THE IMPACT OF A TEMPORARY PROSTHESIS ON A PATIENT WITH DENTIN DYSPLASIA TYPE I: A LIFE-CHANGING TRANSFORMATION.

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ABSTRACT: Dentin Dysplasia (DD) is a rare, hereditary and unusual disease that has affected human dentin development. It is divided into two types: I (radicular) and type II (coronary). Type I is the most common, and may affect the deciduous and permanent dentition. Clinically, the dental units do not present any change in formation, but mobility and early loss can be noted, due to poor formation or root absence, observed radiographically. The objective of this case report is to discuss the provisional and experimental prosthetic rehabilitation of the upper arch of an 8-year-old patient with an early diagnosis of Type I Dentin Dysplasia since she was 3 years old. The patient is being monitored by an interdisciplinary team and, during dental consultations, the need to provide comfort and better quality of life for the child is perceived. Therefore, the creation of a mucous-supported provisional prosthesis was proposed. The treatment of dentin dysplasia is still uncertain and with few reports in the literature, since there is no consensus on the best conducts to be performed. An interdisciplinary and multidisciplinary follow-up is important for these cases.

KEY-WORDS: Dentin Dysplasia; Mouth Rehabilitation; Denture Partial Temporary; Pediatric Dentistry

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1. INTRODUCTION

Dentin dysplasia (DD) is considered a rare genetic disorder involving dentin malformation caused by an autosomal dominant inheritance pattern. It is one of the rarest forms of dentin-related disturbances in humans, with an estimated prevalence of 1 in 100,000 individuals. This condition affects both primary and permanent dentition, compromising enamel and/or dentin during dental development. DD can lead to aesthetic, functional, and psychological problems. It is classified into two types: Type I (radicular) and Type II (coronal), and may also be categorized as hereditary, congenital, or acquired (Toomarian et al., 2010; Rocha et al., 2011; Neville et al., 2016; Akhil Jose et al., 2019).

In Type I DD, both primary and permanent teeth usually show no visible clinical abnormalities in crown morphology. However, there is often pronounced tooth mobility. Radiographic imaging reveals short or poorly formed roots, or even complete root absence, which explains the increased mobility. Consequently, premature tooth exfoliation may occur either spontaneously or following minor trauma (Machado et al., 2012; Chen et al., 2019). In contrast, Type II is characterized by discolored primary teeth, with shades ranging from blue and amber to brown, displaying translucency. The permanent dentition typically appears clinically unaffected, although radiographs may show thin roots and early pulp chamber obliteration (Neville et al., 2016).

Carroll et al. (1991) and Ruela & Sampaio (1998) further subdivided Type I DD into four subtypes:

- DDIa, the most severe form, shows complete pulp obliteration and incomplete or absent root development;
- DDIb presents with short, conical roots and a crescent-shaped horizontal radiolucency at the cementoenamel junction;
- DDIc is characterized by two concave horizontal lines and roots approximately half the normal length;
- DDId, the least severe, features roots of normal length with minor changes in the pulp chamber at the cementoenamel junction

(Bastos et al., 2010; Malik S et al., 2015; Chen D et al., 2019).

Although Type I dentin dysplasia (DDI) may affect both dentitions, the primary dentition is typically more severely compromised, with minimal or no detectable pulp tissue and extremely short or absent roots (Neville et al., 2016). Therefore, the pediatric dentist

plays a vital role in early diagnosis, enabling the development of an appropriate treatment plan tailored to the patient's needs (Carneiro, 2014).

The aim of this case report is to describe the provisional and experimental prosthetic rehabilitation of the maxillary arch in a patient diagnosed with Dentin Dysplasia Type I, who has been under early diagnosis and follow-up. This study highlights the clinical, radiographic, and hereditary features of the condition, emphasizing the importance of interdisciplinary and multidisciplinary management and long-term care.

2. CLINICAL CASE REPORT AND DISCUSSION

Patient J.J.F.M., eight years old, female, Brazilian, student. She attended the pediatric dentistry school clinic at UniFTC, Paralela campus in Salvador-BA, accompanied by her parents for a follow-up appointment. This case report was submitted to the Ethics and Research Committee of the same institution, under number: CAAE: 86613724.2.0000.5032.

The mother denied any allergies or underlying diseases. She reported: "My daughter is being bullied at school because of her missing teeth." She also stated that the current condition of her dentition has affected the child's self-esteem, caused difficulties in socializing, and interfered with vital actions such as eating and speaking, due to tooth mobility and early tooth loss.

Along with the chief complaint, the family also expressed concern and distress about their daughter's future and the limitations she may face during her development, both aesthetically and functionally.

During the anamnesis and review of the patient's medical record, a previous diagnosis of Dentin Dysplasia Type I (DDI) was confirmed, established at the age of three when the child was first seen at the institution.

At that time, a detailed anamnesis, complete clinical examination, and the request for the first panoramic radiograph were carried out, along with the signing of the Informed Consent Form. Since then, the parents were instructed on the importance and necessity of periodic follow-up, as well as the existing limitations regarding treatment options for the case. The father also reported that he had been diagnosed with the same dental condition at the age of eleven.

