

The Role of Groper's Appliance in Aesthetic Rehabilitation: A Retrospective Study of Outcomes in ECC Cases

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Abstract: Space maintainers are used to minimize undesirable drifting of teeth in the dental arch. Using space maintenance after the loss of primary teeth restricts the creation of space, this also prevents the development of malocclusion. The primary teeth loss can lead to different dental malocclusions like midline shifts, space loss and also crowding of teeth. Groper's appliance is a space maintainer used for children who have lost their primary anterior due to accident or caries. Groper's appliance is a fixed partial denture used for aesthetics, restores mastication and speech. The study aims to check the longevity of Groper's appliance in children with ECC. The data included patients who were rehabilitated using groper's appliance. The longevity of groper's appliance was found to be more in 3-6 months (54.9%). The poor longevity rate shows that there is significant room for development in the Groper's' design, materials and its manufacturing to ensure that they can consistently meet their clinical objectives. Addressing these areas for improvement may result in increased lifespan and improved clinical outcomes for paediatric patients who are rehabilitated using Groper's appliance. Reliable and lasting functional appliances are critical for effective treatment outcomes, and the low longevity rate shows that further research and development is needed to improve Groper's appliance.

Keywords: Groper's appliance, Space maintainer, Anterior esthetic space maintenance, Pediatric dentistry

1. Introduction

The Groper's appliance is a fixed partial denture specifically designed for children who have lost their primary anterior teeth due to early childhood caries (ECC) or trauma. The premature loss of these teeth can significantly impact a child's development, affecting not only their dental aesthetics but also critical functions such as mastication and speech. Anterior teeth are essential for maintaining space in the dental arch, supporting proper tongue posture, and facilitating the articulation of sounds. When these teeth are lost, children may develop maladaptive oral habits, such as tongue thrusting, which can further interfere speech development and lead to long-term dental issues^{1,2,3}. By functioning as a space maintainer, it preserves the necessary space for the eruption of permanent teeth by preventing future malocclusions. Additionally, the appliance enhances the child's appearance by filling the space left by missing teeth, which can boost their self-esteem and confidence during successive years. The Groper's appliance also helps in restoring masticatory function and supporting proper speech development, as the presence of anterior teeth is important for phonation⁶.

First introduced by Jasmin and Groper in 1984, this appliance has evolved to incorporate features that improve its functionality and aesthetics. The design typically includes acrylic teeth attached to a metal framework, providing both durability and a natural appearance. The Groper's appliance not only addresses the immediate concerns of tooth loss but also plays a important role in the long-term oral health and psychosocial well-being of children^{4,5}.

2. Materials and Methods

Study setting:

This was a retrospective questionnaire-based study conducted among 91 children who was rehabilitated using groper's appliance

The Selection Criteria

Inclusion Criteria

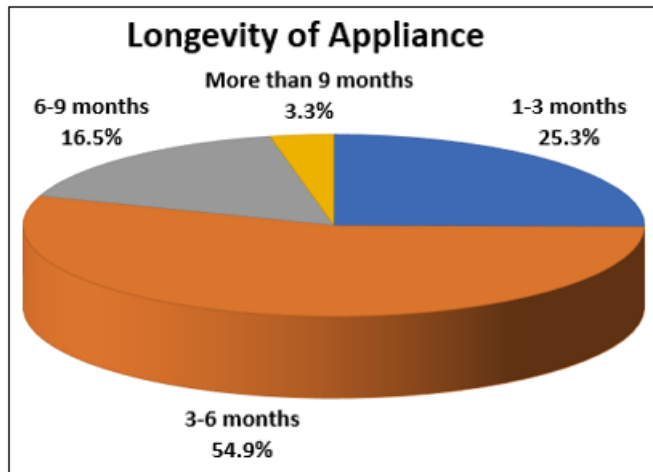
- Children with missing maxillary anterior teeth .
- Rehabilitation using groper's appliance.
- Patients who require replacement of the anterior teeth for the purpose of aesthetics.
- Patients who require space maintenance in the case of premature loss of teeth.

Exclusion criteria

- Medically compromised patients
- Uncooperative patients
- Poor oral hygiene
- Teeth with molar incisor hypo-mineralization (MIH)
- Molars with root resorption
- Bruxism
- Incomplete Questionnaires

3. Result and Discussion

The study included 91 children aged 3 to 5 years who were rehabilitated with the Groper's appliance. The age distribution of the participants indicated that the appliance was predominantly used in the 4-year-old age group. Especially, there was a higher incidence of appliance usage among female children when compared to male children.



The longevity of the Groper's appliance revealed that 54.9% of the appliance remained functional for 3 to 6 months and 25.3% of the appliance was functional for 1 to 3 months.

