

# Management of the anterior sector altered by impacted central incisor and ectopic eruption of canine: case report

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## ABSTRACT

Tooth loss is common during childhood following bucco-dental trauma. Space management is an important issue that should be planned from an early age. Failure to intervene in a timely manner can lead to impacted permanent teeth, crowding, alterations in the eruption of neighboring teeth or malocclusions. This case report describes the dental management performed by a multidisciplinary team that included pediatric dentistry, orthodontics, maxillofacial surgery and periodontics after dental avulsion and subsequent dental impaction and ectopic eruption. The treatment applied consisted of exodontia of the primary canine, distalization of tooth number 23 for correct placement and subsequent traction of tooth number 21, using fixed appliances. If there is premature loss of primary teeth in the anterior sector, the patient should be referred to a specialist to avoid possible consequences. The indicated therapy will depend on each particular case, individualizing needs, costs and benefits. The intervention in these cases should be timely by the treating team, especially when the child is in an important stage of development, both physically and psychologically. The resolution of complications in the anterior sector should be managed by a multidisciplinary group.

**Keywords:** odontological practice; impacted tooth; space maintenance; case report.

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## INTRODUCTION

Primary teeth are of utmost importance for the growth and development of a pediatric patient. They play a role in phonetics, esthetics and chewing. Their other role is to maintain the space for the permanent tooth number (TN) until it emerges into the oral cavity. Following premature tooth loss, space maintainers not only safeguard function and preserve arch length, but also safeguard esthetics and eliminate any potential psychological damage a child might face because of premature tooth loss. At the same time, space maintainers provide a space for proper alignment (1).

Maintaining arch length in the primary, mixed and early permanent dentition is important for normal occlusal development. Premature loss of primary teeth can limit arch length and lead to malocclusion. The lack of space is influenced by aspects such as the patient's age, stage of development, dental losses, molar relationships, crowding or diastemas (2); and in the primary dentition it is one of the causes of malocclusions in permanent teeth (3).

However, maintaining space can reduce the need for prolonged orthodontic therapy. The choice becomes more complicated when the first permanent molar has not erupted (4). There is no solid scientific evidence about the consequences after premature loss of primary anterior teeth. Negative aspects are reported, such as alterations of impaction and eruption of permanent teeth, inclination of neighboring and antagonist teeth, respectively, deviation of the midline and crowding. It is possible to find functional problems such as speech disorders, esthetic problems, development of non-nutritional habits, leading to psychosocial implications, including decreased self-esteem and even being bullied (5).

Premature loss of primary teeth may follow oral trauma, extractions, early childhood caries, periodontal disorders, or be a manifestation of a systemic disease (6). Tooth eruption involves an axial displacement of the teeth from their place of formation in the alveolar bone to their functional position in the oral cavity. For this reason, delayed tooth eruption can have a significant impact on proper patient care (7).

The impaction of permanent teeth is a challenge for the professional when making a diagnosis, designing a treatment plan and determining a prognosis. There is a connection between primary teeth and the germ of permanent teeth, and any lesion to the primary dentition may influence the eruption of the permanent teeth. The extent of damage caused to the permanent

tooth germ will depend on the age of the patient at the time of the lesion, the type of trauma, the severity and direction of the impact (8).

Every year, many children suffer oral injuries and carry their consequences. Among the causes, direct trauma to objects, falls or facial and oral impacts stand out. Sequelae in the permanent dentition are not widespread in the long term, even though the oral region is the second most regularly injured part of the body in children under 6 years old. During this stage, the developing permanent teeth can be altered after trauma, causing mild or severe dental hypoplasia, displacement, injury to the tooth germ, impacted or retained teeth, or morphofunctional alterations. Occasionally, the consequences will be seen when the permanent incisors erupt, with ectopic or non-aligned eruptions. Therefore, patient follow-up is crucial to diagnose and treat the associated complications. Early referral to a pediatric dentist for diagnosis and treatment planning should also be emphasized (9).

