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# Esthetic Rehabilitation Using a Modified Groper's Appliance for a 3-year-old Child: A Unique Case Report

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## ABSTRACT

**Introduction:** Esthetic rehabilitation of a young child with early childhood caries or dental trauma is one of the most important treatment modalities in pediatric dentistry. Parental motivation is a vital factor for the placement of an anterior esthetic appliance.

**Case Report:** The present article discusses about a case report that highlights the fabrication of a modified Groper's appliance in a 3-year-old child with severe early childhood caries (S-ECC). Its design included placement of stainless-steel bands on primary second molars attached to a wire containing an acrylic flange bearing trimmed acrylic teeth anteriorly and a distal stop on the canine in order to prevent distal migration.

**Conclusion:** The appliance was functional and fulfilled the esthetic demands.

**Key Words:** Esthetics, Early childhood caries, Functional, Groper's appliance, Acrylic teeth, Pediatric patients

## INTRODUCTION

Esthetic rehabilitation of a young child with early childhood caries or dental trauma is one of the most important treatment modalities in paediatric dentistry. Parental motivation is a vital factor for the placement of an anterior esthetic appliance.

Space management, after premature loss of primary teeth, is an important part of comprehensive dental care for all pediatric patients. The premature loss of primary teeth due to caries, trauma, crowding, infection or ectopic eruption deviates from the normal exfoliation pattern and may lead to loss of arch length.<sup>1</sup> This deficiency in the arch length may cause malocclusions like crowding, crossbite, rotations, excessive overjet, ectopic eruption, excessive overbite, and unfavourable molar relationships. Thus, the use of space maintainers after untimely loss of primary teeth should be considered.

In pediatric dentistry, most common lesions of the anterior teeth are due to early childhood caries mostly caused by prolonged breast or bottle feeding, especially at night time and poor oral hygiene habits. The most common appearance

of ECC or S-ECC is severely destructed maxillary anteriors which more often than not have to be extracted.

Premature loss of anterior teeth does not cause space loss readily but may have a negative effect on the psyche of the child and cause speech problems. In such cases, parents may request aesthetic rehabilitation for the child where a removable or fixed prosthetic appliance like Groper's appliance can be fabricated depending on age and compliance of the child. A conventional groper's appliance consists of a round wire soldered on the molar bands posteriorly and its attached to tooth unit anteriorly with acrylic.<sup>7</sup>

This case report presents a modified groper's appliance fabricated along with a distal stop on the canine for a 3-year-old child suffering from S-ECC.

## CASE REPORT

A 3-year-old female child had reported to the Department of Pediatric & Preventive Dentistry with S-ECC and an extraoral swelling with respect to 64. On clinical examination, there was severe loss of tooth structure with 51, 52, 61 & 62,

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along with, deep occlusal caries with 54, 64, 74 & occlusal caries with 84 (Fig. 1). The patient demonstrated Frankl's Grade 1 behavior rating and needed extensive dental treatment. On assessing radiographically, the patient required pulpectomies followed by crowns with 54, 74 and extraction with 64, 51, 61, 52, 62 and restoration with 85. Parents were explained about the behavior problems of the child and the treatment options which were available. Full mouth rehabilitation under general anesthesia was considered to be an ideal option. An informed consent for the dental treatment under general anesthesia was obtained from the parents. The parents were concerned about the esthetics and speech problems after the extraction of the upper anterior teeth and hence, a modified Groper's appliance was planned, which would not only fulfill the esthetic needs but also act as a space maintainer in the 64 region (Fig. 3 & 4).

On achieving the pre-anesthetic fitness clearance, the child was admitted to the D.Y. Patil hospital, Navi Mumbai for the treatment under general anesthesia. The patient was intubated nasally and scrubbed and draped as per protocol. Pulpectomies were performed followed by placement of zirconia crowns (Kids-e-crowns by Kids-e-dental<sup>®</sup>) with 54 and 74. (Fig 2) A glass ionomer restoration (3M ESPE Ketac<sup>™</sup> Molar) was done with 85. Stainless steel banding was done with 55, 65 and extraction was performed with 64, 51, 52, 61, 62. Hemostasis was obtained by placing AbGel- Absorbable gelatin sponge in the socket.

After extraction, upper and lower impressions were made using elastomeric impression material (Zhermac Zetaplus). The molar bands were gently removed and stabilized on the impression using cyanoacrylate. The impression was wrapped in a moist cotton towel and was planned to pour the cast later, on the same day. The patient was then extubated and moved to the recovery room as per protocol. The patient tolerated the procedure well and was discharged after meeting the hospital criteria.

Type III gypsum product was used to pour the dental cast. A 0.036 to 0.040 inch round wire was attached to the second primary molars with prefabricated stainless steel bands and was extended to provide a retentive arm to 63 to avoid rotation. The acrylic teeth or plastic teeth were attached to the pink acrylic extending into the vestibule or onto the palate.

The appliance was delivered to the child on the dental chair 1 week post the general anaesthesia procedure. The appliance was cemented using luting GIC (3M ESPE Ketac<sup>™</sup> Cem radiopaque) on the molar bands. A follow-up was conducted at 3 months, 6 months and 1 year. At 1 year follow-up, the child was comfortable with the appliance and did not report any complaints. The appliance was well maintained without any distortion, warping, solder failure, cement loss.

