

Esthetic & Functional Rehabilitation in a Four Year Old Pediatric Patient with Modified Groper's Appliance - A Case Report

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Abstract

Restoration of severely damaged anterior teeth of a young toddler who has suffered from multiple tooth loss due to rampant early childhood caries is the greatest challenge for a pediatric dentist. Premature loss of anterior teeth has a great impact on child's psychology and behavior whereas premature loss of posterior teeth causes space loss which can lead to malocclusion and functional disturbances too. The aim of this paper is to describe the rehabilitation of primary anterior and posterior teeth in a 4 yr old child using a fixed, esthetic and functional appliance: A modified Groper's Appliance. These appliances are considered to be elective and their placement is generally by wish of the parents.

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Introduction

Early childhood caries (ECC) is one of the major reasons for premature loss of both anterior and posterior teeth during infancy and preschool period. Premature loss of teeth has a significant effect on the general oral health of the child even after eruption of the permanent teeth, which often leads to undesirable tooth movements of primary or permanent teeth including loss of arch length. Early loss of maxillary incisors due to caries is very common in young children.

According to the American Academy of pediatric dentistry (AAPD), early childhood caries (ECC) is defined as the presence of one or more decayed (non-cavitated or cavitated lesions, missing (due to caries), or filled teeth in any primary tooth in a child 71 months of age or younger. ECC, known previously as baby bottle caries, nursing bottle caries, baby bottle tooth decay, or nursing decay, is a relatively new term that describes rampant dental caries in infants and toddlers. The extent of decay of teeth in ECC is usually so severe, that by the time the child is brought to the dentist, much of the anterior clinical crowns are decayed or lost. The greatest challenge of pediatric dentist is the esthetic and functional rehabilitation of toddler with ECC.

Many parents seek an esthetic solution to replace the lost teeth after extraction. The young child, after the early loss of teeth becomes psychologically disturbed especially when he views himself as being different from his peers. Anterior dental disharmonies can interfere with normal tongue placement which then can lead to the development of maladaptive articulatory habits. It can also lead to Para-functional habits as well as altered behavior pattern including depression and increased shyness of a child, which leads to less friendly and non-acceptable daily lifestyle. These negative effects of anterior tooth loss affect the patient's quality of life and reduce level of confidence. The lingual sides of anterior teeth, which are required by the tongue for certain phonations, may result in improper speech. The pronunciations of tongue-tip

consonants such as ("t," "d," "s," "sh," and "ch") and labial sounds like ("f" and "v") are affected. Therefore, it is of great significance that the dentists should treat this caries lesion and thus return the oral health and smile esthetics to these Fig. 1 Preoperative Maxillary Viewchildren.

This case report illustrates an interim fixed functional space maintainer appliance for badly decayed primary maxillary incisors and molars.

Case Report

A four year old male child reported to the Department of Pedodontics and Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad with a chief complaint of decayed upper front and lower back teeth (Figure 1). The child was in good general health and had no relevant medical history. Intra-oral clinical examination revealed multiple grossly decayed teeth both in maxillary and mandibular arches. For investigation the patient was advised OPG (Orthopantomogram) and showed multiple carious teeth with pulpal involvement. The child's behavior was positive (Frankle Behaviors Rating III). Diet history revealed that patient had a history of use of bottle. The patient and her parents were concerned with the deprived anterior aesthetics.

On intraoral examination [Fig. 1 & 2] and radiographic examination [Fig. 3], carious (55, 52, 51, 62, 63, 75, 82, 85), grossly carious (54, 61, 64, 74, 84), severely decayed root stumps (54, 61, 64), carious with pulpal involvement (74 and 84) were noticed. Thus, a diagnosis of severe early childhood caries was made. Based on the clinical and radiographic findings, the following treatment plan was made and explained to the parents and a written consent obtained:

- 1) Oral prophylaxis.
- 2) Light cure composite restorations in 52, 51, 62, 51, 62, 63, 75, 82, 85.
- 3) Pulpectomy of 74 and 84 followed by Stainless steel crown.
- 4) Extraction of 54, 61, 64 followed by fixed functional space maintainer.
- 5) Fluoride application.