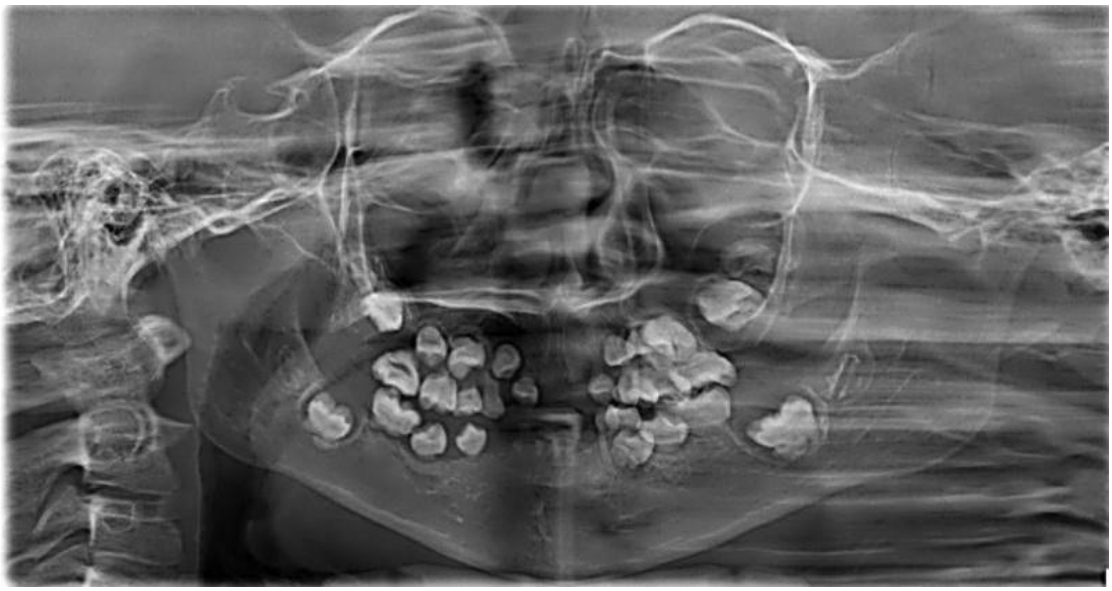
Throughout the child's dental follow-up, she has already undergone preventive procedures (oral hygiene instruction, prophylaxis, and topical fluoride application) and restorative procedures using glass ionomer cement and composite resin (Table 1).

Table 1: Previous consultations.

Service Date	**Performed Procedures**
05/11/2018	First consultation, prophylaxis and Topical fluoride application.
12/11/2018	Diet diary assessment, behavior management, prophylaxis, and topical fluoride application.
10/09/2019	Class I restoration with Light-Cure GIC (SDI) on tooth 54 and Class IV restoration with composite resin on tooth 63.
05/11/2019	Restoration with EB1 composite resin (FORMA) on tooth 63 and intraoral photographs..
03/11/2021	Reevaluation, prophylaxis, and restorations with Light-Cure GIC (SDI) on teeth 63 and 54.
10/11/2021	Prophylaxis and restoration with Light-Cure GIC (SDI) on tooth 16.
17/10/2021	Intraoral photographs, frontal and lateral views.
05/05/2022	Reevaluation, prophylaxis, and intraoral photographs.
31/05/2022	Restorations with Light-Cure GIC (SDI) on teeth 16, 63, and 74; intraoral photographs.
13/09/2022	Intraoral photographs, periapical radiographs of teeth 36 and 46, and panoramic radiograph request.
01/11/2022	Intraoral photographs, anatomical impression, and bite registration.

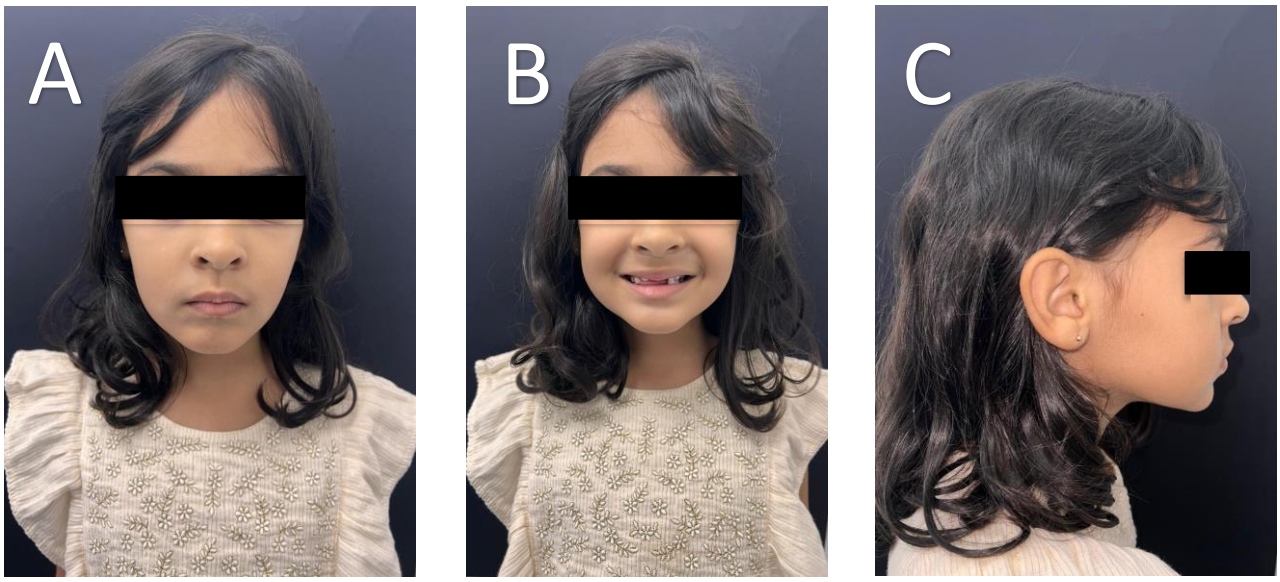
As described in Table 1, in September 2022, a panoramic radiograph was requested in order to investigate the child's dental formation, and the patient only returned at the end of November 2022. Figure 1 revealed a mixed dentition, absence of deciduous teeth 51, 52, 61, 62, 71, 72, 75, 81, 82, 83, 84, and 85, as well as permanent teeth 11, 21, 31, 32, 33, 41, 42, and 43; upper and lower third molars (18, 28, 38, 48) in development at Nolla stage 2; deciduous and permanent teeth with short roots and altered morphology, suggestive of Radicular Dentin Dysplasia, in addition to symmetrical and well-developed maxillary sinuses.

