




## Clinical management of a pediatric dental avulsion. Literature review and case report.

Janneth Noemy Malca Malca<sup>1</sup> , Viviana Daniela Abad Freire<sup>1</sup> , Paul Fernando Vergara Sarmiento<sup>1</sup> ,  
Camila Vásquez Avila<sup>1</sup> .

**Abstract: Introduction:** Dental avulsion, defined as the complete loss of a tooth from its socket, is one of the most common traumatic injuries in the primary dentition, especially in preschool children. Timely management is essential to prevent functional, aesthetic, and emotional consequences. **Objective:** To describe the clinical approach following dental avulsion in the primary dentition, highlighting the use of the Groper appliance as a functional and aesthetic restorative alternative in pediatric patients. **Case presentation:** A 4-year-old male patient presented for dental consultation one year after suffering trauma due to a fall that caused the avulsion of the upper right central incisor (tooth 5.1). The mother reported speech difficulties since the accident. The clinical evaluation revealed the corresponding edentulous space with no signs of inflammation or damage to the adjacent teeth. The fabrication and placement of a Groper appliance were indicated as a space maintainer, with the aim of restoring phonation and preserving facial aesthetics during the growth stage until the eruption of the permanent tooth. **Conclusion:** The use of the Groper appliance in cases of avulsion in primary dentition represents an effective therapeutic option that contributes to the functional and aesthetic recovery of pediatric patients, improving the child's quality of life after dentoalveolar trauma.

**Key words:** Tooth Avulsion, Deciduous Tooth, Pediatric Dentistry, Tooth Injuries.

## Manejo clínico post avulsión dental en paciente pediátrico. Revisión de la literatura y reporte de caso.

**Resumen: Introducción:** La avulsión dental, definida como la pérdida completa del diente fuera de su alvéolo, es una de las lesiones traumáticas más frecuentes en la dentición temporal, especialmente en preescolares. Su manejo oportuno es fundamental para prevenir consecuencias funcionales, estéticas y emocionales. **Objetivo:** Describir el abordaje clínico posterior a una avulsión dental en dentición temporal, resaltando el uso del aparato de Groper como alternativa restauradora funcional y estética en pacientes pediátricos. **Presentación del caso:** Paciente masculino de 4 años de edad que acudió a consulta odontológica un año después de haber sufrido un traumatismo por caída que provocó la avulsión del incisivo central superior derecho (pieza 5.1). La madre reportó dificultades en el habla desde el accidente. En la evaluación clínica se observó el espacio edéntulo correspondiente y sin signos inflamatorios ni afectación en las piezas vecinas. Se indicó la confección y colocación de un aparato de Groper como mantenedor de espacio, con el fin de restituir la fonación y preservar la estética facial durante la etapa de crecimiento hasta la erupción del diente permanente. **Conclusión:** El uso del aparato de Groper en casos de avulsión en dentición temporal representa una opción terapéutica eficaz que contribuye a la recuperación funcional y estética del paciente pediátrico mejorando la calidad de vida del niño tras un trauma dentoalveolar.

**Palabras clave:** Avulsión de Diente, Diente Deciduo, Odontopediatría, Traumatismos Dentales.

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<sup>1</sup> Universidad Católica de Cuenca, Cuenca, Ecuador.

## Tratamento clínico pós-avulsão dentária em paciente pediátrico. Revisão da literatura e relato de caso.

**Resumo:** **Introdução:** A avulsão dentária, definida como a perda completa do dente fora de seu alvéolo, é uma das lesões traumáticas mais comuns na dentição decídua, especialmente em crianças em idade pré-escolar. Seu tratamento oportuno é fundamental para prevenir consequências funcionais, estéticas e emocionais. **Objetivo:** Descrever a abordagem clínica após avulsão dentária na dentição decídua, destacando o uso do aparelho de Groper como alternativa restauradora funcional e estética em pacientes pediátricos. **Apresentação do caso:** Paciente do sexo masculino, 4 anos de idade, apresentou-se para consulta odontológica um ano após sofrer um traumatismo por queda que causou avulsão do incisivo central superior direito (dente 5.1). A mãe relatou dificuldades na fala desde o acidente. A avaliação clínica revelou um espaço edêntulo correspondente, sem sinais de inflamação ou envolvimento dos dentes vizinhos. A confecção e colocação do aparelho de Groper foi indicada como mantenedor de espaço, com o objetivo de restaurar a fonação e preservar a estética facial durante a fase de crescimento até a erupção do dente permanente. **Conclusão:** O uso do aparelho de Groper em casos de avulsão na dentição decídua representa uma opção terapêutica eficaz que contribui para a recuperação funcional e estética de pacientes pediátricos, melhorando a qualidade de vida da criança após um trauma dentoalveolar.

