

Orthodontic treatment in patients with reimplanted teeth after traumatic avulsion: A case report

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Abstract

Introduction: The high prevalence of individuals with dental trauma prior to orthodontic treatment justifies the precautions that should be followed before and during treatment, taking into account all possible effects of orthodontic movement on traumatized teeth. Among the major traumatic dental injuries, avulsion with subsequent tooth reimplantation entails a higher risk of complications, such as pulp necrosis, root resorption and ankylosis. Therefore, it gives orthodontists several reasons for concern. **Objective:** This case report aims to analyze the implications of tooth reimplantation after traumatic avulsion in patients requiring orthodontic treatment. **Conclusions:** Tooth movement of a reimplanted tooth after traumatic avulsion is viable, provided that no signs of abnormality are present. Ankylosed teeth, however, are not eligible for orthodontic movement but should be preserved as space maintainers until root resorption is completed, provided that the teeth do not present with severe infraposition. Should an ankylosed tooth be severely infraposed, crown amputation and root burial are indicated as a means to preserve the alveolar bone in the region, since resorption will occur by replacement of the buried root, as was the case in this report.

Keywords: Tooth movement. Dental ankylosis. Tooth trauma.

Editor's summary

Orthodontic movement after tooth reimplantation is not impossible. According to Malmgren et al,¹ however, after avulsion of permanent teeth followed by reimplantation,

a follow-up period of at least one year is necessary, since most root resorption occurs during the first year post-trauma. Boyd, Kinirons and Gregg² found that a time span ranging between 102 and 997 days³ elapsed before root

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resorption was detected, suggesting the need for a longer follow-up period before starting orthodontic treatment.

When the periodontal ligament experiences extensive damage a small amount of surviving cells near the root surface triggers a repair process through rapid osteogenesis, leading to ankylosis of the tooth⁴ and its subsequent loss and replacement. Alveolodental ankylosis involves fusion of the alveolar bone with the root substance and consequent disappearance of the periodontal space, which loses its structure and function. The close contact between dental tissues and alveolar bone structure furthers the bone remodeling process. This results in resorption of bone tissue and part of the tooth tissue, which will be partially or totally replaced by new bone formation. Resorption by replacement increases if the avulsed tooth is allowed to remain outside the oral cavity for extended periods of time. It ranges from only 9.5% resorption in short periods (fewer than fifteen minutes) to 100% resorption if periods exceed sixty minutes, in a dry medium.⁵

Extraction is recommended in cases of inclined adjacent teeth or extensive infraposition.¹ In other cases, teeth should be examined at intervals of six months until root resorption ceases and the tooth crown either comes loose or can be removed with forceps, after most of the root has been replaced by bone.⁶ Clinical experience has shown that extraction of ankylosed teeth involves substantial bone loss both horizontally and vertically, which affects, in particular, the thin buccal bone wall in the maxilla.⁶ To prevent this loss, Malmgren^{1,6} described a technique that involves removal of the tooth crown with subsequent closure of the alveolus with the root inside it. When resorption by root replacement takes place it preserves or even enhances alveolar bone height in the vertical direction. It also preserves the alveolar bone in the buccolingual direction, which improves the

conditions for orthodontic treatment—if necessary—and/or subsequent placement of a prosthesis and/or implant.

Ankylosed teeth should therefore be preserved as space maintainers until root resorption is completed, provided that the teeth do not present with severe infraposition. Should an ankylosed tooth be severely infraposed, crown amputation and root burial are indicated as a means to preserve the alveolar bone in the region, since resorption will occur by replacement of the buried root, as was the case in this report.

Questions to the authors

1) What precautions should professionals follow when planning orthodontic treatment for patients with a history of trauma?

Orthodontists should first perform a careful anamnesis looking for information about the history of trauma. Injuries to the teeth involve multiple consequences ranging from a small crack in the enamel to tooth loss. Some lighter injuries rarely pose a risk to the health or survival of a traumatized tooth, while others are more severe, such as intrusions and avulsions followed by reimplantation, and pose a greater risk of complications, including pulp necrosis, root resorption to the extent of marginal bone loss and subsequent tooth loss. The prognosis for several types of trauma seems to depend on the type and severity of the injury (measured by the extent of damage to the periodontal ligament). A detailed clinical-radiographic (periapical) assessment can provide a thorough diagnosis of pulp changes, crown fractures, root fractures, possible root resorption prior to orthodontic treatment, and ankylosis.

In some cases, a scan of the traumatized tooth may reveal images that go unnoticed in radiographs. Should the injured tooth show no clinical or radiographic changes, a post-trauma period should be observed—three months in cases of minor injuries such as coronal or coronaradicular fractures without pulp involvement, concussion and subluxation, and 1 to 2 years in cases of root fractures, intrusion, reimplantation after avulsion and lateral luxation with moderate or severe displacement—, and then orthodontic treatment can be performed normally. Orthodontists will not be able to move ankylosed teeth because they are not amenable to orthodontic movement. Radiographic follow-up throughout the orthodontic treatment is also essential.

2) Is tooth reimplantation a contraindication to orthodontic treatment?

Tooth avulsion with subsequent reimplantation is the traumatic injury that involves the greatest risk of complications due to a high likelihood of bacterial infection through both the pulp and the periodontium. However, the orthodontic movement of reimplanted teeth is possible, provided that normal conditions are restored and maintained for period of at least one year with clinical-radiographic follow-up. According to Malmgren et al,¹ most root resorption after reimplantation occurs during the first year post-trauma. Boyd, Kinirons and Gregg² found that a time span ranging between 102 and 997 days³ elapsed before root resorption was detected, suggesting the need for a longer follow-up period before starting orthodontic treatment.

3) Is there general agreement in the literature regarding orthodontic treatment in patients with traumatized teeth or are there still different approaches to this issue?

The literature is indeed very consistent in this regard. Dental trauma does not contraindicate orthodontic treatment, provided there are no

pulp or periodontal changes and/or root resorption. However, some studies indicate that traumatized teeth are more predisposed to resorption. But these findings are not conclusive because the final outcome of traumatized tooth treatment can take more than five years to surface. This is one of the factors hampering the analysis of the effects of orthodontic movement on traumatized teeth. These studies involve a small number of patients, who present with different types of injuries and are treated by different researchers using a variety of orthodontic appliances. These factors combine to render inconclusive any findings regarding the effects of orthodontic treatment on traumatized teeth.

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