Figure 1. Panoramic radiograph taken in October 2022.



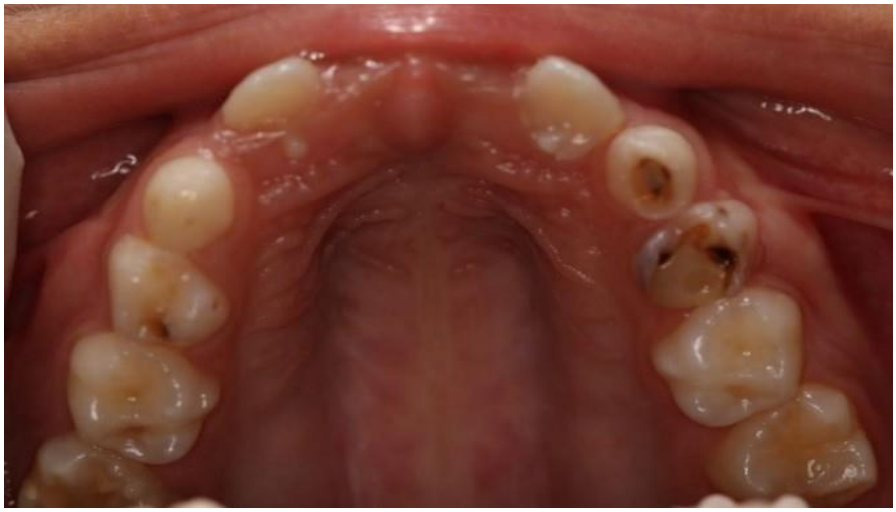
At the follow-up appointment in April 2023, the anamnesis was repeated to confirm the data, and new extraoral photographs were taken to identify the patient's facial profile (Figure 2). In the extraoral clinical examination, the child was observed to have oronasal breathing, along with noticeable alterations in speech.

Figure 2. Patient's facial profile



In the intraoral assessment, mixed dentition was noted, along with premature loss of deciduous teeth, and the presence of unsatisfactory restorations in the upper left deciduous canine (63) and the upper left first deciduous molar (64) (Figure 3).

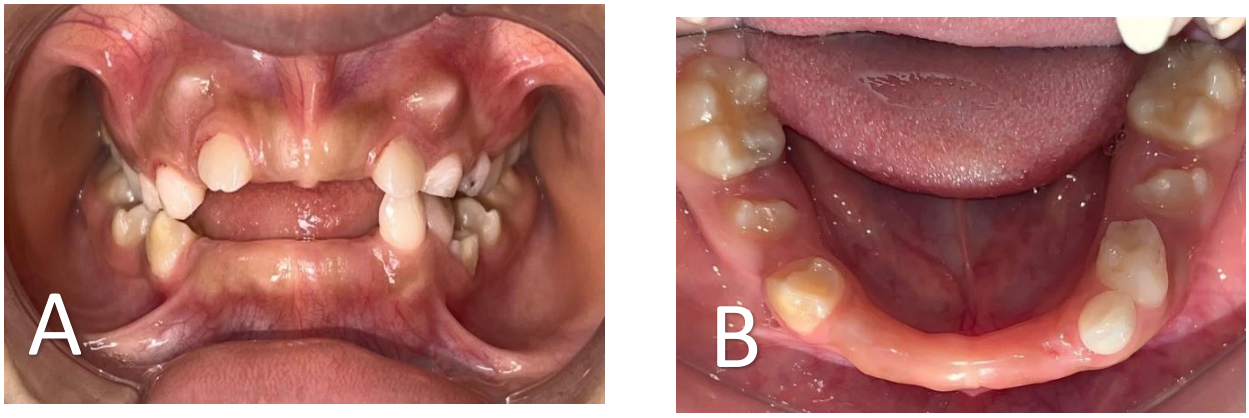
Figure 3. Occlusal view of the upper arch.