Fig. 1 Preoperative Maxillary View



Fig. 2 Preoperative Mandibular View

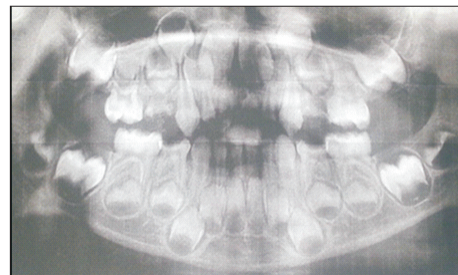


Fig. 3 Preoperative OPG

Clinical Procedure

1. In the first appointment, oral prophylaxis was performed and Intra-oral photographs, upper & lower alginate impressions made, clinical and radiographic records of the patient were taken.
2. In second appointment, light-cure composite restorations were done w.r.t 52, 51, 62, 63, 82.
3. In third appointment, Glass ionomer restorations w.r.t. 55, 75 & 85 were done.
4. In fourth appointment, Pulpectomy in 74

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was performed under local anesthesia wherein canals were obturated with metapex and were sealed with glass ionomer cement followed by adaptation and placement of S.S crown.

5. In fifth appointment, Pulpotomy in 84 was performed under local anesthesia wherein canals were obturated with metapex and were sealed with glass ionomer cement followed by adaptation and placement of S.S crown.
6. In sixth appointment, extraction w.r.t 54 was done under local anesthesia and patients & parents given the post-extraction instructions.
7. In seventh appointment, extraction w.r.t. 61 & 64 was done under local anesthesia and patients & parents given the post-extraction instructions.
8. Patient is recalled after 1 week, for the fabrication of the appliance.
9. 55 and 65 were banded (band size: 0.005" x 0.180") and alginate impressions were made for the upper and lower arches. Casts were poured with dental stone. This appliance was planned to restore form, function and esthetics in anterior region of the upper arch and to prevent space loss in posterior region by acting as a functional space maintainer.
10. On the working cast a 19 gauge stainless steel wire was adapted on the palatal arch in u shaped form 0.5 mm above the palatal surface to make modified Groper's appliance for replacement of missing anterior 61 and posterior 54 & 64 along with Nance-palatal arch space maintainer and the distal portions were bended in the region of 54 and 64 and further the ends of the wire were soldered with the bands [Fig. 5 (A)].
11. Acrylic teeth were trimmed to the desired size and fitted to estimated positions buccal to the wire. After acrylization, trimming and polishing of the appliance was done [Fig. 5 (B)].
12. Cementation of the appliance and occlusion was checked [Fig. 6 (A)].
13. Follow up examination after 24 hours was done and recall after every 3 months was advised.



Fig. 4 Post operative maxillary occlusal view showing missing 54, 61 & 64

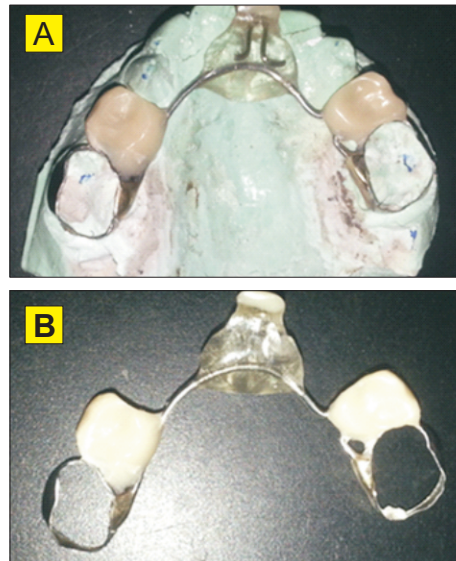


Fig. 5 (A) Maxillary cast with bands on 55 & 65 and wire adapted with trimmed acrylic teeth w.r.t 54, 61 & 64. (B) Finally appliance was ready for cementation after finishing and polishing.

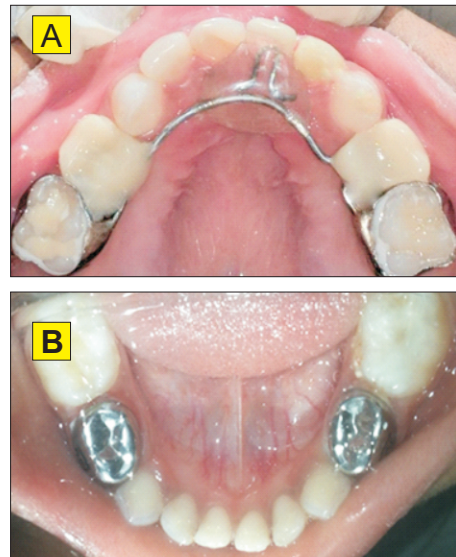


Fig. 6 (A) Post operative maxillary view after cementation of the modified Groper's appliance with Nance-palatal arch space maintainer replacing missing 54, 61 & 64. (B) Post operative mandibular view showing restorations and S.S Crown cementation w.r.t 74 & 84 post endodontic procedure (Pulpectomy).

