

CROWNS IN PEDIATRIC DENTISTRY : A REVIEW

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ABSTRACT

Maintaining primary dentition in a good condition is challenging . children's primary molars and anterior teeth are the most frequently affected by caries in the maxilla. It can be difficult to treat teeth with such severe damage. As a result, several methods for complete coverage restorations for primary teeth have been adopted. Proper selection of the crown by clinician helps in better results . This review seeks to make these crowns more understandable in order to achieve optimal aesthetic and restorative retention in such circumstances.

KEY WORDS: Crowns, complete coverage , esthetic, retention.

INTRODUCTION

The prolonged use of nursing bottles and poor oral hygiene, which results in significant tooth damage, are the two main causes of dental decay in children. Therefore, it's crucial to restore teeth that have been damaged by early childhood caries in order to maintain and encourage the primary dentition's integrity, its exfoliation, and the emergence of permanent teeth. The development of dental materials and the advent of digital technologies have made it possible to create fixed crown restorations in children with great results. "crown" is a tooth shaped covering which is cemented to the tooth surface and its main function is to protect the tooth structure and retain the function . aesthetic crowns and stainless-steel crowns for primary teeth offer a useful option with noticeably higher success rates.

Indications.

1. Caries on multiple surfaces
2. Anteriors that have undergone pulp treatment
3. Severe cervical decalcification
4. Fractured anterior teeth that have lost the majority of their tooth structure
5. Discolored and cosmetically unpleasant teeth
6. High-risk patients with poor oral hygiene but moderate caries.

Classification of crowns

ACCORDING TO POSITION IN ARCH

- a) Anterior crowns
- b) Posterior crowns

ACCORDING TO ESTHETICS

a) Esthetics :

1. Preveneerd crowns
2. Dura crowns

3. Cheng crowns
4. Pedo pearls
5. Pedo jacket crowns
6. Polycarbonate crowns
7. Strip crowns
8. Artglass crowns
9. New millennium crowns

b) Non esthetics:

1. Stainless steel crown

ACCORDING TO BONDING ABILITY WITH TOOTH

a) Crowns that are luted to the tooth

- 1) stainless steel crown
- 2) facial cut stainless steel crown
- 3) preveneered stainless steel crowns
- 4) Pedo pearls
- 5) zirconia crowns

b) Crowns that are bonded to the tooth

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

HISTORICAL DEVELOPMENTS IN PEDIATRIC CROWNS

- 1917—The Rocky Mountain Company created prefabricated (PMC) crowns;
- • 1950—Engel characterised and popularised the stainless steel crown (SSC) in paediatric dentistry;

- 1950 to 1968—prefabricated crowns underwent a variety of alterations.
- 1964 Chosak and Eildeman promoted biologic restoration
- 1970—introduction of polycarbonate crowns
- 1971-Mink and Hill advocated SSC adjustment for oversized and undersized crowns.
- 1977-Mc Evory recommended alteration of SSC approach for SSC with arch length or space loss
- 1980 to 1990—introduction of several veneered stainless steel crowns
- 1980 —introduction of pedo pearls
- 1981—Nash advocates alteration of SSC for adjacent crown placement
- 1983—Hartman recommends veneer SSC technique for aesthetic restoration of anterior crown
- 1987—introduction of cheng crowns by Peter Cheng
- 1989—introduction of kinder crowns
- 1990 to 1995 - Dr. Noma Hall pioneered the Hall procedure for fixation of ssc without tooth preparation on caries teeth.
- 1993, beemer et al recommends band adaptation as a space maintainer instead of crown and loop
- 1997—introduction of pedo natural crowns
- In 1997, Zislock (Incisalock) technology was introduced to improve the retention of previously installed crowns.
- 2002—Kuietzky advise split rubber dam isolation approach for multiple anterior teeth restoration
- 2010- Hansen JP and fisher JP introduced zirconia crowns in pediatric dentistry

1) STAINLESS STEEL CROWN

They are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible material . In 1947 Rocky Mountain Company introduced stainless steel crown in pediatric dentistry

Based on composition it is classified as

- Stainless steel crowns
 1. Chromium 17–20 percent
 2. Nickel 8–12 percent
 3. Carbon 0.15
 4. Iron 0.08–0.12 percent
- Nickel-based crowns
 1. Nickel 70–80 percent
 2. Chromium 10–25 percent
 3. Molybdenum 2–4 percent
 4. Aluminum 2 percent
 5. Beryllium 0.5 percent

Based on shape

- **UNTRIMMED CROWNS** : They are not trimmed or contoured
- **PRETRIMMED CROWN** : Although their sides are straight and untrimmed, they are festooned in a manner that runs parallel to the gingival crest .
- **PRECONTOURED CROWN** : They have festooning and are precontoured but trimming may be necessary

Based on commercial availability

- Rocky mountain
- Ormco company

- Unitek
- 3M Company

The most reliable, cost-efficient, and long-lasting for recovering severely decayed and shattered primary teeth is regarded to be stainless steel crowns [2]. Even in the presence of blood and saliva, it is simple to crimp and successfully applied to very little tooth structure.