After the follow-up appointment, a treatment plan was developed for the patient. During the subsequent visits, it was observed that the upper right (13) and left (23) permanent canines began erupting ectopically in the buccal direction, and that the lower left first premolar (34) was also erupting ectopically due to the prolonged retention of the lower left first deciduous molar (74) (Figure 4). As a result, a new panoramic radiograph was requested

to monitor dental development and assist in the elaboration of a new treatment plan involving an interdisciplinary team.

Figure 4. Teeth 13 and 23 erupting ectopically in the buccal direction (A); Tooth 74 erupting ectopically in the buccal direction (B)



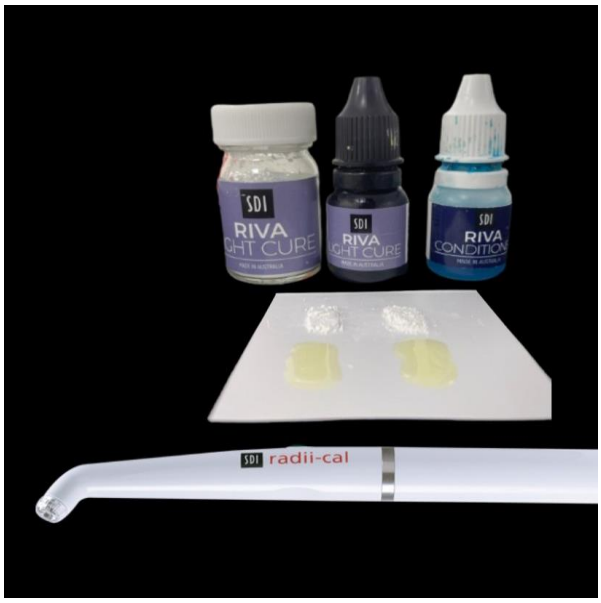
The development of the treatment plan was the most complex stage of this clinical case, as it involved the need for both interdisciplinary and multidisciplinary intervention. In addition to oral environment management, it was noted that prosthetic rehabilitation was necessary, since the patient's parents also expressed concerns related to aesthetics and functionality due to premature tooth loss. During discussions among the involved professionals, questions arose regarding the most appropriate approach for the patient.

Initially, there was disagreement about fabricating a prosthesis due to several factors, such as the child's young age, potential interference with craniofacial growth and development, adaptation challenges, possible acceleration of root resorption, and the lack of studies in the literature. However, all professionals agreed that implant-based treatment was not yet feasible at this stage (Akhil Jose et al., 2019; Chen et al., 2019). After further study and discussion, the decision was made to fabricate a mucosa-supported provisional prosthesis.

Based on the clinical and radiographic findings, and considering the current stage of the patient’s skeletal and dental development, a new treatment plan was established involving the fabrication of a mucosa-supported prosthesis, used provisionally for adaptation, in addition to aiming to improve the patient’s quality of life. The proposed treatment plan was presented and explained to the patient’s guardians, who agreed to and authorized its execution.

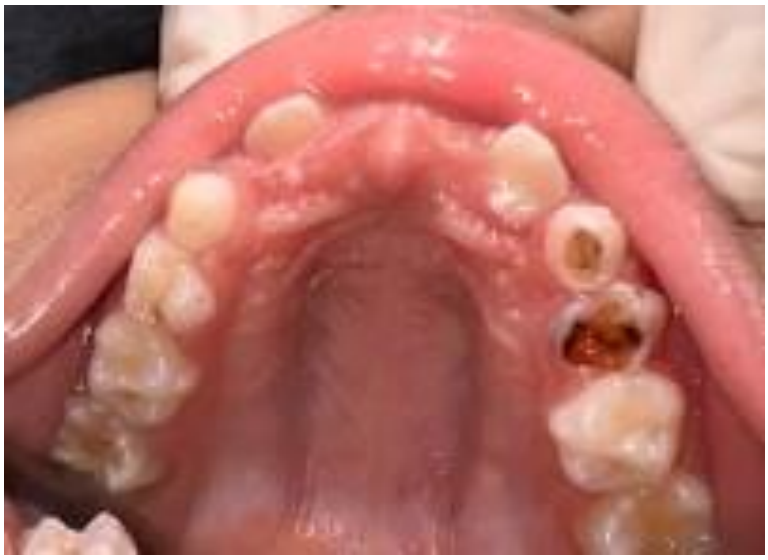
The treatment was initiated with oral environment management, through prophylaxis and the replacement of restorations on the palatal surface of tooth 63 and the disto-occlusal surface of tooth 64, using resin-modified glass ionomer cement (Riva Light Cure – SDI, Bayswater, Victoria, Australia) (Figure 5).

Figure 5. Material used for the restorations.



To accomplish this, the pre-existing restorations were removed using a carbide number 6 (KAVO Dental GMBH – Biberach an der Riß, Germany), followed by the removal of residual material with dentin curette number 17 (Golgran – São Caetano do Sul, São Paulo, Brazil), as the restorations were poorly adapted (Figure 6).

