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Transreplantation: An alternative for periodontally hopeless teeth

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The periodontal therapy of severely damaged teeth that have advanced bone loss, a significant degree of mobility, and often tooth migration and elongation, frequently exposes the dental clinician to difficult decisions regarding the appropriate therapy for the patient. Extensive rehabilitation, with the replacement of periodontally hopeless teeth, has biologic, prognostic, and financial limitations. A possible alternative in such cases is the transreplantation of periodontally hopeless teeth. Ankylosis of the tooth is induced by appropriate extraoral pretreatment and thus the mobility disappears and the alveolar bone is reformed. This little-known technique is described step by step, with reference to a clinical case. *(Quintessence Int 2017;48:287–293; doi: 10.3290/j.qi.a37806; originally published in Quintessenz 2014;66(11):1395–1402)*

Key words: guided tissue regeneration, implantology, interdisciplinary treatment, periodontology, transreplantation

The maintenance of teeth with advanced periodontal disease is often limited by biologic, prognostic, and financial reasons. If there is considerable tooth mobility or even elongation of affected teeth, these teeth usually have to be removed. Remaining vertical bone and soft tissue defects, as well as periodontally diseased neighboring teeth, are often the result, making implant or conventional fixed dental prosthesis therapy more difficult. Elderly patients, in particular, often suffer from advanced periodontal disease and hopeless teeth. This can be accompanied by general medical risks, such as anticoagulation therapy, hypertension, bisphosphonates, diabetes mellitus, rheumatoid arthritis, and osteoporosis.[1-6] The greater these systemic risks, the less likely a decision would be made for extensive bone augmentation procedures in order to graft the remaining bony defect.

A little-known alternative in such cases would be the technique of transreplantation.[7,8] This allows, in specific indicated cases, the possibility of maintaining the periodontally hopeless tooth for many years, by inducing ankylosis of the tooth using appropriate extraoral pretreatment. Tooth mobility completely disappears, the resorbed alveolar bone is reformed, and the pocket probing depths are in most cases within the normal limits. A patient case applying this still relatively unknown technique is presented step-by-step in this case report.

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CASE PRESENTATION

Initial situation and patient history

A 48-year-old man presented in 2005 in a dental practice specializing in the treatment of periodontal disease, with the primary question of the possibility of

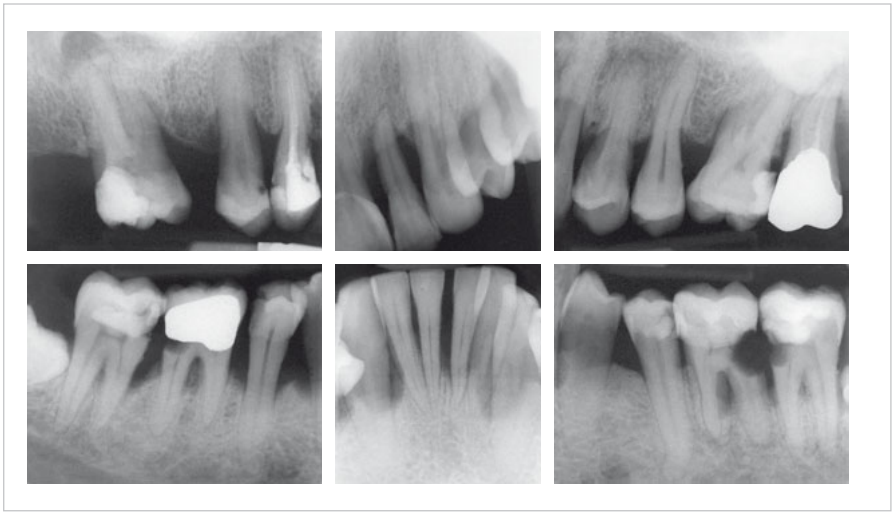


Fig 1a Pretreatment radiographs.