## CASE REPORT

A 9-year-old male patient who comes to the dentist with his mother. When asked about the reason for his visit, he replied: "I am here because I don't have a tooth." The mother indicates that the patient is the product of a twin pregnancy, healthy, without systemic complications. Regarding sociodemographic data, she comments that they are from Valencia, Carabobo in Venezuela, a high school student, and they live in their own home with their mother, that is, their maternal grandmother. Besides, she denies any type of allergies, medication consumption or surgical interventions. She was asked about the presence of oral habits, to which she reported no presence. A dento-facial trauma was identified at 18 months with subsequent dental avulsion, specifically of the upper left primary incisor (TN 61). Among the family history, the mother only refers that the father died of COVID-19 in 2020. It is important to mention that the mother signed an informed consent form at the beginning of the visit to the dentist.

At the initial clinical examination (Figure 1), there is an absence of upper dental number. And at the initial radiographic examination (Figure 2), the panoramic radiograph shows a lack of eruption of the upper left permanent central incisor (TN 21), with deviation towards the mesial of the upper left permanent canine (TN 23) without eruption, in intimate contact with the root of the upper left permanent lateral incisor (TN 22). We can see the presence of a radiolucent area

in the incisal third of TN 21, presumably associated with a defect in the development of the enamel, specifically enamel hypoplasia. It presents a pattern of

dental exfoliation according to age in the lower sector, stage 8 of Nolla.



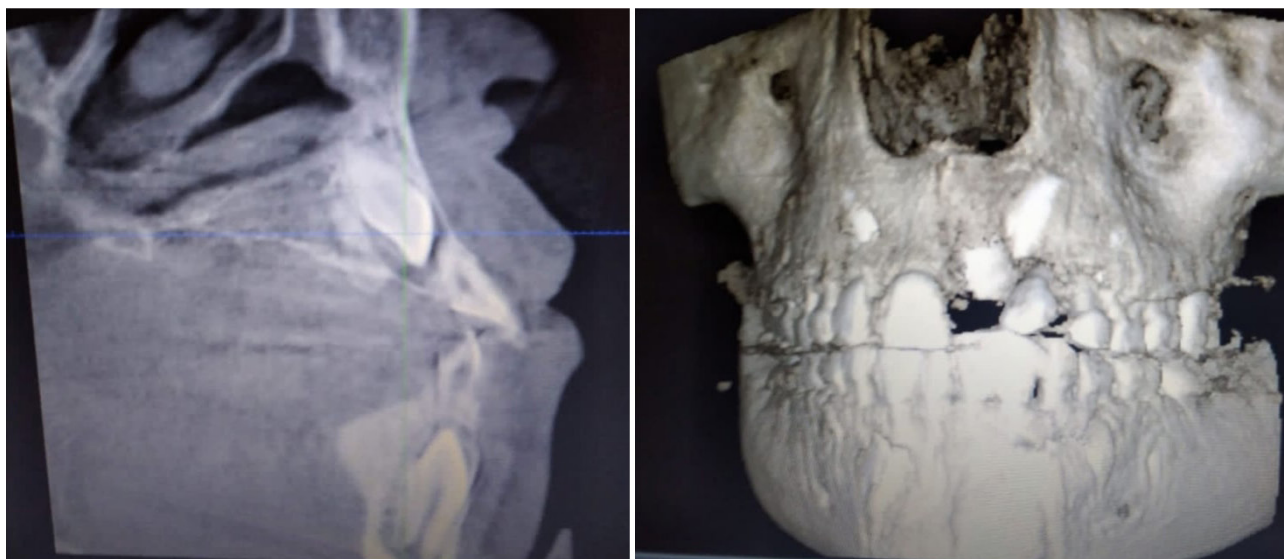
**Figure 1.** Initial photos of the patient. A) Frontal smile; B) Frontal occlusal.



**Figure 2.** Initial panoramic X-ray.

There is no evidence of supernumerary teeth or dental agenesis. In the axial and frontal images of the computed axial tomography, the lack of eruption of TN 21 and its proximity to TN 23 can be observed, as well as the root dilaceration of TN 22 (Figure 3). On

extraoral examination, a slightly convex facial profile was observed; and on intraoral examination, normal *overjet* and *overbite* were observed, without crowding, dental midlines coincided with the facial midline, class I molar.