Preformed stainless steel/nickel chrome crowns are dependable and long-lasting. Except for aesthetic reasons, stainless steel crowns are unquestionably the gold standard of treatment in many ways

Iron, carbon, chromium, nickel, manganese and other metals constitute stainless steel . When the chromium concentration exceeds 11% and is typically between 12% and 30%, the term "stainless steel" is used. As chromium oxidises, a thin layer of chromium oxide (Cr₂O₃) forms on its surface, serving as a "passivating film" and preventing corrosion.

When it comes to placement, it is less technique sensitive and offers full coronal coverage. This is common in uncooperative crying children where suitable crown can be placed without adjusting the standard of the restoration.

Advantages

1. Provides long lifespan, comparable to that of a healthy teeth .
2. Protect the remaining tooth structure that would have been weakened by severe caries eradication .
3. Less technique sensitive with fewer placement errors .
4. It is more economical
5. failure rate is low .

Disadvantages

1. Unappealing metallic look.
2. It is not possible to use on partially erupted tooth

Due to esthetics concern these crowns are modified into resin-veneered stainless steel crowns and the facial cut-out stainless steel crown .

MODIFICATION OF STAINLESS STEEL CROWNS

I. FACIAL CUT STAINLESS STEEL CROWNS

SSC can restore anterior teeth that have decay. Even with minimal tooth structure, this style of crown is easy to fit and resistant to fracture. The chairside method known as the "open-face scc technique" can enhance the silver color. In order to do this, stainless steel crowns' labial side must be filled with composite. The appearance of metal is still present, though. A 330 bur is used to remove the metal from the facial surface of the crown before setting of the recommended glass ionomer cement with a ssc crown. The application of tooth-colored resin comes after bonding and etching. [2,9]

Advantage : They have improved aesthetics ,over stainless steel crown .

Disadvantages : They are time intensive

Metal borders can be seen

II. Pre Veneered Stainless steel crowns

To offer an additional attractive choice for anterior teeth, preveneered SSCs were introduced. These crowns are prefabricated and made of tooth-colored material that is adhered to ssc on the facial surface. These crowns combine the strength of traditional SSC with the cosmetic qualities of composite resin. [2,8] some of these crowns include Cheng crowns, Kinder Krowns, NuSmile, Whiter Biter, Pedo Compu crowns, and Dura crowns

Advantages

1. They have good aesthetics
2. They need only a little amount of operating time.
3. They are as sturdy as a steel crown.

Disadvantages

1. They cost more than stainless steel, strip and polycarbonate crowns
2. The method forbids significant recontouring and reshaping of the crown
3. The crowns are susceptible to fracture

a) CHENG CROWNS

Peter Cheng advocated cheng crowns in 1987. These paediatric anterior crowns are made of stainless steel and have a high-quality composite face and mesh base. [2] Without appreciably adjusting their bond strength or color, they can be heat sterilized.

b) KINDER CROWNS :

These crowns have the essential shade and contours available for paediatric patients. These crowns have an additional retention mechanism known as incisal lock. [3,7] They are available in two appealing colours, Pedro 1 and Pedro 2. The most natural shade is Pedro 2.

c) Nu Smile crowns

These crowns are made of stainless steel and have the most realistic appearance. They have a metal portion on the lingual side and a facing on the labial side, thus only the lingual side can be crimped. [2] They come in normal and big sizes for anteriors.

d) WHITER BITER CROWNS:

A dental crown with a polyester/epoxy hybrid polymeric coating with a stainless steel shell. It has a thin layer of coating, will adhere to the crown during the manipulation. coating does not peel or chip easily. [3]

e) PEDO COMPU CROWNS

In addition to being made of stainless steel, Pedro Compu

crowns also have a mesh base and a high-quality composite face. These crowns match pediatric natural shade and are stain and plaque resistant [3,4].

