

Review Article

Aesthetic management of mutilated primary anterior teeth

¹Dr. Koundal Lisma, ²Dr. Priyanka Kumari, ³Dr. Gupta K Kamal, ⁴Dr. Sharma K Amit

^{1,2}Junior Resident, ³Professor and HOD, ⁴Professor, ⁵Reader, Department of Pedodontics and Preventive Dentistry, Himachal Dental College, Sundernagar, Himachal Pradesh, India

ABSTRACT

Dental caries is most common childhood disease which affects children in their very early stages of development. This severe form of caries is also associated with the deleterious effects like difficulties in phonation, mastication and altered esthetics. Esthetic requirement of severely mutilated primary anterior teeth has been a challenge to pediatric dentists in the case of early childhood caries (ECC). ECC affects more than one out of seven pre-schoolers and is more prevalent in low income families, who generally have limited access to dental services. Numerous treatment approaches have been proposed to address the esthetics and retention of restorations in primary teeth. The technological advances in dental materials for use on children that have occurred in the past few decades make constant re-evaluation of our treatment philosophies and techniques a necessity because what was an acceptable treatment approach in the past may not necessarily be the best treatment option for our young patients today. The choice of restoration depends on various factors such as amount of tooth structure remaining, ability to obtain adequate moisture control, child's cooperating ability, esthetic demands, and cost factor. Depending upon the amount of tooth loss they are treated either intracoronally or full-coronally. Many options exist to repair carious teeth in pediatric patients from metal posts, stainless steel crowns to its various modifications to other esthetic options like fiber posts, strip crowns and zirconium crowns which are rising in their popularity.

Keywords : Early childhood caries(ECC),esthetics, posts, crowns.

Received: 18 February, 2023

Accepted: 27 March, 2023

Corresponding author: Dr. Koundal Lisma, Junior Resident, Department of Pedodontics and Preventive Dentistry, Himachal Dental College, Sundernagar, Himachal Pradesh, India

This article may be cited as: Lisma K, Kumari P, Kamal GK, Amit SK. Aesthetic management of mutilated primary anterior teeth. J Adv Med Dent Scie Res 2023;11(4):1-9.

INTRODUCTION

Early childhood caries is a major public health problem and the most prevalent chronic disease of childhood. The **American Academy of Pediatric Dentistry (AAPD)** defines "early childhood caries" (ECC) as at least 1 decayed, missed, or filled surface in any primary tooth in a child 71 months old or younger.^[1,2] The restoration of severely mutilated primary anterior teeth has for long been a challenge for the Pediatric dental surgeon and one of the most difficult goals to achieve, not only because of the lack of available materials and techniques, but also because the children who require such restorations are usually among the youngest and least manageable group of patients. Various materials have been advocated to rehabilitate teeth with ECC; Traditionally, metal posts have been used to restore but increased esthetic demands as well as possible problems resulting from corrosion of posts led to the

development of tooth-colored post systems.^[3] In addition, metal posts are associated with inferior esthetics. Fiber posts came into practice in the early 1990s, and provided an efficient means to restore the teeth. Fiber posts are composed of fibers (e.g. carbon, quartz, silica, zirconia, or glass) in a resin based matrix.^[4]Recent developments in full coronal restorations such as band reinforced composite, composite resins, indirect shell crowns, polycarbonate crowns, strip crowns, and zirconia crowns with placement techniques, preparation designs, and adhesive protocols have provided clinicians with an alternative to extraction and facilitated aesthetic restoration of mutilated primary anterior teeth to quite an extent.^[1]Each of these methods has short comings but each of them can be used at some time. The search for the ideal intracoronary and full coronal restorations in pediatric dentistry continues. The purpose of this

library dissertation is to throw light and analyze the recent developments and trends in pediatric dentistry.

INTRACORONAL RESTORATIONS

To provide shape, function and esthetics in mutilated primary anterior teeth, use of intracanal retainers is necessary, which includes different and innovative root canal retentive post and core systems so that the primary teeth can be retained until their replacement by successors.^[5]

INDICATIONS OF POSTS

1. When ½ crown structure has been lost.
2. At least 1 mm of tooth structure is seen supragingivally.
3. Reduced crown tooth structure.