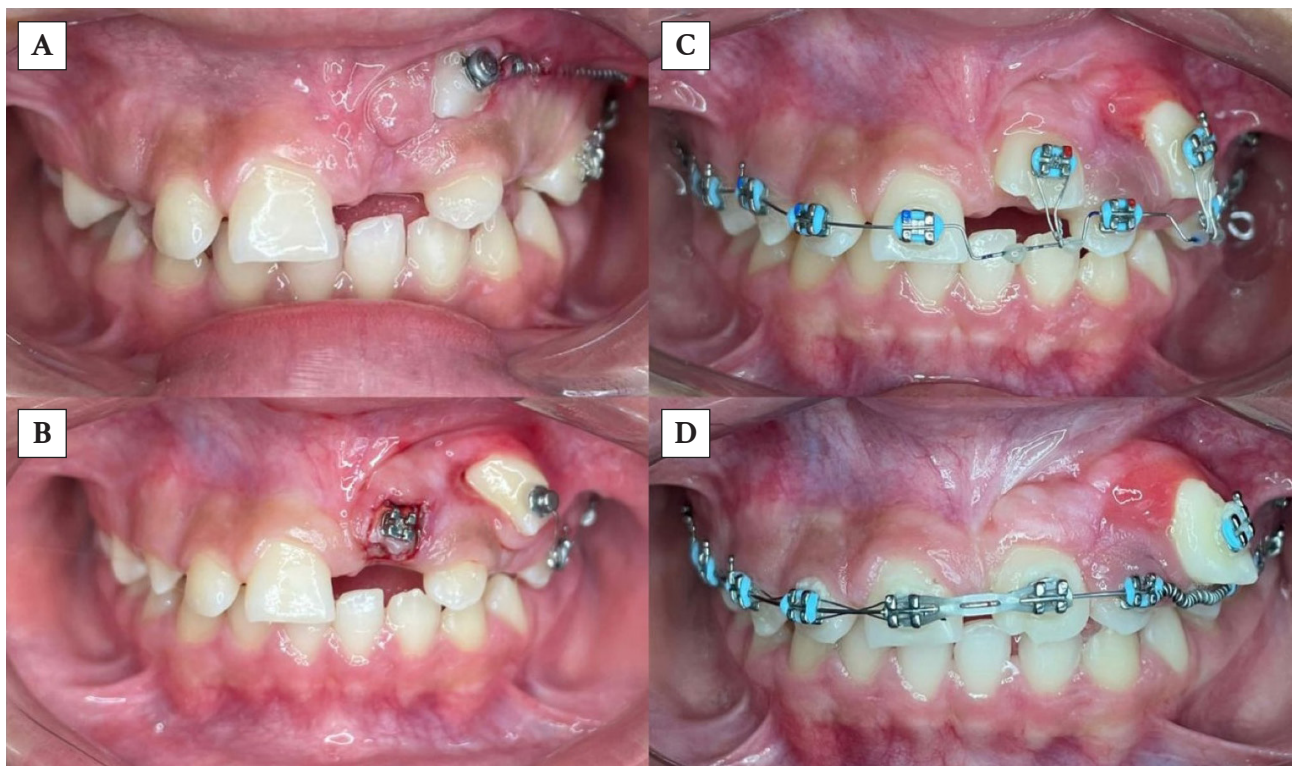
**Figure 3.** Computerized axial tomography of the patient.

Regarding the treatment plan, a multidisciplinary proposal was made by a pediatric dentist, an orthodontist, a maxillofacial surgeon, and a periodontist. The treatment alternatives were as follows: 1) extraction of TN 23 and 63, closing spaces with orthodontics, sacrificing TN 23 and making traction of TN 21; 2) extraction of the primary canine (TN 63), distalizing TN 23 for correct placement and subsequent traction of TN 21. The last option was chosen because of the possibility of distalizing the canine and placing it in position without eliminating another tooth.

