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Does post-traumatic transient discoloration indicate a good pro-gnosis? Case report with 2 years of follow-up

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Abstract
Coronal discoloration is a common event observed following trauma in deciduous and permanent teeth. The clinician choose between immediate endodontic treatment and follow-up, waiting for clear evidence of pulpal necrosis.
A 35 years old female patient, showed the concussion of the element #21, the sub-luxation of the element #11 and the concomitant coronal fracture of both. The crown fractured of both elements was rebuilt three days after the trauma. Two weeks after the trauma the element #11 was negative to the cold test, had coronal discoloration (red) and it was painful to percussion. Althought there were several signs which indicated the possible pulpal necrosis, root canal therapy has not been perfor-med on the tooth. After two months the syptoms had returned to normal, as well as the color of the tooth. Two years after the trauma, the tooth responds positively to the sensitivity test (cold), is asyn-tomatic and has a normal color.

Keywords: Post-traumatic transient, Coronal discoloration, the trauma, sensitivity test (cold)

Introduction
Confidence Post-traumatic color change is a well-known phenomenon. These changes can range from a lack of translucency to pink, bluish or grey discoloration [1].
A pink discoloration that occurs shortly after injury, i. e. within 2-3 days, can be reversible. If the crown of the tooth turns progressively grey, pulp necrosis should be suspected [2].
Experimental findings indicate that hemoglobin breakdown products enter in dentinal tubules. This penetration initially alters the crown color to a pinkish hue. As the hemocomponents disintegrate, the color turns bluish which, when seen throught the grey enamel, gives a greyish-blue tinge. This shift from pink to greyish-blue occur approximately 2 weeks in the permanet dentition. A certain fa-ding of the grey-blue tint can occur, or an opaque grey hue can persist. If the pulp survives, the stain can disappear [1]. Several authors support the existence of a transient traumatic pathology, where the discolored teeth return to normal after a certain time [1-7].
Cohenca N. *et al*. discribe the "transient apical breakdown" that is a sequelae of certain dental traumatic injuries where the injured tissues undergo a spontaneous process of repair with no perma-nent damage to the pulp. In their case report this healing process includes transient discoloration of the tooth [3].
Discoloration of the tooh, for some authors, is directly linked with pulpal necrosis [8], but to carry out root canal therapy, there must be other signs of pulp necrosis in addition to discoloration and not only [1-9].
In this work we would describe a case of a patient that had a concussion of the element 21 and the sub-luxation of the element 11 with the concomitant non complicated coronal fracture of both, trea-ted with a conservative approach.
Materials and Methods.
A 35 years old patient came to our observation after a dental trauma, happened 3 days earlier. She reported general good health.
Both elements were fractured in the incisal third and in the mesial wall (Fig. 1). The fragments have not been found. The patient, in addition to dental trauma, had a laceration of the upper lip sutured with three points in the emergency room, and a bruised chin.
Clinical examination of the upper left central incisor reveals tenderness to percussion, no response to cold test, and the coronal fracture. For the upper right central incisor clinical

examination reveals tenderness to percussion, no response to cold test, mobility of one degree and coronal fracture. The diagnosis was a concussion of the element #21, sub-luxation of #11 and concomitant coronal fractu-re for both.

We decided to not perform the endodontic treatment because there was a good chance that the pulp of both elements would heal. Then a composite restoration on both elements was made (Fig. 2). Radiographic examination was performed immediately after the restoration and revealed no fractu-res or other signs of root disease (Fig. 3).

Amoxicillin clavulanate tablets (2 gr a day for 6 days) and Ibuprofen 600 mg as nedeed were presci-bed to the patient.

After two weeks the patient came to a follow up visit and the upper right central incisor was disco-lored (Fig. 4). The tooth was reddish, moreover the restoration was incongrous. The cold test was still negative for both elements, while the tenderness to percussion was attenuated. There was no change in the radiographic examination (Fig. 5). Restorations were finished and polished, root canal therapy was not performed (Fig. 6). The next visit, one month after, the trauma cold test was positi-ve, but the elements are hypersensitive to cold perhaps because pulpal problems remain, tenderness to percussion was diminished and the upper central right incisor was still discolored but had become pink from reddish. (Fig. 7). At two month after trauma, the cold test was positive for both teeth, ten-derness to percussion, hypersensitive to cold and discoloration of the upper central right incisor, the color of #11 was normal in comparison with the other teeth.

Radiografic examination reveals an alteration of the apex of the upper central righ incisor, described by some authors as “transient apical breakdown” as sequelae of certain dental traumatic injuries where the injured tissues undergo a spontaneous process of repair with no permanent damage to the pulp (Fig. 8).

Eight months after the trauma, the patient was asymptomatic, the color of the central incisor was normal, and test to cold was positive for both elements. The restorations were redone (Fig. 9).

