Dental Traumatology

Dental Traumatology 2009; 25: 346-349; doi: 10.1111/j.1600-9657.2009.00788.x

Decoronation of an ankylosed permanent incisor: alveolar ridge preservation and rehabilitation by an implant supported porcelain crown

CASE REPORT

Shabtai Sapir¹, Ariel Kalter², Minda Rose Sapir²

¹Department of Pediatric Dentistry, Hebrew University – Hadassah Faculty of Dental Medicine, Jerusalem, Israel; ²Private Practice, Rechovot, Israel

Correspondence to: Dr Shabtai Sapir, Department of Pediatric Dentistry, Hebrew University – Hadassah Faculty of Dental Medicine, PO Box 12272, Jerusalem, Israel Tel.: +972 2 6776168 Fax: +972 2 6431747 e-mail: sapirdrs@zahav.net.il Accepted 30 January, 2009 **Abstract** – Replacement resorption and ankylosis are frequently diagnosed following severe dental trauma. The complications that may develop as a result of ankylosis of a permanent incisor in children and adolescent include: esthetic compromise, orthodontic complications because of: arch irregularity; lack of mesial drift; tilting of adjacent teeth, arch length loss and local arrest of alveolar ridge growth. To avoid such complications, an ankylosed tooth should be removed before the changes become so pronounced that they compromise future prosthetic treatment. The purpose of this article was to present a case of preservation of the alveolar ridge for implant rehabilitation by utilizing decoronation for the treatment of a young permanent central incisor. An implant was inserted, without any bone augmentation procedures, followed by prosthetic porcelain crown rehabilitation. We conclude that treatment of an ankylosed young permanent incisor by decoronation may maintain the alveolar bone ridge width, height and continuity, and facilitate future rehabilitation with minimal, if any, ridge augmentation procedures.

Progressive replacement resorption and ankylosis are frequently diagnosed following a severe dental trauma (1).

The replacement resorption rate is variable and is dependent on age, basal metabolic rate, extra-alveolar time, treatment to the root surface prior to replantation, amount of root dentin at the time of the trauma, severity of the trauma and the extent of periodontal ligament necrosis (2, 3). In young children, progressive infraposition gradually develops (4). In patients 7–16 years old, the tooth is lost within 3–7 years after the onset of root resorption (3).

The complications that may develop as a consequence of ankylosis to a permanent incisor in children and adolescents include: esthetic compromise and orthodontic complications because of arch irregularity; lack of mesial drift; tilting of adjacent teeth, arch length loss and local arrest of alveolar ridge growth. To avoid such complications, an ankylosed tooth should be removed before the changes become so pronounced that they compromise future prosthetic treatment (5–8).

Frequently the pediatric dentist is the first professional to diagnose ankylosis of a permanent incisor. It is crucial

that the dentist is aware of the different treatment options, and whenever appropriate coordinate a treatment plan with other specialists.

The treatment options may involve one or more of the following:

- **1.** Early extraction of the ankylosed tooth and esthetic solution until more definitive treatment is provided in the future.
- 2. Orthodontic space closure after extraction.
- **3.** Extraction of the ankylosed tooth, followed with immediate ridge augmentation/preservation.
- **4.** Auto-transplantation (9–11).
- 5. Single tooth dento-osseous osteotomy (12, 13).
- **6.** Decoronation and esthetic space maintenance until more definitive treatment is provided (5–8).

Treatment options which consider an extraction of the ankylotic incisor are not routinely recommended, because extraction is frequently accompanied by extensive alveolar bone loss, particularly in the presence of a thin maxillary buccal plate. This may compromise future prosthetic solutions, because of vertical and horizontal loss of alveolar bone, and may necessitate complex regenerative procedures to provide sufficient bone and soft tissue to support an esthetic solution with an implant (14).

To avoid such bone loss, a technique for extracting ankylosed teeth, called decoronation, has been developed with excellent long-term results in terms of alveolar bone preservation (7). Moreover patients treated before the age of 13 years, i.e. before or during pubertal growth periods, have shown improvement of vertical bone height and maintenance of the alveolar ridge in the buccopalatal direction (8).

The purpose of this article was to present a follow up of a case presented in the past of an ankylosed permanent maxillary incisor in a young patient (6). The preservation of the alveolar ridge and rehabilitation by an implant-supported porcelain crown is described. Decoronation as the sole management for alveolar bone preservation enabled an implant insertion after 6 years.

Case report

At the age of 18 [6 years following decoronation of the ankylosed upper right central incisor (Figs 1-3), and



Fig. 1. Intraoral occlusal view of the ankylosed right maxillary central incisor at the initial examination.



Fig. 2. Intraoral view of the wound edge approximation (over the decoronated ankylosed root) and suturing without tension.



Fig. 3. Postoperative periapical radiograph of the decoronated ankylosed central incisor.



Fig. 4. Periapical radiograph of the alveolar bone ridge 5 years after decoronation. Notice the complete remodeling of the root to bone. Moderate apical root resorption of adjacent roots because of the orthodontic treatment is also noticeable.

after 3 years of orthodontic treatment], once the completion of developmental facial growth was anticipated, the patient was referred to an oral and maxillo-facial surgeon for an implant insertion. A periapical radiograph revealed complete replacement resorption of the



Fig. 5. A CT scan of the alveolar ridge of the decoronated tooth site prior to implant placement.



Fig. 6. Intraoral view of the alveolar bone ridge at the time of implant insertion. Notice the preservation of the alveolar bone ridge.

decoronated root (Fig. 4). A CT scan of the edentulous site indicated the feasibility of placing a dental implant (Fig. 5). A 13-mm-long, 3.75-mm-wide tapered screw type implant (Seven, MIS, Shlomi, Israel) was placed using a two-stage surgical protocol (Fig. 6). After 6 months, the implant was surgically exposed and a provisional resin crown was adjusted to facilitate esthetic healing of the soft tissues.



