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CASE REPORT **OPEN ACCESS**

Rehabilitation of Mutilated Primary Anterior Teeth- Case Series and Review of Literature

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ABSTRACT
Dental caries is extremely prevalent in primary dentition due to poor oral hygiene and increased sugar consumption. Primary teeth are crucial for speaking, phonetics, and other fundamental life processes including mastication and neuromuscular balance. Rehabilitation of mutilated primary anterior teeth poses a special challenge to pediatric dentist. Owing to their significance in the proper growth and development of a child, proper functional and esthetic rehabilitation of anterior primary teeth is of utmost importance. Therefore, this paper is a case series describing the various treatment modalities in rehabilitation of mutilated primary anteriors in 2–4-year-old patients.

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INTRODUCTION

Dental caries is one of the conditions that affects children the most often worldwide [1]. Some of its risk factors include a high intake of sugar and starches, irregular or incorrect eating practices, genetic predisposition, and salivary composition [2]. These lesions are frequently ignored [3] due to the wide population base and lack of understanding regarding oral health care. The child's oral and physical functioning progressively deteriorates as a result, causing discomfort and significant loss of tooth structure [4].

Early childhood caries (ECC) is a kind of dental caries with a specific pattern that is rapidly growing and spreading. ECC is defined 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 under the age of six [5]. The definition of severe early childhood caries (S-ECC) is any sign of smooth-surface caries in a child younger than three years of age, and from ages three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of greater than or equal to four (age 3), greater than or equal to five (age 4), or greater than or equal to six (age 5) [6]. ECC has the potential to destroy the crown structure in severe circumstances. It affects the dentition shortly after teeth emerge, resulting in early tooth loss, decreased masticatory function, loss of vertical dimension, tongue thrusting, speech difficulties, malocclusion, space loss, and psychosocial issues.

The primary goal of therapy should always be to restore the aesthetics and function of these decayed primary teeth. Such teeth may be treated using full-coronal or intracoronal restorations [7]. Full-coronal restorations are recommended for teeth with multisurface caries involvement and traumatized/discolored teeth, whereas intra-coronal restorations are recommended for teeth with single-surface caries and comprise tooth-colored materials such composites, glass ionomer cement, etc [8]. According to the American Academy of Pediatric Dentistry (AAPD), restoration techniques for the anterior primary teeth include the following: open-faced stainless steel crowns, full-coverage composite, strip crowns, and full white ceramic crowns [9]. The choice of treatment depends on age of the patient, extent of tooth destruction, patient cooperation and affordability of the patient. This case series depicts 4 different treatment modalities namely, open-faced stainless-steel crown, strip crown, gropers appliance and composite post followed by direct composite restoration for rehabilitation of primary incisors.

CASE 1: 3-year-old female patient, reported to the department of pediatric and preventive dentistry with complain of pain in upper front tooth region in the last 10 days. Pain was spontaneous, continuous, aggravated on mastication, relieved on medication. On examination, 51, 52, 61, 62 and 54 had deep carious lesions. Intraoral periapical radiographs revealed pulp involvement in relation to all the above-mentioned carious teeth. Treatment plan was implemented phase wise. Preventative measures such as diet counselling, oral prophylaxis and oral hygiene instructions were given. Further, pulpectomy followed by open-faced stainless-steel crown with 51, 52, 61, 62 and pulpectomy followed by stainless steel crown with 54 was done. (Figure 1).

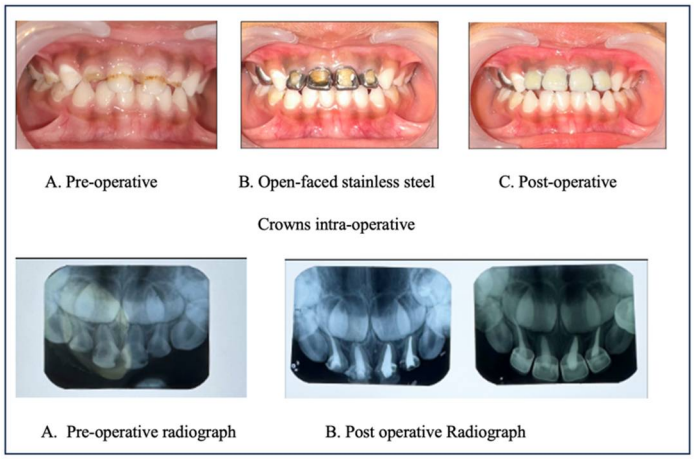

Figure 1

CASE 2: 3-year-old female patient, reported to the department of pediatric and preventive dentistry with complain of pain and swelling in upper front tooth region since 2 months. Pain was spontaneous, intermittent, aggravated on mastication, relieved on medication. History of nocturnal pain. On examination, 51, 52, 61, 62, 54, 64, was carious. Intraoral periapical radiographs revealed pulp involvement in relation to all the above-mentioned carious teeth. IOPA with upper anterior showed periapical radiolucency and decreased root length. Treatment plan was implemented phase wise. Preventative measures such as diet counselling, oral prophylaxis and oral hygiene instructions were given. Extraction of 51, 52, 61, 62 was done followed by fabrication of Groper's appliance. (Figure 2)