f) PEDO PEARLS

metal crown that resembles one made of stainless steel that has a tooth-colored epoxy paint finish all around it. The crowns are more durable since the epoxy coating binds better to aluminium, the crowns are made of aluminium rather than stainless steel. These crowns are made of thick gauge aluminium and are coated with an organic enamel that is both flexible and durable (FDA food grade powder). The colour coating is not going to chip or peel. They are offered in universal anatomical types that can be employed on either side, reducing selection time and cost. advantages it is easy to crimp without peeling and chipping. [3,10]

g) DURA CROWNS

They are high density polyethylene veneered crowns. These crowns may be readily festooned, trimmed with crown scissors. They can also be crimped both labially and lingually. After placement, if the facing cracks, cosmetic restoration is challenging and typically necessitates replacing the crown. [4,9]

2) Polycarbonate crowns

Polycarbonate crowns are heat-molded acrylic resin that are adapted to teeth with self-cured acrylic resin. They are simple to cut. Polycarbonate crowns are often offered in two tooth-colored shades: dark and light. These crowns are unable to withstand significant abrasive forces, resulting in occlusal wear, fracture, or dislodgement. [2,25]

Advantage

1. They are very esthetic
2. Contours and crimp similar to metal crowns

Disadvantage

1. They are not advised in bruxism conditions.
2. More tooth reduction is necessary .

3) Pedo jacket

They are made of copolyesters that have resin filling and remain on the tooth after polymerization rather than being taken out of the crown form after curing of luting resin cement. It does not split, stain or crack. [2,7,9]

Advantage

1. Single sitting crown placement
2. Crown will not stain or break
3. Can be altered with scissors

Disadvantage

1. Available in one size
2. Cannot be altered with high speed finishing bur

4) Strip crowns

For the purpose of restoring primary anterior teeth, strip crowns are celluloid crown shapes that serve as a matrix for filling with tooth-colored materials. After polymerization, a dental bur or a cutting edge can be used to quickly remove the celluloid form of the resin-based composite. [4,10,25]The color of the material can change due to bleeding, and moist deterioration from blood or saliva can interfere with the bonding .

Advantage

1. It provides superior esthetics and cost of material are reasonable
2. Simple to fit and trim
3. Leaves smooth shiny surface

Disadvantage

1. It is extremely technique sensitive
2. Not advised on patients with bruxism condition

5) New Millennium crown

These crowns resemble Pedo Jacket and strip crowns, however they are composed of a composite resin material that has undergone laboratory enhancement. These crown forms are attached to the tooth using resin filling. If placed upon an improperly reduced preparation, crown forms may fracture. It requires a sufficient bonding area, great moisture management, and absence of bleeding. [3,7,9]

Advantages

1. Esthetic crown
2. Can be altered with high speed finishing burs

Disadvantages

1. Expensive crown
2. Needs adequate moisture control

6) Artglass crowns

Artglass is a polymer glass that has a highly cross -linked three- dimensional molecular network .It is made up of 55% microglass and 20% silica as a filler ,but when the matrix is cured, organic glass forms which is called polymer glass .As a result it has a tough ,elastic property of porcelain as well which provides greater durability esthetics than strip crowns .[4,9,10]

Advantages

1. Single visit crown placement

2. easily adjusted or repaired intraorally
3. Color stable
4. Provides greater durability and esthetics

Disadvantage

1. Crown failure usually due to result of poor bond

7) ZIRCONIA CROWNS

Zirconia is a type of crystalline zirconium dioxide. The yttriumoxide-partially-stabilized zirconium in particular (3Y-TZP). Compared to stainless steel crowns, zirconia crowns are more aesthetically pleasing and have higher fracture resistance and flexure strength. Zirconia is now the most durable dental ceramic available, as well as the most aesthetically beautiful. Zirconia is a new restorative material for the deciduous dentition, despite being widely recognized as a permanent restorative material. They have the disadvantage of greater tooth preparation and increased cost compared to stainless steel crowns. [4,8,16] Brand names include EZ Pedo, Nu Smile ZR, Zirconia Kinder Krowns and Cheng zirconia crowns.

Advantages:

- Highly durable
- Resistance to wear and tear
- Tooth reduction is less
- It is metal free
- Less susceptible to fracture
- It is highly Biocompatible

Disadvantages :

- Abrasive effect on tooth
- High cost

CONCLUSION

For the restoration of deciduous teeth, there are many different types of crowns that are available. These crowns have been used for many years with great success. The

choice of the restorative material are influenced by the operator's preferences, the parents' aesthetic requirements, the child's behaviour, moisture and bleeding control, and other factors. To offer children with comprehensive care using these crowns to restore function and aesthetics, the practitioner must be knowledgeable of the most recent restorative procedures.

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