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Severe dentoalveolar ankylosis of primary molars: Therapeutic Conducts

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Abstract

Primary Dentoalveolar ankylosis is a tooth anomaly that can be defined as the anatomic fusion of the radicular cementum of the tooth to the alveolar bone, where the periodontal ligament is absent. Its diagnosis can be reached by clinical and radiological exams associated with the evaluation of its symptoms. Depending on the severity of the pathology, it may contribute to the development of problems like malocclusion, localized or generalized loss of the perimeter of the dental arch, supra eruption of the antagonist tooth or impaction of the permanent successor. The levels of tooth decay and periodontal disease may also increase with the condition due to difficulties with local hygiene. The aim of this study is to review the literature on the clinical considerations of severe ankylosis, illustrate the condition, and discuss the treatment options through the presentation of a case report of a female child, 8 years and 8 months of age, with the complaint of vast destruction of the superior primary molars. The absence of the crown of teeth 54, 55 and 65 was noticed clinically and the severe dentoalveolar ankylosis of the elements cited above was confirmed radiographically. Consequently, there was a mesial inclination of the first permanent molars on both sides, invading the perimeter of the dental arch. This resulted in the loss of space for the eruption of the maxillary cuspids and bicuspids, successors to the ankylosed teeth, which were next to Nolla stage 6 and impacted at the region of the cuspid teeth. Initially, the therapeutic method was the regaining of space through the use of a removable orthodontic appliance in order to distalize the maxillary permanent first molars. This approach would allow the extraction of the retained primary teeth, and the regaining of the growth of the alveolar bone. Clinical and radiographic follow ups would be instituted until eruption of the successor permanent teeth.

Keywords

tooth decay; pathology; periodontal disease

Introduction

Primary dentoalveolar ankylosis is a tooth anomaly that can be defined as the anatomic fusion of the radicular cementum of the tooth to the alveolar bone [1]. This pathology causes the retention of the tooth in a determined position [2]. The affected tooth is consequently unable to follow the eruption and/or post eruption movements that adapt to the facial growth, therefore staying under the occlusion

plane, varying from one millimeter to the complete impaction of the tooth element inside the gingival tissue, characterizing a severe ankylosis [3].

The prevalence ratio of dental ankylosis in deciduous molars ranges from 1.3% to 38.5% [4,5,6]. The etiology of dentoalveolar ankylosis is unknown, but some etiological factors such as local mechanical trauma and metabolic disturbances, localized infections, chemical and thermal irritation, deficient force of eruption, the morphology of the face, abnormal tongue pressure and other forces exerting compressive pressure on the dental arch maintaining tooth into infraocclusion are related to ankylosis as external factors [7-8]. Between the theories found in the literature, the most cited are the genetic, traumatic, and disturbance of the periodontal ligament theories [9-11].

Ankylosis may be progressive, therefore, the earlier the intervention, the less deep and severe its consequences will be. This depends on the oclusal and facial development stage when the pathology was installed, the remaining growth and the timing of the initial intervention [1,3,6].This condition may lead to the loss of space in the dental arch, over eruption of the antagonist tooth, migration of the successor tooth, and increased risk of caries due to food impaction in the infraoccluded tooth [1,3,6,12]. Ankylosed teeth can also produce an open bite, interfering in phonetics, chewingandesthetics [1,3,12].

This article presents the perspective of the treatment of **a** clinical case of a female child, eight years and eight months of age, with severe dental ankylosis, who sought out treatment at the Pediatric Dental Clinic of Newton Paiva's University Center. The perspective of the treatment was through an integrated approach of the following dental specialties: surgery, orthodontics and pediatric dentistry**.**

This case report has a clinical significance to illustrate a severe dentoalveolar ankylosis that strongly interferes with the localized vertical growth of the maxilla, contributing to the establishment of a relevant lateral open bite.

Case Report

The patient S.P.A., female, 8 years and 8 months of age, sought out treatment at the Pediatric Dental Clinic of Newton Paiva University Center, with a complaint of vast destruction of the superior primary molars. The child's mother reported no relevant systemic conditions, nutritional deficiencies or congenital anomalies. The extraoral exam showed a symmetric face and a convex facial profile with proportional vertical thirds that can be observed in Figure 1. The patient was in the first transitional period of mixed dentition, but the first permanent superior molars presented a great mesial inclination of the crown that made intercuspation impossible, what caused extreme occlusal instability. The cuspids on both sides presented Class I relations, and there was an open bite restricted to the posterior region on both sides. A lingual cross bite was diagnosed at the region of the superior permanent lateral incisor, superior primary cuspid and inferior primary cuspid on the left side. The clinical exam showed residual roots corresponding with the dental elements 55, 64 and 65 that presented infraocclusion and extensive destruction of the crowns of dental elements 74 and 75. In addition, the inferior permanent cuspids had erupted without the exfoliation of the primary correspondent teeth, the left inferior permanent cuspid was in lingual position in relation to the primary cuspid and the right permanent cuspid was mesialized (Figure 2).