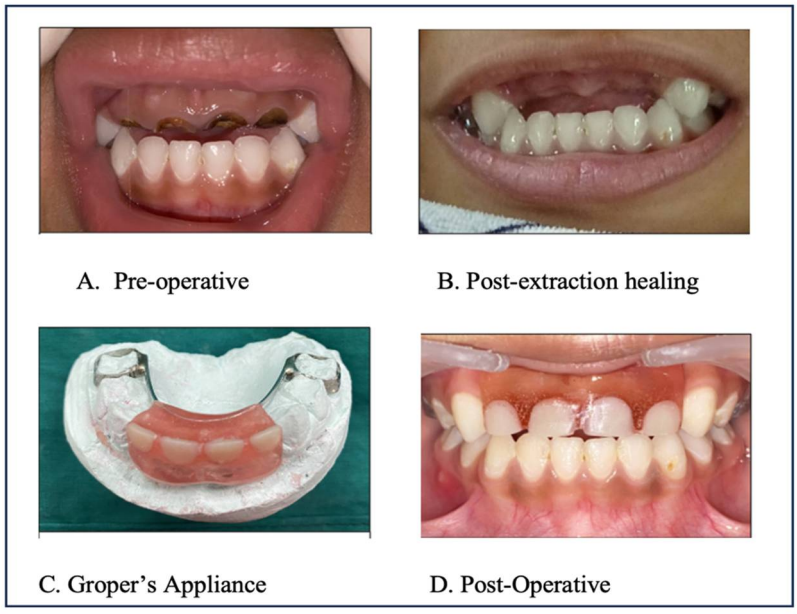

Figure 2

CASE 3: 2-year-old male patient, reported to the department of pediatric and preventive dentistry with complain of decayed teeth. History of night feeding until 1.5 years of age. On examination, 51, 52, 61, 62 were decayed. Intraoral periapical radiographs revealed pulp involvement in relation to all the above-mentioned carious teeth. Treatment plan was implemented phase wise. Preventative measures such as diet

counselling, oral prophylaxis and oral hygiene instructions were given. Pulpectomy followed by composite post with 51and 61 and direct composite restoration with 51, 52, 61, 62. (Figure 3)

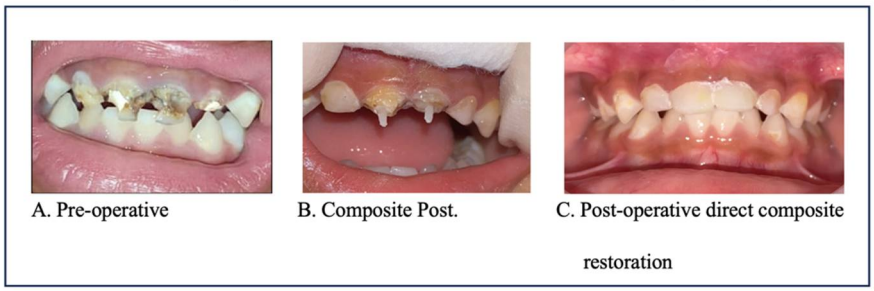

Figure 3

CASE 4: 3-year-old male patient reported to the department of pediatric and preventive dentistry with complain of pain in upper front tooth region since 3 weeks. Pain was spontaneous, intermittent, aggravated on mastication, relieved on medication. History of nocturnal pain. History of night bottle feeding intermittent snacking. On examination, 51, 52, 61, 62, 54, 64, was carious. Intraoral periapical radiographs revealed pulp involvement wrt 51, 52, 61, 62, 54. Treatment plan was implemented phase wise. Preventative measures such as diet counselling, oral prophylaxis and oral hygiene instructions were given. Pulpectomy followed by strip crowns with 51, 52, 61, 62 was done. Pulpectomy followed by stainless steel crown was done with 54. GIC restoration was done with 64. (Figure 4)

