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Case Report

Replantation and transplantation following avulsion of two maxillary incisors

Swiatkowski W, Rahnama M, Tomaszewski T. Replantation and transplantation following avulsion of two maxillary incisors.

Abstract – Here we describe replantation and transplantation as a treatment conducted in a 16-year-old patient following a bicycle accident. An avulsed left central incisor in maxilla was replanted after extra-oral root canal treatment, and the lost right central incisor of the maxilla was replaced by a left lateral incisor of the mandible in the region of the fracture fissure. Follow-up examination at 34 months showed validity of treatment, although slight evidence of replacement resorption in the transplanted and replanted teeth was revealed.

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Key words: replantation; transplantation; avulsion

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Avulsion of the teeth can be a consequence of traumatic injuries in the facial region. Following the World Health Organization's classification system modified by Andreasen, avulsion is classified as an injury of periodontal tissues, as well as extrusive, lateral, or intrusive luxation (1).

As a treatment of the avulsed tooth, replantation is the method which can restore occlusal function and esthetic appearance shortly after injury. Clinical studies have shown that the prognosis is best for teeth replanted within 5 minutes of avulsion (2–5). Healing with a normal periodontal ligament can occur only if the innermost cell layers among the root surface are vital (1). Because of injury circumstances, replantation often cannot be conducted in such a short period of time, which results in necrosis of the periodontal ligament and consequent healing by replacement root resorption. Following this process, the periodontal ligament and the root surface of the replanted tooth is resorbed and replaced by surrounding alveolar bone, a process that results in ankylosis (1). Because of normal remodeling cycle bone, the tooth becomes an integral part of that system and the root is gradually transformed to bone at the same rate as in other parts of the body (6).

In addition to the extra-alveolar period of the avulsed tooth, there are other factors influencing the clinical success of replantation: the degree of injury to the alveolar bone, the storage medium, and the timing of root canal treatment after the avulsion (1, 6).

Case report

A 16-year-old male patient was referred from the Clinic of Pediatric Surgery to the Clinic of Oral and Maxillofacial Surgery 6 h after a bicycle accident. The extra-oral examination revealed the swelling of the right cheek, as well as the lower and upper lips. The intra-oral examination revealed a fracture of the mandible in the region of the left canine (Fig. 1). The left lateral incisor was avulsed and laying among crushed alveolar ridge and soft tissues of the fracture fissure region. The maxillary central incisors were missing from their sockets and a laceration of the oral mucosa in this region was observed. The upper right central incisor and mandible canine were lost in the accident. The left upper central incisor was stored extra-orally in a handkerchief for about 20 min after injury and, after admission to the Pediatric Clinic, the tooth was

Fig. 1. Postero-anterior head radiograph. Status after injury.

transmitted to saline. Antitetanus serum was given prophylactically.

The patient was classified for treatment under general anesthesia. All additional examinations were taken. The treatment plan, accepted by parents, was as follows: plate osteosynthesis of the mandible, replantation of the avulsed left upper incisor after extra-oral root canal treatment, and transplantation of the mandible left lateral incisor from the damaged alveolar ridge into the socket of the avulsed maxillary right central incisor which was lost at the time of accident. Because of vast damage of alveolar ridge, the avulsed lateral incisor was useless in this region.

The surgical procedure was performed the day after the injury with antibiotic coverage. During the operation, mandible osteosynthesis was carried out, and the sectioned and damaged part of alveolar ridge was removed together with the left lateral incisor. Conventional Gutta Percha root canal obturation was completed on this tooth prior to transplantation.

Further examination of the avulsed tooth sockets in the maxilla confirmed absence of labial plate of the alveolar ridge in the region of the left central incisor previously shown by computed tomography examination (Fig. 2).

After Gutta Percha root canal obturation, the left upper central incisor was returned to its own socket and the mandible left lateral incisor was placed into the socket of the right upper central incisor. Missing bone tissue was grafted from the discarded part of

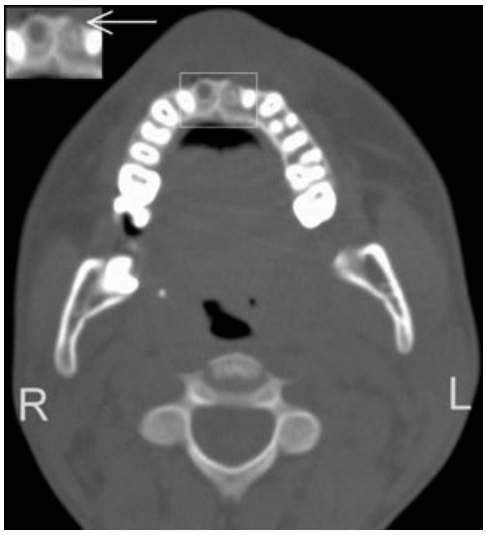

Fig. 2. Computed tomography scan at the level of alveolar ridge of maxilla. Damage of the labial site of incisors alveoli.

the mandible alveolar ridge. Sutures were placed, and the replanted and transplanted teeth were splinted with Fiber-Splint and composite.