**Palavras-chave:** Avulsão Dentária, Dente Decíduo, Odontopediatria, Traumatismos Dentários.

### Introduction

Dental avulsion is one of the most severe injuries encountered in pediatric dentistry, characterized by the complete loss of one or more teeth from their alveolus as a result of trauma. This type of injury is common in children under 10 years of age, especially in the early years of life, when they begin to walk and explore their surroundings, which significantly increasing the risk of falls and blows.<sup>1-3</sup>

Dental avulsion affects not only the tooth itself, but also important structures such as the periodontal ligament, gingival tissue, and the neurovascular bundle. This damage can have a significant impact on the child's oral health, functionality, and facial aesthetics, underscoring the need for appropriate and timely treatment.<sup>4-5</sup>

Proper management of dental avulsion in primary teeth is essential to prevent long-term functional and esthetic complications. Premature loss of primary teeth can affect

phonation, swallowing, and facial aesthetics, as well as interfere with the eruption of permanent teeth. Treatment focuses on maintaining the stability of adjacent teeth and preventing space loss, which could affect the alignment of permanent teeth.<sup>5-7</sup>

In this situation, the use of the Groper appliance is an effective option, as it not only functions as a space maintainer but also helps improve the patient's speech and aesthetics. This appliance also contributes to the recovery of important oral functions and reduces the psychological impact that early tooth loss can cause.<sup>7-8</sup>

By evaluating its effectiveness in improving function and aesthetics, we seek to demonstrate how this device can optimize clinical outcomes and offer a comprehensive solution for complications arising from dental trauma.<sup>9</sup>

This study aims to describe the clinical management following dental avulsion in a pediatric patient using the Groper appliance, with the purpose of providing a clearer

vision of the impact of this treatment on the quality of life of the affected child.

### Clinical case report

A 4-year-old male patient with no relevant personal or family history (ASA I), attended the Pediatric Dentistry Clinic at the Catholic University of Cuenca, Azogues campus, accompanied by his legal guardian. The reason for the consultation, as reported by the mother, was: "He fell and knocked out his tooth." The dental trauma had occurred a year prior to the current consultation, and the mother mentioned that since the trauma, the child had been experiencing speech difficulties.

Initial clinical evaluation:

Extraoral examination revealed no apparent pathology (Figure 1). Intraoral examination revealed an edentulous space in the region of tooth 5.1, with signs of mild alveolar collapse. No signs of inflammation or alterations in adjacent tissues were observed (Figures 2, 3, 4).

Complementary studies:

A periapical radiograph was requested,



Figure 1: Extraoral Photographs



Figure 2: Photograph in maximum Intercuspation



Figure 3: Maxillary Occlusal Photograph



Figure 4: Mandibular Occlusal Photograph

which confirmed the absence of tooth 5.1, with no evidence of bone fracture in the alveolar process (Figure 5).

Therapeutic intervention

- Placement of separator bands: Separator bands were placed between teeth 5.4-5.5 and 6.4-6.5 for 8 days to create adequate space for subsequent appliance cementation (Figure 6).

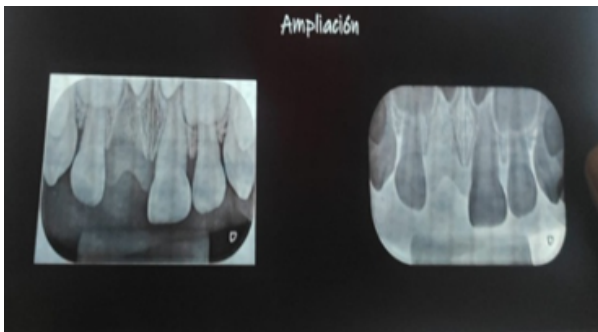


Figure 5: Periapical Radiograph



Figure 6: Placement of Separating Elastics

- Intraoral digital scanning: After the indicated period, a digital scan of the upper arch was performed using an intraoral scanner, ensuring complete capture of anatomical structures (Figure 7). The field was maintained dry with the use of a saliva ejector and gauze.
- Appliance fabrication: Based on the digital file obtained, a Groper appliance was fabricated using acrylic resin. An artificial tooth in shade A2 (according to the VITA color guide) corresponding to the missing tooth was incorporated. The design included metal bands cemented onto the primary molars 5.5 and 6.5, serving as bilateral anchorage (Figure 8).
- Appliance cementation: After removing the separator bands, dental prophylaxis was performed. The appliance was tried in the mouth to verify its fit and then cemented with type I glass ionomer (Meron-VOCO). Excess material was removed and the occlusion was verified. Finally, both the patient and his legal representative were instructed on oral hygiene techniques and appliance care (Figure 9).



Figure 7: Dyadent digital scan



Figure 8: Groper Appliance



Figure 9: Cementation of the Groper Appliance

#### Follow-up Appointments

- First follow-up (15 days post-installation): The general condition of the appliance was assessed, confirming

adequate retention and absence of damage (Figure 10). A clinical phonetic analysis was performed focusing on the phonemes /s/ and /r/, which are commonly affected by the loss of anterior teeth. Evaluation consisted of a guided repetition test of words and syllables containing these phonemes, recorded in a controlled environment and compared with the mother's description of the child's prior pronunciation. A significant improvement in articulation was observed, attributed to the presence of the artificial tooth providing proper support for the tongue and lips during sound production.

