

Anterior aesthetic crowns in Paediatric Dentistry

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Abstract

In modern society, the demand for aesthetic restorations is increasing in pediatric dentistry. Parents have high expectations of the various restorative materials which are used especially in the aesthetic zone. Esthetic rehabilitation of badly decayed primary anterior teeth is both difficult and challenging. A clinician needs to restore the tooth aesthetically and also manage a young child's temperament in a clinic. Due to their very young age and developing cognitive skills, it is very difficult to presume that a child is going to be the most cooperative in a dental clinic. The most common condition that affects a child's anterior teeth is due to dental caries seen in the form of nursing bottle caries. It is usually observed in children from 18 to 36 months. The restoration for primary anterior teeth needs to be durable, aesthetically pleasing, retentive, and strong since it is required for duration of approximately 8 years until the primary teeth begin to shed. Durability, cost and aesthetics are the main factors considered by parents when determining a treatment plan. Tooth-coloured restorations, especially for anterior teeth,

are of primary concern to parents. A particular study showed that parents ranked attractiveness and health similarly. The same study also mentioned that parents viewed silver stainless steel crowns as unhealthy and aesthetically unacceptable. While the decision on treatment planning is often driven by the parents, children are also concerned about aesthetics and tend to prefer white fillings rather than silver. Anterior teeth used to be treated with primarily preformed polycarbonate crowns, acid-etched resin crowns, and stainless steel crowns. However, each came with their own set of advantages and disadvantages which brings us the development of newer type of crowns to replace primary anterior teeth.

Keywords: Anterior, Aesthetic, Zirconia, Pompedo, Biologic.

Introduction

Dentistry has undergone a big evolution since beginning. Today, with the explore for beauty and natural color take such a dominant role in our society, modern dentistry ought to create advances in these fields. Esthetics by definition is that the science of beauty: that individual

detail of an animate or inanimate object that makes it appealing to the eye. In the modern cosmetically aware world, well contoured and well aligned white teeth set the quality for beauty. Such teeth are not only considered attractive, but are also indicative of nutritional health, self-esteem, hygienic and shows economic status of a person.¹ Esthetic restorations in primary anterior teeth are a good concern and challenging task for most of the dentists. The restoration of unhealthy, fractured, or discolored primary incisors is rewarding to dentists because it provides them the satisfaction of knowing they have restored the smile and self-confidence of a growing child. However, restoring primary teeth can be challenging because of the difficulty of isolation and the lack of cooperative ability of a young child to cooperate for longer periods of time. A study by Riekman and Badrawy reported that early loss of primary teeth resulted in speech problems.²

Indications

According to American Academy of Pediatric Dentistry full coverage is indicated in any of the following circumstances:

- 1) Children who are at a high risk with anterior and / or posterior decay,
- 2) Tooth with extensive decay,
- 3) Large lesions or multiple surface lesions,
- 4) Pulpally treated teeth and
- 5) Children requiring general anaesthesia.³

Crowns for restoring primary incisors falls into two categories: (1) those that are preformed and held onto the tooth by luting cement, and (2) those that are bonded to the tooth (Waggoner, 2015). In the mid-1990s, preveneered stainless steel crowns (PVSSCs) were manufactured and used for primary anterior teeth restorations such as Cheng Crowns, Kinder Crowns, NuSmile Primary Crown, Whiter Biter II Crown (Baker et al., 1996; Yilmaz and Yilmaz, 2004). Each brand has its

own secrets that could not be revealed such as the materials used and manufacturing the preveneered crowns (Waggoner and Cohen, 1995). Beattie et al. (2011) have reported that NuSmile crowns had a strong chemical bond between the stainless steel metal and composite resin. They are prebonded with resin veneer facings extending to all esthetically prominent areas. Stainless steel is strong, resilient and malleable.⁴ . If full coronal restoration of mandibular incisors is required it requires the use of a maxillary lateral crown form, which, ultimately, results in a very bulky looking restored incisor.

