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## Restoring a child's smile with groper's Appliance: A case report

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### Abstract

Traumatic injuries in children often result in anterior tooth avulsion, posing both aesthetic and functional challenges. This case report highlights the successful use of a Groper's appliance to restore the smile of an eight-year-old girl following trauma-induced avulsion of the maxillary central incisor and crown fracture. The treatment plan included pulpectomy of carious primary molars, extractions of severely resorbed teeth, and the fabrication of a Groper's appliance with a U-loop design reinforced by silver solder. The appliance addressed the aesthetic concerns of the patient's family while ensuring long-term stability and space maintenance. The intervention also involved comprehensive management of concurrent dental issues, emphasizing the importance of a multidisciplinary approach in pediatric dentistry. The successful outcome underscores the role of timely and aesthetic restoration in improving the psychological well-being of pediatric patients and their families.

**Keywords:** Traumatic injuries, anterior tooth avulsion, pediatric dentistry, groper's appliance

### Introduction

Many parents nowadays are very concerned about their children's aesthetics. Childrens play outdoor sports in the growing days, like cricket, football, hide and seek etc. They tend to be a little reckless in the process. And that's when traumatic injuries occur. Many a times it leads to avulsion of the anterior teeth. Avulsion and luxation are multifaceted injuries involving multiple tissues, comprising up to 16% of traumatic injuries in permanent teeth and 7.2% in primary teeth <sup>[1]</sup>. Managing space following the early loss of primary teeth is a crucial aspect of comprehensive dental care for pediatric patients <sup>[2]</sup>. The early loss of primary teeth caused by caries, trauma, crowding, infection, or ectopic eruption disrupts the natural exfoliation process and can result in a reduction of arch length <sup>[3]</sup>. In these cases if the parent and children agrees, appliances which replaces the avulsed anterior teeth can be a treatment option.

### Case report

An eight-year-old girl had come with her grandfather to the Department of Pedodontics and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, Panihati, Kolkata complaining about missing upper anterior teeth due to trauma. The parents were unhappy with the esthetics of the child and wanted an esthetic replacement of the upper front teeth. On examination, no abnormality was detected extraorally. General appearance, height, weight, and built were normal. The patient had bilaterally symmetrical facial profile. After taking history it was revealed that avulsion of 11 & fracture of crown in 21 are due to trauma from falling 1 week back. Intraoral examination & radiographs revealed presence of caries wrt. 54, 55, 64, 65 along with Ellis and Davey's class 1 fracture wrt 21[Fig 1].

### Treatment plan

The treatment plan was decided as following:

1. Pulpectomy for maxillary right & left 2nd primary molars (55 & 65).
2. Extraction of maxillary right and left 1st primary molars (54 & 64).
3. To make a Groper's appliance for restoring the missing central incisor (11) & maintaining

- space for 54 & 64.
- 4. Restoration of 21.



**Fig 1:** Preoperative intraoral photograph



**Fig 2:** Preoperative extraoral photograph



**Fig 3:** Preoperative intraoral photograph; anterior view

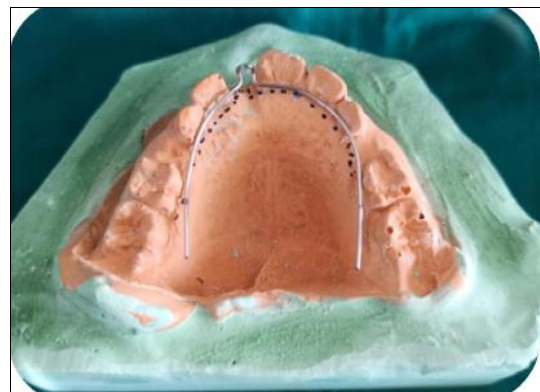
**Fabrication of the appliance**

- Both of the primary second molars underwent stainless steel banding [Fig 4].
- Primary alginate impressions were made. Type IV dental stone was used to pour the casts.
- 19 gauge wire was used to produce the wire component,

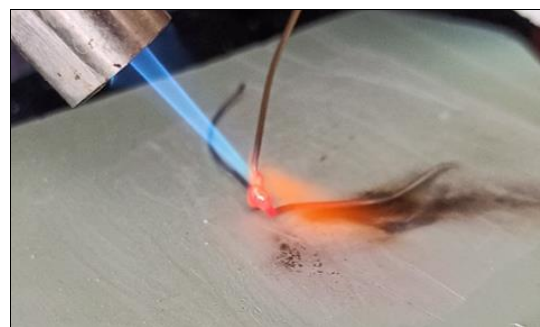
- Within the edentulous area a ‘U’ loop was made [Fig 5].
- Silver solder was placed on the ‘U’ loop for additional support [Fig 6, 7].
- It was then soldered to bands on second primary molars after being tailored to the palatal contours [Fig 8, 9].
- Grooves were made in the palatal surface of the acrylic tooth.
- The acrylic tooth was then attached with the loop with the help of composite.