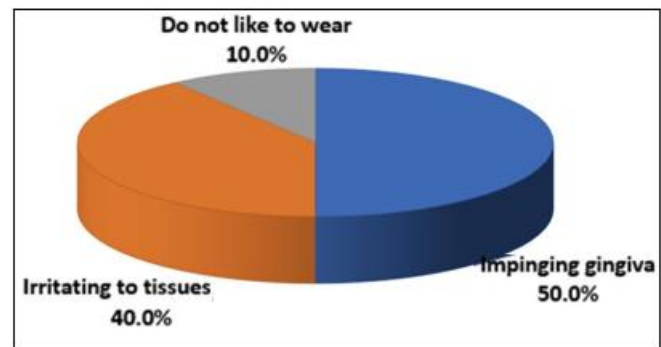
The Groper's appliance is a fixed partial denture specifically intended for children who have lost their anterior teeth prematurely, usually due to early childhood caries (ECC) or trauma. The loss of these teeth can have serious consequences for a child's overall development, including aesthetics, mastication and communication, and long-term dental problems like malocclusions⁶.

The Groper's appliance is a successful treatment option for children who have lost their anterior teeth prematurely. It acts as a space maintainer, preserving the appropriate space for the eruption of permanent teeth and this helps in preventing future malocclusions. This appliance also improves the child's look by filling in the spaces created by missing teeth, which can promote their self-esteem and confidence during their developing years. The Groper's appliance also helps to restore masticatory function and promote speech development, as the presence of anterior teeth is required for articulating specific sounds. The higher incidence of Groper's appliance usage among female children is due to a combination of aesthetic considerations, speech development concerns, parental decision-making, and social factors^{5,7}.

The Groper's appliance has a relatively low longevity rate, with only 54.9% of appliances remaining functional for 3 to 6 months. This raises concerns about the appliance's durability and the potential need for frequent replacements, which can be inconvenient for both patients and practitioners. If the Groper's appliance fails or is not properly maintained, it may aggravate issues related to mastication affecting the child's nutrition and overall health. The absence of anterior teeth can lead to mispronunciation of certain sounds, particularly labiodental sounds. If the Groper's appliance is not functioning effectively, it may hinder proper speech development and articulation which requires further intervention.

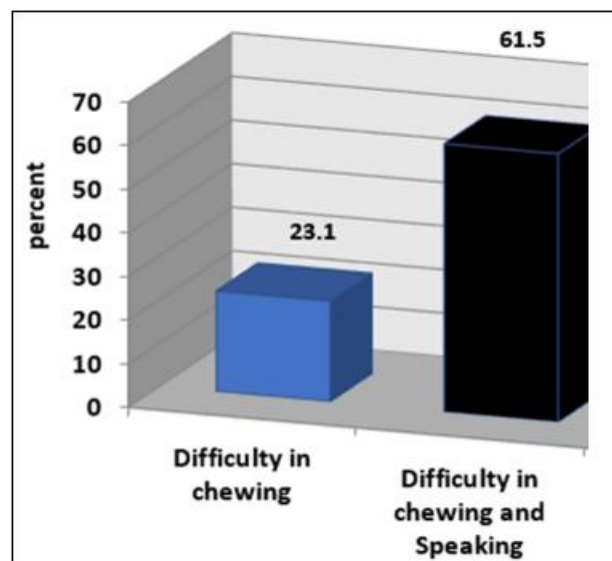
When the Groper's appliance fails or is uncomfortable, children may develop maladaptive oral habits, such as tongue thrusting. These habits can interfere with normal speech patterns and lead to further orthodontic issues in the

future. While the Groper's appliance is designed to improve aesthetics by filling space left by missing teeth, any failure or discomfort associated with the appliance can lead to dissatisfaction with appearance, affecting the child's self-esteem and social interactions. Children may require time to adapt to wearing the appliance. During this adjustment period, they may experience discomfort or difficulty in eating and speaking, which can be distressing for both the child and the parents. The need for regular maintenance and monitoring of the appliance can be a burden for parents. If not properly cared for, the appliance can accumulate plaque and debris, leading to potential oral hygiene issues.^{2,8}



Patient and parent acceptance was evaluated based on children's and their parent's feedback regarding the Groper's appliance: 90% of the children liked the appliance and 10% of children expressed their dissatisfaction it was primarily due to the appliance impinging on the gingiva and surrounding tissues.