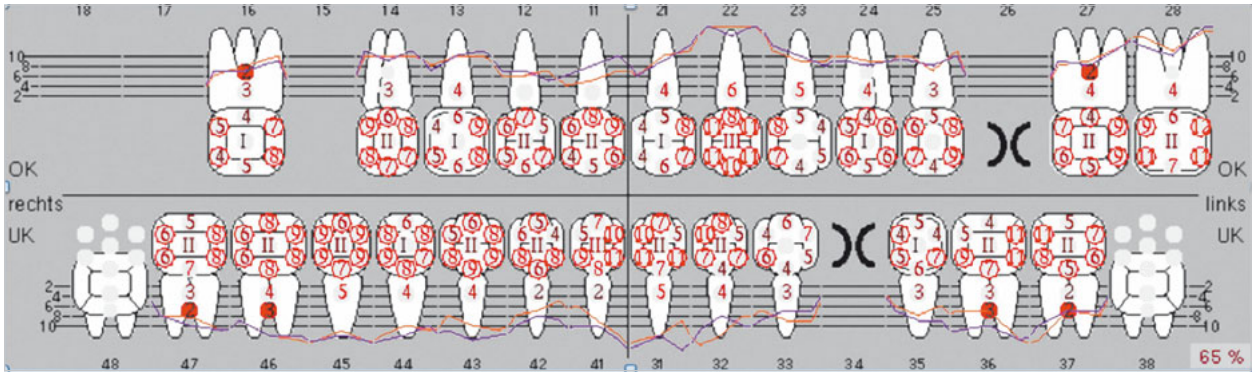


Fig 1b Initial periodontal status (24 Feb 2005).

maintaining as many of his own teeth as possible, especially the highly mobile, but vital, maxillary left lateral incisor. The patient was generally in a good medical condition and was a former smoker (he quit smoking a pack of cigarettes per day about 7 years ago, after 25 years of smoking). The patient reported having neglected his dental health for many years, because he was professionally under a lot of stress. The initial radiographs and the initial periodontal measurements are shown in Fig 1.

On clinical examination, it became evident that an interdisciplinary treatment approach would be necessary in order to treat advanced carious defects, endodontic lesions, and provide treatment of localized advanced chronic periodontitis prior to performing final prosthodontic restorations. Furthermore, pronounced occlusal wear facets and incisal abrasions were present in a bilateral group guidance. Regarding the etiology of the advanced periodontal defect on the maxillary left lateral incisor, the functional overload due to the lack of posterior supporting zones may have played a role.

Treatment plan and treatment

The suggested treatment plan therefore included, on the one hand, the establishment of posterior supporting zones after removal of caries and the hopeless maxillary left second molar and mandibular left first molar; and on the other hand, the elimination of periodontal infections and stabilization of already mobile

Fig 2 Clinical view pretreatment. In particular, the maxillary left lateral incisor shows gingival recession and elongation.

Fig 3 A silicone impression was fabricated to record the position of the incisal edges of the anterior teeth.

Fig 4 Preparation for semi-permanent periodontal splinting under rubber dam.

Fig 5 Periodontal splinting was performed, splinting every tooth except the maxillary left lateral incisor.

teeth (Fig 2). After systematic periodontal treatment in the form of oral hygiene instruction and professional tooth cleaning, initial periodontal therapy was performed according to the concept of full-mouth disinfection. Part of the treatment plan was not only to maintain the periodontally severely damaged, mobile, and elongated maxillary left lateral incisor using the concept of transreplantation, but also to replant it back to its former tooth position. A prosthodontic restoration using a fixed partial denture was out of the question due to the periodontally severely damaged neighboring teeth. An implant-supported crown should be avoided in this stage of treatment, since the long-term prognosis of many teeth as well as the compliance of the patient was uncertain.

Transreplantation

As a prerequisite for transreplantation, the vital maxillary left lateral incisor was initially treated endodontically. Afterwards, a silicone impression was fabricated, representing the preoperative position of the incisal edges of the maxillary anterior teeth (Fig 3). Rubber dam was placed in the maxillary anterior region in order to keep the area dry during periodontal splinting (Fig 4). Thereafter, periodontal splinting using everStick Perio (StickTech) was performed, splinting every tooth except the maxillary left lateral incisor, which was kept unsplinted for later transreplantation (Fig 5). The periodontal defect is shown clinically following the removal of granulation tissue and scaling of the root surfaces (Fig 6).

Fig 6 Intraoperative view after surgical treatment of the osseous defects in the maxillary left central and lateral incisors.

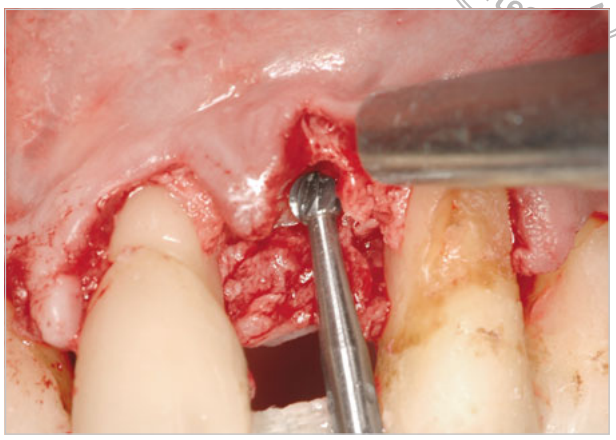


Fig 7 Clinical situation after removal of granulation tissue and preparation of the socket using a round bur.

Fig 8 Intraoperative monitoring of the correct position of the maxillary left lateral incisor.