- Second follow-up (3 months): Sustained improvement in pronunciation of the evaluated phonemes was confirmed. The mother reported noticeable progress in the child's verbal fluency at home and school. A new phonetic test was performed, replicating the previous procedure, documenting clearer and more precise pronunciation. The stability of the appliance and oral hygiene were also evaluated, and a panoramic X-ray was requested to assess the Nolla stage of the permanent teeth and the physiological resorption of the temporary roots (Figure 11). Check-ups were scheduled every 6 months.
- Third follow-up (12 months): Proper pronunciation was verified, and the appliance was found to be well-fitted, functional, and aesthetically preserved. Oral hygiene instructions were reinforced, and continued dental checkups were scheduled until the eruption of the permanent tooth 1.1 (Figure 12).



Figure 10: First Follow-up at 15 days post-installation



Figure 11: Second Follow-up at 3 months



Figure 12: Third Follow-up at 12 months

## Discussion

The outcomes obtained in this clinical case were satisfactory, confirming the effectiveness of the Groper-type appliance as a key component in the therapeutic approach. Its specific design facilitated functional, esthetic, and occlusal recovery. One of the most relevant achievements was the improvement in the pronunciation of the /r/ and /s/ phonemes, which had

been previously altered due to the dental avulsion. This progress highlights the positive impact of the appliance on speech development throughout treatment.<sup>10</sup>

Dental avulsion in the primary dentition is a common childhood injury and can have significant aesthetic, functional, and emotional repercussions. The loss of a primary incisor compromises essential functions such as mastication, speech, and the child's self-esteem. A particularly relevant clinical complication is the loss of space for the succeeding permanent tooth, which may interfere with its proper eruption and lead to malocclusion. In some cases, compensatory tooth movement may cause extrusion, inclination or displacement of adjacent teeth.<sup>11,12</sup>

In this case, the diagnosis of avulsion was confirmed through clinical and radiographic evaluation, showing complete loss of tooth 5.1. Reimplantation was not performed because this practice is contraindicated in primary dentition, as it could damage the permanent tooth germ, as established by the International Association of Dental Traumatology (IADT).<sup>13</sup>

For rehabilitation, the use of a fixed Groper-type appliance was selected. Although other alternatives exist, such as the Denari pediatric bridge which can be either removable or fixed the decision was based on the patient's individual characteristics. The patient was 4 years old and had limited ability to cooperate, which made the choice of a removable appliance risky, as such devices require the child to be able to put them in, take them out, and keep them clean, otherwise they could cause injury to the mucosa, damage to adjacent teeth, or even loss of the appliance.<sup>14-16</sup>

The Groper fixed appliance was selected for its ability to preserve the edentulous space, restore esthetics, facilitate phonation, and offer stability without relying on the patient's active cooperation and frequent adjustments, which is ideal for preschool-aged patients. These benefits are widely recognized by clinical guidelines such as those of the American Academy of Pediatric Dentistry (AAPD) and various studies specializing in pediatric dentistry.<sup>17,18</sup>

Although the patient did not attend the scheduled check-up at six months, which could have caused some concern about the progress of the treatment, the follow-up carried out at 12 months showed that the appliance was in good condition, functional, and without complications. No discomfort was reported, and phonation remained adequate. This demonstrates the effectiveness and durability of the fixed Groper appliance, even with spaced clinical follow-ups.<sup>19-21</sup>

When comparing this treatment with other alternatives, the choice of a fixed space maintainer proved to be the most appropriate for this case. Although removable pediatric bridges can perform similar functions, their success depends directly on the level of patient cooperation. In children under 5 years of age, as in this case, fixed appliances offer greater safety, better retention, lower risk of complications, and minimal cooperation requirements. These factors are key to clinical success.<sup>22-24</sup>

This clinical case illustrates how an appropriate and timely intervention, tailored to the patient's profile, can contribute significantly to preserving functionality, phonation, and esthetics

during the preschool stage. However, it is important to acknowledge as a limitation that this is a single case, which does not allow for generalization of the results. Future research should include comparative studies between fixed and removable space maintainers in different age groups and clinical contexts, as well as long-term assessments of their effects on phonetic, occlusal, and emotional development.

## Conclusion

This clinical case report showed positive outcomes following the placement of a Groper-type appliance as treatment for dental avulsion in the primary dentition. The device effectively fulfilled its role as a space maintainer while also contributing to significant improvements in the patient's speech, esthetics, and occlusion throughout the documented follow-up period.

Although not all scheduled check-ups were completed, the follow-up carried out up to

12 months allowed the functionality of the appliance and its permanence in the mouth to be verified without complications. This case highlights the importance of selecting appropriate prosthetic devices in pediatric dentistry that are adapted to the age and level of cooperation of the patient.

## Conflict of Interest

The authors declare that they have no financial, personal, or professional conflicts of interest that could have inappropriately influenced the conduct of this research, the interpretation of the results, or the writing of the manuscript.

## Ethical Statement

The legal guardian was fully informed about the nature of this clinical case and provided written consent for the publication of the related data and images, with full understanding that the patient's identity would remain undisclosed.

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Correspondencia: Camila Vásquez Avila, correo: camila.vasquez@ucacue.edu.ec