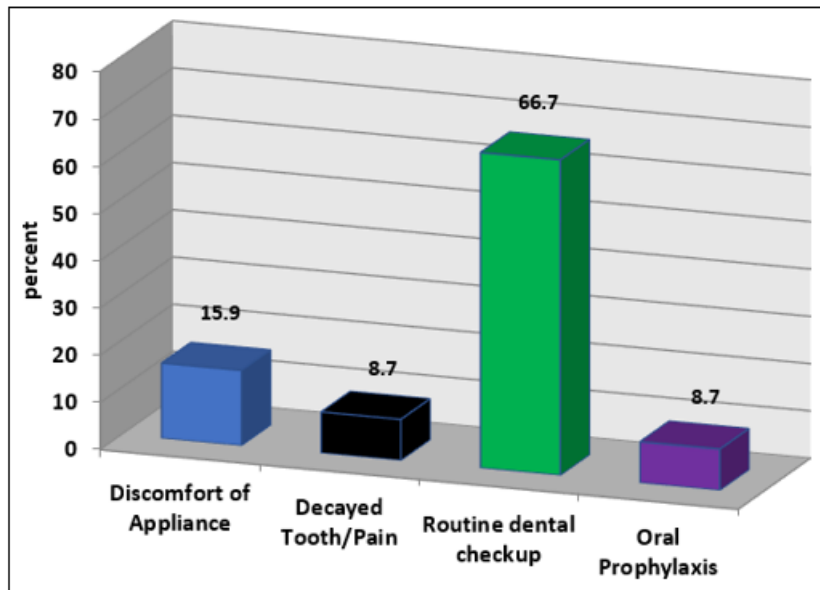
The comfort and functionality level associated with the Groper's appliance was high with 85.7% of children indicating that the appliance was comfortable to wear. But there were some limitations as 61.5% of children reported difficulties with mastication and phonation while using the appliance.



The Groper's appliance is generally well-accepted by children and provides a high level of comfort. However, there are concerns regarding its effect on mastication and speech. A small percentage of children reported dissatisfaction, particularly related to gingival

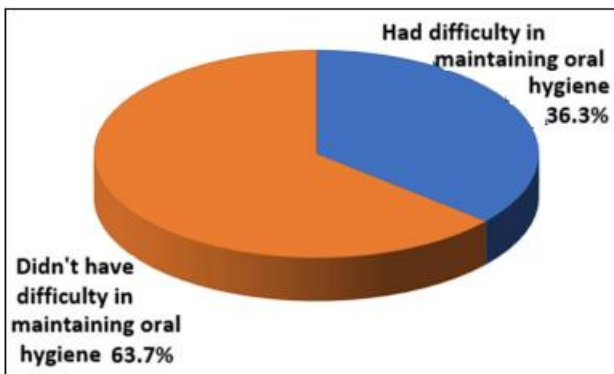
impingement. This highlights the need for careful fitting and monitoring of the appliance. Addressing the reported difficulties with mastication and phonation is essential for improving the overall efficacy of the Groopers appliance.

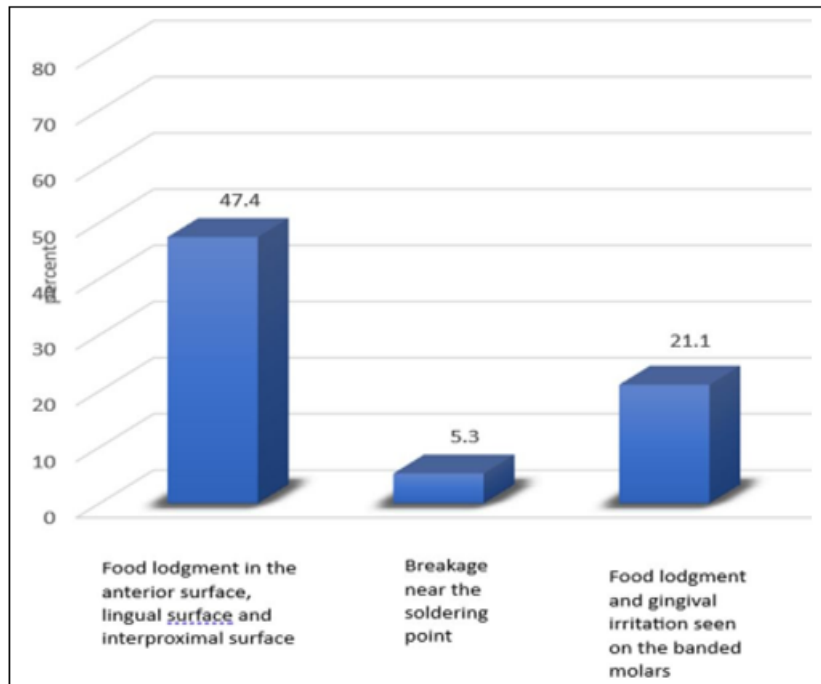
Continuous feedback from patients and parents will be significant in refining the design and functionality of this appliance to enhance user experience and clinical outcomes.⁷



In this study, 75.8% of children returned to the dentist after receiving the Groopers appliance, indicating a proactive approach to dental care among both children and their parents. Among these follow-up visits, 66.7% were for routine dental checkups, reflecting the importance of regular monitoring in maintaining oral health. Also 15.9% of the visits were due to the discomfort associated with the appliance, while 8.7% sought help for issues related to oral prophylaxis, tooth decay, or pain.