**Fig 4:** After extraction molar band placement



**Fig 5:** Preparation of the wire component

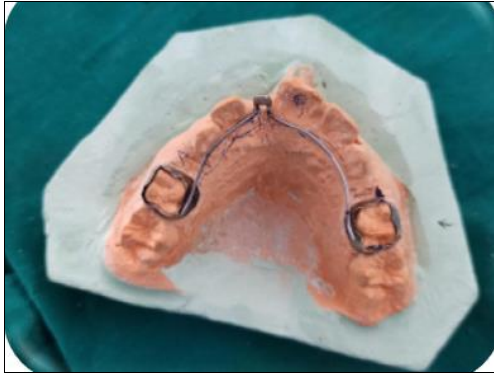


**Fig 6:** Silver solder placement on the u-loop

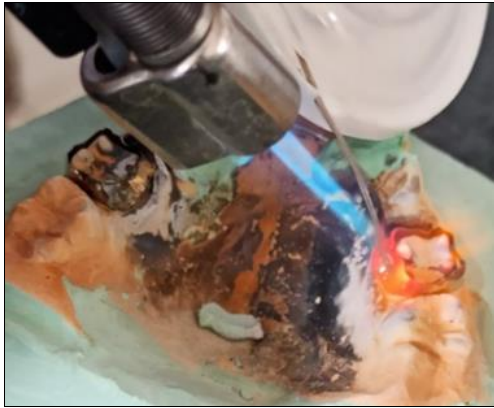


**Fig 7:** Silver soldered u-loop





**Fig 8:** Checking the position of the u-loop



**Fig 9:** Soldering of wire component with the molar bands



**Fig 11:** After obturation of 65



**Fig 12:** Cementing of the appliance

### Treatment

1. Pulpectomy were performed in the maxillary primary second molars.
  - Working lengths were determined.
  - biomechanical preparations were done.
  - Obturations with calcium hydroxide and iodoform were done [Fig 10 & 11].
  - Post operative restorations were done with GIC.
2. The maxillary first primary molars of both side were extracted as there were signs of severe root resorption. The patient did not have any of the following conditions: deep bite, over-jet, anterior cross bite, immune-compromised children, intellectually challenged children, or children with seizure disorders. These are the contraindications of this appliance. Then the appliance was checked for proper fit and cemented with Type-I luting cement [Fig 12].
3. A 3 month follow-up showed exfoliation of the maxillary left deciduous canine and an erupting first premolar [Fig 14].



**Fig 10:** After obturation of 55



**Fig 13:** Front view post-op



**Fig 14:** 3 month follow-up

### Discussion

The Groper's appliance has proven to be an effective esthetic and functional solution for addressing anterior tooth loss in pediatric patients, especially in cases where parental concern plays a significant role in decision-making [4]. In the present case, the primary motivating factor was the parental desire to restore their child's appearance following trauma-induced avulsion of the maxillary central incisor (tooth 11) and crown fracture of tooth 21. This aligns with findings in the literature where aesthetics and psychological well-being are cited as key drivers for anterior tooth replacement [5].

Several considerations were taken into account during treatment planning. Unlike cases where space maintenance or speech issues necessitate intervention, this patient did not exhibit impaired speech or functional challenges. However, the aesthetic concerns significantly impacted both the child's and the family's perception of her well-being, underscoring the importance of timely intervention. Research supports the psychological benefits of restoring a child's smile, particularly during early socialization phases such as attending school and engaging in outdoor activities [6].

The design and fabrication of the appliance in this case incorporated key modifications to ensure stability, durability, and esthetic integration. The use of stainless steel bands on primary second molars provided a reliable anchorage for the U-loop design. Additional support was achieved through silver solder reinforcement, ensuring that the acrylic tooth replacement mimicked natural dentition both functionally and visually.

The treatment approach also highlighted the importance of addressing concurrent dental issues. The management of carious lesions and root resorption through pulpectomy and extractions ensured a comprehensive care plan, minimizing the risk of future complications. This integrated approach is critical, particularly in pediatric patients, to support long-term oral health and appliance longevity.

A notable challenge in using the Groper's appliance remains the risk of plaque accumulation and food debris, as emphasized in prior studies. To mitigate these issues, parents were provided with thorough instructions on maintaining the child's oral hygiene. Parental involvement is essential in ensuring the success of such appliances, given the child's limited ability to independently manage oral hygiene at this age.

### Conclusion

The use of a Groper's appliance has demonstrated a successful approach in managing anterior tooth loss in pediatric patients, particularly when addressing both esthetic and functional concerns. In this case, the intervention was

driven primarily by the parents' desire to restore their child's smile after traumatic injuries. The comprehensive treatment plan, which included pulpectomies, extractions, and the fabrication of a well-constructed Groper's appliance, ensured not only aesthetic restoration but also long-term stability and functionality. Additionally, addressing concurrent dental issues such as caries and root resorption further contributed to the success of the treatment. This case underscores the importance of a multidisciplinary approach in pediatric dentistry to ensure both immediate and lasting oral health outcomes.

### Conflict of Interest

Not available.

### Financial Support

Not available.

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