Fig 1

Fig 2

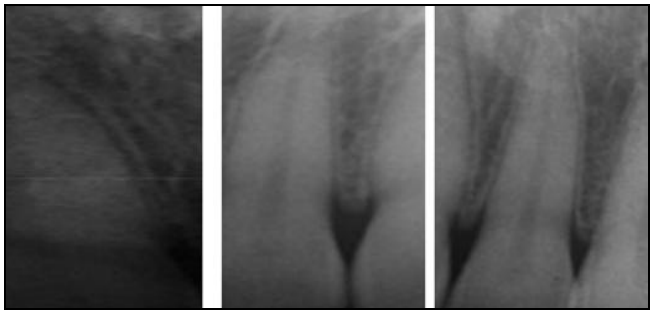

Fig 3

Fig 4

Fig 5

Fig 6

Fig 7

Fig 8

Fig 9

Results

The last control to one year and eight months, highlights the good condition of the restoration: the patient is still asymptomatic, boths Elements have a positive cold test and x-rays show that there were no pathologic changes (fig. 11; Fig 12).

Discussion and conclusion

According to and reasen *et al*. the survival of the pulp up to ten years after concussion and sub-lu-xation is over 90% [10].

Some works, divided into three parts, states that when concussion and sub-luxation are concomitant with crown fracture, the risk of pulpal necrosis in greater. Moreover, according to the same authors, the risk of pulpal necrosis increases when the initial cold test is negative [11, 12].

Ravn, in an older work, analyzed the risk of pulpal necrosis in teeth with concussion, sub-luxation and concomitant crown fracture. He stated that in teeth with coronal fracture the risk of pulpal ne-crosis was 3%, but increased up to 6% in teeth with concomitant concussion and up to 25% in teeth with concomitant sub-luxation [13].

In our case report we have two teeth with coronal fracture, with two different types of trauma. The upper central left incisor has suffered concussion, while the right incisor a sub-luxation. For the up-per right incisor there were two of the signs of pulp necrosis: discoloration and negative sensibility testing. Also tenderness to percussion was present. Therefore we would expect pulpal necrosis of element number [11].

According to the Internal Association of Dental Traumatology guidelines 2012, at least two signs and symptoms are necessary to make the diagnosis of necrotic pulp [9].

And reasen states that the diagnosis of pulp necrosis should be based on primaily two or more of the following signs: crown discoloration, negative sensibility testing and periapical radiolucency, but the importance of transient negative sensibility testing should be considered (i. e. a minimum of 2-3 month's observation) [1].

Some authors, however, support the existence of a traumatic transient pathology, wherein the tooth, after discoloration, returns to normal spontaneously [1-7].

In a recent study Malmgren *et al*. analyzed the frequency and prognosis for intra-alveolar root frac-tures with discoloration. They have analyzed 42 teeth with intra-alveolar root fracture, and 9 of the-se had discoloration. In eight of these discolored teeth, the discoloration varied between a grey, rosy, grey/rosy, and brown/rosy hue and disappeared within 4 weeks to 6 months. No sensibility was registered at the first visit, but the sensibility was regained successively as the discoloration di-sappeared. All the eight teeth with transient discoloration healed. The authors conclude that although the numbers in this study are too small to draw any statistically significant conclusions, discolo-ration in intra-alveolar root-fractured teeth is relatively common and is indicative of a good prognosis for healing [2].

Cohenca *et al*. have published a case of transient apical breakdown following a subluxation injury of a maxillary central incisor in a 15-year-old girl. Four months after injury, coronal discoloration, periapical radiolucency as well as negative pulp responses to cold and electric tests were still recor-ded. Subsequently, the tooth spontaneously regained its original shade and the pulp responded nor-mally to pulp sensitivity tests [3].

The main difficulty in the case of minor dental trauma is probably to determine whether the pulp is compromised or not, because the pulp is often only temporarily damaged (14).

Currently, the tests most commonly used to assess the state of the pulp are mainly thermal and elec-tric pulp tests [15, 16, 17]. It is important to note that the usual pulp tests provide information only about the presence or absence of nerve

receptors in the pulp and not about pulpal blood flow [15].

Traumatized teeth may have their innervation damaged and give a negative response to pulp tests although their blood circulation, and thus their true vitality, is functional. Usually 1 to 8 weeks elap-se before a normal pulpal response can be elicited, but longer observation periods may be required [16].

Current efforts to assess pulp circulation involve the use of laser Doppler flowmetry (LDF) and pul-se oximetry, but are not ready for general clinical application [1-15].

The patient of the case reports described above, after 1 year and eight months did not show signs of pulpal problems or radiographic alterations and the element #11 and #21 were positive to sensibility testing.

In conclusion, this conservative approach allowed to avoid the eradication of the pulp, preserving the functionality and integrity of the teeth.

However, controls are necessary over time to identify any complications like root resorption or pulp canal obliteration, which may rarely occur in this case.

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