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RESEARCH ARTICLE

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ANTERIOR FIXED FUNCTIONAL SPACE MAINTAINER- A CASE SERIES

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ABSTRACT

Groper's space maintainer is a fixed, functional space maintainer used in pediatric dentistry to preserve arch length following premature loss of primary anterior teeth. Designed specifically for the esthetic and functional needs of young children, it consists of a band or crown on a posterior tooth connected to a wire framework that supports artificial anterior teeth. Unlike traditional space maintainers, Groper's appliance restores not only the space but also provides esthetic replacement of missing incisors, improving speech, mastication, and self-esteem. It is particularly useful in children where early tooth loss could affect psychological development or lead to undesirable oral habits. The appliance is cemented in place, requiring minimal maintenance and ensuring patient compliance. Groper's space maintainer represents a solution for early anterior tooth loss, combining functionality, esthetics, and comfort in pediatric dental care.

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INTRODUCTION

In the pediatric dental practice most common cause of lesion in anterior tooth is due to early childhood caries and traumatic dental injury in young children leading to premature loss of anterior teeth. [1,2] Early loss of maxillary anterior teeth can cause psychological, aesthetic and functional problem [2]. It also causes tipping of adjacent teeth, over-eruption of antagonist teeth, midline deviation, masticatory impairment, speech problems, lingual dysfunction. [3] Thus it is very important to replace all this teeth to restore function, aesthetic and phonation. [4] The replacement of this tooth should be in such a way that it should not interfere with the eruption of permanent teeth. Various fixed and removable aesthetic space maintainers are available for this [1]. The Groper's appliance was first introduced by Jasmin and Groper in 1984 [3] This case reports describe the management of patients with missing maxillary anterior teeth using Groper's appliance.

On clinical examination, child was diagnosed with multiple carious lesions with grossly decayed upper front teeth. It was confirmed as a case of early childhood caries [Fig 1].



CASE PRESENTATION

A 4 year old girl reported to the Department of pediatric and preventive dentistry with history of pain in upper front teeth region since last 2 weeks.



Fig. 1. Pre-operative intra-oral clinical image

Clinical and Radiographic findings [Fig: 2]:

1. Grossly decayed teeth in relation to 51,52,61,62
2. Chronic reversible pulpitis in relation to 54,64,74,84
3. Smooth surface caries in relation to 71,72,81,82
4. Pit and fissure caries in relation to 75,85



Fig. 2. Pre operative radiograph

Treatment plan

1. Extraction followed by space maintainer 51,52,61,62
2. Indirect pulp capping 54,64
3. Restoration in relation to 71,72,74,75,81,82,84,85

Treatment was started after obtaining parent consent. Initially GIC restoration was done w.r.t 54,74,84,73,83,71,81,72,82. Pulpotomy was done w.r.t 64 followed by permanent restoration was given, extraction was done w.r.t 51,52,61,62 and fixed anterior nonfunctional space maintainer was planned.

Fabrication of appliance: Banding was done w.r.t 55 and 65 for fabrication of the appliance. After taking primary impression band was transfer to impression and cast poring was done. Fabrication of wire component followed by soldering and polishing was done on working cast [Fig: 3]. Acrylic teeth of appropriate size was chosen previously and pink acrylic resin was applied to adapt the teeth on the gingival. The appliance was removed from the cast and finishing and polishing was done [Fig: 3]. After trial and occlusal adjustment, the appliance was cemented in place using glass ionomer cement [Fig: 3].

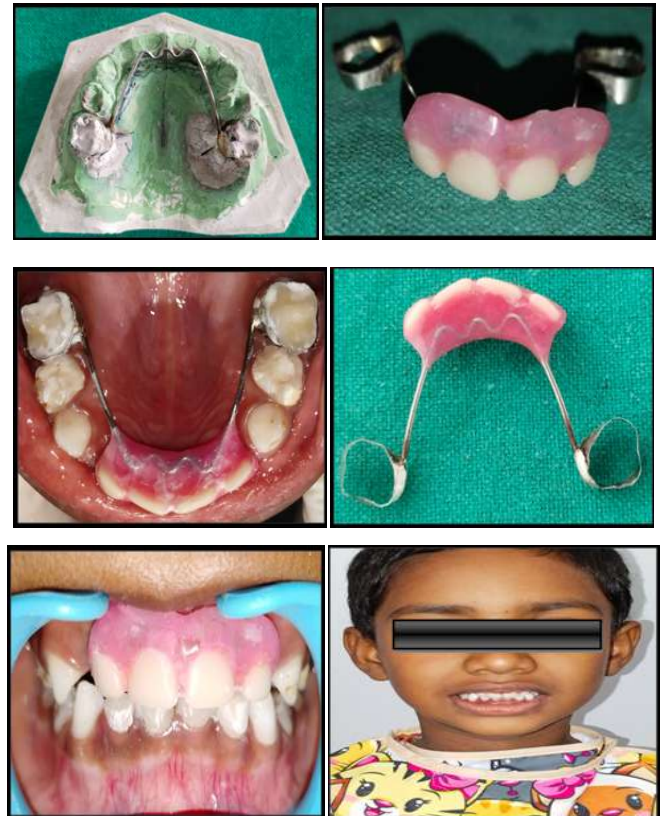


Fig. 3. Post operative image

Case-2: A 3 years male patient reported to the department of Pediatric and Preventive dentistry with chief complain of mobile and decayed upper anterior.