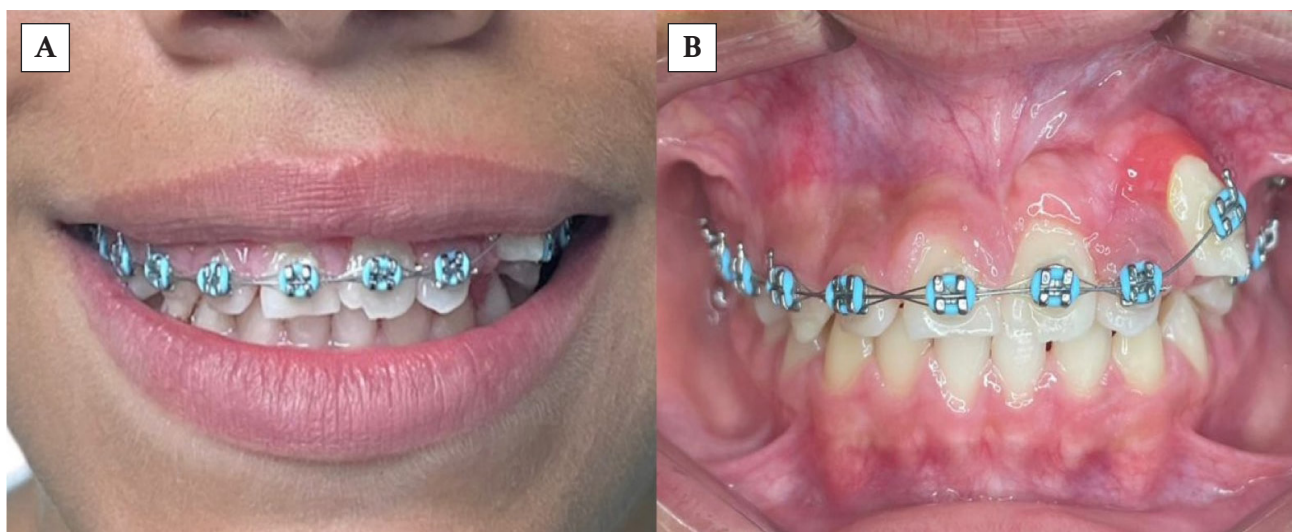
Initially, the upper left primary canine was exodontia to improve the eruption corridor of the upper

permanent central incisor. In the initial orthodontic phase, fixed appliances with a prescription of Roth slot 0.22 are placed exclusively in TN 24, 25 and 26, in addition to a mini-screw as absolute anchorage in the left molar area for distal traction of the upper canine (TN 23) to avoid undesired mesialization when consolidating this sector. By placing TN 23 in its correct position, TN 21 erupted posterior to unblock that space. After observing that this tooth was erupting, a surgical eyelet was performed and a *bracket* was cemented in TN 21 and in the rest of the upper arch to continue with the steps of alignment and leveling, following the sequence of arches with normal corrective orthodontics (Figures 4 and 5).





