

Decoronation of an ankylosed tooth for preservation of alveolar bone prior to implant placement*

Filippi A, Pohl Y, von Arx T. Decoronation of an ankylosed tooth for preservation of alveolar bone prior to implant placement. Dent Traumatol 2001; 17: 93–95. © Munksgaard, 2001.

Abstract – A 12-year-old patient sustained avulsions of both permanent maxillary central incisors. Subsequently, both teeth developed replacement resorption. The left incisor was extracted *alio loco*. The right incisor was treated by decoronation (removal of crown and pulp, but preservation of the root substance). Comparison of both sites demonstrated complete preservation of the height and width of the alveolar bone at the decoronation site, whereas the tooth extraction site showed considerable bone loss. In addition, some vertical bone apposition was found on top of the decoronated root. Decoronation is a simple and safe surgical procedure for preservation of alveolar bone prior to implant placement. It must be considered as a treatment option for teeth affected by replacement resorption if tooth transplantation is not feasible.

Ankylosis and replacement resorption following tooth injuries in the growing child not only lead to the predictable loss of the affected teeth but also interfere with the localized jaw growth (1–3). Frequently, the corresponding teeth appear shorter (infraocclusion). After body growth is completed, a vertical bone deficiency is often present, necessitating an augmentation procedure prior to implant therapy.

In children, ankylosed teeth should therefore be removed, and be replaced by a tooth transplant with a viable periodontal ligament for functional and esthetic reasons (4). This measure assures the continuous development of the alveolar process. The use of premolars for transplantation has been particularly successful (5–8). As an alternative method, the transplantation of primary canine teeth has been reported in children with unerupted premolars (9). However, long-term data are not available for this treatment option. In the early stage of ankylosis or when only small areas of the root are affected by replacement resorption, intentional replantation using Emdogain®

* This article is dedicated to Dr. Alberto Manna, member of the IADT, who died last year in an accident. Alberto we will miss you.

**Andreas Filippi¹, Yango Pohl²,
Thomas von Arx¹**

¹Department of Oral Surgery, School of Dental Medicine, University of Berne, Switzerland,

²Department of Oral Surgery, University of Giessen, Germany

Key words: decoronation; replacement resorption; ankylosis; bone preservation

Andreas Filippi, Department of Oral Surgery, School of Dental Medicine, University of Berne, Freiburgstrasse 7, CH-3010 Berne, Switzerland
Tel: +41 31 632 2504

Fax: +41 31 632 9884

e-mail: andreas.filippi@zmk.unibe.ch

Accepted July 12, 2000

(Biora, Malmö, Sweden) has been suggested (10). Again, no long-term data have as yet been reported.

In adolescents older than 12–14 years, tooth transplantation is no longer recommended, mostly for orthodontic reasons (8). When ankylosed or heavily resorbed teeth are present, these should not be extracted or surgically removed, but rather treated by decoronation (4, 11). Following removal of the (root filling) material or tissue from the root canal and plastic wound closure, the decoronated root will be gradually fully resorbed (4). This technique allows for complete preservation of the width and height of the alveolar process. In addition, vertical bone apposition is frequently observed on top of the decoronated root (4). In view of subsequent implant placement, the bone volume is well preserved and ridge augmentation can be obviated.

Case presentation

Preoperative situation

In 1995, a 12-year-old girl sustained avulsion of both permanent maxillary central incisors. After an approximal 2-h extraoral storage, the teeth were re-



Fig. 1. Radiographic appearance 4 years after the trauma: maxillary right incisor presents with replacement resorption.

planted. In 1998, the private dentist diagnosed an advanced replacement resorption of the left incisor and extracted the tooth. One year later, the 16-year-old patient was referred to our department. She now presented with an advanced stage of replacement resorption of the right incisor (Fig. 1). Decoronation was chosen as the surgical treatment option for the following reasons: (i) tooth restoration on implants was planned, (ii) jaw growth was not yet complete, (iii) tooth transplantation was orthodontically contraindicated, and (iv) the heavily discolored tooth was a nuisance to the patient (Fig. 2).

Decoronation procedure

Under local anesthesia, a full buccal mucoperiosteal flap was reflected. The crown of the right maxillary central incisor was removed using rotary instruments. The cut coronal root face was smoothed flush with the adjacent bone crest. Employing endodontic files, the tissue was completely removed from the root canal. The instrumented root canal was allowed to be filled with a blood coagulum. For primary and tension-free wound closure, the periosteum was released and, finally, wound edges were reapproximated.

