Tooth displacement and root dilaceration after trauma to primary predecessor: an evaluation by computed tomography

Andrade MGS, Weissman R, Oliveira MG, Heitz C. Tooth displacement and root dilaceration after trauma to primary predecessor: an evaluation by computed tomography.

Abstract – This case report illustrates the relationship between trauma to a deciduous tooth and the consequences to the permanent dentition. The patient suffered an injury to the central incisors at the age of four with resultant pulpal necrosis. The permanent dentition was affected by displacement from its original position and a severe dilaceration at the crown/root junction.

Miguel Gustavo Setúbal Andrade[1], Ruben Weissman[2], Marília Gerhardt Oliveira[2], Cláiton Heitz[2]

[1]Division of Oral and Maxillofacial Surgery, School of Dentistry, Bahia Foundation for Science Development, Salvador, Bahia, Brazil; [2]Master's Degree Program on Oral and Maxillofacial Surgery and Traumatology, School of Dentistry, Catholic University of Rio Grande do Sul, Porto Alegre, Riò Grande do Sul, Brazil

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Miguel Gustavo Setúbal Andrade, Bahia Foundation for Science Development, School of Dentistry, Division of Oral and Maxillofacial Surgery, Avenida Silveira Martins, n° 3386, Cabula, CEP 41150-100, Salvador–Bahia, Brazil
Tel./Fax: +55 71 32578200
e-mail: miguelsetubal@hotmail.com

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During odontogenesis, any factor that changes the metabolic and physical conditions around the tooth germ may disturb its development. Among metabolic alterations, the ability of tetracycline (1) or fluorides (2) to stain dentine and enamel have been extensively discussed. Traumatic injuries to deciduous dentition are the most important physical factors that can disturb permanent tooth formation (3, 4). They lead to anomalies in permanent dentition, the severity of which depends on the interaction between the stage of odontogenesis of the permanent tooth and the impact intensity and direction (5).

The purpose of this paper is to report on a case in which the ectopic eruption of a central permanent incisor and its root dilaceration was associated to a trauma of its deciduous predecessor. The relevant literature was also revised and the pathogenesis of these anomalies is discussed.

Case report

An 8-year-old girl was referred to the Master's Degree Program on Oral and Maxillofacial Surgery and Traumatology of the Catholic University of Rio Grande do Sul, Porto Alegre, Brazil, to evaluate the clinical absence of the upper right permanent central incisor.

Her dental history revealed a traumatic episode to the upper deciduous incisors at the age of four. From that time onwards, a darkening of the crown of the upper right deciduous central incisor was observed, and it exfoliated at the age of six, as did the left homologue.

An intraoral examination revealed that, despite the clinical absence of the upper right permanent central incisor, the upper left one erupted and was normally positioned. The upper right permanent lateral incisor was erupting towards midline due to the clinical absence of the central one (Fig. 1). Despite the decayed upper deciduous cuspid, no pulp necrosis was observed.

The panoramic incidence showed the upper right permanent central incisor positioned transalveolar as high as the anterior nasal spine. The deciduous cuspids had no root resorption (Fig. 2). The patient was subjected to a spiral-computed tomography of

Fig. 1. Intraoral aspect. It is possible to note the large caries in the upper deciduous cuspids and the ectopic eruption of the upper left permanent lateral incisor towards the midline.

Fig. 2. Panoramic incidence showing the transalveolar position of the upper left permanent central incisor.

the upper maxilla. The tomograms were analysed using a dental computed tomography software program in order to evaluate the root formation of the upper right permanent central incisor and its position in the anterior alveolar process.

The root formation was further analysed through axial sections that showed important dilacerations between the crown and the root and also along the root (Fig. 3). The cross-sectional oblique images confirmed the position of the crown of this tooth towards the anterior nasal spine (Fig. 4). Through the use of coronal multiplanar reconstruction, it was possible to observe a radiolucent area involving the upper right central permanent incisor and the upper right permanent cuspid (Fig. 5).

Due to its dilacerations (Fig. 6) and its unfavourable position, a decision was taken, after an orthodontic evaluation, to remove the upper right central permanent incisor and to curette the enlarged tissue around its crown and around the upper right permanent cuspid crown. Both histopathological diagnoses were of pericoronal folicule.

