

# Different Crown Used For Restoring Anterior Primary Teeth: A Review

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**Abstract:****Aim:**

The aim of this review is to discuss about various anterior crowns available for restoring anterior primary teeth.

**Objective:**

To list out the various materials used in crowns and their advantages and disadvantages in clinical work.

**Background:**

Primary dentition exposed to early caries mainly affects the primary maxillary anterior teeth and primary molars. Restoring primary maxillary anterior teeth requires material to be retentive, resistance to fracture and aesthetics. Crowns available for restoration of primary anterior teeth include those that are directly bonded to the tooth which generally are made up of a resin material, and those crowns that are luted onto the tooth like strip crown, stainless steel crown and zirconia. The importance of these crowns is for phonetic, aesthetic and mastication.

**Conclusion:**

This review is being done to better understand advantage and disadvantages of these crowns, to ensure proper aesthetics and retention of restorations for such cases.

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**INTRODUCTION:**

Early childhood caries is a chronic disease that is prevalent in children of low socioeconomic status<sup>[1-3]</sup>. Early dental caries is a significant problem affecting 60-90% of school children in industrialised countries<sup>[4]</sup>. Early childhood caries mainly affect the primary maxillary incisors followed by maxillary and mandibular first molars and mandibular cuspids. Early childhood caries lead to severe tooth destruction which is associated with prolonged association with carious substances in nursing bottle and lack of maintenance of oral hygiene. These lesions can lead to total destruction of crowns<sup>[5-9]</sup>. This kind of dental destruction can lead to development of parafunctional habits like tongue thrusting, psychological problems, reduced masticatory efficacy, and loss of vertical dimension occlusion<sup>[10-15]</sup>. Therefore it is important to restore crowns of destroyed by early childhood caries to preserve and promote the integrity of primary dentition, its exfoliation and eruption of permanent tooth<sup>[10]</sup>. Aesthetic is the science of beauty. Even with the introduction of various techniques for restoring primary incisors, it is still challenging for clinician to satisfy the patients as they emphasis on the restoration being more aesthetic. In this modern world, well aligned and well contoured teeth are considered attractive and also indicated for nutritional status, self esteem and economic status<sup>[16]</sup>. Aesthetic restoration can be challenging for the anterior teeth due to fact that the teeth is small in size and close to the pulp with thin enamel and less surface area to bond and issue with child behaviour and finally the cost of the treatment<sup>[17,18]</sup>. The conventional form of restoring these teeth was use of bonded composite resin strip crown. But due to their young age and behaviour complexities, the treatment is less than ideal restoration but can be improved by use of general anaesthesia<sup>[19]</sup>. There are numerous treatment approaches have been proposed for better aesthetics and retention of restorations in these teeth. Intra-coronal tooth-coloured restorations include glass ionomer cements, resin-modified

glass ionomers (RMGI), polyacid-modified resins or resin composites and composite by using celluloid strip crowns<sup>[20]</sup>, or ready-made crowns like preveneered stainless steel crowns<sup>[21]</sup> and the recently introduced pre-fabricated primary zirconia crowns. Stainless steel crowns (SSC) have been used to restore primary and permanent posterior teeth for almost 50 years. They are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent. The SSC is extremely durable, relatively inexpensive, subject to minimal technique sensitivity during placement, and offers the advantage of full coronal coverage. Despite the favourable qualities mentioned, SSCs have a major drawback—namely, their poor aesthetic appearance. So preveneered stainless steel crowns are better in aesthetics and thus used for primary incisors<sup>[22]</sup>. Excellent aesthetic appearance with acceptable longevity has been obtained from resin-based crowns (strip crowns) for decayed and/or fractured anterior primary incisors. but they are technique-sensitive restorations. Each of these methods has short comings but each of them can be used at some time<sup>[23-24]</sup>. The search for the ideal full coverage restorations in paediatric dentistry continues. The purpose of this review is to throw light and analyse the major crowns used in regards to full coverage restorations in paediatric dentistry.