Postoperative course

The healing was uneventful. Two weeks following decoronation, the width of the alveolar process including the mucosa measured 12.5 mm, and 8.7 mm excluding the soft tissues (bone mapping) at the respective site. Nine months later, the same dimension was measured, indicating complete preservation of the alveolar bone volume (Fig. 3). In contrast, the site of the previously extracted left central incisor presented with a buccal dehiscence of the alveolar process (overall ridge width 8.5 mm, bone width 4.2 mm). The attached gingiva measured 7.8 mm at the right site and 8.5 mm at the left site. Radiographically, the decoronated root showed further replacement resorption and an additional apposition of 1 mm of bone coronal to the decoronation level (Fig. 4). Implant restoration of both maxillary central incisors is planned in about 9 months when the decoronated root is fully resorbed and body growth completed.



Fig. 2. Clinically, tooth shows distinct discoloration.



Fig. 3. Model of occlusal view demonstrates a marked difference of the ridge width comparing site of maxillary right vs. left incisor.



Fig. 4. Radiograph taken 9 months postoperatively depicts vertical apposition of bone and continuing replacement resorption.

Discussion

Ankylosis and replacement resorption are frequent sequelae of severe tooth injuries. In adult patients, planning of implant treatment is normally feasible following removal of such affected teeth. However, in children and adolescents, ankylosed teeth should not only be removed for functional and esthetic reasons, but also to avoid interference with the localized jaw development (4). In children younger than 12–14 years, transplantation of a tooth with a vital periodontal ligament is advocated, whereas in older children, a decoronation procedure is recommended, especially when a tooth transplantation is orthodontically contraindicated. The alternative treatment of surgical removal of an ankylosed tooth often leads to considerable bone loss, mainly reducing the bone volume in an oro-facial dimension. This may later necessitate an augmentation procedure. The decoron-

ation procedure is a reliable technique in terms of preservation of the width and height of the alveolar process (11). Complete resorption of the ankylosed tooth is predictable if the enamel, i.e. the whole crown, and the root-canal pulp have been fully removed (4). An occasional root-canal filling material must also be completely removed. The decoronation procedure is a simple and clearly less traumatic technique compared to the surgical removal of an ankylosed tooth. In addition, coronal bone apposition is noted in many cases, thereby enhancing the bone volume of a future implant site (4, 11). Data from the literature as well as our observations show that no complications occur following decoronation of an ankylosed tooth, and that the decoronated root is gradually resorbed. In summary, the decoronation procedure is a simple and predictable technique prior to insertion of a root-form dental implant.

References

1. 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.
2. Ebeleseder KA, Friehs S, Ruda C, Perl C, Glockner K, Hulla H. A study of replanted permanent teeth in different age groups. *Endod Dent Traumatol* 1998;14:274–8.
3. Andreasen JO, Andreasen FM. Avulsions. In: Andreasen JO, Andreasen FM, editors. *Textbook and color atlas of traumatic injuries to the teeth*. Copenhagen: Munksgaard; 1994. p. 383–425.
4. Malmgren O, Malmgren B, Goldson L. Orthodontic management of the traumatized dentition. In: Andreasen JO, Andreasen FM, editors. *Textbook and color atlas of traumatic injuries to the teeth*. Copenhagen: Munksgaard; 1994. p. 587–633.
5. 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.
6. Kristerson L. Autotransplantation of human premolars. A clinical and radiographic study of 100 teeth. *Int J Oral Surg* 1985;14:200–13.
7. Kristerson L, Lagerström L. Autotransplantation of teeth in cases with agenesis or traumatic loss of maxillary incisors. *Eur J Orthod* 1991;13:486–92.
8. Andreasen JO, Kristerson L, Tsukiboshi M, Andreasen FM. Autotransplantation of teeth to the anterior region. In: Andreasen JO, Andreasen FM, editors. *Textbook and color atlas of traumatic injuries to the teeth*. Copenhagen: Munksgaard; 1994. p. 671–90.
9. Pohl Y, Filippi A, Kirschner H. Auto-alloplastic transplantation of premolars and primary canines after loss of upper permanent incisors. *Proceedings 10th International Conference on Dental Traumatology, Melbourne*; 1999.
10. Heijkoop P. Repositioning of ankylosed teeth in the developing dentition. *Proceedings 10th International Conference on Dental Traumatology, Melbourne*; 1999.
11. 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.