Dental History: patient reported to the department with pulpectomy of 64 with SS crown.

Clinical findings: Edentulous area w.r.t 51, Mobile tooth w.r.t 61, Restored teeth wrt 52 and 62.

Treatment plan

Extraction of 61 followed by aesthetic space maintainer.
Pulpectomy of 52 and 62 followed by post and core build up.



Fig. 4. Pre-Operative image

Initially pulpectomy was started under local anaesthesia (2% lignocaine with 1:80000 epinephrine) and obturation was done using zinc oxide eugenol cement of 52 and 62 [Fig: 5]. In second appointment extraction of 61 was done.

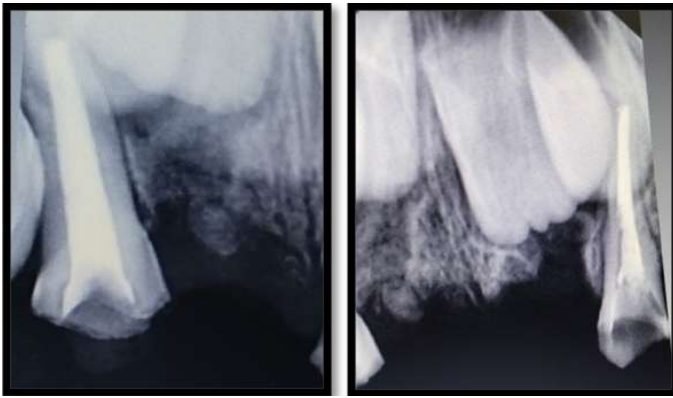


Fig. 5. RVG showing obturation of 62 and 52



Fig. 6. Placement of post in 52 and 62



Fig. 7. Post followed by strip crown given w.r.t 52 and 62

Banding was done w.r.t 55 and 65. primary impression was taken with alginate impression material and cast was poured. working model with the initial wire framework soldered to the band and additional wire component placed on edentulous maxillary anterior region. each loop representing a missing tooth.

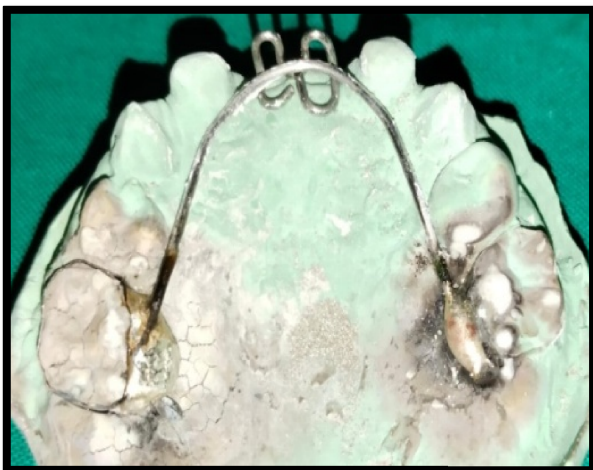


Fig. 8. Working cast with wire framework and additional wire component on maxillary anterior region



Fig. 9. Wire component is stabilized with cold cure acrylic



Fig 10: Strip crown placed in wire component



A.Frontal view



B.Occlusal view

Fig. 11. Appliance placed intra-orally

DISCUSSION

This space maintainers offers several advantages like esthetics, restoration of masticatory and prevention of abnormal oral habit development and phonetion but the main disadvantages is the accumulation of food debris and plaque. Riekman and Badrawy reported that the loss of primary anterior teeth before the age of 3 years resulted in speech problems[5]. Space loss in the anterior region after canine eruption is minimum and is clinically non significant. The importance of anterior esthetic fixed space maintainers in

children with dental caries are maintain space for permanent teeth to erupt properly, prevent over-eruption of opposing teeth (antagonists), restore functionality, allow for proper maxillary (upper jaw) growth, promote hygiene maintenance.[6]The similar dental appliance design documented by Jasmine and Groper. In this case, the appliance featured plastic teeth that were attached to metal cleats, which were then soldered to a palatal wire bar. This design differs from the more commonly used appliances where the teeth are typically attached directly to acrylic. [7] Jabin *et al.* concluded that “the restoration of anterior esthetics with this appliance gave an essential psychological boost to the child and his parents”[8]. Seth *et al.* [9] and Aniyo *et al.* [10] also concluded that “After the eruption of primary canines, loss of primary incisors is not a prime consideration for space loss but other factors indicates their replacement”. Shanmugaavel *et al.* designed GRASCE appliance where used the palatal wire to attach the teeth directly and replace molar bands by stainless steel crown. [11] The appliance being discussed here is a fixed-type dental appliance, which offers several advantages over there movable type.

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