produce knife edge cervical margin identical to that of stainless steel crown preparation. Reduce the facial surface by at least 1 mm and lingual surface by at least 0.5 mm. Create knife edge gingival margin. Remove existing carious lesions with a spoon excavator or round bur [1].

**Crown Placement**

Trim the selected crown form to remove excess crown form material cervically with crown and bridge scissors. Trial check for fitting of crown form on prepared tooth. Trimmed crown form should fit 1 mm below gingival margin with comparable height to adjacent teeth. Create a small hole with sharp explorer at incisal edge of trimmed crown form to create vent for flow of excess composite material while placement. Etch the prepared tooth with acid etchant for 15 to 20 seconds. Rinse and dry the tooth followed by bonding agent application and curing. Fill the crown forms with selected composite shade material to approximately two-thirds of length and seat on to tooth and check for correct position. Excess material should flow from gingival margin and vent hole. Remove the excess composite material from gingival area with explorer. Light cure the celluloid crowns to polymerize the composite material. After proper curing remove the celluloid crown form by using a composite finishing bur or curved scalpel blade [1].

**Advantage of strip crown [1]**

1. Simple to fit and trim
2. Removal is fast and easy
3. Easily matches natural dentition
4. Leaves smooth shiny surface
5. Easy shade control with composite
6. Superior esthetic quality
7. Ideal for photo cure
8. Crystal clear and thin celluloid crowns
9. Large selection of size
10. Easy to repair
11. Crowns are cost-effective

**Disadvantage of strip crown [1]**

1. Moisture or blood contamination affects resin bonding.
2. Time consuming procedure in young and uncooperative child
3. It is extremely technique sensitive.

**Polycarbonate crown**

Polycarbonate crowns are the temporary crowns which can be given in such situation as a fixed prosthesis to deciduous anterior teeth which will get exfoliated in future. Polycarbonate crowns are aromatic linear polyesters of carbonic acid. These crowns exhibit high impact strength and rigidity and are termed thermoplastic resins since they can be molded as solids by heat and pressure into desired form [6].

**Advantage of Polycarbonate crown [1]**

1. Crowns are made up of polycarbonate resin with micro glass fibers which permit crown adjustment with pliers, good durability and strength.
2. Contours and crimps similar to metal crowns.
3. Esthetic/U62 shade.
4. Good anatomic form.

**Zirconia crown**

Zirconia crowns are new, unique, esthetic pediatric dental crowns available on the market today. Zirconia crown has created a new approach to restoring the natural appearance of a child's smile with a minimally invasive technique [1].

**Tooth preparation**

After clinical and radiographic evaluations; caries should be removed with stainless steel round burs under local anesthesia. Reduce incisal surface for 1 mm. Reduce 0.5 to 1.0 mm on facial and lingual surface. The facial and lingual preparation should meet in a thin incisal edge corresponding to the planned incisal edge of the final restoration. Occlusion should be checked for adequate clearance from opposing dentition. Interproximal reduction can be carried out and it involves creating parallel mesial and distal walls extending 1 to 2 mm subgingivally. After tooth preparation zirconia crown should fit passively. Glass ionomer cement should be used to fill the crown completely, to eliminate any internal voids [7].

**Advantage of Zirconia crown [1]**

1. Single visit appointment for crown preparation and placement
2. Time saving
3. No need of temporary crown
4. Esthetically acceptable
5. Durable

**Disadvantage of zirconia crown**

Drawbacks which limit the use of zirconia crowns are that it requires significantly more time to prepare the tooth for fitting the crown. Bleeding from the gum may hinder the setting of the cement used to bond the zirconia crown to the tooth [7].

**Figaro crown**

Figaro Crowns are recently introduced crowns for primary teeth. These are said to be all white, metal (Bisphenol-A)-free, and are made from the highest safest, and time-tested products used in dentistry and medicine today. Figaro Crowns are made in the U.S.A. and possess all ISO Certifications required by Canada Health and the FDA [8].

**Properties of Figaro crown**

1. **Biocompatible:** comprised of the same material currently used in pacemaker.
2. **Strong:** created for superior strength to withstand grinding and chewing forces.
3. **Safe**: thoughtfully designed with materials that does not allow for sharp edges due to tooth grinding or shattering of the crown while clenching or chewing.
4. **Metal Free and autoclavable**: provide peace of mind and reassurance for patient's parents.

**Other anterior esthetic crown in pediatric dentistry**

**Pedo jacket crowns**

Pedo Jacket crown is like a strip crown. It is handled similar to a celluloid crown form. It is made up of tooth-colored polyester material which can be filled with resin and left on the tooth after polymerization. It cannot be trimmed or reshaped with a high speed finishing bur otherwise the material will melt to the bur [9].

**Artglass crowns**

These are forms of full coronal restorations with esthetic value for the deciduous dentition. Artglass crown are the most esthetic crowns available for pediatric dentistry, which is made up of artglass. Artglass is a polymer glass, which provides the natural feel, bond ability associated with composite but the esthetics and longevity of porcelain [10].

**New Millennium crowns**

These crowns are very similar to the pedo jacket and strip crowns except that they are made of a laboratory-enhanced composite resin material. They are very esthetic and unlike pedo jacket crowns, they can be finished and trimmed with high-speed bur. They are also filled with resin and bonded to the tooth [11].

**Composite shell crowns**

Composite shell crowns are crowns prepared with composite material by indirect method [12].

**Advantages of Composite shell crowns [12]**

1. Requires less chair side time
2. No need of trimming or crimping during clinical procedure
3. No need of postoperative adjustment of crowns since adjustments are made in lab
4. Less technique/moisture sensitive as compared to strip crowns

**Disadvantages of Composite shell crowns [12]**

1. Two visit procedure.
2. Needs lab procedures

**Biological restorations**

Biologic crown are an alternative treatment for primary teeth. Biologic restorations are made from tooth fragments selected from natural extracted teeth or from a bank of tooth tissues and bonded with dual cure composite cement to prepared teeth. Biologic post and core are made from natural extracted teeth radicular dentin. Presence of similar structure might enable to absorb and dissipate stress. Biologic restoration using natural post and core can provide natural esthetics. Biologic post and core, crown and veneer restoration are comparatively cheaper to other esthetic materials. These restorations are performed easily without need of sophisticated equipment [13].

**Conclusion**

The present era of pediatric dentistry relies extensively on esthetic principles because of increasing patient demands. There are a wide range of options that can be used to rehabilitate carious primary anterior teeth. Each of which comes with its own advantages. Thus, the choice of material is dependent on the clinician’s preference, skill, and esthetic and functional demands of the child.

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