4. To re-establish the shape and form of a severely decayed or fractured maxillary anterior tooth crown while it provides support for the final restoration.
5. The posts also increase the resistance of the restored teeth to mechanical load.^[5]

CONTRAINDICATION

1. When 2/3rd of tooth structure present.^[5]

METAL POST(Fig 1)

They are made up of stainless steel wire of 22 gauge/0.7 mm. They are rigid but not aesthetic. Retention can be increased with addition of serration in the post. They may interfere with physiologic root resorption if they are placed beyond 3 mm in the canal.^[6]



Fig 1: Metal post

PROCEDURE

Number 4 metal screw post is selected which is snugly fitted into the canal to avoid any fracture because of stress and then it is modified by trimming the post part to 3mm and flattening its core part so that strip crown restoration can be easily performed. Intracanal metal short post is cemented into the canal using Glass Ionomer cement. Special consideration is given to make sure post is 3mm into the canal so that it does not interfere with physiological root resorption. Acid etching is

performed followed by bonding of the post into the canal.

ADVANTAGES

1. It is a fast and simple technique
2. Not expensive

OMEGA POST(Fig 2)

The use of Omega loop was introduced by **Mortada and King** as intracanal retainer in the year 2004. Total of 5 mm long post is used in primary teeth. Both 3mm long free ends of post is placed inside the canal. Remaining 2 mm of omega post provides retention to the coronal restoration.^[7]



Fig 2: Omega post

HALF OMEGA POST

Stainless steel wire is bent to half omega shaped to make the post. Serrations are added to increase the potential surface area for attachment of the restorative material and consequently increased the long-term stability of an aesthetic restoration.^[8]

ALPHA POST

Stainless steel wire is bent into Alpha shape and placed in the canal and the extension of the post in the canal should not be more than 3 mm.

GAMMA POST

0.6-mm orthodontic wire is bent to form the Greek letter "y". The loop portion is placed inside the post space, and the 2 free ends are placed toward the coronal portion that helps to provide retention to coronal restoration.^[5]

FIBER BASED POST

Fiber based posts are available in various diameter & length.^[5]

ADVANTAGES OF FIBER POST OVER METAL POST:

1. Aesthetics
2. Translucency
3. Resin composite crown reinforcement
4. Ease for manipulation

GLASS FIBER POST(Fig 3)

They are composed of unidirectional glass fibers embedded in resin matrix that strengthens the dowels without compromising the modulus of elasticity.



Fig 3 Glass fiber post

PROCEDURE

Removal of 4mm length of the coronal portion of the root filling is removed (2-3 mm below CEJ).A thin layer of fast-setting glass ionomer cement condenses over the obturating material to act as a barrier between the obturating material and the resin restoration to prevent interference with the setting process of the composite resin. For each canal a post of corresponding size is trial for proper fitting and length. The post is then placed to a distance of 3mm into the canal and the length is adjusted, such that it extends 2mm outside the canal. Acid etched for 15 seconds with a 37% phosphoric acid gel, rinsed, dried and two coats of adentin adhesive single bond are applied. The tip of flowable composites tube is placed 2 to 3 mm below the CEJ and the composite is injected. The glass post is inserted into the canal with cotton pliers and light cured. The coronary portion of the fiber is completely restored using resin composite.^[9]

ADVANTAGES

1. Stress distribution over broad surface area and increases load threshold.
2. Simple and easy to perform.

DISADVANTAGES

1. Failure to stick to the resinous matrix.
2. Interfere with resorption if extended beyond 3 mm.

RIBBOND FIBERS

These fibers have adequate translucency for cases with great aesthetic appeal because they can be camouflaged inside the resin composite structure, as in cases of intracanal reinforcement. They have advantages of easy to manipulate, fall apart, or rebound, maintaining unaltered extension after being cut. Dual cure resin cement is used with ribbonfibers and final restoration is done with composite resin.^[5]

