

Smile makeover with fiber posts and strip crowns in preschool children with early childhood caries

Abstract

The most prevalent and chronic disease affecting upper anterior teeth in children are dental caries, predominantly caused by bottle feeding. Children though young, are very conscious about their appearance and are prone to develop inferiority complex between their peers because of unpleasant smile. Therefore, aesthetic and functional rehabilitation of primary teeth represents a challenge for the Pedodontist. The restoration of dental morphology using preformed crowns might be a possible biologic, fast, easy to accept, long-lasting and affordable alternative. A case report of 2 children aged 4 years is presented here. They displayed dental caries on upper incisors and were treated with composite resin and glass monomer restorations with fiber posts after IRoot canal treatment. Restoring primary incisors by means of strip crowns is easy to perform even with little tissue remaining after preparations and provides good aesthetic results. However, long-term clinical studies are needed to investigate the advantages and disadvantages of this technique, and evaluate the clinical success and failure of these restorations.

Keywords: strip crowns, maxillary incisors, morphology, glass monomer, composite, fiber post

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Introduction

Oral health represents an important component of the general health of a child. Oral health problems can lead to alterations of the child's general health status and development, and affect the quality of life. The most frequent oral health issue is dental caries. Sometimes, it can affect even very small children, short after the eruption of the first teeth, being called early childhood caries (ECC). This particular type of dental caries has been defined by the American Academy of Pediatric Dentistry as "the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger".¹

ECC represents an aggressive form of dental caries, which first develops on teeth surfaces that are not usually affected by decay, such as the labial surfaces of maxillary incisors. It subsequently affects the occlusal surfaces of the upper and lower molars, followed by the upper and lower canines and finally, by the upper and lower second molars. Practically, the teeth are affected in their order of eruption. The mandibular incisors are affected only in very advanced stages, due to their position in the mouth, being protected by the salivary flow and the tongue.² Depending on the degree of tooth alteration, ECC may be mild to moderate – characterized by the presence of white spots and caries on molars and/or incisors; moderate to severe – characterized by labiolingual carious lesions affecting the maxillary incisors with or without molar caries (depending on the age of the child and the stage of the disease), mandibular incisors are not affected; severe – the carious lesions affect almost all teeth, including the mandibular incisors.^{3,4} The initial clinical aspect of ECC is under the form of white spot lesion, noticeable on the smooth surfaces of teeth. In this stage, the enamel is intact but demineralized. Left untreated, the lesion progresses into dentin, followed by the appearance of cavitation. The tooth crown is subsequently destroyed, triggering dental pulp inflammation, necrosis and sepsis, with painful symptomatology.²

The etiology of ECC is multifactorial, involving the interaction of primary risk factors (such as the susceptible tooth/host, the food substrate – consisting in fermentable carbohydrates and the type of bacterial plaque) and the presence of associated risk factors. Certain features are specific to children with ECC: the presence of high levels of Streptococcus mutants in the bacterial plaque (acquired early, from their mothers or other family members/other people) and the increased and prolonged consumption of Sugary drinks. The associated risk factors include nocturnal bottle feeding (with cariogenic liquids), prolonged breastfeeding (though a clear association with ECC could not be established), poor oral hygiene, lack of fluoride in toothpastes, low level of parental education and poor socio-economic status.⁴⁻⁷

Treatment options depend on the stage of the disease. Thus, in the initial stage, when only white spots are present (enamel demineralisation), treatment consists in topical fluoride applications, instructions toward proper oral hygiene and changing eating habits. When dental lesions progress into dentin, tooth restorations are needed. In extreme cases, where the entire tooth crown is destroyed, tooth extraction is the choice.^{8,9} Tooth restoration options include dental fillings and full tooth coverage by the placement of tooth crowns. The first crown types used were steel crowns, which are not esthetic.

The high demand for esthetic restorations of front teeth has led to the development of various types of dental crowns, such as: open faced steel crowns, resin (composite) strip crowns, pre-veneered steel crowns and Zirconia crowns.^{10,11} Strip crowns are thin, transparent, celluloid preformed crowns; they serve as support for the restorative material while being applied on the prepared tooth, during the restoration protocol. They are removed from the tooth after the restorative material has set (at the end of the procedure). The aim of the study was to assess the strength and stability of the glass ionomer and composite material crown restoration using the preformed strip

crown technique in primary maxillary incisors with restricted and extended decay.

Case study of 3 year old girl child

A 3 year old girl child born and raised in Dubai, UAE reported with pain in upper anterior teeth. Patient did not have any significant medical history. On clinical examination it was seen that the child suffered from nursing bottle caries. Gross dental decay involving pulp was also diagnosed in second primary molars. Since the child was uncooperative, dental treatment under General Anesthesia was carried out. Though more than half of the anterior crown structure was destroyed due to dental caries, decision was made to save the teeth.¹⁻⁵ Pulpectomy was carried out in all four upper anterior teeth. After obturation with zinc oxide eugenol, glass fiber post (Angelus Company), were adapted to appropriate length and cemented using dual cure composite resin.