**CLASSIFICATION:**

According to Sahara S et la<sup>[25]</sup>,

- a) Crowns that don't bond to the tooth,
  - 1) Resin veneered stainless crown
  - 2) Facial cut out crown
  - 3) Polycarbonate crowns
  - 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

#### **PREVENEERED STAINLESS STEEL CROWN (PVSSC):**

Preveneered stainless steel crowns were initially introduced for primary anterior teeth and later on introduced for primary molars<sup>[26]</sup>. They offer good restoration for extensive decay in anterior teeth. The chair-time is significantly less<sup>[27]</sup>. They are a combination of conventional stainless steel crowns with composite or thermoplastic resin, combining durability with aesthetics<sup>[26]</sup>. The resistance to fracture and attrition is good in preveneered stainless steel crowns. The retention is very good in PVSSC<sup>[28]</sup>. The main disadvantage is the resin shades which give an artificial look<sup>[27]</sup>. One article stated that the colour stability of these crowns were stable for minimum 6 months. This study also stated that while restoring the canine with PVSSC, they showed the highest number of fractures and colour change. They give 'bulky' appearance to the tooth. The colour changes were observed more on repeated steam sterilisation<sup>[28]</sup>. The resins on the facing side tend to break due to wear during mastication and solely by time<sup>[29, 30]</sup>. Another article stated that nano-composite material showed promising increase in aesthetics, strength and durability than micro filled composite and thus increases longevity<sup>[31]</sup>. Placement of PVSSC is also technique sensitive as they rely on luting of the cement and crimping of gingival margins<sup>[32]</sup>. Crimping is generally done only on lingual side to avoid damage to resin on the facial side<sup>[33]</sup>. The preveneered stainless steel crowns has the least parental satisfaction when compared with strip and zirconia crowns and also because of it least property of colour stability<sup>[34]</sup>.

#### **Technique:**

The preparation begins by first with the mesial and distal surface and removing 1.0 to 1.5 mm incisal edge. Small amount of 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 side 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. conducted the first study on resin-faced stainless steel crowns used for restoring primary anterior teeth and described the clinical performance of these crowns<sup>[25]</sup>.

#### **FACIAL CUT OUT STAINLESS STEEL CROWNS:**

Facial cut out crowns involves placement of composite material in a labial fenestration of SSC. There is an improvement in the appearance, most durable and reliable restoration for a primary incisor in need of complete coverage but they are least attractive. To improve the appearance, the prominent aspect of the crown is removed of its luting cement to leave retentive undercuts and fill the void with bonded resin composite. Success rate of these crowns are good as they bond with tooth by phosphoric acid etching and dentin bonding<sup>[35]</sup>. The main advantage of this crown is it has attempted to be more aesthetic than

stainless steel crown<sup>[36]</sup>. The disadvantages are time consuming, haemorrhage control on application of the crown and the metal margins can be seen<sup>[37]</sup>.

#### **POLYCARBONATE CROWNS:**

Polycarbonates are aromatic linear polyesters of carbonic acids which shows high impact in strength and rigidity. Usually the classIII cavities are treated with composites and when the caries is severe, polycarbonate crowns are used. They are termed as thermoplastic resins because they are moulded as solids by heat and pressure into the desired form. They are more aesthetic than stainless steel crowns, the polycarbonate material showed brittle and did not resist strong forces, resulting in fracture. After the advent of composite strip crowns, polycarbonate crowns lost their popularity<sup>[38]</sup>. These crowns were indicated for rampant caries, treated pulp therapy tooth, tooth malformation and abutment for space maintainer. These are contraindicated in crowding, deep bite and bruxism<sup>[39]</sup>. Its advantages are time consumption is less, better aesthetics and extreme dimensional stability. Its disadvantages are poor abrasion resistance<sup>[38]</sup>.

#### **PEDO PEARLS:**

These crowns are made of aluminium instead of stainless steel and coated with tooth coloured epoxy coating which adheres much better to the aluminium. They serve as ultimate permanent crown in the primary dentition. The main advantage is they can be easily cut and crimp without chipping and the composite can be added afterwards if needed. The disadvantage is that they are less durable and are soft<sup>[40]</sup>.

#### **STRIP CROWNS:**

This type of crown was introduced by Webber and colleagues in 1979<sup>[41]</sup>. This crown is indicated for extensive decay and fractured anterior teeth<sup>[41-43]</sup>. But they are contraindicated for severely decayed and loss of tooth structure and periodontal disease<sup>[41]</sup>. One study stated that this technique requires adequate moisture control and long chair-time. It is also highly technique sensitive. The gingival health in case of strip crowns is considered better<sup>[27]</sup>. In other studies, the chair time was reduced by use of celluloid strip with resin composite short post, also called as mushroom undercut. This aids in retention of the crown. This technique requires reduction of composite at the gingival margins and adapting the crown in cervical regions of the tooth<sup>[44]</sup>. In one of the article, the sandwich technique was described where the resin-modified glass ionomer is placed to cover the dentin and then the composite material is placed<sup>[45]</sup>. When strip crowns are to be used for pulpotomy treated tooth then Glass Ionomer cement should be placed on top of the zinc oxide eugenol paste and when iodoform paste has been used, it should be removed since its colour will be seen through the strip crowns<sup>[34,46]</sup>. Their main advantages are simple to fit and trim, the removal is fast and easy, easily match with natural dentition, they give a smooth shiny surface, they have easy shade control with composite, they are superior aesthetically, economically and functionally and they are