BIOLOGIC POST(Fig 4)

The term biological restoration was introduced by Santos and Bianchi (1991) to describe an alternative technique that uses adhesive capabilities of materials in combination with strategic placement of parts of extracted human teeth. Ramires-Romitoet al (2000), used teeth from the Human Tooth Bank of Sao Paulo University Dental School to be used as natural posts and crowns to fit into the roots and replace the crowns as well.^[10]

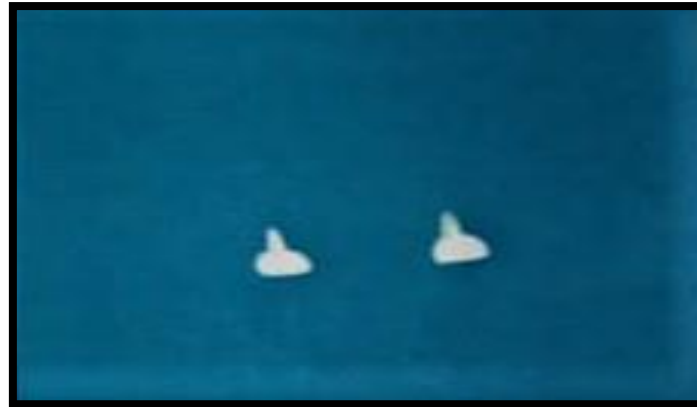


Fig 4 Biological post

PREPARATION OF BIOLOGICAL RESTORATION

Teeth selected from the tooth bank are reshaped to be used as natural post and crown using crown preparation kit (Shofu). The roots that are shaped to function as posts are strengthened by flowable composite material. Tooth selected and prepared for use as biological restoration is then autoclaved for 30 minutes at 121 degree C and 15lbs pressure before cementation. The tooth is then tried for fit and adjustments to be done.^[11] Preparation and retrograde filling of root-stump with flowable composite.

ADVANTAGES

1. Natural tooth obtained from patient or from tooth bank
2. Easy to perform
3. Aesthetics
4. Economical

DISADVANTAGES:

1. Not acceptable by many patients
2. Need of tooth bank
3. Donor & recipient acceptance & cross infection make this treatment option largely impractical.

FULL CORONAL RESTORATIONS

CLASSIFICATION

ACCORDING TO SAHANA S ET AL (2010)^[12]

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

STAINLESS STEEL CROWNS

Stainless steel crowns were introduced to pediatric dentistry by the Rocky Mountain Company in 1947 and made popular by **W. P. Humphrey in 1950**. Until then the treatment for grossly decayed primary teeth was extractions.

ADVANTAGES

1. They are very durable, wear well and are retentive.
2. The time for placement is fast compared to other techniques.
3. They may be used when gingival hemorrhage or moisture is present or when the patient exhibits less than ideal cooperation.
4. They are fairly inexpensive.

DISADVANTAGE

1. Aesthetics are extremely poor. Some parents may opt for extractions in lieu of restoration of the teeth.

MODIFICATIONS

1. OPEN FACED CROWNS(Fig 5)

This involves placement of composite material in a labial fenestration of SSC.



Fig 5 Open faced stainless steel crown

PROCEDURE

Once the cement is set, cut a labial window in the cemented crown using a no. 330 or no. 35 bur. Using a no. 35 bur remove the cement to a depth of 1mm and place undercuts at each margin with a no. 35 bur or with a no. ½ round bur. Smooth the cut margins of the crown with a fine green stone or white finishing stone. After using a glass ionomer liner to mask differences in color between remaining tooth structure and cement place a layer of bonding agent. Place resin based composite into the cut window forcing the material into the undercuts and polymerize. Add additional material in 1mm increments and

polymerize and then finish the restoration with abrasive disks from the resin to the metal at the margins so as not to discolor the resin with metal particles.

