Ridge Preservation/Decoronation

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Abstract

Dentoalveolar ankylosis of a tooth is a serious complication in growing individuals. The ankylosed root is continuously resorbed and replaced by bone, and an infraposition of the damaged tooth will develop. The normal alveolar development will be disrupted in this way, and prosthetic treatment will be compromised. Therefore, an ankylosed tooth should be removed before future orthodontic and/or prosthetic therapy is jeopardized. This article will present a method, decoronation, to remove an ankylosed tooth in such a way that the alveolar ridge is preserved and give guidelines for the timing to intervene. The decoronation method is described, and a possible explanation for the favorable outcome is discussed. Different aids to decide the time for intervention are presented. The alveolar ridge was maintained in buccal/palatinal direction, and the bone level increased after decoronation in patients treated before or during pubertal growth periods. The bone level also increased in those treated after this period but not at the same rate, and in a few patients it was unchanged. The clinical finding that decoronation can maintain or reestablish normal alveolar conditions is important for successful implant insertion later. *(J Endod 2013;39:S67–S72)*

Key Words

Ankylosis, decoronation, implants, infraposition

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This article is being published concurrently in *Pediatric Dentistry* 2013;35(2). The articles are identical. Either citation can be used when citing this article.

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0099-2399/$ - see front matter

http://dx.doi.org/10.1016/j.joen.2012.11.056

The majority of traumatic dental injuries to the permanent dentition affect children between 8–10 years of age (1). The upper incisors, which are most commonly subjected to injury, might still be immature. At that age, erupting teeth change the position of the incisors, the alveolar process is developing, and growth of the jaws is intense. All these factors must be taken into consideration; therefore, treatment planning should be made with specialists in different fields.

Intrusions and avulsions constitute 0.5%–3% of traumatic dental injuries (2, 3) and are the most severe injuries because they involve damage to both the pulp and the periodontal ligaments. After these injuries 4 possible sequelae can be expected.

1. Both the pulp and the periodontal ligaments are damaged.
2. The pulp is devitalized, but the periodontal ligaments are vital.
3. Both the pulp and periodontal ligaments are vital.
4. The periodontal ligaments are damaged, but the pulp is vital.

Ankylosis is a common complication when the periodontal ligaments are damaged. The consequence is fusion of the alveolar bone and root substance. The first sign of ankylosis is a high percussion sound, followed by decreased mobility, replacement resorption, and an increasing infraposition in growing individuals.

An ankylosed root is continuously resorbed and replaced by bone, eventually resorbing the entire root. The condition is progressive, and to date there is no means of arresting or reversing the process. The rate of this resorption has been found to be related to age. Andersson et al (4) showed that in patients 8–16 years old at the time of avulsion, the rate of root resorption was significantly higher compared with patients 17–39 years old. In children and adolescents an increasing infraposition is another problem. Orthodontic extrusion is not possible. An ankylosed tooth can be compared with an implant and cannot be moved. Such an attempt will only result in intrusion of the adjacent teeth.

Treatment Options

A buildup may be a treatment option if the patient has passed the pubertal growth spurt and the infraposition is minimal. In growing individuals this is not recommended. The infraposition will increase, and buildups must be repeated, resulting in a long clinical crown with no esthetic success.

Surgical repositioning has been suggested when the ankylosed area is minimal (5). However, the long-term prognosis is poor, because the reduced marginal bone level is unchanged, and further ankylosis might be promoted.

Bone distraction by dento-osseous osteotomy of the segment has been reported, and different types of appliances have been suggested (6–8). However, this treatment must be postponed until growth of the jaws is completed. Fusion between the root and the adjacent bone still remains.If bone distraction by dento-osseous osteotomy of the segment is performed in a growing individual, infraposition of the damaged tooth might recur.

Autotransplantation is an alternative when crowding indicates extraction of a premolar. To achieve revascularization of the pulp and successful periodontal healing, the ideal root development should be three-fourths of the full root length (9). In such cases the whole root of the ankylosed tooth must be extracted. Loss of attached bone will not be a problem. The transplant with its sound periodontal ligament will induce new bone formation (10).

An ankylosed tooth left *in situ* in children and young adolescents will arrest the vertical growth of the alveolar ridge in the region, and tilting of adjacent teeth will

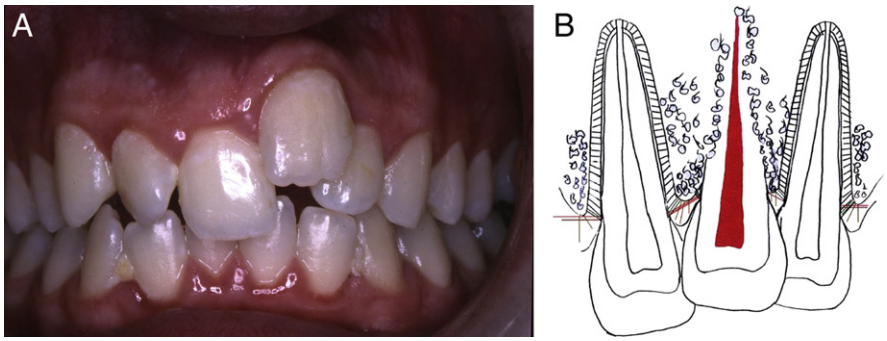

Figure 1. A 17-year-old boy with ankylosed left upper incisor. (*A*) Severe infraposition, tilting of adjacent teeth, and midline shift 4 years after avulsion and replantation. (*B*) Graphic illustration showing gradual bony replacement of the root, preventing it from erupting normally. (From Malmgren BM, Malmgren B, Malmgren O, Andreasen JO. Alveolar bone development after decoronation of ankylosed teeth. Endodontic Topics 2006;14:35–40.)