This study found that a significant majority of children (63.7%) reported no difficulty maintaining oral hygiene after receiving an oral appliance. But, 36.3% experienced difficulties, with food lodgement being the primary concern in the anterior region, This can lead to discomfort and makes oral hygiene maintenance difficult which highlights educating both children and parents on effective oral hygiene techniques.





Some children reported issues with the appliance, where 27.3% experienced dislodgement of the appliance, which can affect its effectiveness and require additional dental visits for adjustments. Also, 5.3% of children reported breakage near the soldering joint, indicating potential weaknesses in the appliance's design or materials.

Food accumulation can increase the risk of plaque buildup, which can lead to dental caries and gingival inflammation. This highlights the need for effective oral hygiene techniques and possibly redesigning the appliance to minimize food lodgement. Gingival impingement can cause pain and inflammation, which may require adjusting the appliance. It also emphasizes the importance of proper fitting and regular follow-up visits to monitor and address any discomfort.^{5,9}

Breakage near the soldering joint can compromise the appliance's integrity, which requires repairs or replacements. The breakage of this appliance is often caused by a combination of factors, including material properties, soldering techniques, design flaws, wear and tear and its maintenance. Addressing these factors can help improve the durability and effectiveness of the appliance.^{5,9}

4. Conclusion

This study showed that Groper's appliance has a poor longevity rate, which indicates that it needs consistent improvement in its design, materials, and manufacturing processes to meet clinical objectives. Addressing these issues may increase lifespan and better outcomes for children rehabilitated with the Groper's appliance.

By addressing these areas for improvement, Groper's appliances can be manufactured which are more durable and effective in maintaining aesthetics, space, mastication, phonation and also proper oral hygiene maintenance. This will ultimately lead to better clinical outcomes and an improved quality of life for the children.

References

- [1] Joybell CC, Ramesh K, Simon P, Mohan J, Ramesh M. Dental rehabilitation of a child with early childhood caries using Groper's appliance. *J Pharm Bioallied Sci.* 2015 Aug;7(Suppl 2):S704-7. doi: 10.4103/0975-7406.163483. PMID: 26538948; PMCID: PMC4606690.
- [2] Saini N, Pradhan D, Tiwari S, Thakur R, Jain N. Innovative Aesthetic and Functional Rehabilitation in a Two-and-a-Half-Year-Old Using a Modified Groper's Appliance. *Cureus.* 2024 Jul 18;16(7):e64824. doi: 10.7759/cureus.64824. PMID: 39156253; PMCID: PMC11330192.
- [3] Waggoner WF, Kupietzky A. Anterior esthetic fixed appliances for the preschooler: considerations and a technique for placement. *Pediatric dentistry.* 2001 Mar 1;23(2):147-50.
- [4] Shrivastava U, Barjatya K, Masih U, Chand BR, Manker A, Juneja P. Esthetic rehabilitation with modified Groper's appliance in a four year old child: A case report.
- [5] Jabin, Zohra; Verma, Sunil Datt; Agarwal, Nidhi; Anand, Ashish; Waikhom, Nandita. Groper's Appliance – For Esthetic Rehabilitation of Anterior Missing Teeth: Two Case Reports. *Journal of Interdisciplinary Dentistry* 12(1):p 22-25, Jan–Apr 2022. | DOI: 10.4103/jid.jid_26_21
- [6] Ilangovan S, Ravindran V, Mani G. INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES.
- [7] Awari V, Sajjanar A, Chandak S, Rajan M, Bhattacharya M, Sharma R. Esthetic management of an anterior avulsed primary teeth with Groper's appliance in a 3 year old child: A case report. *Journal of Pharmaceutical Negative Results.* 2022 Nov 13:1766-71.
- [8] Sharma V, Dutta B. A Novel Approach to Groper's Appliance: A Case Report. *Journal of Medical and Dental Science Research.* 2024;11(6):32-3.

- [9] Kashyap V, Kaur J. Functional and aesthetic rehabilitation of a 5 year old child using fixed and removable appliances-A case report. Baba Farid University Dental Journal. 2020;10(2):80-3.