PRE-VENEERED STAINLESS STEEL CROWNS(Fig 6)

They are aesthetic; placement and cementation are not significantly affected by hemorrhage and saliva and can be placed in a single appointment. The stainless steel crown is covered on its buccal or facial surface with a tooth colored coating of polyester/epoxy hybrid composition.



Fig 6 Pre-veneered stainless steel crown

PROCEDURE

Size the crown to the tooth by placing the incisal edge of the crown against the incisal edge of the tooth. Prepare the tooth as for a standard stainless steel crown, however more circumferential tooth reduction required. Do not force the crown on the tooth; crown should extend 1mm past the gingival margin. The

length of the crown is altered by trimming the gingival margin with a diamond bur and water spray and lingual aspect of the crown may be crimped slightly with a no. 137 Gordon plier. The crown is cemented with glass ionomer cement and excess cement is removed. After cementation the incisal edges may be contoured with a finishing disk or point.

POLYCARBONATE CROWN(Fig 7)



Fig 7 Polycarbonate crown

Polycarbonate crowns are aromatic linear polyesters of carbonic acids. They exhibit high impact strength and rigidity and are termed thermoplastic resins since they can be molded as solids by heat and pressure into the desired form. Their heat distortion point is 270° F. Their weakness, as far as dentistry is concerned, is poor abrasion resistance.^[13]

PEDO PEARLS(Fig 8)



Fig 8 Pedo Pearls crown

Pedo Pearls are metal crowns coated with epoxy resin, which serve as permanent crowns for primary teeth. The difference was that the metal used was aluminium in place of stainless steel. The epoxy resin coating adheres better with aluminium surface rather than stainless steel. Available in universal size and can be used on any side. This was first introduced in 1980. However, the aluminium crowns are quite soft and which may create a problem with long-term permanence. Likewise in the areas of heavy occlusion, there is usually wearing off of the white coating. In spite of these problems they offer, these crowns can be easily placed of all the crowns with reasonable esthetics. While using these crowns it is advisable to

fill them with either self cure or dual cure composite rather than using regular luting cement. When the epoxy resin coating wears off at the contact point with the opposing tooth, it can be patched up with more composite. Pedo pearls crowns should be avoided in the patients with a history of bruxism.^[14]

STRIP CROWNS(Fig 9)

The bonded resin composite strip crown is perhaps the most aesthetic of all the restorations available to the clinician for the treatment of severely decayed primary incisors. However, strip crowns are also the most technique-sensitive and may be difficult to place. Composite strip crowns are composite filled celluloid crowns forms.^[15, 16]



Fig 9 Strip crown

THE BENEFITS OF THESE CROWNS INCLUDE:^[14]

- a. Parent/patient pleasing.
- b. Ideal for ankylosed tooth build-ups.
- c. Simple to fit & trim.
- d. Removal is fast & easy.
- e. Easily matches natural dentition.
- f. Leaves smooth shiny surface.
- g. Easy shade control with composite.
- h. Superior aesthetic quality.
- i. Crystal clear and thin.
- j. Large selection of size.
- k. Easy to repair.

PROCEDURE

STRIP CROWN PREPARATION

The crown is pierced with a sharp explorer at the mesial or distal incisal angle to create a core vent for the escape of any air bubbles entrapped in the crown. Sharp, curved scissors should be used. Sharp, curved scissors should be used to trim the crown gingival margins. To ensure sharpness, task-designated scissors are recommended for this purpose. All crowns may be trimmed to an approximate level and can be fine-fitted at chair side during the treatment.^[16]

CARIES REMOVAL AND CROWN PLACEMENT, CURING AND FINISHING

1. A stainless steel, round, medium-to-large-sized bur should be used in a slow- speed handpiece for caries excavation.
2. Following the application of a resin-modified glass ionomer liner/base for dentin protection, all crowns should be fitted and placed.
3. Fill and cure each crown individually with unfilled crown forms in place on their respective teeth to ensure proper spacing between restorations.

