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Esthetic Rehabilitation of Maxillary Primary Incisors Affected by Early Childhood Caries Using Strip Crowns and Zirconia Crowns: A Case Report

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Abstract

Background

Early childhood caries (ECC) is a highly prevalent chronic disease affecting children younger than six years of age. It is characterized by the presence of one or more decayed, missing, or filled tooth surfaces in primary teeth. ECC progresses rapidly and may result in pain, infection, functional impairment, and compromised esthetics, adversely affecting a child's quality of life.[1–5]

Case Presentation

This report describes two pediatric patients with ECC involving maxillary primary incisors. In the first case, esthetic rehabilitation was achieved using composite strip crowns following caries removal and tooth preparation. In the second case, severely damaged anterior teeth with pulpal involvement were treated with pulpectomy followed by zirconia crown restoration. Clinical and esthetic outcomes were evaluated during follow-up visits.

Results

Both treatment approaches successfully restored function, esthetics, and patient comfort. High levels of parental satisfaction were reported, and no postoperative complications were observed during the follow-up period.

Conclusion

Early diagnosis and timely restorative intervention are essential for successful management of ECC. Both strip crowns and zirconia crowns provide effective esthetic rehabilitation of primary anterior teeth, with treatment selection based on the extent of tooth destruction and clinical requirements.

Keywords: Early childhood caries; esthetic rehabilitation; strip crown; zirconia crown; primary incisors.

Introduction

Early childhood caries (ECC) is recognized as one of the most prevalent oral diseases affecting preschool-aged children worldwide. The condition is diagnosed when one or more primary tooth surfaces are decayed, missing due to caries, or restored in children younger than 71 months of age.[1] ECC is no longer viewed as a disease caused by a single factor; rather, it results from a complex interaction between cariogenic microorganisms, dietary practices, host susceptibility, and environmental influences.[2,3]

The onset of ECC commonly coincides with the eruption of the primary dentition and may progress rapidly if preventive measures are not instituted. Frequent exposure to fermentable carbohydrates, prolonged bottle-feeding, inadequate plaque control, and unfavorable feeding habits contribute significantly to disease development.[3,4] Beyond its impact on oral tissues, ECC can negatively affect mastication, speech, appearance, and overall well-being, thereby compromising a child's quality of life.[4,5] Consequently, timely diagnosis and early management are critical to preventing disease progression and minimizing long-term complications.[1]

Case Presentation 1

A 4-year-old female child reported to the Department of Pediatric and Preventive Dentistry with the chief complaint of decayed upper front

teeth and compromised dental appearance. The parents noticed gradual discoloration and structural breakdown of the anterior teeth over the preceding months. Dietary evaluation revealed frequent consumption of cariogenic snacks and beverages, while oral hygiene practices were found to be inadequate. Such factors have been strongly associated with the development of early childhood caries.[3,4]

Clinical examination revealed multiple cavitated carious lesions involving the maxillary primary incisors. Loss of enamel and dentinal structure was evident; however, there were no signs or symptoms suggestive of pulpal involvement. The surrounding soft tissues appeared healthy, and no swelling, abscess, or sinus tract was detected. Based on the clinical findings, a diagnosis of ECC affecting the maxillary primary incisors was established.[5]

Considering the extent of tooth destruction and the esthetic concerns expressed by the parents, restoration using composite strip crowns was planned. Following complete caries removal and conservative tooth preparation, appropriately sized celluloid crown forms were selected. The crown forms were filled with composite resin and adapted to the prepared teeth. After polymerization, the celluloid forms were removed, and the restorations were finished and polished to achieve optimal contour and esthetics. The treatment resulted in satisfactory restoration of both function and appearance.[7]

Figure 1: Preoperative clinical photograph showing carious maxillary primary incisors.

Figure 2: Placement of composite strip crowns during restorative treatment.

Figure 3: Postoperative clinical view following esthetic rehabilitation.

Case Presentation 2

A 3-year-old child presented with a chief complaint of pain and severe decay involving the upper anterior teeth. According to the parent, the discomfort had been present for approximately two to three months and was aggravated during mastication. Medical history was non-contributory. Dietary assessment revealed frequent exposure to sugary foods and beverages along with inadequate oral hygiene measures.[3]

Intraoral examination demonstrated extensive carious destruction of the maxillary primary incisors with clinical evidence of pulpal involvement. Significant loss of coronal tooth structure was observed, rendering direct restorative treatment unsuitable. Based on the clinical and radiographic findings, a diagnosis of severe ECC involving the maxillary anterior dentition was made.[4,5]

A treatment plan involving pulpectomy followed by full-coronal restoration with zirconia crowns was formulated. Under appropriate anesthesia and isolation, pulpectomy was performed using standard endodontic procedures for primary teeth. Following biomechanical preparation, the canals were obturated with a resorbable obturating material. After completion of endodontic therapy, tooth preparation was carried out according to the manufacturer's guidelines for zirconia crowns. Suitable crowns were selected, adjusted as required, and cemented using glass ionomer luting cement.