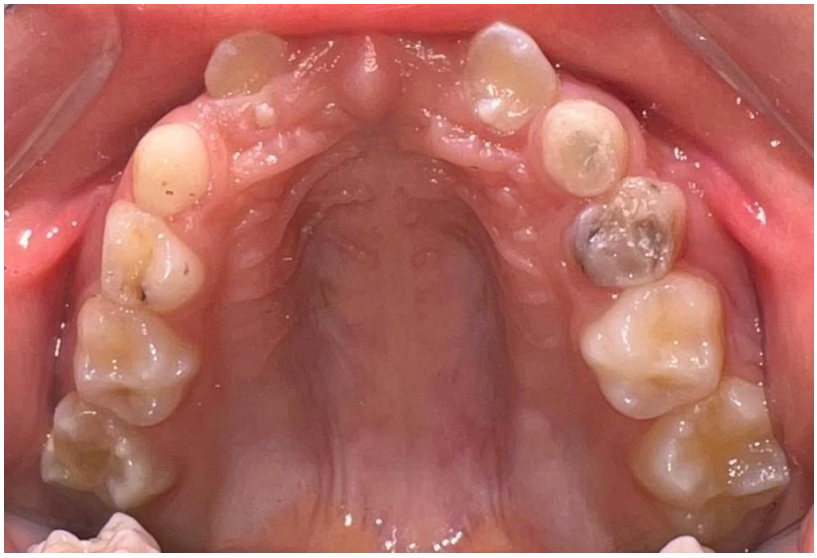
Figure 6. Cavity after removal of the old restorative material (GIC).



Relative isolation was performed using cotton rolls (Cremer – Blumenau, Santa Catarina, Brazil), and dentin conditioning was done with 26% polyacrylic acid (Riva Conditioner – SDI, Bayswater, Victoria, Australia) for 10 seconds, followed by rinsing and drying of the surface with a cotton pellet. Then, relative isolation was replaced, and the restorative material was manipulated on a mixing pad using a spatula no. 24, in a ratio of 2 drops of liquid to 1 scoop of powder, as recommended by the manufacturer in the product instructions.

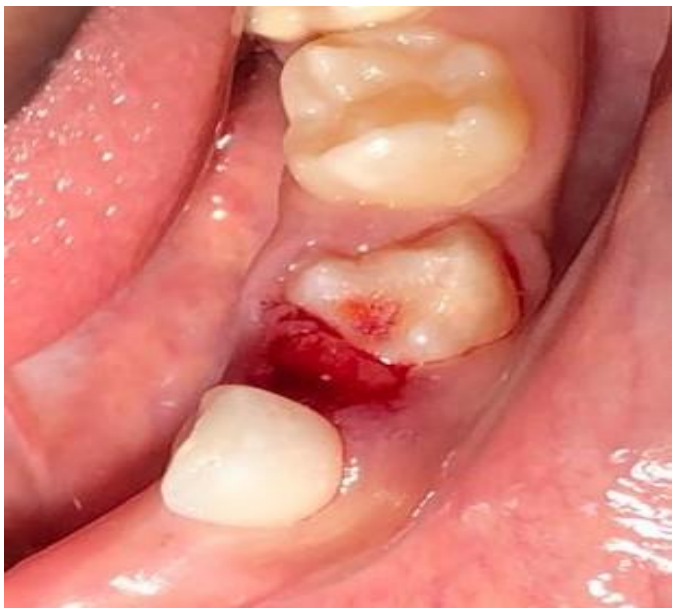
Once the material was ready, it was inserted into the cavities using an insertion spatula (Millenium – Golgran – São Caetano do Sul, São Paulo, Brazil) and photoactivated for 20 seconds on each surface using a curing light (RADII-CAL CX, with an intensity of 1200 mW/cm²). Two portions of the restorative material were used to completely fill the cavities. Occlusion was checked using articulating paper and Muller tweezers, and occlusal adjustments were performed with burs 3168F and 1190F (KG Sorensen – Serra, Espírito Santo, Brazil). The restorations were satisfactory, thus concluding the restorative procedure (Figure 7).

Figure 7. Occlusal view after restoration with resin-modified GIC on teeth 63 and 64.



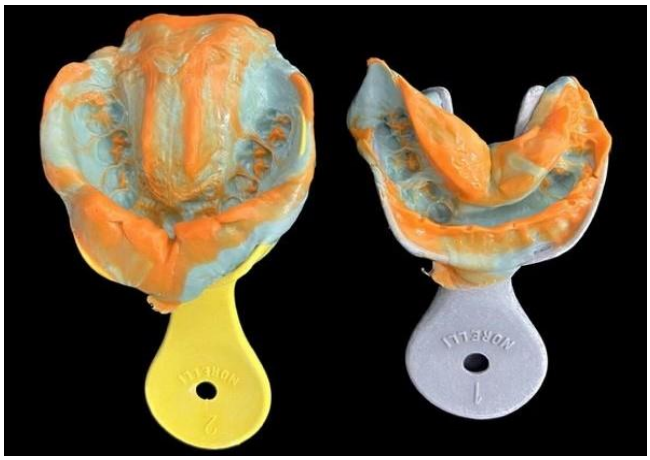
The second stage of oral environment management consisted of the extraction of the retained lower left first deciduous molar (74), which was hindering the eruption of the lower left first premolar (34). For the procedure, ¼ of a cartridge of 2% lidocaine with 1:100,000 epinephrine anesthetic (DFL – Rio de Janeiro, Rio de Janeiro) was used. The anesthetic technique employed was local infiltration. A Molt periosteal elevator no. 2-4 (Golgran – São Caetano do Sul, São Paulo) and forceps no. 1 (Golgran – São Caetano do Sul, São Paulo) were used. No suturing was required, as the permanent tooth (lower left first premolar – 34) was already erupted (Figure 8).