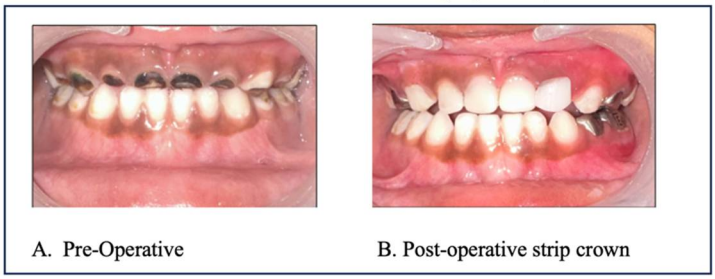

Figure 4

DISCUSSION

Early childhood caries usually affects the primary maxillary anterior teeth, making significant post-endodontic rehabilitation difficult. This is caused by the child's young age, relatively big pulp chambers, and small crown size. Restorations are more vulnerable to fracture because of the weak sound tooth structure that is still there. As mentioned earlier untimely tooth loss can cause a number of issues, such as lingual dysfunction, antagonist teeth over-eruption, midline deviation, masticatory irregularity, and neighboring teeth tilting [10].

Myriad of treatment modalities are available for rehabilitation of lost maxillary anterior namely, extraction of the severely damaged tooth structure, using semipermanent crowns, and inserting intracanal posts to successfully restore lost function and anatomy. The choice of rehabilitation method should be based on accurate information provided by the pediatric dentist and is usually based on parental desire and motivation.

Factors that determine the possible course of action for rehabilitation are age of the patient, amount of remaining tooth structure, cognitive abilities of the child, behaviornolla's stage of the permanent successor, esthetic expectations, oral hygiene general health of the patient, parents desire for treatment, operating dentist's skill,cost and affordability.

According to Lee's literature review [11], there limited long-term, controlled clinical data that validates or endorses any set restorative methods for treating carious anterior primary teeth. Therefore, treatment is usually rendered based on anecdotal data and clinical experience. Intracoronal restorations may be the first choice of treatment being conservative. The limitations of this are thinness of the enamel, technique sensitivity close attention to detail during restoration, adhesion and retention of the restoration, moisture control, hemorrhage control and achieve superior esthetic outcomes [12]. Long-term success was evaluated by Lo et al [13] and concluded there was only 14% retention after 30 months of these restorations.

Full coronal restoration of carious primary incisors may be indicated when: (1) caries is present on multiple surfaces, (2) the incisal edge is involved, (3) there is extensive cervical decalcification, (4) pulpal therapy is indicated, (5) caries may be minor, but oral hygiene is very poor (high-risk patients), or (6) the child's behavior makes moisture control very difficult, creating difficulties in placing restorations [14]. These

restorations are classified as luted or bonded. Webber et al [15], Croll et al [16], Ram et al [17] state that most esthetic restorative option for carious primary incisors is the bonded strip crowns. However, the most technique-sensitive option, subsequently chip or fracture and requirement of adequate tooth structure caries removal to ensure sufficient surface area for bonding make their application challenging.

Besides, strip crowns, bonded tooth-colored crowns can also be used. These may be stainless steel or aluminium crowns with tooth-coloured veneers or complete esthetic crowns like zirconia, figaro or bioflex crowns. The advantage of veneered crowns ease of placement, adaptability and durability. However, the limitation is that the esthetic veneer is available in limits shades and has poor fracture resistance. According to a systematic review by Aiem et al [18], zirconia crowns were best suited for primary incisors compared to pre-veneered stainless steel and resin strip crowns. An evidence-based study of 90 papers done by Waggoner et al [19] concluded that failure rates for strip crowns varied from 0-50% and for veneered-metal crowns was 32-39%. A randomized controlled trial by Walia et al [20] compared the clinical outcomes of three aesthetic full-coronal restorations (composite strip crowns, pre-veneered stainless-steel crowns (SSCs) and prefabricated primary zirconia crowns) in carious and traumatised primary maxillary incisors and concluded that the retention rate was highest for zirconia crowns (100%) followed by pre-veneered SSCs (95%). Strip crowns were the least retentive (78%). Zirconia crowns showed low grade abrasion in four opposing teeth. Teeth restored with resin composite and pre-veneered SSC showed an increase in mean gingival index score, while corresponding values decreased in zirconia crowns.

For grossly decayed teeth in which extraction is the last resort, gropers appliance is usually preferred as choice of rehabilitation. Limited evidence is available on the comparison between gropers appliance and fixed restorations.