DISADVANTAGES

1. Technique sensitive

2. Moisture contamination with blood or saliva interferes with the bond and haemorrhage can alter the shade or colour of the material.^[14]

PEDO JACKET(Fig 10)

An alternate crown form for grossly decayed or traumatized primary incisors that is commercially available is the Pedo Jacket. The “jacket” consists of a copolyester material in the natural primary tooth color shade A2. The crown is flexible and its length can be adjusted and trimmed with scissors. In contrast with all of the crowns it is important to note that this is the only flexible or soft crown option available. This property allows for the Pedo Jacket crown to accommodate the great variability in tooth size and shape and to facilitate adaptation to the teeth, especially in a pre-cooperative child.^[17]



Fig10 Pedo Jacket crown

NEW MILLENIUM CROWNS

These crowns are similar in form to the Pedo Jacket and Strip Crown except that these crowns are made of laboratory enhanced composite resin material and bonded to the tooth. They are very brittle, can crack or

fractured if forced down onto a preparation that has not been adequately reduced. For clinical success it requires adequate bonding, excellent moisture control and absence of haemorrhage.^[18]

ARTGLASS CROWNS(Fig 11)



Fig11 Art glass crown

This is a polymer glass, made up of bifunctional and new multi-functional methacrylate matrix with a 3 dimensional molecular networks with a highly cross-linked structure. The total filler content is 75% (55% microglass and 20% silica filler) but when matrix is cured, the amorphous highly cross-linked organic glass forms, which is called as polymer glass. It gives a natural feel, bondability and kindness associated with composite but the esthetics and longevity of porcelain. It is color stable, wear of polymer glass is similar to enamel, kind to opposing dentition and is plaque resistant. ^[13, 18]

COMPOSITE SHELL CROWNS(Fig 12)

Composite shell crowns are crowns prepared with composite by indirect method. ^[19]



Fig12 Composite Shell crown

PROCEDURE

After caries excavation with a spoon excavator, full arch impressions of the maxilla and mandible is made. Composite build up is done on the cast in harmonious relation to the mandibular anterior teeth. Before separation of shell crowns, a silicone based positioner is fabricated which helps in holding the crowns in mouth during cementation.

Once positioner is prepared, shell crown are carefully detached from the cast. The positioner is checked intraorally for proper fit without crowns. Then teeth are cleaned and dried, etched followed by application of bonding agent and light curing. Shell crowns are filled with dual cure resin and placed in silicone positioner, which is then transferred intraorally.

ZIRCONIA CROWNS(Fig 13)

It was introduced by **John P Hansen & Jeffery P Fisher in 2010**. Zirconia is a form of crystalline dioxide of zirconium. In particular, the yttrium oxide-partially-stabilized zirconia has mechanical properties very similar to those of metals and yet it has a color same as that of teeth.



Fig13 Zirconia crown

PROCEDURE

Select the correct crown size by placing the incisal edge of the crown against the incisal edge of the tooth. Incisal edge was reduced to provide clearance of about 2mm. For the labial surface: the 2-plane reduction was made close to natural tooth and For

proximal surface the distance to the adjacent teeth was considered and parallel mesial and distal walls were created extending 1-2 mm subgingivally. Enough reduction of cingulum was done on the palatal surface. Feather-edge margins were provided about 1-2 mm subgingivally. After being evaluated for marginal fit, the zirconia crowns were cemented with light cure resin cement and were held with firm consistent pressure at proper position on the teeth till the initial set. The occlusion was checked and removal of interferences and shape modification required was done with high speed diamond bur. ^[20]

CONCLUSION

Through this manuscript, effort has been made to bring together the various approaches for esthetic management of mutilated anterior teeth in pediatric dental practice. Each technique and material carries its own advantages and disadvantages. The newer advances in the field of pediatric dentistry have made it possible for the clinicians to achieve excellent esthetic rehabilitation for children. This is important not only for the dental benefits but also for the overall psychological development of a child.