Figure 8. Post-operative view following extraction of tooth 74.



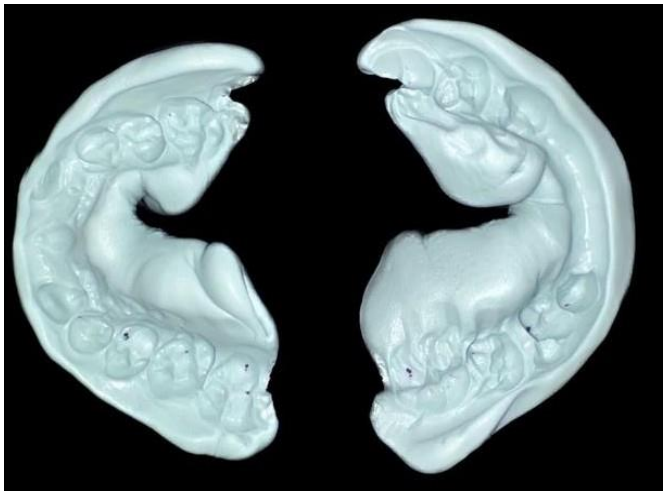
The experimental rehabilitative stage took place in parallel with the oral environment management phase and began with the impression of the arches and bite registration using condensation silicone (Zetaplus – Zhermack, Italy) to obtain the study model (Figure 9).

Figure 9. Bite registration.



A pediatric tray no. 2 (Morelli – Sorocaba, São Paulo, Brazil) was used for the upper arch impression, and a pediatric tray no. 1 (Morelli – Sorocaba, São Paulo, Brazil) was used for the lower arch (Figure 10).

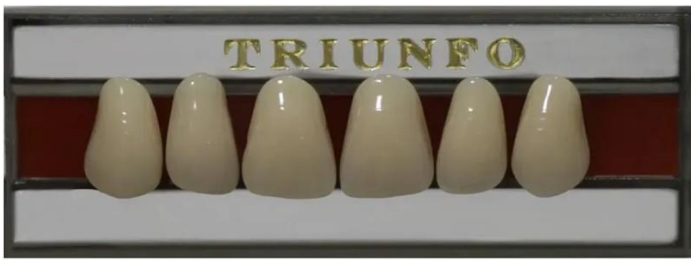
Figure 10. Impression of the arches with condensation silicone.



Next, a working model was fabricated using type IV special dental stone (Yamany – Atibaia, São Paulo, Brazil), which was used for the fabrication of the mucosa-supported prosthesis.

For the fabrication of the prosthesis, stock tooth A26 shade 62 central incisors (Triunfo – Pirassununga, São Paulo, Brazil) were used (Figure 11), which were trimmed for anatomical, functional, and aesthetic adaptation. Next, the stone model was coated with Cel-Lac (SS-WHITE – Rio de Janeiro, Brazil), and in a Paladon pot, colorless self-curing acrylic resin powder and liquid (Clássico – JET – Campo Limpo Paulista, São Paulo, Brazil) were mixed. The material was spatulated with spatula no. 24 to the proper consistency and applied to the palatal area of the working model and the buccal area where the teeth were positioned, completing the acrylization of the teeth.

Figure 11. Stock Teeth.



Once the prosthesis was fabricated, finishing and polishing were performed using maxicut and minicut burs, along with a universal finishing and polishing kit (American Burrs – Palhoça, Santa Catarina, Brazil) (Figure 12).

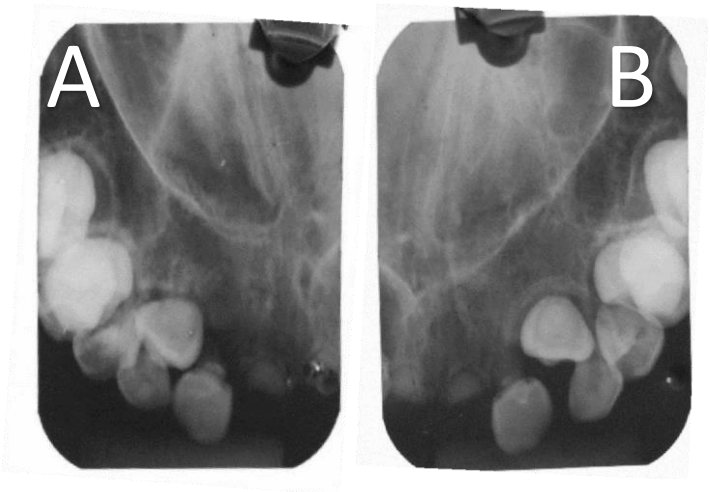
Figure 12. Maxillary removable partial denture.