The child and parents were satisfied with the replacement of his lost teeth. The parent was informed that the appliance will be removed around the age of 6-8 years, to prevent interference of erupting permanent successors. The child was also advised to return immediately in case there was any problem with the space maintainer, including distortion or breakage. On the third review visit, it was noticed that the boy appeared nourished (weight = 13.5 kg) and cheerful. Child's mother informed that the overall performance of boy in school had improved with better friends circle. Oral hygiene of the patient was satisfactory and

was informed to maintain it the same way.

Discussion

There exist numerous factors typically associated with tooth loss such as tipping of adjacent teeth, over-eruption of antagonist teeth, midline deviation, masticatory problems, speech problems and lingual dysfunction.⁸ The aesthetic rehabilitation of primary anterior teeth has a significant role in psychological development of patient's self confidence that can be in a negative way driven by the condition of their anterior teeth. Restoration of esthetic appearance is one of the most essential reasons behind replacement of the missing anteriors.^{1,8,10} Riekman & Badrawy revealed that the loss of primary anterior teeth before the age of three years lead to speech problems.^{4,8,11} As a consequence of the missing maxillary anterior teeth, the palatal sides of which are touched by the tongue for many phonations, may result in improper speech. Gable et al observed that early loss of incisors had no long term effects on speech.^{8,11,12} Moreover, parents of children who had their incisors extracted, found no masticatory or speech difficulties in their children. Speech problems are unusual in children who are over four years of age and if they happen, they are usually compensated and reversible. Our patient had no complaints with mastication or speech, but his parents had a concern for aesthetics. This was most likely because the patient had completed four years of age when the extraction of maxillary anterior had been performed due to extensive caries.

Certain pre requisites of a space maintainer are to maintain the space, to prevent of over-eruption of antagonist teeth, to restore of function; allowance for maxillary growth; management of hygiene; durability and low expenses. The appliance that has been mentioned is of the fixed type and it has none of the disadvantages of the removable type, like need of the patients' cooperation and probability of breakage. An identical appliance was documented by Jasmine and Groper, in which, plastic teeth were attached to metal cleats which were soldered to the palatal wire bar rather than being attached to acrylic, as it was in our design.⁸ Despite the fact that, their appliance would be superior in hygiene, it may cause the risk of a gap developing between the teeth and the alveolus, as a result of an improper anterior fit or decrease of ridge height. Even if our acrylic flange design would not pose the above risk, lack of hygiene under the inaccessible acrylic flange results in mucosal inflammatory disease. However, if it occurs, the appliance can be temporarily debanded until the tissue heals. In the present case, minimum amount of palatal coverage is done causing no or less irritation. Banding of molars was carried out to develop strength rather than bonding. Bhasin et al, in a

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case, used bonded space maintainer to preserve the space in the primary molar area.² It is important to consider the type of material to be preferred and that is economical and will be able to work the purpose until the eruption of the permanent teeth without leading to interference to the normal eruption process. One of these types of aesthetic space maintainer is Groper's appliance that is just like Nance holding arch, but it contains acrylic teeth processed to the wire instead of a palatal acrylic button in the rugae area. In the present case study customization with Nance palatal arch holding appliance to groper's appliance was done as Groper's appliance showed greater success rate.^{1, 5, 8} This technique was accepted by patient and this type of functional fixed space maintainer helped in restoring phonetics, speech and mastication without causing loss of space in maxillary anterior region. The appliance was found to be functioning satisfactorily in the oral cavity till the last visit.

Conclusion

Early intervention can prevent the psychosocial problems because of early loss of primary teeth. Restoration of anterior aesthetics

and function with this appliance gave a huge psychological boost for the child. Thus, to deal with the functional and aesthetic predicaments coupled with early loss of anterior teeth the present appliance can be used with an aesthetic and functional acceptable outcome. In conclusion, a simple modification of this type can easily reduce the disadvantages of fixed space maintainers and reduce patient discomfort there by increasing the durability of the space maintainers.

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