REFERENCES

1. Duhan H, Pandit IK, Srivastava N, Gugnani N, Gupta M, Kochhar GK. Clinical comparison of various esthetic restorative options for coronal build-up of primary anterior teeth. *Dent Res J*. 2015; 12(6):574-80.
2. Eshghi A, Kowsari IR, Khoroushi M. Evaluation of three restorative techniques for primary anterior teeth with extensive carious lesions: A 1-year clinical study *Dent Child*. 2013; 80(2):80-7.
3. Michalakis KX, Hirayama H, Sfolkos J, Sfolkos K. Light transmission of posts and cores used for the anterior esthetic region. *Int J Periodontics Restorative Dent* 2004; 24:462-9.
4. Zicari F, Meerbeek BV, Debels E, Lesaffre E, Naert I. An up to 3-year controlled clinical trial comparing the outcome of glass fiber posts and composite cores with gold alloy-based posts and cores for the restoration of endodontically treated teeth. *Int J Prosthodont* 2011; 24(4): 363-72.
5. Shah S, Bargale S, Anuradha KV, Patel N. Posts in primary teeth-a sile for better smile *Adv Med Dent Sci Res*. 2016 Jan 1; 4(1):58-62.

6. Rallan M,Rallan NS,Navit P,Malhotra G.Modified intracanal post for severely mutilated primary anterior teeth.BMJ case rep.2013 Apr.
7. Arora K,Patel D.Restoring severely decayed primary anterior teeth using omega posts and fiber post systems a case report.Ind J App Bas Med Sci.2015;17(24):126-34.
8. CH SJayanthi M.Post Endodontic Restoration of Severely Decayed primary Dentition: A Challenge to Pediatric Dental Surgeon.Wor J Dent.2011; 2:67-9.
9. Mehra M, Grover R. Glassfiber Post: An Alternative for Restoring Grossly Decayed Primary Incisors. Int J ClinPediater Dent 2012;5(2):159-162.
10. Ramires-Romito AC,Wanderley MT,Oliveira MD,Imparato JC,Correa MS.Biologic restoration of primary anterior teeth. Quintessence Int.2000 Jun; 31(6):405-11.
11. Bariker RH,Mandrolki PK,Gokhale N,Pujar A.Esthetic and functional restoration in a child with S-ECC using Contemporary and Biological Techniques.Ind J Dent Adv.2014;6(3):1649-54.
12. Sahana S, Vasa AAK and SekharR.Esthetic crowns for anterior teeth: a review. Annals Ess Dent.2010;2(2):87-93.
13. Garg V, Panda A, Shah J, Panchal P. Crowns in pediatric dentistry: A review. J Adv Med Dent Sci Res 2016 Mar 1;4(2):41-7.
14. Waggoner WF. Restoring primary anterior teeth. *Pediatr Dent.* 2002;24:511-516.
15. AnuradhaK, Bargale S, Shah S, Ardeshana A. Esthetic Crowns in Primary Dentition- Reestablishing the innocent Smile. *J Adv Med Dent Sci Res.*2015 Jul 1;3(3):46-50
16. Kupietzky A. Bonded resin composite strip crowns for primary incisors: clinical tips for a successful outcome. *Pediatr Dent.*2002 Mar-Apr;24(2):145-8.
17. Vivek K,Vizhi GK,Silas AJ,Sanjeev R, Kumar S.Modern concepts in esthetic rehabilitation of primary anterior teeth in pediatric dentistry.J Ind Dent.2014;2(4):1-4.
18. Muhamad AH, Nezar W, Azzaldeen A, Hanali AS. Anterior Dental Esthetics in Primary Teeth. *Int J of Pub H Res.*2015; 3(1)25-36.
19. Murthy PS, Deshmukh S. Indirect Composite Shell Crown: An Esthetic Restorative Option for Mutilated Primary Anterior Teeth. *Journal of Advanced Oral Research.* 2013; 4(1):22-25.
20. Ashima G, Sarabjot K Bhatia, Gauba K, Mittal HC. Zirconia Crowns for Rehabilitation of Decayed Primary Incisors: An Esthetic Alternative *ClinPediater Dent.*2014 Sep 1; 39(1):18-22.