A panoramic radiography (Figure 3) was carried out in order to diagnose and plan the patient's

treatment. It was possible to observe the teeth in infraocclusion. Figure 3 suggests the preserved presence of periodontal ligament space.

Discussion

Severe primary dentoalveolar ankylosis was clinically diagnosed, bilaterally on the upper arch, on dental elements 55 and 65 and on element 64, through the enormous localized vertical growth deficiency of the alveolar process and the deaf sound to the dental axial percussion examination. Complementary imaging examinations, through orthopantomography and computed tomography cone beam, showed severe primary dentoalveolar ankylosis, meaning that one third of the dental crown was below the interproximal gingiva of one or both of the adjacent teeth and that there was extensive crown destruction, showing the residual roots of the respective teeth. It is primordial to note that the dental pantomograms may underestimate ankylosis because of the lack of the three-dimensional image. On the other hand, long cone periapical radiographs and cone beam computed tomography might overestimate some structures [13], which restricts the importance of these examinations to morphological visualization and guidance in the planning of clinical procedures. The space of the periodontal ligament is observed in the panoramic view because it is a two-dimensional image of a three-dimensional structure, and it can be verified that only this image is inconclusive for the diagnosis of the whole radicular diameter [13].

Although it is known that the complete destruction of the crown of the deciduous tooth leads to the lack of stimulation of the periodontal ligament and, consequently, the lack of physiological root resorption, this hypothesis was ruled out as an isolated causal factor due to the marked lack of vertical growth of the alveolar bone. In consequence of this extensive destruction, the first permanent maxillary molars (16 and 26) became mesially inclined, resulting in the loss of space in the dental arch for the permanent successors of the ankylosed teeth and in occlusal instability (Figure 3).

A Computed Tomography scan, seen in images 4, 5 and 6, was done in order to help locate and observe the anatomical proximity of the ankylosed residual roots with the permanent successor tooth, therefore enabling an adequate surgical plan.

According to the literature, one the possible consequences of dentoalveolar ankylosis is damages to occlusion. Amongst those, the inclination of the adjacent teeth may be observed, which happens due to the transseptal fibers that connect the proximal root and crown surfaces to the alveolar bone, pulling them slightly under the occlusion level and therefore deepening the Curve of Spee. The extrusion of the opposing tooth and the development of a posterior open bite may also be observed [7,14]. Regarding the successor tooth, ankylosis may cause a delay in tooth eruption and/or ectopic eruption due to the delay or absence of exfoliation of the retained tooth element, rotation of bicuspids due to loss of space, alterations of the development of bicuspid roots and hypoplastic or hypocalcified crowns [7]. Regarding the patient, ankylosis may harm the masticatory function and make hygiene more difficult, therefore increasing the possibility of the development of tooth caries and periodontal disease. This is also intensified by the possible exposure of the cement from the adjacent tooth element and the long-term loss of the periodontal ligament [14].

According to the literature, depending on the level of submersion, the position of the permanent

tooth germ may be affected [15]. In the described case, the successor teeth presented a deviation of the eruption path due to the severe ankylosis of the primary molars; longer retention of the primary teeth, incorrect axial inclination of adjacent teeth and alterations of eruption of the successor permanent teeth were also observed in this case. The successor permanent teeth were already on stage 6 of Nolla, with their crowns completely formed, but with great capacity of undergoing the eruption movements. Figure 3 shows the elements 13, 23, 14, 24, 15 and 25 impacted at the region of the cuspids.

In the presence of dentoalveolar ankylosis, the alveolar bone has its development and growth affected, what diminishes its height and does not allow the vertical movement of the ankylosed tooth that will remain inferior to the occlusal plan, giving the impression of being submerged [3,16]. Primary teeth have a great rule on the growth of alveolar bone and on maintenance of space for permanent successor teeth. Therefore, when primary teeth present severe submersion, they may compromise the normal development of occlusion. In severe ankylosis, the ankylosed teeth appear submerged when compared to the adjacent teeth because there is little to almost no growth of the alveolar process next to the affected teeth. Another aspect is the lack of contact points between the adjacent teeth, causing gaps between them. The supra eruption of the opposing teeth is also observed [17].

In addition, ankylosis is causing dental positioning issues to the patient, not only on the ankylosed teeth but also on opposed and successor teeth. It also brings occlusion issues in general and may cause a delay of tooth exfoliation of ankylosed teeth and a delay of eruption or ectopic eruption of the successor teeth.

The treatment to be adopted depends of various factors, such as the patient`s age, the degree of dental infra occlusion, the level of damage to occlusion, the presence and location of the successor permanent tooth, the level of development of the successor tooth, the severity of damage caused by the condition and the systemic conditions of the patient [3,18,19].

According to the literature, when the germ of the permanent successor tooth is observed with two thirds of its crown formed (stage 8 of Nolla) in radiographic exams, the ankylosed tooth may be removed and then the eruption of the permanent tooth can be anticipated [3].