Open Faced Stainless Steel Crowns

With the development of the acid-etch technique, and also improvement in handling, finishing aesthetic concerns of composite materials, these have for the most part replaced the use of stainless steel crowns for the repair of fractured incisors. Whenever the fracture-line extends beneath the gingival margin, the stainless steel crown may still be the better choice. The main drawback is aesthetics, and this can be overcome by cutting out the labial face of the crown and filling in with a tooth-coloured material, such as composite. Hartmann CR and Helpin ML suggested that in kids with rampant unhealthy lesions, open-faced stainless steel crowns can be used. Though some aesthetics is sacrificed, enhanced functional stability is added to these restorations.



Open Faced Stainless Steel Crown

Disadvantages of the crown includes less time consuming procedures, metal margins will be seen, clinicians need to take care of hemorrhage management throughout the application of composite facings, they may have a short lifespan.⁵

Roberts C et al conducted the primary study on resin-faceted stainless steel crowns used for restoring anterior primary teeth and described the clinical performance of these crowns. He concluded that stainless steel crowns have high rate of retention and also there was failure at one third of the facing that occurred most commonly at resin-resin and resin-metal interface.⁶

Resin Veneered Stainless Steel Crown

Recently, resin-veneered SSCs have been introduced where composite resins and thermoplastics are “bonded” to the metal. Cheng crowns, Kinder crowns, Nu-smile and Whiter biter, Pedo compu crowns and Dura crowns are the commercially available resin veneered crowns.

Pedo Pearls

These are heavy gauge aluminum crowns which are coated with FDA food grade powder coating along with epoxy-resin. (Stoller WJ, Shiwota S, 2006). They serve as ultimate permanent crown for primary teeth. Aluminum is

used because it bonds more effectively to epoxy paint but they are relatively softer and may cause the epoxy paint to wear off in areas of heavy occlusion.⁷



Pedo Pearls

Nusmile Crowns

They are conjointly manufactured from stainless steel with more esthetically appearing tooth-colored coating. They are offered in two styles which are the NuSmile Signature and NuSmile ZR. The NuSmile Signature crowns are anatomically perfect with a natural tooth-colored coating which can serve as a substitute to the traditional stainless steel and composite strip crowns. NuSmile ZR, is made from a high-grade monolithic zirconia ceramic which makes them highly aesthetic and durable compared to the NuSmile Signature.⁸



Nusmile Crowns

Cheng Crowns

They are stainless steel crowns, mesh-based with a light-cured composite. There are two variants which are the classic crowns and also the zirconia crowns. The classic crowns have a resin veneered to a stainless steel coping where as the zirconia crown can be a precision-milled monolithic ceramic crown that is indestructible. While

zirconia crowns are not crimpable like the classic crowns, they are precrimped to give a crimplock retentive margin to have natural emergence profile. Zirconia crowns are often sterilized by autoclave while the classic crowns are usually cold sterilized.⁸



Cheng Crowns

Dura Crowns

Dura crowns are manufactured from a high-density polyethylene veneered crown. Dura crowns have the advantage of higher retention when compared to nonveneered crowns. These crowns have the advantage that can be crimped labially, lingually, and can also be trimmed with crown scissors and festooned. It also has a full knife edge.⁸



Dura Crowns

Kinder Crowns

Kinder Crowns offers the foremost natural shades and contour available for the pediatric patients. They are available in pair of aesthetically pleasing shades, Pedo 1 and Pedo 2. Pedo 2 shade is the most natural shade While Pedo 1 shade is for those patients where bleached natural shade is required. Kinder Crowns are designed with distinctive IncisaLock™ - the optimal union of state-of-the-art bonding procedures and mechanical retention.⁹



Kinder Crowns

Whiter Biter Crowns

These crowns have a chemical compound coating with polyester/epoxy hybrid composition. Though the coating is thin, it does not peel or chip easily.¹⁰

Pedocompu Crowns

Pedo Compu crowns are stainless steel primary anterior crowns with prime quality composite facing and mesh based with a light cured composite crown. Like Cheng crowns, they are conjointly plaque resistant and have great colour stability.¹¹

Polycarbonate crowns

Polycarbonates are aromatic linear polyesters of carbonic acids. They exhibit high impact strength and rigidity and are termed thermoplastic resins since they are molded as solids by heat and pressure into the required form. Their heat distortion point is 270° F. Although they were more aesthetic than stainless steel crowns, the polycarbonate material was brittle and did not resist strong abrasive

forces, causing frequent fracture and dislodgement. They are easy to trim and can be adjusted with pliers. These crowns fail to resist strong abrasive forces hence it is contraindicated in cases of severe bruxism and deep bite patients.