A PUBMED search with keywords 'primary anterior teeth' 'esthetic restorations' showed 49 articles which included RCT's, literature reviews and case reports. Search on 'primary anterior teeth', 'esthetic restorations' strip crowns, open-faced stainless-steel crowns, 'posts' and 'gropers appliance' for a timeline of last 10 showed 16 articles. Most articles were RCT's and case reports. Upon reviewing with the keyword - mutilated primary anterior teeth in PUBMED search engine from the year 2013 to 2023, a total of 10 articles were found. Among these articles 7 were of primary anterior teeth rehabilitation .

There were 3 case reports, 3 were original article and 1 in-vitro study of primary anterior teeth rehabitilation: (Table 1)

Table 1: Literature Review

AUTHOR	YEAR	ARTICLE	PARAMETERS EVALUATED	FOLLOW UP	CONCLUSION
Mandeep Rallan et al [21]	2018	Modified intracanal post for severely mutilated primary anterior teeth	Metal screw post followed by composite resin crowns	6 months follow up	Teeth restored using composite resin crowns with metal screw post is easy to perform and requires no specialised equipment. After the follow up the teeth were intact and stable
Neeraj Sharma et al [22]	2013	Clinical comparison of various esthetic restorative options for coronal build-up of primary anterior teeth	Polyethylene fiber post inserted followed by restoration with hybrid composite	None	Use of Polyethylene fibres, is simple and effective and it represents a promising alternative for rehabilitation of grossly destructed or fractured primary anterior teeth.
Ruchi Arora et al [23]	2016	Successful Restoration of Severely Mutilated Primary Incisors Using a Novel Method to Retain Zirconia Crowns – Two Year Results	After root canal treatment, the primary maxillary central incisors were reinforced using modified omega post and followed by using celluloid strip crowns.	None	The modified omega loop with serration used in this case report demonstrated good retention, good esthetics, and masticatory function to the child.

Ajinkya Sawant et al [24]	2017	Evaluation of Novel Glass Fiber-reinforced Composite Technique for Primary Anterior Teeth with Deep Carious Lesions: A 12-month Clinical Study	Comparative evaluation of EverStick glass fiber-reinforced composite post, and ParaPost Taper Lux post.	Follow up at 3,6,9, and 12 months interval	Fiber post system has proved to be successful clinically in both primary and permanent teeth due to the mono-block effect with luting agent, post system, core material, and bonding to dentin. Thus, today the EverStick glass fiber post system provides a novel way of fabricating cost-effective and less time-consuming custom-made post in treating mutilated maxillary anteriors.
Himanshu Duhan et al [25]	2015	Clinical comparison of various esthetic restorative options for coronal build-up of primary anterior teeth	Compare the clinical performance of composite, strip crowns, biological restoration, and composite with stainless steel band when used for the coronal build-up of anterior teeth.	48 h, 3, 6, and 9 months.	Biological restoration was found to be most satisfying esthetically owing to color compatibility with the patient's tooth. Thus, it has a great potential to be used as esthetic restorative option in primary anteriors.
Osama Ibrahim El Shahawy et al [26]	2016	Successful Restoration of Severely Mutilated Primary Incisors Using a Novel Method to Retain Zirconia Crowns – Two Year Results	Use of rigid glass ionomer post over which zirconia crowns were fitted to achieve a longterm stable esthetic restoration for primary anterior teeth.	24 months	Use of zirconia crowns retained using this technique offers superior esthetic, durable restorations with remarkable gingival response up to 24 months.
Dhanalakshmi Ravikumar et al [27]	2017	Effect of Mechanical and Chemical Root Surface Treatment on the Shear Bond Strength of Intracanal Post in Primary Anterior Teeth: An In vitro Study	Evaluated the effect of different root surface treatment on the shear bond strength of glass fibre reinforced post in primary anterior teeth. Group 1: Control group; Group 2: Chemical surface treatment of the root with 2% chlorhexidine; Group 3: Mechanical surface treatment with	None	Mechanical and chemical surface treatments together led to a improved shear bond strength and increased the retention of the post to the root surface.

			mushroom-shaped undercut; Group 4: Combination of mechanical and chemical surface treatments.		

CONCLUSION

The importance of primary maxillary anterior teeth cannot be overstated. There are several choices for treating carious primary incisors, however there is little controlled clinical evidence to say that one restoration method is better than another. Reviewing the above stated literature it was seen that the type of restoration to be provided depends on the requirement of the patient. Namely the functional requirement of the patient. Therefore, the treatment modality is chosen as per the patients requirement, the tooth structure remaining, the root length of the teeth and various other factors. Lack of evidence-based data for anterior esthetic rehabilitation leads to treatment based on clinician experience and patient demand. Further research should be carried out to compare various treatment modalities and evaluate their clinical success along with patient satisfaction.

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