Fig. 7. Intraoral view of the prosthetic porcelain crown on the day of cementation.



Fig. 8. Periapical radiograph of the implant and prosthetic restoration.

After two months, the orthodontic bands and brackets were removed, a prosthetic porcelain crown was fabricated and cemented and an orthodontic splint was inserted (Figs 7 and 8). At the 6 month postrehabilitation follow-up appointment, the clinical examination, and the periapical radiograph of the implant and prosthetic restoration demonstrated stability and acceptable esthetic result (Fig. 9).

Discussion

Decoronation provides certain advantages over other treatment options: (i) it is reliable in terms of alveolar process width and height preservation; (ii) it is a simpler and more economical surgical procedure than ridge augmentation; (iii) vertical bone apposition is possible (4, 7, 8, 15).



Fig. 9. Periapical radiograph of the implant and prosthetic restoration at 6 month follow-up appointment, demonstrating stability under function of the implant supported crown.

The disadvantages are its surgical nature, which may be challenging in young children, and the necessity for a long-term esthetic space maintainer. Once ankylosis is diagnosed, a strict follow up is indicated. The timing of the intervention is decided according to the following major variables: the vertical difference between the ankylosed and adjacent teeth (1/8 to 1/4 is recommended), the child's age, gender (sexual dimorphism) and included growth pattern (5, 6).

Numerous case reports describing decoronation can be found in dental literature (4–8, 15–17). However, there is a paucity of cases that actually present successful implant insertion following decoronation (2). Cohenca and Stabholtz described a case of prosthetic rehabilitation after decoronation, but because of the late presentation of the patient decoronation was not sufficient in preserving the alveolar bone volume and an extensive bone augmentation procedure had to be performed concurrently (18). In the present case, we describe an implant osteo-integration and esthetic rehabilitation without any additional bone augmentation procedures.

We conclude that treatment of an ankylosed young permanent incisor by decoronation may maintain the alveolar bone ridge width, height and continuity, and assist future rehabilitation with minimal, if any, ridge augmentation procedures. The pediatric dentist should be aware of this treatment option, and whenever appropriate manage the case with the orthodontist, oral and maxillo-facial surgeon and prosthodontist to provide the best outcome.

References

- Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Munksgaard; 2007. pp. 390–1, 453–5, 695, 704–7.
- Ebeleseder KA, Friehs S, Ruda C, Pertl C, Glockner K, Hulla H. A study of replanted permanent teeth in different age groups. Endod Dent Traumatol 1998;14:274–8.
- Andersson L, Bodin I, Sorensen S. Progression of root resorption following replantation of human teeth after extended extraoral storage. Endod Dent Traumatol 1989;5:38–47.
- Malmgren O, Malmgren B. Rate of infraposition of reimplanted ankylosed incisors related to age and growth in children and adolescents. Dental Traumatol 2002;18:28–36.
- 5. Sapir S. Decoronation: indication and treatment timing. Refuat Hapeh Vehashinayim 2006;23:19–26, 68.
- Sapir S, Shapira J. Decoronation for the management of an ankylosed young permanent teeth. Dent Traumatol 2008;24:131–5.
- Malmgren B, Cvek M, Lundberg M, Frykholm A. Surgical treatment of ankylosed and infrapositioned reimplanted incisors in adolescents. Scand J Dent Res 1984;92:391–9.
- Malmgren B. Decoronation: how, why, and when? J Calif Assoc 2000;28:846–54.
- Czochrowska EM, Stenvik A, Bjercke B, Zachrisson BU. Outcome of tooth transplantation: survival and success rates 17–41 years post treatment. Am J Orthod Dentofacial Orthop 2002;12:110–9.
- Czochrowska EM, Stenvik A, Zachrisson BU. The esthetic outcome of autotransplantated premolars replacing maxillary incisors. Am J Orthod Dentofacial Orthop 2002;18:237–45.
- Andreasen JO, Paulsen HU, Yu Z, Schwartz O. A long-term study of 370 autotransplanted premolars. Part III. Periodontal healing subsequent to transplantation. Eur J Orthod 1990;12:25–37.
- Medeiros PJ, Bezerra AR. Treatment of an ankylosed incisor by single tooth dento-osseous osteotomy. Am J Dentofacial Orthop 1997;112:496–501.
- Isaacson RJ, Strauss RA, Bridges-Poquis A, Peluso AR, Lindauer SJ. Moving an ankylosed central incisor using orthodontics, surgery and distraction osteogenesis. Angle Orthod 2001;71:411–8.
- Kohavi D. Dental implants. In: Bimstein E, Needleman HL, Karimbux N, Van Dyke TE, editors. Periodontal and gingival health and disease. London: Martin Dunitz Ltd; 2001. p. 275– 89.
- Schwartz-Arad D, Levin L, Ashkenazi M. Treatment options of untreatable traumatized anterior maxillary teeth for future use of dental implantation. Implant Dent 2004;13:11–9.
- Filippi A, Pohl Y, von Arx T. Decoronation of an ankylosed tooth preservation of alveolar bone prior to implant placement. Dent Traumatol 2001;17:93–5.
- 17. Diaz JA, Sandoval HP, Pineda PI, Junod PA. Conservative treatment of an ankylosed tooth after delayed replantation: a case report. Dent Traumatol 2007;23:313–7.
- Cohenca N, Stabholz A. Decoronation-a conservative method to treat ankylosed teeth for preservation of alveolar ridge prior to permanent prosthetic reconstruction: literature review and case presentation. Dent Traumatol 2007;23:87–94.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.