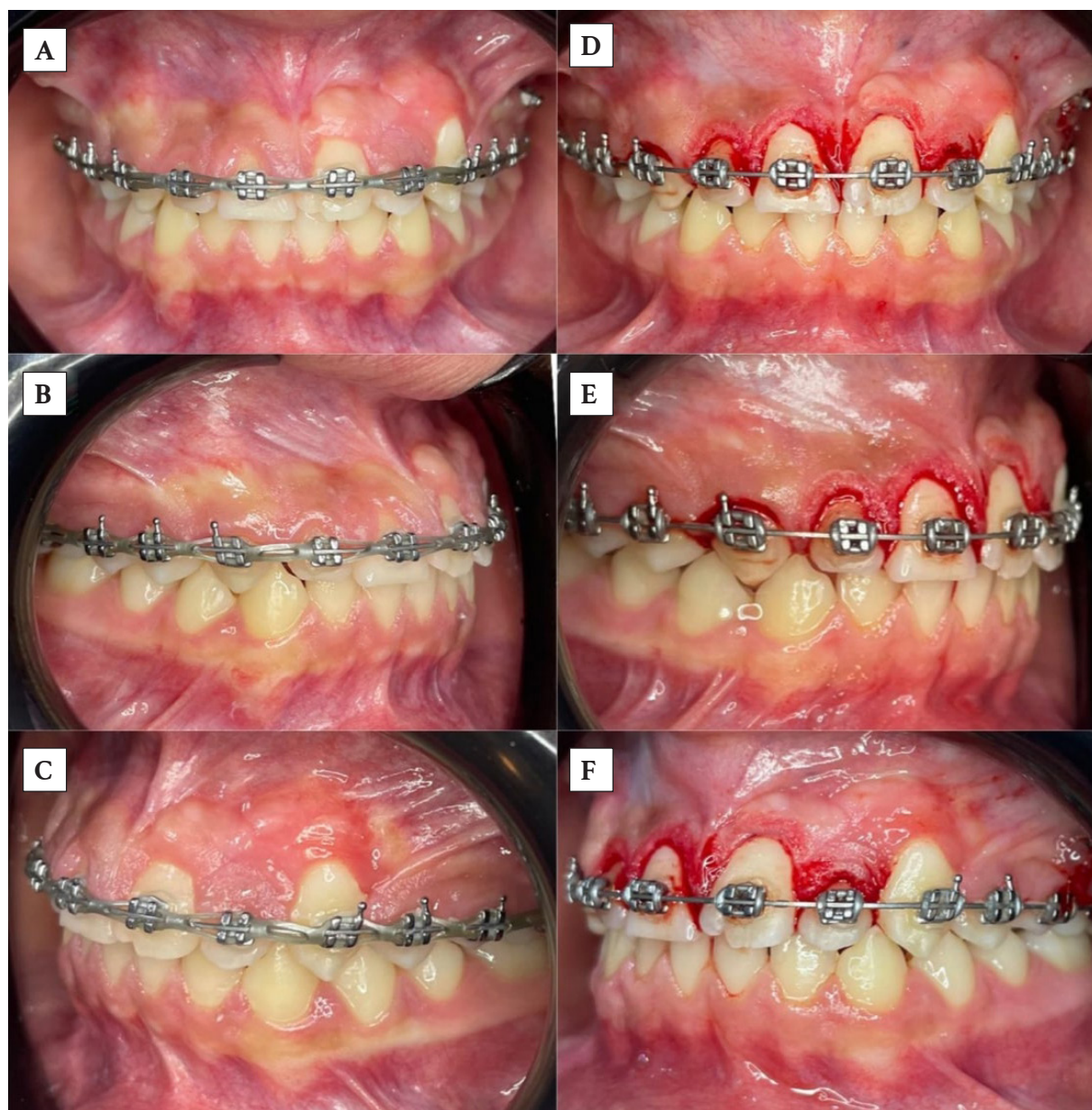
**Figure 4.** Evolution of left upper canine traction with the aid of a miniscrew. A) Distalization of TN 23 with closed nitinol spring to the absolute anchorage (miniscrew); B) Distalization of TN 23 completed, leaflet and bracket cementation on TN 21; C) Orthodontic mechanics of alignment and leveling with distance traction of TN 21 and 23; D) Working phase for space management and placement of TN 23 in the dental arch.



**Figure 5.** A) Orthodontic alignment and leveling phase; B) Space consolidation, alignment and leveling of TN 23.

When the teeth were correctly positioned, it was observed that the patient had an asymmetrical gingival topography, so gingivectomy and gingivoplasty of the anterosuperior sector were performed to obtain a more esthetic and physiological contour of the soft tissue (Figure 6). Following an order, an excess of

keratinized gingiva is observed in some teeth. For example, a very narrow band can be identified in TN 23. In addition, adjustments in dental esthetics are necessary to harmonize the dental anatomy, which also has an impact on the evaluation of esthetic parameters.



**Figure 6.** A) Front photograph in maximum intercuspation prior periodontal treatment; B) Right side photograph in maximum intercuspation prior periodontal treatment; C) Left side photograph in maximum intercuspation prior periodontal treatment; D) Front photograph in maximum intercuspation after performing gingivectomy and gingivoplasty in the anterosuperior sector, preserving an adequate amount of keratinized gingiva; E) Right lateral photograph in maximum intercuspation after performing gingivectomy and gingivoplasty only touching TN 13, preserving an adequate amount of keratinized gingiva; F) Left lateral photograph in maximum intercuspation, where no periodontal procedure is performed due to the defect present in the contour of TN 23.