Kudos Crowns

Pedonatural Crowns

The PedoNatural consists of three components mainly ultrathin polycarbonate material, hybrid acrylic filling material and glass ionomer cement. All components of the PedoNatural Crown are hydrophilic. These crowns can be easily used in crowded situations as well as Class III malocclusions.



Pedonatural Crowns

Artglas Crowns / Glastech Crowns

These are forms of full coronal restorations with aesthetic value for the deciduous dentition. Artglass is made up of bifunctional and new multifunctional methacrylates. The Artglass matrix has the ability to form three dimensional molecular networks with a highly cross-linked structure. However, the complication rate and the increased plaque accumulation restrict the indication for permanent restorations.¹³

Strip Crowns

Esthetically, they provide a striking similarity to the original primary tooth. Resin-bonded composite strip crowns are the first choice restoration for many clinicians, mainly because of the superior aesthetics and the ease of



Polycarbonate Crown

Some of the commercially available polycarbonate crowns include: 3M ESPE Polycarbonate Crowns, Kudos polycarbonate crowns, PedoNatural Crowns

Kudos Crowns

Kudos crowns are newer generation polycarbonate crowns which are commonly used as temporary pediatric crowns. It is simple to use considerably reducing the chairside time and at the same time overcomes the difficulties reported so far pertaining to placement and retention. It is user friendly and aesthetically acceptable. The firmness of the crown permits it to function as a provisional crown restoration up to several months/years to safeguard the patient's teeth from trauma.¹²

repair if the crown subsequently chips or fracture. It is the foremost technique-sensitive option. Contamination with blood or saliva may interfere with the bond, and hemorrhage can alter the shade or color of the material.¹⁴



Strip Crowns

Pedojacket Crown

Pedo Jacket crown is like a strip crown. It is handled same as celluloid crown form. Because the crowns are made of a copolyester, they cannot be trimmed or reshaped with a high-speed finishing bur due to the fact that the material will melt to the bur.¹⁵



Pedojacket Crown

Composite Shell Crowns

Composite shell crowns are crowns are made of composite material by indirect method. Benefits includes require less chairside time, no need of trimming or crimping during clinical procedure, less technique or moisture sensitivity. Disadvantages are two visit procedure and need lab procedures.¹⁶



Composite Shell Crowns

New Millenium Crowns

This crown is analogous in form to the Pedo Jacket and strip crown except that it is fabricated from a laboratory enhanced composite resin material. These crowns can be very aesthetic and can be finished and reshaped with a high speed bur. More costlier than either of the other two.¹⁷



New Millenium Crowns

Glass Ionomer Crown

These crowns are fabricated using GIC in conjunction with celluloid strips crown. This method provides a definitive advantage of glass ionomer restorative material over composite in its ability to release fluoride for extended period. Disadvantages include lack of strength.⁷

Zirconia Crowns

Zirconia (zirconium dioxide) crowns are fabricated from solid monolithic zirconia ceramic material. They are available as preformed crowns for primary teeth. Zirconia crowns also known as “ceramic steel” as it provides tooth like esthetics and strength close to available metal crowns have been in use in dentistry for the last one decade.¹⁸

Zirconia incorporates a distinctive 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.¹⁹ They are anatomically contoured, metal free, completely bio-inert, and resistant to decay.²⁰

Zirconia provides extremely polished surface thus preventing staining and plaque accumulation in contrast to composite strip crowns.¹⁸

A recently clinical study found that zirconia crowns provide better gingival health and less plaque accumulation, compared to SSC ones.¹⁹