The subsequent stage consisted of adapting the prosthesis intraorally. At this point, it was necessary to make adjustments to the prosthesis for better adaptation. Relief was

performed only in the area corresponding to the labial frenum. Once the prosthesis was properly adapted, the patient received instructions regarding use, hygiene, and storage. Insertion and removal tests were carried out intraorally, along with phonation tests, during which the patient was asked to speak full sentences.

On the same day, periapical radiographs of teeth 12 and 22 were taken (Figures 13a and 13b) to evaluate mobility detected during prosthesis insertion.

Figure 13. a) Periapical radiograph of tooth 12; b) Periapical radiograph of tooth 22.



At the end of the appointment, the prosthesis delivery was documented with intraoral photographs and videos (Figure 14 -15).

Figure 14. Documented with intraoral photographs.

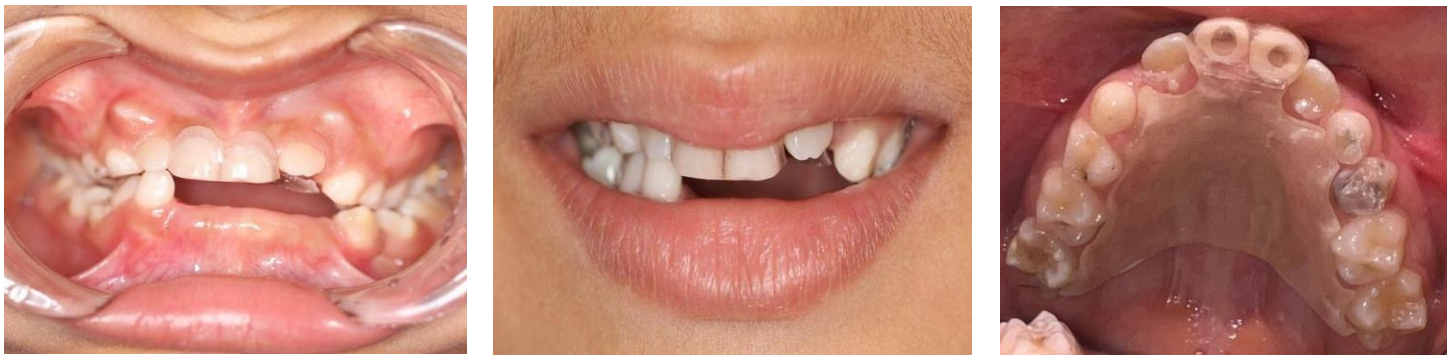


Figure 15. Frontal photo of the patient with prosthesis in her mouth.

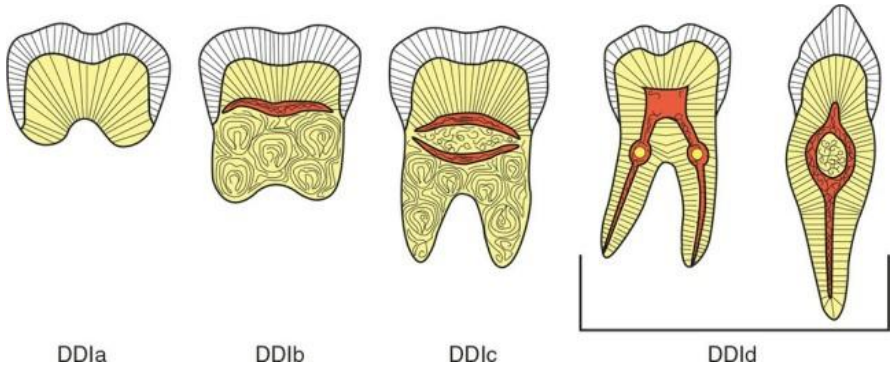
The patient returned for a follow-up appointment the following week to assess the prosthesis adaptation. She reported good adaptation and high satisfaction. The child will continue to be monitored at the UniFTC outpatient clinic for future treatment options.

The etiopathogenesis of dentin dysplasia remains a topic of debate in dental science. In 1980, Melnick classified DD into type I and type II. Type I is a rare condition that clinically presents with teeth that have normal enamel but atypical dentin. Radiographically, it is characterized by pulp chamber obliteration and minimal to no root development, resulting in tooth mobility and premature exfoliation of both primary and permanent teeth. Given this condition, early diagnosis and multidisciplinary follow-up are extremely important, as there is no consensus on specific treatments for DD (Akhil Jose et al., 2019).