The case is not finished, there is still asymmetry at the level of the gingival contour, but the evolution of the orthodontic treatment is expected to perform a single gingival procedure according to the needs of each area. The next step is to finish with conventional corrective orthodontics, with cementation of the lower appliances, with a sequence of archwires until finishing with removal and retention. For economic reasons, the patient has not completed all phases of treatment. It was the aesthetic problem that made the mother look for help. Upper completion is proposed exclusively because the primary occlusal parameters are present: class I molars and canines, midlines, firm interdental contacts, no gaps and acceptable dental inclinations.

## DISCUSSION

Tooth loss in anterior teeth should be managed from an early age. Space management is paramount in the initial stage to avoid future consequences. The prevalence of dental trauma in male patients is higher than in female patients, as is the frequency of impacted teeth (10). This case report is of a male patient whose initial dental trauma was at 18 months of age, which resulted in dental avulsion and subsequent impaction of the permanent successor tooth. Upper central incisor impaction is a rare phenomenon that affects the facial appearance of a pediatric or adolescent patient with esthetic and functional implications, with the central incisors being of vital importance for the smile, lip support and food incision (11).

In this case, the patient was a pre-adolescent who could hardly express himself and smile due to the absence of a central incisor. The upper incisor teeth generally erupt in the early mixed dentition, but alterations in eruption can occur and are often attributable to local factors. A failure in eruption will affect the development of occlusion and will have an influence on psychological aspects of the child. The main thing is to provide space in the dental arches and to avoid any impediment to the correct eruption of the tooth. Therapeutics should include a careful clinical evaluation, and a specialized multidisciplinary approach is recommended to optimize the treatment outcome (12).

Although the patient had the indication of space maintainer after dental avulsion, the lack of use over time resulted in the impaction of the upper central incisor. The potential benefits of the use of appliances are the reduction of ectopic eruptions, malocclusions such as crossbites, dental impactions and alterations

in molar relationships. There may also be a cost reduction in orthodontic treatment. Duward (2) believes that careful consideration of many factors is required when deciding whether a space maintainer is indicated. In this case, there was a treatment plan for the installation of a fixed space maintainer. However, in the face of constant dislodgement of the device, the parents decided not to follow the treatment. Ahmad et al. (13), in their review, found no strong evidence in favor of a particular method of space maintenance. At the same time, they showed that evidence to evaluate the achievement of clinical objectives, patient preference and device costs were poor, and recommendations cannot be made based on these results. When evaluating the best method of space maintenance, much depends on longevity and efficiency results. Failure rates varied widely among the studies. This statistic shows that this type of intervention does not always give satisfactory results; however, it should also be noted that more studies are needed to support these data.

A retrospective study conducted in Saudi Arabia determined the prevalence of late eruptions of the upper permanent central incisors, using panoramic radiographs of subjects aged 6 to 10 years attending university hospitals, between 2014 and 2020. Radiographs were analyzed to determine the delayed eruption of the upper permanent central incisors. They identified late erupting upper permanent central incisors according to the stages of tooth development and eruption sequence. Retention of primary teeth was the main factor causing delayed eruption, followed by early loss of primary teeth and lack of space in the arch (7). It is important to point out that in this case report it was not a primary tooth retention, but tooth avulsion, which was a premature loss before the age of 2, and that the space maintainer was not used correctly over time. In contrast to this case report, Yordanova and Gurgurova (14) mentioned that the most frequent cause of impaction of the upper central incisor was the presence of supernumerary teeth, specifically mesiodents, consequent to the presence of follicular cysts and odontoma or a sum of both.

In a study conducted in patients with traumatized teeth, dental anomalies in the permanent successor teeth were detected in 21 patients, in 26 teeth and 28 anomalies. Most frequently found were anomalies of the eruptive process, then enamel hypoplasia and white spots. If the trauma was in children younger than 36 months, the percentage of anomalies was found to be more frequent. Intrusive and extrusive

luxations were linked to clinical alterations in the successor permanent teeth. The risk of dental anomalies following trauma in the primary dentition is pointed out in this research (15). In the present case reported, when analyzing the panoramic radiograph, an image was observed in the area of the incisal third of the upper left permanent central incisor, which upon eruption was found to be a dental hypoplasia. At the same time, when posterior radiographs were

taken, root dilaceration was observed in the lateral incisor on the same side (Figure 7). De Amorim et al. (16) found, among a group of 815 traumatized primary teeth, that the most common sequelae observed in successor teeth were enamel discoloration, dental hypoplasia, and root and crown dilaceration. All these data coincide with the oral manifestations found in the present case report.



