Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 3038 – 3044
Received 15 April 2021; Accepted 05 May 2021.

Semi Permanent Crowns in Pediatric Dentistry: A Review

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Abstract: 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. Maintenance of the primary dentition in a nonpathologic and healthy condition is important for the overall well being of the child. Treatment of the severely destructed teeth poses a challenge for the pediatric dentist as three important considerations have to be kept in mind, patient's behavioral management, preservation of the tooth structure and parental satisfaction Present review highlights the various recent advances in crowns the field of pediatric dentistry.

Keywords: Pediatric dentistry. Primary tooth, Semi permanent crown, Crowns

Introduction: Rehabilitation of badly decayed primary teeth is a challenging task. A clinician needs to restore the tooth comprehensively and also manage a young child's temperament in a clinic. Due to their young age and still developing cognitive skills, it is very hard to presume that a child is going to be the most cooperative in a dental clinic.[1] The restoration for primary teeth needs to be durable, esthetically pleasing, retentive, and strong as it is need for a duration of approximately 8 years until the primary teeth begin to shed.[2]

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Stainless steel crowns (SSC) for primary molar teeth were first described in 1950 by Engel, followed by Humphrey. Since then, design modifications have simplified the fitting procedure and improved the morphology of the crown so that it more accurately duplicates the anatomy of primary molar teeth. Stainless steel crowns are the most commonly used restorative material in primary teeth and it is often used as an interim restoration in permanent teeth in certain condition.[3] However various other crown with better esthetic are now available in the market. Present review highlights the various recent advances in crowns the field of pediatric dentistry.

Historical developments in pediatric crowns[3]

Table no :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.
2018	Figaro crown

Classification

According to Sahana S et al (2010)[4]

a) Crowns that are luted to the tooth

1) Resin veneered stainless steel crown

2) Facial cut out crown

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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

Various semi permanent crowns used in pediatric dentistry

Stainless steel crowns

Stainless steel crowns are one of the earliest crowns used in dentistry to restore teeth. Introduced by the Rocky Mountain Company in 1947 and popularized by W. P. Humphrey in 1950, they have proved to have high strength, durability, and wear resistance. However, they are highly unesthetic due to its colour. Two modifications of these types of crowns are the resin-veneered stainless steel crowns and the facial cut out stainless steel crowns. Facial cut-out stainless steel crowns or open faced stainless steel crowns have composite material substituted in the facial surface of the crown to prevent the unsightly silver colour of steel. Although composite is placed anteriorly, the metal margins are still seen and the procedure to fabricate the crown is time consuming. Resin-veneered stainless steel crowns, on the other hand, have thermoplastisized composite resin bonded to the metal. Examples of these types of crowns are the Cheng crowns, Kinder Krowns, NuSmile, Whiter Biter, Pedo Compu crowns, and Dura crowns.[2,3]

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.[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

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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]

Dura crowns

Dura crowns are made of a high density polyethylene veneered crown. Dura crowns have the advantage of higher retention compared to nonveneered crowns when cement and crimping are combined. These crowns can be crimped labially, lingually, and can be trimmed with crown scissors and festooned. It also has a full knife edge.[5]

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.[7]

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.[8]

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.[2]

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

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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.[9]

Pedo Compu crowns

Pedo Compu crowns are also stainless steel crowns which a high quality composite facing and mesh based with a light cured composite crown. Like Cheng crowns, they are also plaque resistant and have good color stability.[4]

Composite shell crowns

Composite shell crowns are crowns prepared with composite material by indirect method. This technique of restoration is mainly advantageous in rehabilitation of teeth in very young children. Apart from the advantages of indirect composite restoration technique over the direct composite restorations, the custom made positioner helps in simultaneous restoration of multiple teeth.[10]

Zirconia pediatric crown

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. 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.[11]

Figure No 1: NuSmile Trying Crown and Zirconia Crown

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(Image courtesy- Dr. Susheel Kumar, Simply Smilez Dental Clinic, Hyderabad)

Biological Crown

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.[12]

Golden stainless steel Crown: Recently, Shinhung Co. Ltd. introduced titanium coated golden Stainless steel crown (Kids crown, Shinghung, Seoul; Korea) which has added advantage over conventional stainless steel crown. They are the SS crown having natural golden luster through titanium coating which provides high quality esthetic finish with easy maneuverability and reduce chair side time.[13] Bamdadian Z et al. (2019) evaluated physical and mechanical properties of different brands of primary molar stainless steel crowns; the results showed that kids has satisfactory physical and mechanical properties.[14]

Figure No. 2 – Golden stainless steel Crown

(Image courtesy- Dr. Susheel Kumar, Simply Smilez Dental Clinic, Hyderabad)

Conclusion: Through this review of literature, effort has been made to bring together the various approaches for full coverage restorations in pediatric dental practice. 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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