Fiber Post after RCT - 4

The restoration protocol included the following steps:

- Selection of Crown forms, these being available in 6 sizes (No. 1 to 6) (Unitek Strip Crown, 3M ESPE.)¹¹ with a mesiodistal incisal width equal to the tooth to be restored by placing the incisal edge of the crown against the incisal edge of the tooth (Figure 1).
- Shade Selection: The composite shade can be selected for better esthetics. A2 shade was selected.
- Crown Placement: the selected crown form was trimmed with crown and bridge scissors, to remove excess crown material at cervical level; a small hole was created by punching the strip crown with a sharp explorer at the incisal edge or palatal surface, to allow flowing of excess composite; the crown form was filled with the selected material and seated on the tooth and checked for correct position; the excess material from the gingival area was removed; the composite material was light cured through the celluloid strip crown; the celluloid crown form was first removed and the occlusion was checked.



Figure 1 Strip crowns.

Case study of 4 year old girl child

A 4 year old girl child born in Jordan and raised in Dubai, UAE reported with early childhood caries. She also had caries involving pulp in all her first primary molars. Since the child was cooperative, dental treatment was carried out in multiple appointments. Unlike the above mentioned GA case, where treatment was done in one single sitting, for this patient, in the first appointment root canal treatment of all 4 upper anterior teeth was performed.⁶⁻¹⁰ In the next appointment after 4 days, fiber post were cemented and composite restoration was done using 3M strip crowns.



Pre op - 7



Post op - 10



Pre op - 7



Post op - 9



Post op - 9

Discussion

The purpose of restoring carious primary incisors is to allow the patient retain these teeth until natural exfoliation. The choice of restoration materials used includes glass ionomer cements (GICs), compomers and composite resins. The bonded resin composite strip crown technique has been used to restore primary incisors with extensive and multisurface decay for over 30 years.¹¹⁻¹³ Despite this, there are few studies evaluating its clinical performance. Some of them revealed high esthetic results and acceptable durability over time.^{14,15} Children of today are very conscious of their appearance. Both of these patients, though very young were aware of their smiles. They refused to smile even when asked to and their parents complained that the girls wouldn't smile even in school as they felt their smile was not healthy because of teeth. Carious anterior teeth are not only esthetically unpleasant; they also lead to inferiority complex development right from early stages in life. No child should go through this. Strip crowns are a very affordable method of restoring beautiful confident smiles in children where Zirconia crowns are not feasible.

The technique proves simple to use by dentists, provides great parent and patient satisfaction due to very good esthetics and it is easy to repair in case of breakdowns. The time for restoration placement is reasonable and the cost of materials (strip crown kit) is affordable. However, it may be easily fractured by trauma/traumatic occlusion, it is technique-sensitive, requires good tooth isolation from moisture, needs adequate tooth structure for retention and also patient cooperation.^{10,11}

In the results of a study conducted by Kupietzky et al.¹⁴ who assessed 112 strip crown composite restoration placed in 40 children, after a period of 18 months, reported an 88% overall retention rate, with only 12% of restorations losing some resin material, and none of the restorations being totally lost. Ram D,¹⁵ evaluating the longevity of strip crown restorations in primary incisors after a 24-months period of follow-up reported a success rate of over 80%. Dhillon et al.¹⁶ while assessing the clinical performance of 26 restorations of primary incisors by means of the strip crown technique, obtained a success rate of 80.8% after one year of follow-up.

Eshghi A, et al.¹⁷ treated 161 compromised primary maxillary incisors with 53 composite post restorations, 54 fiber post restorations and 54 reversed post restorations. After root canal preparation and post cementation, the tooth crown was reconstructed with composite

resin and celluloid crowns (the strip crown technique). After one year of follow-up, 136 teeth were available for assessment. The retention rates of the restorations after one year were: 100% for the reverse post technique, 97.83% for fiber post and 97.73% for composite post. Walia T et al.¹⁸ compared the clinical outcomes of composite strip crowns, pre-veneered stainless steel crowns (SSCs) and pre-fabricated primary Zirconia crowns in restoring 129 carious and traumatized primary maxillary incisors. The evaluation was made after 6 months and showed a retention rate of 100% for Zirconia crowns, 95% for SSCs and 78% for strip crowns. Duhan H et al.¹⁹ assessed the clinical performance of four different types of restorations: composite, strip crown, biological and composite with stainless steel band. A total of 52 primary frontal teeth were treated by these means. The check-up periods were 3, 6 and 9 months after treatment. Loss of retention was seen in composite restorations and composite restorations with stainless steel band after 3 months. After 6 months, retention loss was seen in all restoration types, except for strip crowns, in which loss was seen after 9 months.

Conclusion

Restoring temporary incisors by means of strip crowns is easy to perform even with little tissue remaining after preparations and provides good aesthetic results. However, long-term clinical studies are needed to investigate the advantages and disadvantages of this technique, and evaluate the clinical success and failure of restorations.

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Conflicts of interest

The author declares there are no conflicts of interest.

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