However, when presented with a severe stage of ankylosis, which is associated with slow root resorption, the treatment of choice is extraction with space maintenance [2,20]. in order to avoid the loss of the mesial-distal diameter of the arch [3,21]. In cases where space loss has already taken place, the regaining of space is first in recovery [22].

In the reported case, the degree of ankylosis was considered severe. Following these studies, the surgical treatment, with the support of orthodontics, consisted of the use of a removable anteroposterior expansion plate that made a distal pendulum movement on the first permanent maxillary molars on both sides, aiming to regain space for tooth elements 13, 14, 15, 23, 24 and 25, as those (16 and 26) had axially inclined in the mesial direction. This made the extraction of the ankylosed elements difficult, also impairing the visualization of the teeth cited above and the occupying the space for the eruption of the second bicuspids. After regaining space, a transpalatal bar must be used as a space maintainer, followed by the extraction of the ankylosed elements. A vertical growth of the bone and the eruption of the successor permanent teeth are expected, and would not happen if the residual roots of ankylosed teeth

were kept. Clinical and radiographic follow ups must be carried out throughout the treatment until the eruption of the permanent teeth.

The prognostic is good due to an early diagnosis and adequate planning of the case, as the earlier the intervention, the shorter the time of treatment, therefore avoiding problems resulting from this anomaly. For example, with earlier intervention future bone defects, as well as differences on the levels of the alveolar bone, may be smaller when compared to the permanent teeth with no ankylosis. The estimated time for the treatment depends on patient collaboration during the orthodontic treatment, being proportional to the time of use of the orthodontic appliances.

In compliance with the literature reviewed and the reported case, an early diagnosis of ankylosis of a severe degree, as well as adequate treatment planning, are mandatory for the correct development of the permanent occlusion, diminishing or avoiding problems that may arise from this anomaly when diagnosed at a later time, adding a favorable prognostic to the case.

It is important to emphasize that the establishment of the treatment must follow adequate planning by clinical and complementary exams. Judiciously, aiming for efficient conduct and considering factors such as the patient's age, the degree of infraocclusion, the presence and placement of the permanent successor, the stage of development of the successor, the severity of the damage caused by the anomaly, and the systemic condition of the patient in the treatment plan as determinant factors for the therapeutic conduct [12,23,24].

The diagnosis can be reached by clinical and imaginological exams associated with the evaluation of its signs, and may be obtained through the observation of infraocclusion, metallic sound during the percussion test, and lack of tooth mobility [4]. The radiographic exam is used more frequently as a complementary diagnostic tool for the observation of the marginal bone level, of primary molar root resorption, for the observation of the eruption process, and inclinations and dislocation of the permanent successor [12,,23,24]. Therefore, the importance of an early diagnosis of this anomaly by the dental pediatrician should be emphasized, in order to implement effective conservative or invasive measures associated with periodic follow-ups of the patient, aiming to obtain a better prognostic [25,26,27].

Figures

Figure 1: Extraoralphotographies of the patient. Frontal (A-B) and profile (C-D).

Figure 2: Intraoral photographies. Right profile (A-B), (B) detail of the lateralopenbite and mesial crown inclination of first right permanent molar, upper arch (C), lower arch (D), left profile (E-F), (F) detail of the lateral openbite and tongue interposition.

Figure 3: Panoramic radiography.

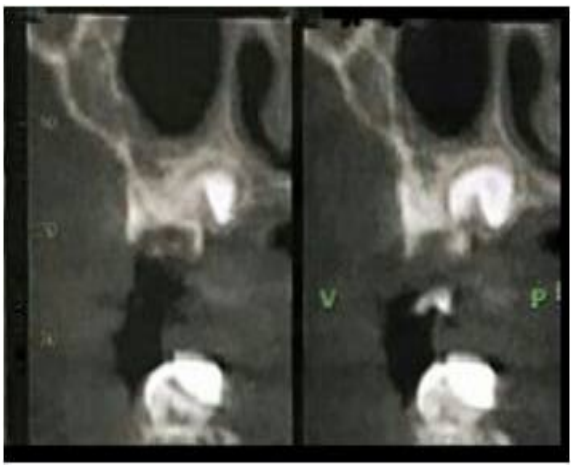

Figure 4: Transaxial slice in real size 1:1, that suggests the impaction of dental element 15 at the ankylosed residual root of the element 55.

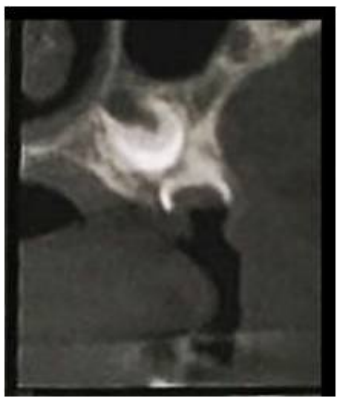

Figure 5: Transaxialslice in real size 1:1, that suggests impaction of the dental element 24 at the ankylosed residual root of element 64.

Figure 6: Transaxial slice in real size 1:1, that suggest impaction of the dental element 25at the ankylosed residual root of element 65.

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