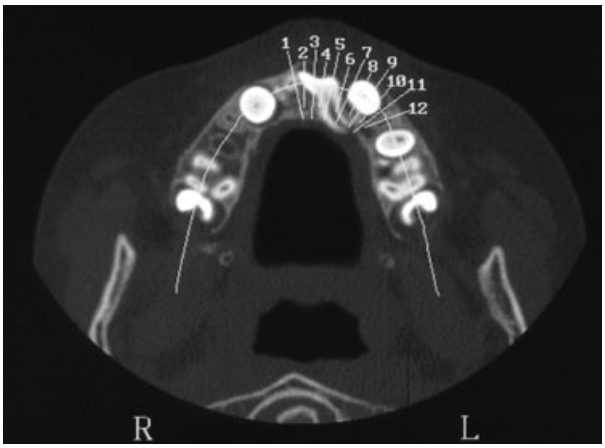

Fig. 3. Axial reconstruction showing the dilacerations of the upper left permanent central incisor. The lines and the numbers represent the place where the program will perform the cross-section oblique reconstruction.

All the diagnostic exams, as well as the actual surgery, were conducted under informed consent that is extensive to data published in this paper.

Discussion

The germs of the permanent incisors are positioned palatally and in very close proximity to the roots of their predecessors (6), thereby predisposing these developing permanent teeth to secondary injuries when the deciduous ones are traumatized. The central incisors are the most affected teeth, as the lateral ones are located behind them, and are protected against labial traumatisms (7). The major injuries associated with developmental disturbances are avulsion and intrusive luxation (8, 9) to their predecessors. Dental anomalies of the permanent tooth can also appear after trauma to the lip or to the gum surrounding the alveolar bone (10, 11).

Trauma to deciduous dentition, during the beginning of odontogenesis, can cause necrosis to the tooth bud, thereby causing the abortion of the tooth formation and the sequestration of the germ. The displacement of the deciduous tooth can change the histological relationship between the permanent enamel and the dentin matrix that is secreted (7), thus forming an odontoma-like tooth (12). Gemination (11) and enamel hypoplasia (13) occur when the force has lower intensity.

Coronal dilaceration appears when some calcified matrix is moved by the deciduous displacement. This previously calcified incisal portion changes its position while the remaining, apically soft matrix remains unaltered (14). A minor trauma can cause the dental papilla to bleed, which will be responsible for crown discoloration as a result of the