Type I dentin dysplasia (DDI) can be further divided into 4 subtypes (Figure 16). DDIa is considered the most severe, with no visible pulp chamber, minimal or absent root development, and frequent periapical radiolucencies. DDIb presents with a single, small, horizontally oriented pulp and conical or short roots. In DDIc, two horizontally oriented, crescent-shaped pulp areas can be observed, with significant but still shortened root length and variable periapical radiolucencies. Lastly, DDId presents with visible pulp chambers and canals, roots nearly normal in length, pulp chamber enlargement with pulp stones in the coronal portion, creating a localized bulging of the canal and root, apical constriction of the pulp toward the apex, and minimal periapical radiolucency (Bastos et al., 2010;

Neville et al., 2016; Chen D et al., 2019).

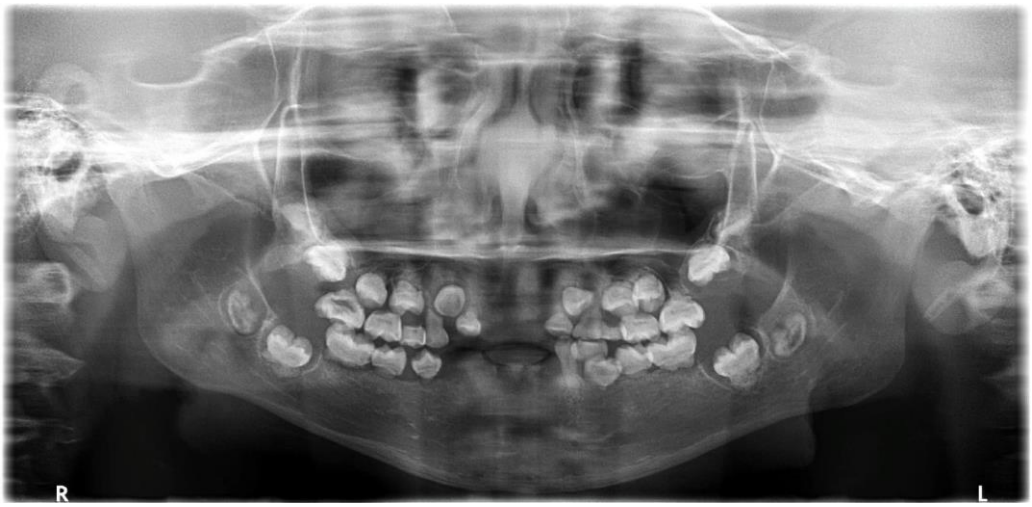
Figure 16. Subdivision of the DDI.



Source: Neville *et al*., (2016. p109).

In the reported case, it is believed that the patient has type I dentin dysplasia (DD), as she presents teeth with unaffected enamel and atypical dentin. Radiographically, pulp chamber obliteration and little to no root development are observed (Figure 17). It is believed to be subtype B, as she presents a single, small, horizontally oriented pulp, with conical or short roots.

Figure 17. Panoramic X-ray taken in May 2023.



The patient experienced early loss of primary teeth, as well as permanent teeth, illustrating the severity of the clinical condition. Therefore, it is essential that she remains under continuous follow-up. Managed by an interdisciplinary team, the provisional

mucosa-supported prosthesis fabricated for the patient will need to be replaced at short intervals due to ongoing tooth loss and eruption changes, while also preventing further damage to maxillary growth and development.

The literature describes different treatment approaches for dentin dysplasia. In the case of DDI, where tooth loss occurs in both primary and permanent dentitions, treatment typically consists of partial or complete prosthetic rehabilitation until craniofacial growth is complete. Dental implants are only indicated once the patient's growth has fully matured, generally around 18 years of age (Barron et al., 2008).

There is still no consensus in the literature on the best treatment for DD, as the reported cases vary significantly in their characteristics. Additionally, there is a lack of studies addressing treatment during childhood.

Early diagnosis of DD contributes to a more favorable prognosis. However, there are still no less invasive alternatives than the fabrication of partial or complete prostheses, or implant-supported prostheses in DDI cases (Akhil Jose et al., 2019; Chen D et al., 2019). The literature remains limited in both understanding the causes of DD and defining effective treatment options. There is a notable difficulty in finding studies that explore and report cases of dentin dysplasia and their respective treatments.

Since implant-supported rehabilitation is not recommended for patients with incomplete bone development, the treatment proposed for this patient was the fabrication of a dentomucosa-supported prosthesis, aimed at restoring proper function, esthetics, and phonation. Considering the patient is only 8 years old and was diagnosed at the age of 3, this prosthesis will need to be replaced periodically to avoid interfering with bone growth. Furthermore, due to the early loss of teeth resulting from root malformation or absence, the prosthesis tends to become ill-fitting over time, requiring a new device. Therefore, the patient will remain under continuous dental follow-up.

3. CONCLUSION

As dentin dysplasia is an irreversible condition, it is of utmost importance that its diagnosis occurs as early as possible, aiming for better management both in maintaining the present teeth and in rehabilitating the missing or lost units. The pediatric dentist plays

a crucial role in these cases, as they are the professional responsible for early diagnosis and initiating clinical follow-up.

The treatment of dentin dysplasia is still uncertain and has few reports in the literature, as there is no consensus on the best approaches to be adopted. Provisional prosthetic rehabilitation is considered important, aiming to restore function and aesthetics, as well as improve the quality of life of these patients.

Thus, the importance of interdisciplinary and multidisciplinary treatment and follow-up is emphasized.

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