Commercially available zirconia crowns include ZIRKIZ CROWN, KINDER KROWN AND EZ CROWN

Zirkiz Crown

Three type of zirconia are currently used in dentistry; these are yttria stabilized tetragonal zirconia polycrystal (Y-TZP), magnesia partially- stabilized zirconia and zirconia toughened alumina. Y-TZP is a monolithic zirconia that consists of equiaxed partially stabilized 4 tetragonal grains. Because of the superior mechanical properties of Y-TZP ceramics, these materials have a wide range of clinical applications, from implant abutments and single-tooth restorations to fixed partial dentures involving several elements.²⁰



Zirkiz Crowns

Ez –Crown

EZ-pedo is the first company to offer fully “white,” prefabricated, ceramic crowns especially designed for children. Each crown is glazed with a touch of natural colour, creating them very smooth, shiny and impermeable to staining. Zirlock technology has been implemented within the EZ-pedo crown to boost retention.



Zirlock Technology for Retention

Zirconia Kinder Krowns

They have extremely characterized incisal edge, scientifically developed shades, and finely feathered margins. The finely feathered margins help create an aesthetic emergence profile. Zirconia Kinder Krowns have an internal retention system in the form of retention bands which locks the restoration to the tooth after cementation. These retention bands also increase the total surface area for the cement to bond to both the tooth structure and the crown.



Zirconia Kinder Crowns

Nusmile Zirconia

NuSmile ZR is made from a high-grade monolithic zirconia ceramic which provides superior esthetic and durability. It is produced by the nano technology, produces most consistent, high quality zirconia. A drawback of these crowns is the high cost.



Nusmile Zirconia

Pompedo Crown

An alternative cheaper crown was developed by CAD-CAM technology and was called Pompedo crown. Pompedo crown is made of polyoxymethylene (POM). One advantage of Pompedo crown was its resilience. Hence, the crown can be pressed upon without fear of breakage. Also, the crown can embrace an undercut.

Pompedo can be recommended for use as an aesthetic replacement for zirconia crowns in primary teeth due to its lower cost and comparable clinical performance over two years post placement.²¹



Pompedo Crowns

Biologic Crowns

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. The technique eliminates high costs associated with other restorative techniques for deciduous anterior teeth, because stored extracted over-retained deciduous teeth were used for the procedure.²²



Biologic Crown

Flex Crowns

Flex white-faced stainless steel pediatric crowns are manufactured from new material that may be crimped on facial and lingual, and can also be squeezed on the mesial and distal to allow for better adaptation without the fear of compromising the bond strength.



Flex Crowns

High Density Polyethylene Veneered Crowns For Children

These are aesthetic preformed crown for children. The veneer is comprised of high density polyethylene, which is thermoformed over a preformed stainless steel crown to obtain the desired appearance.⁷



High Density Polyethylene Veneered Crowns

Ceramo Base –Metal Crowns

Ceramo-metal alloys are those used to create the substructure of a bridge or crown which will have cosmetic porcelain fused to its visible surfaces. The American Dental Association has three classes of Crown and Bridge Alloys such as high noble, noble and base metal alloys.⁷

Conclusion

There are a wide variety of options that can be used to rehabilitate carious primary anterior teeth. Each of which comes with its own advantages and disadvantages. Thus,

the choice of material is dependent on the clinicians preference, skill, esthetic and conjointly along with the functional demands of the child and parents.