## DISCUSSION

Severe early childhood caries (S-ECC) is defined as 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).<sup>2</sup>

Early childhood caries (ECC) and dental trauma are the main reasons for premature loss of both anterior and posterior teeth during childhood. Premature loss of the maxillary incisors does not necessarily affect the growth and development of the child. However, problems regarding speech, masticatory inefficiency, abnormal oral habits, and unesthetic appearance should not be overlooked.<sup>3</sup> Child's speech development following extraction of primary incisors can cause erroneous labiolingual sounds which eventually leads to inappropriate speech compensations which can develop if the teeth are missing.<sup>4</sup> A study by Riekman and Badrawy reported that the loss of primary anterior teeth before the age of 3 years resulted in speech problems.<sup>5</sup> It usually affects sounds such as "s," "z," and "th".<sup>6</sup>

Thus, aesthetic rehabilitation of the maxillary anterior teeth is the promising treatment of choice. It can be done using a removable appliance or a fixed appliance also known as the Groper's appliance.<sup>7</sup> Groper's appliance is an adjustable, non-breakable fixed anterior space maintainer. This appliance replaces lost anterior teeth in very young children and has a lingual stainless-steel wire with an eyelet a direct bond pad soldered with a mesh base.<sup>8</sup> According to Waggoner and Kupietzky, the strongest factor in placing this appliance is the parental desire.<sup>3</sup>

In the present case report, the parents were concerned with aesthetics and the psychological effect of missing anterior teeth on the child. Hence, the Groper's appliance was modified by adding a distal stop on 63 to prevent its rotation or distal migration while maintaining the space for the successor. This was done by soldering a wire stop on the Groper's appliance in the canine region.

There are a few cases in literature where the Groper's appliance has been modified to fit the patient's needs. Shanmugavel et al. had modified the Groper's appliance by cementing the wire arm directly on the stainless-steel crowns placed on the molars following pulpectomies called as the GRACE appliance (Groper's Appliance with Stainless steel Crowns and customised teeth).<sup>9</sup> Tarsad et al. modified the Groper's appliance and increased its stabilisation in all three planes by soldering another piece of stainless-steel wire on the U loop.<sup>10</sup>

One of major disadvantages of the Groper's appliance is the

accumulation of food debris and plaque.<sup>11</sup> The other disadvantages include dislodged or broken appliances, undesirable tooth movement, inhibition of alveolar growth, soft tissue impingement, damage of successors etc.<sup>1</sup>

At one year follow-up, the appliance was clinically intact with no signs of failure and with good oral hygiene status. The appliance and the oral hygiene were well maintained. (fig 5)

## CONCLUSION

Replacement of anterior teeth with Groper's appliance and adding a distal stop in the canine region provides a reasonable treatment option for children with S-ECC who have had to undergo extraction of not only anterior but also the posterior teeth. This appliance is easy to fabricate and can be routinely incorporated in clinical practice to aid the child in aesthetics, function and speech.

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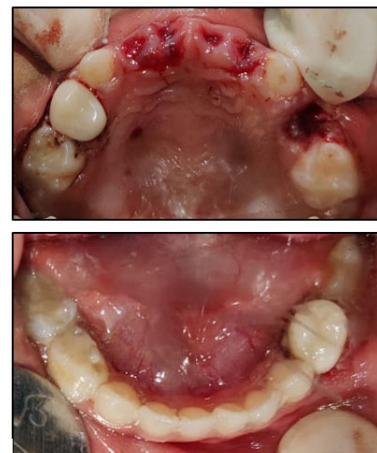
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**Figure 1:** Preoperative image showing loss of crown structure with 51, 52, 61 & 62, deep multi surface caries with 54, 64, 74 & occlusal caries with 84.



**Figure 2:** Post-extraction image showing extraction done with 51, 52, 61, 62 & 64, pulp therapy followed by zirconia crowns with 54 & 74 & GIC restoration with 84.

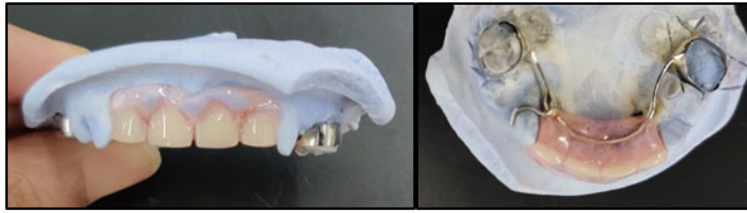


Figure 3 & 4: Modified Groper's appliance with the canine retentive arm.

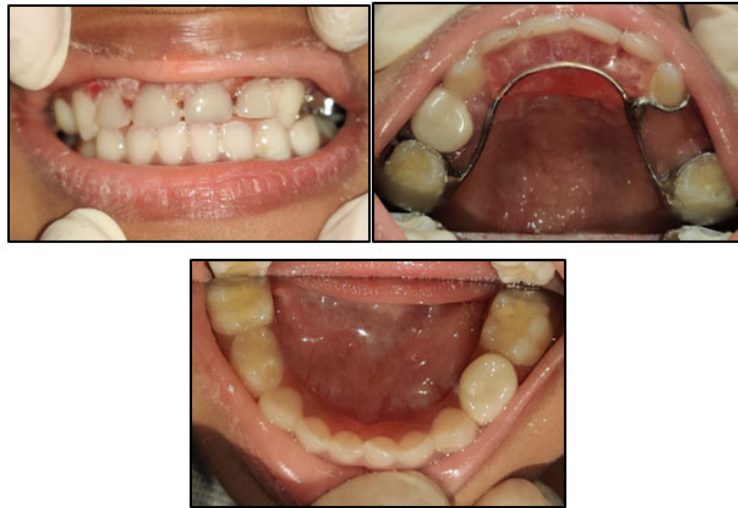


Figure 5: Appliance at one year follow up.