crystal clear and thin, easy to repair. The disadvantage of strip crowns as most technique sensitive option, moisture contamination with blood or saliva interferes with the bond and haemorrhage can alter the shade or colour of the material<sup>[47]</sup>. One study were all three crowns, veneered stainless steel, strip and zirconia crowns were compared based on parental satisfaction showed that compared with veneered stainless steel crowns- strip crowns and zirconia crowns were very satisfying<sup>[34]</sup>.

#### **Technique:**

Local anaesthesia is administered. The tooth is isolated. The tooth is prepared in such a way that the crown of the tooth allows for the bulk of the resin in the final crown form. The length of the crown is reduced incisally using a high speed tapered diamond bur. Mesial and distal side of the tooth are cut to give a knife edge at the gingival margins. Proper shade of the composite resin is chosen. This is mandatory to achieve good esthetic results. Celluloid strip-crown forms are selected of right size. Vent holes at the incisal-edge corners of the crown form allow air to escape when it is filled with composite resin. The crown form with composite resins are firmly seated on to the prepared teeth. The composite resin is cured and using an excavator or probe is the celluloid and the crown form is stripped off. The cured crown is smoothed and polished<sup>[25]</sup>.

#### **PEDO JACKET CROWNS:**

The Pedo Jacket has a "jacket" that is made of a tooth coloured co polyester material, which is filled with resin material and left on the tooth after polymerization instead of being removed like the celluloid crown form. The main disadvantages are these crowns come in one shade only, which is very white therefore matching it with adjacent, non-restored teeth will be difficult. Also, because the crowns are made of a co polyester, they cannot be trimmed or reshaped with a high-speed finishing bur because the material can melt to the bur<sup>[48]</sup>.

#### **NEW MILLENNIUM CROWNS:**

These are similar to pedojacket crowns and strip crowns. They are made from laboratory enhanced composite resin material. Its advantage are it is aesthetic, can be trimmed with the bur and gives high parental satisfaction. The disadvantages are it is technique sensitive, inflamed gingiva, brittleness and thus can be more prone to fracture on pressure. Proper isolation is required. These crowns are indicated in discoloured tooth, extensive caries and fractured tooth. It is contraindicated in deep overbite and existing periodontal disease<sup>[33]</sup>.

#### **ART GLASS CROWN:**

Artglass crown is made of a polymer glass. It is called as glastech and mainly used for 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 the micro glass and silica as filler materials which provide greater durability and esthetics than strip crown. It gives the

advantages of providing the bondability and feel of composites and longevity and esthetics of porcelains<sup>[49]</sup>.

#### **ZIRCONIA CROWN:**

The research done on primary zirconia crowns is limited. These crowns are made up of zirconia for the primary dentition that contain no metal. Zirconia restorations are one of the dominant types of ceramics used for a variety of computer aided manufacturing design /computer restorations, aided including framework/hand veneer, framework/milled veneer, full-contour fixed prosthodontics, implant abutments, and large substructures. Zirconia is currently the strongest dental ceramic available and is also esthetically pleasing. Even though zirconia is widely accepted as a restorative material for the permanent dentition, it is a relatively new restorative material for the primary dentition. The retention rate of the zirconia is good after 6 months<sup>[50]</sup>. The fracture resistance is greater and thus makes them very strong<sup>[51]</sup>. They are tooth coloured. One study recently done stated that the zirconia crowns showed less opposing tooth wear and parents were highly satisfied with the shape, colour and size of the crown. They improved the patient appearance and oral hygiene and thus zirconia is clinical good restoration<sup>[50]</sup>. Important points to consider when indicating for zirconia crowns there should be adequate subgingival facial reduction with complete removal of the cingulum area. The labial and lingual surface should meet at the thin incisal edge. The thin incisal edge helps to reduce the internal interferences between the tooth and the internal surfaces of the crown<sup>[51]</sup>. The parents were very much satisfied with zirconia crowns than strip crowns and veneered crowns<sup>[34]</sup>. The commercially available zirconia crowns are EZ Pedo, NuSmile and Kinder Krowns.

#### **CONCLUSION:**

This review is being done to better understand advantage and disadvantages of these crowns, to ensure proper aesthetics and retention of restorations for such cases.

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