Because of the damage to the recipient alveolus for the transplanted tooth, and applied bone grafting, the splinting period was 6 weeks. After that period the splint was removed. In clinical examination, transplanted and replanted teeth were stable without radiological evidence of resorption (Fig. 3). A prosthetic crown was made for the transplanted tooth (Fig. 4), and a removable prosthesis was provided in the region of the missing incisor and canine in the mandible. Clinical and radiological examinations were conducted at the 3rd, 6th (Fig. 5), 12th (Fig. 6), 24th and 34th months postsurgery (Fig. 7).

The patient remains under care. At 34 months, a follow-up examination showed radiological evidence of limited replacement root resorption of the transplanted and replanted teeth (Fig. 7).

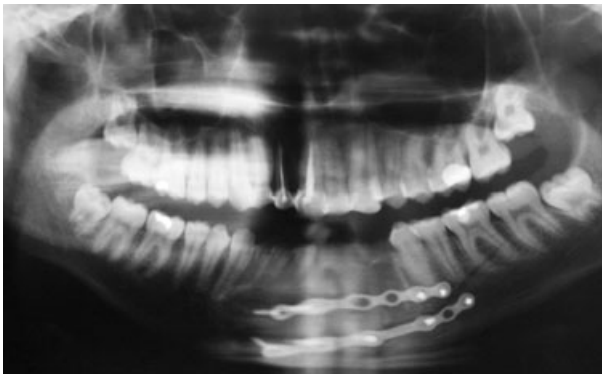

Fig. 3. Pantomograph – sixth week postsurgery, before splint removal.

Fig. 4. Intra-oral photograph of replanted and transplanted teeth. Prosthetic crown on the transplanted tooth (right central incisor).

Fig. 5. Intra-oral radiograph taken sixth month postsurgery. No signs of root resorption in the transplanted and replanted teeth.

However the prosthetic crown of the transplanted tooth made the percussion examination test result uncertain, the initial, radiological elusive symptoms of replacement resorption were diagnosed by percussion examination 12 months after surgery (Fig. 6). Thirty-four months follow-up showed no radiographic sign of inflammatory root resorption with fully maintained function of transplanted and replanted teeth.

Discussion

Avulsion is a serious dental emergency. Although there are standards in avulsion treatment, the success rate depends upon many factors (2, 6–8).

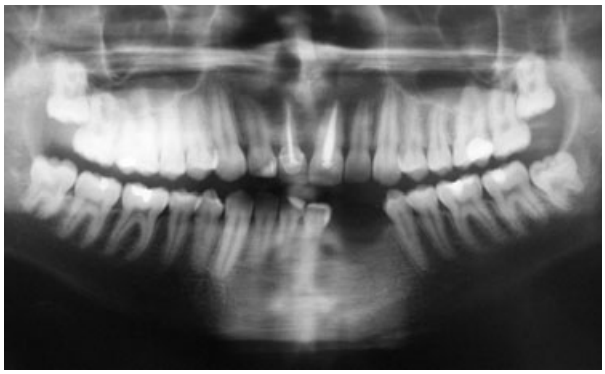

Fig. 6. Pantomograph – twelfth month postsurgery. Symptoms of ankylosis diagnosed by percussion examination of the transplanted and replanted teeth.

Fig. 7. Intra-oral radiograph taken 34th month postsurgery. Slight evidence of replacement resorption on the distal site of transplanted tooth's root.

Each case is unique and depends upon the range of trauma, the timing of the treatment, the status of the avulsed teeth and management of the case.

Healthy periodontium on the surface of the transplanted or replanted tooth's root is a definitive factor in treatment success (1–7). In our case study, replacement resorption after surgery was calculated as an expected complication because of damage to the periodontium at the time of the injury itself, as well as extra-oral root canal treatment (9). Performed prereplantation and pretransplantation root canal treatment seemed to prevent against

inflammatory root resorption, which is a frequent complication after tooth luxation or avulsion caused by pulpal infection (10, 11). In adolescents, infra-occlusion of replanted tooth can be another complication related to the age of patient (12), however in our case study there were no clinical or radiological signs of infra-occlusion.

Transplantation and replantation prevented against alveolar bone loss and solved esthetic and treatment problems of any missing central maxilla incisors in this adolescent patient. Follow-up at 34 months showed the validity of the performed treatment. Enhancement of replacement resorption progress seems to be slow in the transplanted and replanted teeth. First diagnosis was conducted 12 months postsurgery (by percussion test), however, 22 months later, the esthetical and functional outcomes still remained acceptable.

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Meeting

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