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ZIRCONIA CROWNS- A PROMISING ALTERNATIVE FOR ESTHETIC REHABILITATION OF DECAYED PRIMARY INCISORS

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ABSTRACT

Esthetic management of severely decayed primary maxillary anterior teeth is a great challenge to pediatric dentists especially in very young children. Over the years, Many esthetic treatment options have been tried each having its own advantages, and technical, functional or esthetic limitations. Zirconia crowns have provided an excellent treatment option to resolve the esthetic issues and the ease of placement of full coverage restorations on primary anterior teeth.Thiscase series presents two cases where grossly decayed and discolored maxillary primary incisors were restored with zirconia crowns. After the endodontic treatment, the teeth were restored with zirconia crowns. Over a 6 months period, the crowns have shown good retention and esthetic results. Dealing with the esthetic and functional requirements of the children affected with early childhood caries, zirconia crowns presents a promising and successful alternative for esthetic rehabilitation of decayed primary teeth.

Key words: Early childhood caries, children, zirconia, Esthetic rehabilitation.

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INTRODUCTION

Early childhood caries and dental trauma are the most common problems which leads to the structural damage of primary maxillary anterior teeth. Structural loss of these teeth affects esthetics, and also leads to poor phonetics, compromised mastication, along with a difficulty in social and physiological adjustment[1].

Esthetic management of grossly decayed primary maxillary anterior teeth in children is challenging especially due to their small size, high pulp horns, relatively thin enamel, less surface area for bonding alongwith difficulty in behaviour management especially in very young children[2].

An ideal anterior esthetic restoration for children should be easy to place, durable, esthetically pleasing and cost effective. For years, many options have been tried for esthetic restoration in anterior primary teeth each having its own advantages and associated functional or esthetic limitations[3]. Intracoronal restorations for single-surface caries include tooth-colored materials like composites,glass ionomer cement etc[4],while in multisurface caries involvement and discolored teeth, full-coverage restorations are indicated[5].

More recently, zirconia crowns for primary anterior teeth have been introduced over the last decade, keeping in view the esthetic requirement of pediatric patients. Zirconia is a crystalline dioxide of zirconium that has mechanicalproperties similar to those of metals and its color is similar to thatof teeth.

The purpose of this article is to describe the esthetic rehabilitation of grossly decayed primary maxillary incisors using zirconia crowns in pediatric patients.

CASE PRESENTATION

CASE 1

A 3 year old girl presented to the Department of pedodontics and preventive dentistry, SGRD Amritsar with

concern of grossly decayed upper front teeth. The patient's history was taken; a clinical and radiographic evaluation was performed. Medical history was non contributory. Diet counselling was done and prophylaxis was carried out. Restoration of carious primary incisors using zirconia crowns was planned keeping in mind the esthetic concerns of the parents. Informed consent was taken from the parents.

After administration of local anaesthesia,pulpectomy of the maxillary central and lateral incisors was done.The canal was further prepared by removing root canal filling material by one-third of the canal length. A thin layer of glass ionomer cement was placed to seal the root canal filling material followed by placement of intracanalglass-fibreposts in the root canals with light cured resin composite.

Crown selection was made beforehand based on the mesio-distal width of the teeth and the tooth preparation was done for "passive fit" as the zirconia crowns lack the property to flex. Incisal edge was reduced to provide clearance of 2mm. For the labial surface: 2-plane reduction was carried outand for proximal surface theparallel mesial and distal walls were created. Feather-edge margins were provided about 1-2 mm subgingivally. After evaluating the marginal fit, zirconia crowns were cemented with light cure glass ionomer cement and were held with firm consistentfingerpressure on the teeth till the initial set. The occlusion was checked and removal of interferences was done. The child and parents were instructed on the importance of oral hygiene and dietand to maintain regular follow up after every 3 months.A 6 month post-operative evaluation of the restored teeth revealed excellent esthetics along with the proper functioning of the crowns with no discoloration and loss of marginal integrity.