complicate the condition (Fig. 1). To prevent these adverse effects, the ankylosed tooth should be removed. Clinical experience shows that extraction of an ankylosed tooth may involve loss of attached bone, particularly the thin buccal plate of the maxilla.

It is well known that uncompleted extraction of teeth leads to undesirable lowering and diminished volume of the alveolar ridge. The resorption of the alveolar ridge is more pronounced on the buccal than on the palatal aspect of the alveolus (11–13).

As early as the 1970s it was shown experimentally that new marginal bone may form over the coronal surface of submerged roots covered with a mucoperiosteal flap (14–17). Very few inflammatory changes were seen when vital roots had been submerged, whereas this was a consistent finding periapically and pericoronally in submerged endodontically filled roots. From these findings the decoronation technique was developed.

The first study was published in 1984 (18) and a second in 2000 (19). Later several case reports have been reported (20–24).

The idea was to remove the crown and the root filling and maintain the resorbing root as a matrix for new bone development. The volume of the alveolar ridge could thus be preserved, allowing more optimal conditions for a later prosthetic solution.

Decoronation Technique

A mucoperiosteal flap is raised at the place of the ankylosed tooth, and the crown is removed with a diamond bur under continuous saline irrigation (Fig. 2*A*). The root filling is removed with an endodontic file, and the coronal part of the root surface is reduced to approximately 2 mm below the marginal bone (Fig. 2*B*).

The empty root canal is thoroughly rinsed with saline solution and allowed to fill with blood (Fig. 2*C*). This is very important because the blood clot is organized from the surrounding tissues. The mucoperiosteal flap is drawn over the alveolus and sutured with single sutures. A periosteal plastic (incisions in the periosteum to lengthen the flap to cover the alveolus) is contraindicated. A blood clot is formed in the gap between the labial and palatal mucosa (Fig. 2*D*).

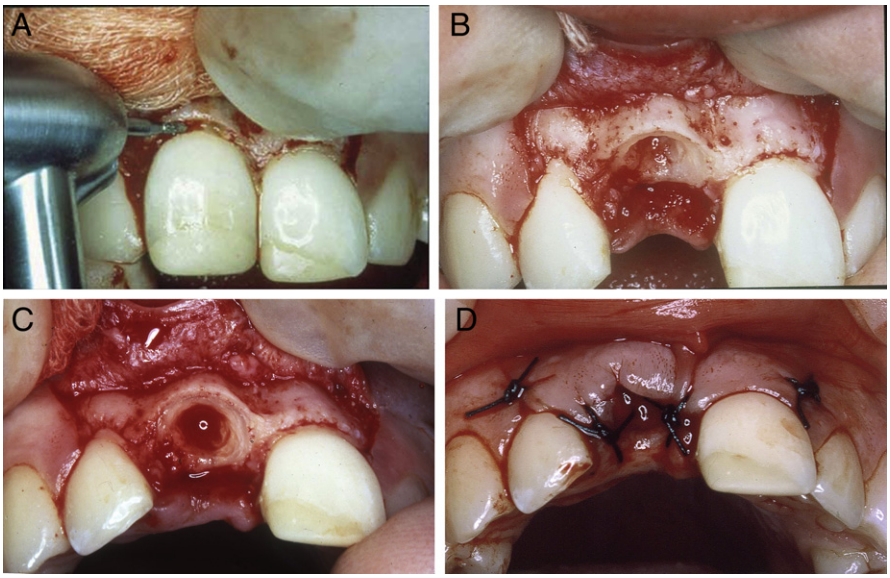

Figure 2. Decoronation of ankylosed, infrapositioned incisor. (*A*) The crown is removed with a diamond bur under continuous saline irrigation. (*B*) The root filling has been removed with an endodontic file, and the coronal part of the root is reduced to a level of 1.5–2 mm below the marginal bone. (*C*) The empty root canal is thoroughly rinsed with saline and thereafter allowed to fill with blood. (*D*) The mucoperiosteal flap is drawn over the alveolus and sutured with single sutures. (From Malmgren O, Malmgren B. Orthodontic management of the traumatized dentition. In: Andreasen JO, Andreasen FM, Andersson L, eds. *Textbook and Color Atlas of Traumatic Injuries to the Teeth*, 4th ed. Oxford, UK: Blackwell Publishing; 2007:704–5.)