**Figure 7.** Control panoramic radiograph to observe the location of TN 22 and 23, without the presence of root resorptions.

Results found by Santo Jacomo et al. (17) report very similar statistics. The most common developmental alterations were enamel discoloration and/or enamel hypoplasia and eruption alterations due to traumatic injury in their predecessors. It was not possible to find an association between the type of lesion in primary teeth and damage to their successors in the age groups studied. The study concluded that enamel opacities and/or enamel hypoplasia were the most prevalent consequences in the permanent dentition and that there was no statistically significant association between the occurrence of sequelae in permanent teeth and the type of traumatic injury to their teeth.

In the present case, a dilaceration was found in the lateral incisor, which is defined as a dental

anomaly characterized by an abrupt deviation in the longitudinal axis of a tooth. It can occur in the crown, between the crown and the root, or in the root. Despite not being so prevalent, retained upper incisors with root dilaceration represent a diagnostic and treatment challenge for the clinician. Dilaceration is observed as a tooth deformity with an angulation between the crown and the root, which can interrupt the eruption of the incisor. In this case report, it was not the impacted tooth (TN 21) that presented root dilaceration, but the neighboring tooth (TN 22) and the upper canine (TN 23).

Corroborating the above, Tan et al. (19), in their research on impacted teeth, found that the upper permanent central incisors were the most affected



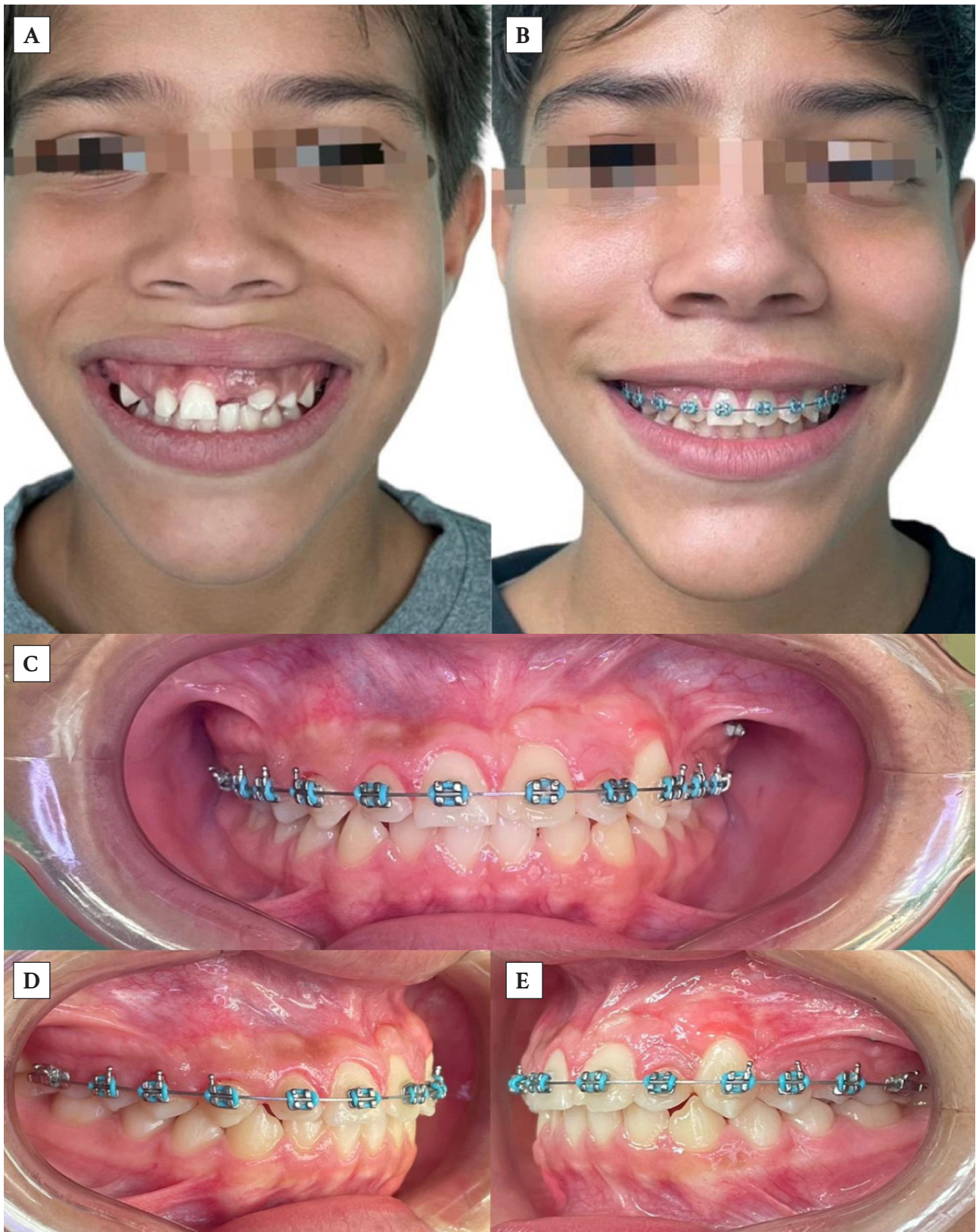
teeth (70.6%). The most common causes of unerupted incisors were dilacerations ( $n = 83$ ; 36.7%) of the upper central incisors; anomalies of tooth development ( $n = 22$ ; 30.6%), along with unfavorable root development ( $n = 22$ ; 30.6%) for the upper lateral incisors and abnormal tooth/tissue ratio ( $n = 11$ ; 50.0%) for the lower incisors. Most of the unerupted incisors had sequelae, including ectopic position/displacement/rotation of the unerupted incisors (46.6%), space failure (36.9%) and midline displacement (27.5%), which is very similar to the present case report, in which lack of space, dental impaction, eruption disorder of other teeth, presence of dental anomaly such as dental hypoplasia and root dilaceration were found.