CASE 2

A two and a half year old girl was brought to the Department of pedodontics and preventive dentistry, SGRD Amritsar with the complaint of decayedprimary teeth. The patient's history was taken; a clinical and radiographic evaluation was performed. Medical history was non –contributory. The treatment plan suggested to the parents included diet counseling, oral hygeineinstructions and esthetic rehabilitation of primary anterior teeth. As mentioned above, pulpectomy was performed on the central and lateral incisors and the teeth were restored with composite. The incisal edges were reduced approximately 2 mm,

Case 1

Fig 1 (a) Pre operative frontal view of maxillary incisors

Fig 1(b) - (a) Pre op IOPA 51, 52, 61, 62 ; (b) IOPA followed by obturation

Fig 1(c) Intracanal placement of glass fibre posts

Fig 1 (d) Final view after crown cementation

Fig 1 (e) Zirconia crowns at 6 month follow up

Case 2

Fig 2 (a) Labial view of the maxillary central and lateral incisors showing extensive decay

(a) Pre op IOPA 51, 52, 61, 62 ; (b) IOPA followed by obturation

Fig 2 (c) Final view after crown cementation

Fig 2 (d) Zirconia crowns at 6 month follow up

interproximal contacts were broken followed by labial and lingual reduction. A 1-2 mm subgingival feather-edge was created to facilitate a passive fit. After the tooth preparations, the crowns were cemented with light cured glass ionomer cement. Instructions on the importance of oral hygiene and diet were given to the child and the parents and a regular recall appointmentswere carried out every 3 months. During follow up visits crowns were evaluated for any discoloration or fracture. A 6 month follow up revealed excellent esthetics and the zirconia crown showed complete integrity, without any cracks or discoloration.

DISCUSSION

The esthetic rehabilitation of grossly decayed primary anterior teeth has been a great challenge for the pediatric dentist, notbecause of narrow choices of available materials, but also because the patients are among the youngest and least manageable group of population[6].When adequate tooth structure is present after caries removal, restoration with the resin composite strip crowns remains an excellent treatment choice. But when the compromised tooth structure and less enamel is present for bonding, pre veneered esthetic crowns is a favorable solution and more recently, a new type of ceramic material crown based on zirconium dioxide, has been developed[7].

Zirconia crowns also known as “ceramic steel” have been in use in dentistry for the last one decade and is commonly used for restoration of permanent teeth in the form of Crowns, Fixedpartial denture, Implant abutment, fixture, inlay, onlay ,CAD/CAM etc.

The Zirconia Crowns are more translucent, and almost five times stronger than the Porcelain fused to the Metal crowns as the Zirconia crowns are milled from a single densely sintered block of crystal[8].

Zirconia which is yttria-stabilized tetragonal zirconia polycrystal(Y-TZP), has a unique 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[9].

The clinical success of resin bonding procedures for cementation depends on the quality and durability of the bond. The bonding mechanisms are controlled in part by the surface treatment that promotes micromechanical and/or chemical bond to the substrate.Thenonreactive surface of zirconia(acid-resistant ceramic), however, presents a consistent issue of poor adhesion, *i.e.*, low bond strength to other substrates. The clinical strategies to resin bond acid-resistant ceramic based zirconia restorations are micro-mechanical retention of alumina particles with an adhesive/cement system containing ceramic primers, such as phosphate-based monomers,e.g., MDP and a chemical bond of resin-based adhesive/cement system between silica-coated alumina particles (irregular silica layer) of zirconia with silane coupling agent of adhesive/cement system[10].The zirconia crowns manufactured for use in pediatric dentistry are available in different sizes for maxillary anterior teeth which allow better fit and reduced chair side time.Thin labial structure of the zirconia crowns resembles natural primary anterior tooth providing better gingival tissue adaptation. Zirconia provides highly polished surface thus preventing staining and plaque accumulation unlike composite strip crowns.The zirconia crowns presents superior durability as is reported in the present case seriesand a good balance of strength, precision, and translucency allowszirconia-based restorations to accommodate a variety of clinical situations[11].

CONCLUSION

Zirconia crowns are the recent and most esthetically acceptable pediatric dental crowns with a remarkable patient satisfaction available in the market today. These crowns present a new approach and a great alternative for the restoration of the natural appearance of a child's teeth compromised by caries and /or trauma.

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