References

1. Muhamad AH, Nezar W, Azzaldeen A, Hanali AS. Anterior dental esthetics in primary teeth. *Int J Environ Res Public Health*. 2015 Jan 19;3(1):25.
2. Joybell CC, Ramesh K, Simon P, Mohan J, Ramesh M. Dental rehabilitation of a child with early childhood caries using Groper's appliance. *J Pharm Bioallied Sci*. 2015 Aug;7(Suppl 2):S704.
3. AAPD, Reference Manual, Clinical Guidelines V 33 / No 6 11/12
4. Al Shobber MZ, Alkhadra TA. Fracture resistance of different primary anterior esthetic crowns. *The Saudi dental journal*. 2017 Oct 1;29(4):179-84.
5. Garg V, Panda A, Shah J, Panchal P. Crowns in pediatric dentistry: A review. *J Adv Med Dent Scie Res* 2016;4(2):41-46.
6. Robert C, Lee JY, Wright JT. Clinical Evaluation Of and Parental Satisfaction With Resin-Faced Stainless Steel Crown. *Pediatr Dent*. 2001;23:28-31.
7. Babaji P. *Crowns in Pediatric Dentistry*. 1st ed. New Delhi: Jaypee Publishers;2015
8. Yang JN, Mani G. Crowns for primary anterior teeth. *International Journal of Pedodontic Rehabilitation*. 2016 Jul 1;1(2):75.
9. Tote J, Gadhane A, Das G, Soni S, Jaiswal K, Vidhale G. Posterior Esthetic Crowns in Pediatric Dentistry. *Int J Dent Med Res*. 2015;1(6):197-201.
10. Gadhane A, Das G, Soni S, Jaiswal K, Vidhale G. Posterior Esthetic Crowns in Pediatric Dentistry. *Int J Dent Med Res*. 2015;1(6):197-201.
11. Sahana S, Vasa AA, Ravichandra SK, Vijaya Prasad KE. Esthetic crowns for primary teeth: A review. *Ann Essence Dent* 2010;2:87-93.

12. Venkataraghavan K, Chan J, Karthik S. Polycarbonate crowns for primary teeth revisited: restorative options, technique and case reports. *J Indian Soc Pedod Prev Dent.* 2014 Apr 1;32(2):156.
13. Lehmann F, Spiegl K, Eickemeyer G, Rammelsberg P. Adhesively luted, metal-free composite crowns after five years. *J Adhes Dent.* 2009 Dec;11(6):493-8.
14. Ram D, Fuks AB, Eidelman E, et al. Long-Term Clinical Performance of Esthetic Primary Molar Crowns. *Pediatr Dent.* 2003;25:582
15. Evans D, Southwick C, Foley J, Innes N, Pavitt S: The Hall technique: a pilot trial of a novel use of preformed metal crowns for managing carious primary teeth. *Tuith Online*, December 2000.
16. Updyke J, Sneed WD. Placement of a preformed indirect resin composite shell crown: A case report. *Pediatr Dent.* 2001;23:143-4.
17. Kupietzky A, Waggoner WF, Galea J. Long-term photographic and radiographic assessment of bonded resin composite strip crowns for primary incisors: results after 3 years. *Pediatr Dent.* 2005 May 1;27(3):221-5.
18. Ashima G, Sarabjot KB, Gauba K, Mittal HC. Zirconia crowns for rehabilitation of decayed primary incisors: an esthetic alternative. *J Clin Pediatr Dent.* 2014;39(1):18-
19. Larsson C. Zirconium dioxide based dental restorations. Studies on clinical performance and fracture behaviour. *Swedish dental journal. Supplement.* 2011(213):9-84.
20. Khatri A. Esthetic zirconia crown in pedodontics. *International Journal of Pedodontic Rehabilitation.* 2017 Jan 1;2(1):31.
21. Diener V, Polychronis G, Erb J, Zinelis S, Eliades T. Surface, Microstructural, and Mechanical Characterization of Prefabricated Pediatric Zirconia Crowns. *Materials.* 2019 Jan;12(20):3280.
22. Piconi C, Maccauro G. Zirconia as a ceramic biomaterial. *Biomaterials.* 1999 Jan 1;20(1):1-25
23. Elkhadem A. Clinical outcomes of Pompedo versus Nusmile (Nsz) crowns. A retrospective cohort study. *Egyptian Dental Journal.* 2018 Jan 1;64(1-January (Orthodontics, Pediatric & Preventive Dentistry)):1-7.
24. Mandroli PS. Biologic restoration of primary anterior teeth: a case report. *J Indian Soc Pedod Prev Dent.* 2003; 21(3):95-97.

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