The concepts of gingivectomy and gingivoplasty generally go hand in hand, and are indicated in cases of supraosseous grooves, grooves larger than 3 mm, when there is no need for osseous surgery, asymmetrical and unsightly gingival topography, gingival elongation. Due to these reasons, the patient underwent such interventions.

It is important to mention that smiling starts at a very early age and it is a mechanism through which the individual expresses him/herself and receives

encouragement. Over time, other concepts, such as self-image and self-esteem, are strengthened according to what the individual observes or the appraisals he or she receives from parents, relatives and peers. Oral health encompasses an integral concept where these variables must be taken into consideration, emphasizing that it is a fundamental basis for the quality of life of children and adolescents. Subjects with dentobuccal disorders have more difficulty in acceptance and socialization than their non-disordered counterparts, and the dental professional can offer changes to help improve self-image and self-esteem (20).

Even though this case report had limitations, such as the lack of completion of orthodontic treatment, the evolution observed in the resolution of the imbalance resulting from premature tooth loss in the anteroposterior sector, carried out by a multidisciplinary team, was very satisfactory (Figure 8). Over a period of 18 months, solutions have been provided to a list of problems presented by the patient, such as impaction of TN 21, lack of spaces, proper placement of TN 22 and 23, alignment and management of periodontal tissues. Consequently, this individual is a patient who can smile and interrelate with his peers without any type of complex, as it was not the case before treatment.



**Figure 8.** A) Pre-treatment facial forehead photograph; B) Post-treatment facial forehead photograph; C) Intraoral forehead photograph at maximum intercuspation after completion of treatment; D) Post-treatment intraoral right-sided photograph at maximum intercuspation after treatment; E) Post-treatment intraoral left-sided photograph at maximum intercuspation after treatment.

## CONCLUSIONS

After premature loss of primary teeth in the anterior sector, the patient should be referred to a pediatric dentist to maintain the space. The indicated therapy will depend on each case, individualizing needs, costs and benefits. Resolution of complications following lack of space management should be managed by the orthodontist, maxillofacial surgeon and periodontist, if necessary. By making a treatment plan in conjunction with several specialties, the patient is given the possibility of solving his problem in a short time, channeled to a success that translates into esthetics and function. From this specific case report, it can be concluded that dental traction through orthodontic treatment works satisfactorily in dental impaction.

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