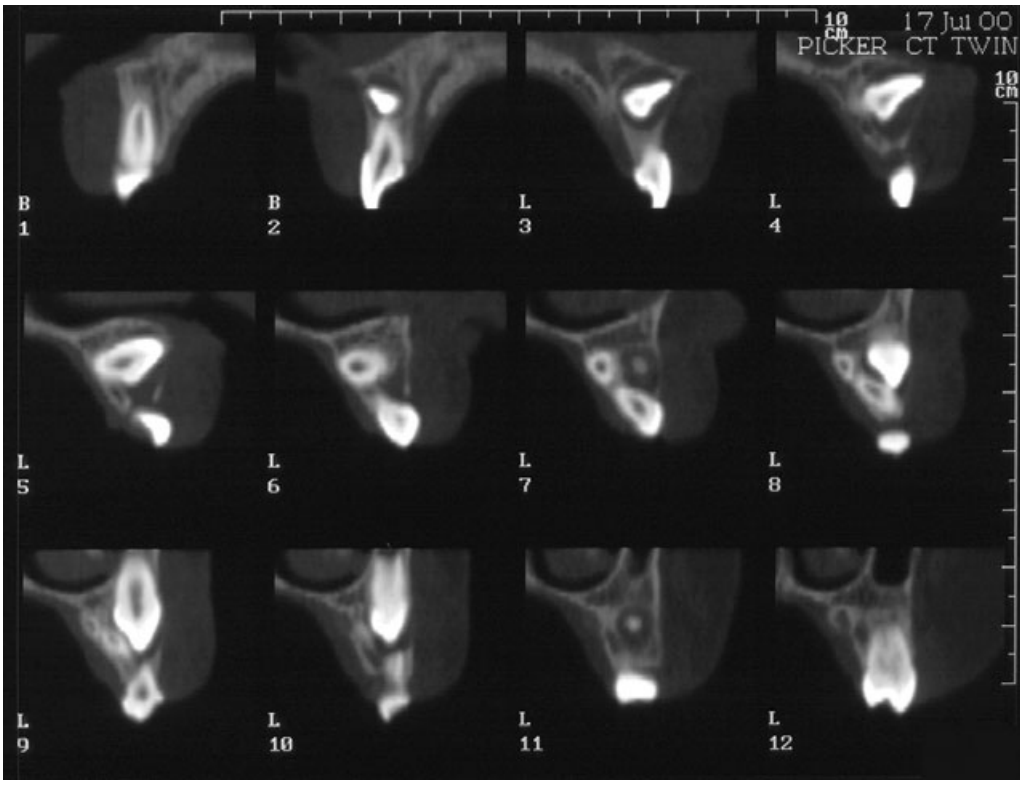

Fig. 4. The cross-section oblique images show the position of the crown of the upper left permanent central incisor (sections 2, 3 and 4). Letters B and L mean, respectively, the buccal and lingual aspect of the alveolar ridge.

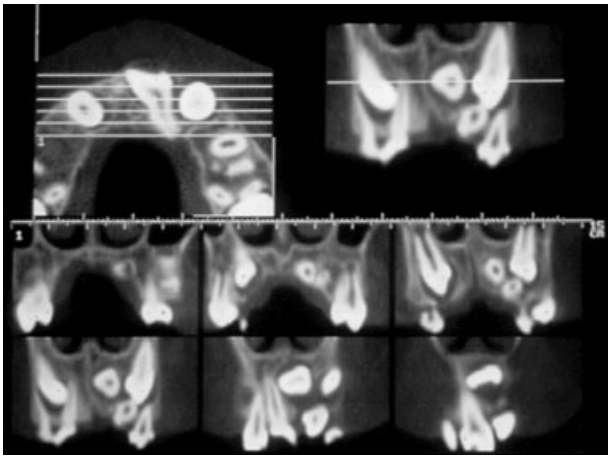

Fig. 5. A radiolucent area involving the upper right central permanent incisor and the upper right permanent cuspid can be observed as coronal multiplanar reconstructions.

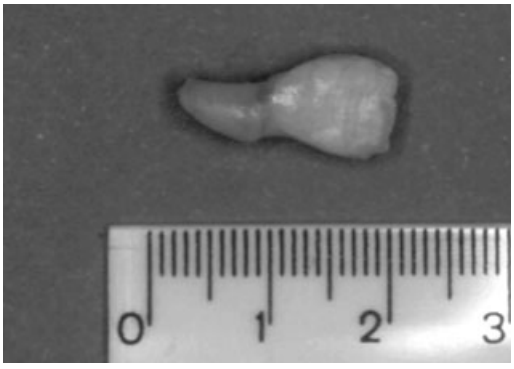

Fig. 6. Macroscopic aspect of the teeth confirming the dilacerations.

incorporation of breakdown haemoglobin by the hard tissue matrix of the tooth (7, 15). Coronal root dilaceration occurs when the fully formed crown suffers a non-axial displacement that promotes a deviation to the long axis of the tooth (16, 17). The dilaceration along the root takes place if any portion of the root was calcified when such injury occurred (10, 18).

In the present case, the injury to the deciduous incisor was the possible aetiological factor which caused the non-axial displacement of the right upper permanent central incisor. This injury was also responsible for the necrosis of the right upper deciduous central incisor, as suggested by the darkening stated during anamnesis. Pomarico et al. (19), reported a similar case where root dilaceration in permanent upper incisors resulted from trauma in the primary dentition.

A focus of inflammation can stimulate dentigerous cyst development which will derive from the

obstructed follicular veins of the unerupted tooth and fluid accumulation between its crown and the reduced enamel epithelium (20). The enlargement of the dental folicule confirmed by histopathological observation was possibly a consequence of the pulp necrosis observed in this case.

According to Kilpatrick et al. (21), dental injuries are more common among preschool children, whose energies and interests are not matched by a similar level of co-ordination. During this period, the permanent incisors are in continuous formation and any trauma can disturb their morphology. So, although dental anomalies can also be associated to idiopathic developmental disturbance, the attention to the permanent dentition in case of traumatism to deciduous dentition is an important cause of concern.

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