At the completion of treatment, the restored teeth demonstrated satisfactory esthetics, improved function, and acceptable gingival adaptation. The parents expressed satisfaction with the overall outcome. Postoperative instructions regarding oral hygiene maintenance, dietary modification, and periodic follow-up visits were provided to minimize the risk of future caries development.[7]

Figure 4: Preoperative clinical photograph showing severe destruction of maxillary primary incisors.

Figure 5: Pulpectomy and zirconia crown preparation procedures.

Figure 6: Postoperative clinical view after placement of zirconia crowns.

Discussion

ECC continues to represent a major challenge in pediatric oral healthcare because of its multifactorial etiology and widespread prevalence among young children. The disease arises from a dynamic interaction among microbial, behavioral, dietary, and social

determinants.[3] Cariogenic bacteria, particularly Streptococcus mutans, utilize dietary sugars to produce organic acids that lower plaque pH and initiate demineralization of dental hard tissues.[3] Emerging evidence also suggests that changes in the oral microbial ecosystem, including the presence of Candida albicans, may further contribute to the progression of ECC.[4]

Dietary behavior is considered a key determinant in the development of ECC. Repeated consumption of sugar-containing foods and beverages, especially during nighttime feeding, prolongs acid attacks on tooth surfaces and accelerates the carious process.[3] Poor oral hygiene practices further enhance plaque accumulation and increase the risk of lesion progression. Additionally, socioeconomic circumstances, parental education, fluoride availability, and accessibility to dental services play important roles in determining disease prevalence and severity.[4,5]

The present case report highlights two restorative approaches for the management of maxillary primary incisors affected by ECC. In the first patient, composite strip crowns were selected because sufficient coronal tooth structure remained after caries removal. Strip crowns are widely used in pediatric dentistry because they provide favorable esthetics, good retention, and acceptable functional outcomes.[7] In contrast, the second patient exhibited extensive coronal destruction associated with pulpal involvement, necessitating pulpectomy followed by full-coronal rehabilitation with zirconia crowns. Zirconia crowns offer excellent esthetics, superior strength, and high parental acceptance, making them a valuable option for severely compromised primary anterior teeth.[7]

Effective management of ECC extends beyond restorative treatment alone. A comprehensive preventive strategy incorporating dietary counseling, oral hygiene reinforcement, fluoride exposure, periodic recall visits, and parental education is essential for achieving long-term treatment success and reducing the likelihood of recurrence.[1,5]

Recent technological advancements have further optimized these treatment modalities. For resin-based composite strip crowns, material advancements have focused on balancing excellent aesthetic outcomes with improved functional durability and reduced clinical time (Almajed, 2024).11 Simultaneously, the introduction of pediatric monolithic zirconia crowns represents a significant advancement in primary tooth rehabilitation, combining the mechanical properties of metals with highly tooth-like aesthetics. Key clinical features of modern pediatric zirconia crowns include high fracture resistance, superior color stability, and excellent biocompatibility (Alzanbaqi et al., 2022).12 Furthermore, recent manufacturing advancements, such as the addition of internal mechanical undercuts, have been developed to enhance crown retention and mitigate bonding failures caused by saliva or blood contamination (Kumar et al., 2022).13 Clinically, zirconia crowns have demonstrated superior gingival and periodontal tissue health, alongside a notable reduction in plaque accumulation compared to traditional metal-based alternatives (Alzanbaqi et al., 2022).12

Conclusion

ECC remains a highly prevalent yet largely preventable childhood disease with significant implications for oral health and overall quality of life. The successful management of affected children requires early recognition, individualized treatment planning, and implementation of preventive measures. In the cases presented, both composite strip crowns and zirconia crowns successfully restored esthetics and function of maxillary primary incisors affected by ECC. Selection of the restorative modality should be based on the extent of tooth destruction, pulpal status, esthetic demands, and clinical requirements. Continuous parental education, reinforcement of preventive practices, and regular follow-up visits remain indispensable for maintaining oral health and preventing future caries development. [1,5]

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