Traumatic intrusion of primary tooth: follow up until eruption of permanent successor tooth CASE REPORT

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Abstract – This paper presents a clinical case of a $2\frac{1}{2}$ -year-old boy who suffered dental trauma because of a fall from a bike. His father thought that the boy's central upper left incisor had been fractured. The clinical exam showed laceration of the upper maxillary frenum and a possible intrusion of the tooth, as the area was swollen. An upper maxillary occlusal X-ray confirmed the intrusion of the incisor. The procedure adopted was to wait for the re-eruption of the tooth. It was recommended that the boy stop using a pacifier and feeding bottle. The necessity of keeping the affected area clean was also emphasized. The patient was observed and, within 6 months, the central upper left incisor was found in occlusion. The successor permanent tooth was normal after 6 years.

Dental traumas are common among children and could be considered one of the most dilacerating and stressful injuries in dentistry.

This type of injury has a high rate of incidence in deciduous teeth among children in the motor development phase (1–4). This is, on many occasions, the first contact that the child has ever has with a dentist (5). During this period, falls or tumbles are the most common reasons for the damage to occur, with intrusion being the most frequently occurring trauma (6-8) and the most affected teeth being the upper central incisors (1, 9, 10). This trauma is also thought to be the main injury associated with the development of further problems in permanent teeth (11-15) because of the close anatomic relationship between the apices of the the primary incisors and the germs of the succeeding teeth. In addition, the germs of the permanent incisors are separated from the periapical region of the primary incisors by a hard tissue barrier of less than 3 mm and that might simply consist of connective fibrous tissue. Therefore, it is not permeable to the displacement of the primary teeth, infection or necrosis.

The exact position of the intruded tooth into the dental socket is decisive with reference to the procedure to be followed. The majority of clinical data and research recommends a wait-and-watch approach. That is, spontaneous re-eruption of the tooth should be expected which would occur within a maximum of 6 months. If, after this period has elapsed, the tooth has not reverted to its original position, it should be extracted. When there is an invasion of the follicle of the permanent germ or an infection that has spread around the area, extraction of the tooth is recommended to be carried out immediately. This procedure is

intended to protect the integrity of the permanent tooth bud development.

Primary teeth which bore intrusion also have problems themselves, such as discoloration, pulp canal obliteration, root resorption, pulp necrosis and ankylosis, among others.

Clinical case

A 2¹/₂-year-old boy arrived at the Clinical Infant Unit of the Dental Faculty of Pelotas (Federal University of Pelotas, RS, Brazil) accompanied by his father. The father explained his assumption that his son's central upper left primary incisor had been fractured because of a bicycle fall the day before. With the father's consent for clinical examination, an anamnesis was carried out, it was verified that there had been no change in the child's general health after the accident. Clinical examination revealed laceration of the maxillary frenum and a possible intrusion of the central upper right incisor as suggested by the swelling in the area. A fracture was also observed in the angle of the lateral incisor of the homologous tooth which, according to the father, was the result of another fall that had occurred roughly a year before (Fig. 1). The examination also showed that no other damage had occurred in the oral facial structure and the patient had no dental caries. The anterior teeth presented a large accumulation of dental plaque because of the difficulty of dental hygiene in that area. A maxillary occlusal radiograph confirmed the presence of the central upper left incisor buried in the alveolar process. In the same radiographic image it could also be seen that the central upper right incisor showed extensive periapical radioluscency because of pulp necrosis as a result of the previous



Fig. 1. Clinical aspects in the first appointment.



Fig. 2. Upper occlusal X-ray in the first appointment.

accident (Fig. 2). There was no complaint of sensitivity. With a lateral extraoral radiograph, an aid in diagnosis, it was verified that, with the intrusion, the tooth suffered an axial displacement, without invading the follicle of the permanent germ (Fig. 3).

The decision adopted was to wait for the re-eruption of the central upper left incisor and use endodontic treatment for the central upper right incisor. It was explained that the use of a pacifier and feeding bottle (both of which the child still used) should be discontinued and the need to keep the affected area clean was emphasized. It was made clear to the father that these precautions should be strictly observed.

The patient returned a week after the initial examination with the damaged tissue in good shape, good oral hygiene, without symptoms or swelling and the damaged lip appeared completely healed. After 15 days the incisal edge of the central upper left incisor could be seen and the patient remained asymptomatic (Fig. 4). After 3 months, two-thirds of the crown was visible. Periapical radiograph showed that there had been no alteration and that the periapic injury to the central upper right incisor had healed (Fig. 5). After 6 months, the central upper left incisor was in occlusion and the central upper right incisor was unchanged (Fig. 6). The open bite was corrected too. Clinical and radiographic follow up continued to be performed every 6 months until the child was 9 years old when the permanent teeth (central upper right and left incisors) were in occlusion. Both teeth were



Fig. 3. Lateral extraoral X-ray in the first appointment.



Fig. 4. Clinical aspects after 15 days.

completely normal from a clinical and radiographic point of view. The patient had a small enamel fracture of the mesio-incisal angle of the central upper right permanent incisor whose etiology was unknown and repair was carried out as soon as possible (Figs 7 and 8).

Discussion

When a dental trauma occurs, a series of injuries may occur to different types of cells, not just to the teeth themselves but also in adjacent tissues, among which there is physiological interaction. The intrusion of the deciduous teeth is an injury with great potential for further problems, both in the formation of the succeeding permanent teeth and in the traumatized tooth itself. Damage to the bud of the permanent tooth is related to the direction and intensity of impact, the position taken over by the intruded tooth, the type of treatment and by the stage of bud formation at the moment of the trauma (11–14, 16).



Fig. 5. Periapical X-ray after 3 months.



Fig. 6. Clinical aspects after 6 months.



Fig. 7. Clinical aspects after 6 years and 6 months.

The diagnosis of the intrusion can be carried out clinically by digital palpation of the vestibule of the labial bone plate however, it is essential that a radio-



Fig. 8. Periapical X-ray after 6 years and 6 months.

graph be taken to confirm the exact position and relationship with the permanent germ tooth. This is especially necessary when no part of the tooth is visible in the oral cavity and may be misinterpreted as avulsion. Besides confirming the new position of the tooth, the radiograph shows the direction of the displacement and whether the intruded tooth has invaded the follicle of the permanent tooth or not (17).

In this particular case, the radiographic diagnosis confirmed that the central upper left incisor, under impact, had vestibular displacement that did not jeopardize (by direct contact) the permanent tooth. Despite the fact that the lateral extraoral radiography had showed a good image, the clinical examination and periapical radiographs could be sufficient for diagnosis (18, 19). The central upper deciduous incisors showed an apical curvature towards the labial and the successor teeth would develop in the palatine. This is important in order to displace the deciduous teeth to the vestibular because of the axial impact of the accident, in order to protect the permanent tooth from further damage. Occasionally, the impact may move the intruded tooth inside the developing bud follicle. In this case, the tooth should be extracted immediately (20-22).

In such cases, spontaneous re-eruption will occur in, at most, 3 months. Should this not occur, then extraction is recommended (23). As the central upper left incisor in this present case took on a vestibular position, it was decided to wait for it to re-erupt. This method has become standard because of the positive results that it obtains (13, 21, 22). After 15 days, it was observed that the incisal edge had become visible in the oral cavity and after 6 months the tooth had occupied its correct position in the arc. This was certainly because of discontinued use of the pacifier and the feeding bottle. Another condition that allowed us to wait for re-eruption was the absence of infection which, if present, would have required immediate extraction and antibiotic therapy in order to prevent the spread of inflammation to the permanent germ. In this case, antibiotics were not prescribed (21).

The intensity of the trauma in this case needed a thirddegree intrusion on the Von Arx scale entailing severe or complete intrusion of the crown (12, 24). Some authors recommend immediate extraction in this situation (25, 26). The experience at the Clinical Infant Unit in Pelotas shows that it is not a condition which requires this treatment on its own. It is recommended that re-eruption should be waited for, even in total crown intrusion situations in accordance with other published research (13, 27).

When dealing with alterations in the development of permanent teeth after intrusion of the primary teeth, various factors were revised (12). Depending on the age of the child when the accident occurred, it can be shown that the younger the child, the more severe the damage may be and, before 2 years of age, the frequency may reach 63%. Regarding the direction of displacement when the intrusive force takes a palatine direction, it may create a condition where the apex of the primary tooth makes contact with, or invades, the bud follicle of the permanent tooth. This increases the possibility of any future deformations in the successor of the damaged primary tooth. A correlation has also been found between the severity of the disturbance of development and the degree of intrusion of the primary tooth. This means that the percentage of malformation in permanent incisors after intrusion of the primary teeth is greater according to whether the intrusion was second or third degree, where more than 50% of the crown is immersed in the socket. If the intrusion is accompanied by a fracture of the dental socket, the chance of the impact being transferred to the developing bud increases and may cause disruption in the morphology or mineralization of the tooth. One final issue raised by authors is the type of treatment decided upon for the intruded primary tooth, for which there have been no differences between allowing the tooth to re-erupt spontaneously or extracting it immediately, in relation to the frequency and severity of developmental disturbances (11, 15, 17, 28).

This clinical case reinforces the possibility of treating intruded deciduous teeth on a wait-and-watch basis. One should, however, be alert to the need for radiographic and clinical monitoring of the case until the eruption of the permanent successor, intervening to minimize sequelae when necessary.

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