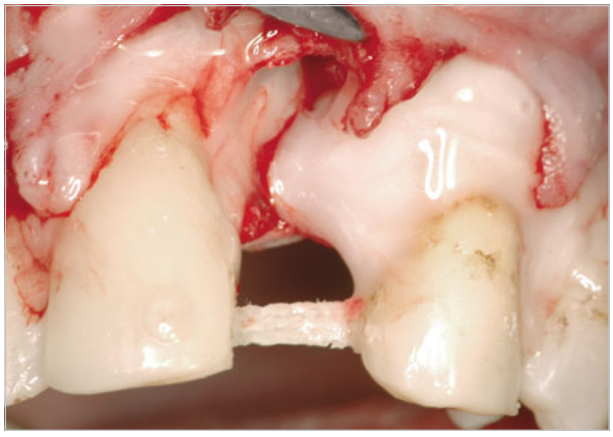


Fig 9 Application of PrefGel to condition the root surface of the neighboring teeth.

The maxillary left lateral incisor was carefully extracted and its root surface thoroughly cleaned, planed, and all granulation tissue removed. Subsequently, the socket was prepared carefully using a round bur, which corresponded to the diameter of the apex of the maxillary left lateral incisor (Figs 7 and 8). Finally, the root surfaces were conditioned with ethylenediaminetetraacetic acid (EDTA; PrefGel, Straumann) and then the teeth to be treated, including the transreplanted maxillary left lateral incisor, were treated with enamel matrix proteins (Emdogain, Straumann) (Figs 9 to 11). The periodontal defects were then treated by generally known regenerative techniques.

Primary closure was achieved with monofilament suture using horizontal and vertical mattress sutures as well as the papilla preservation technique.[9] The maxillary left lateral incisor was attached with composite to the previously prepared splint (Figs 12 and 13). With the help of the silicone impression, the incisal edge of the maxillary left lateral incisor was rebuilt, until it reached the original level (Figs 14 and 15). The periapical radiographs demonstrate the situation preoperatively and immediately postoperatively (Fig 16). The patient received oral hygiene instructions, and after about 2 weeks of healing, the sutures were removed.

Fig 10 The maxillary left lateral incisor after extraoral cleaning of the root.

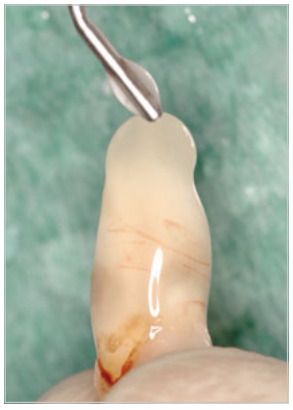


Fig 11 The maxillary left lateral incisor after extraoral pretreatment with enamel matrix proteins (Emdogain).

Fig 12 Intraoperative view after integration of the transreplanted maxillary left lateral incisor in the previously prepared splint.

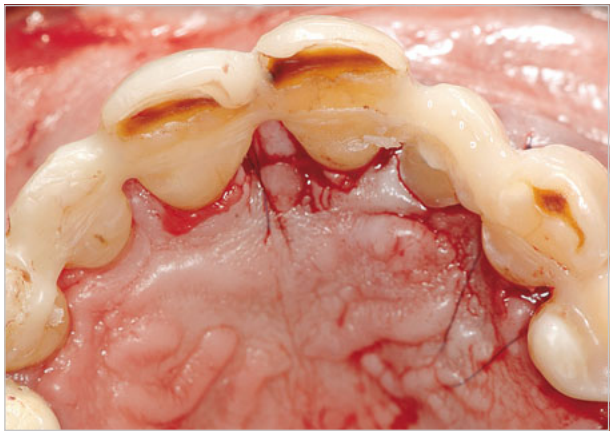
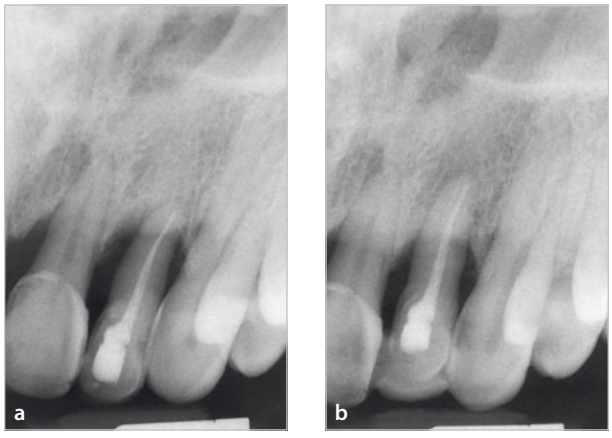


Fig 13 Palatal view of transreplanted tooth after integration into the splint.

Fig 14 Repositioning of the prepared silicone impression to control the incisal edge.

Fig 15 Primary closure and incisal buildup of the maxillary left lateral incisor.



Figs 16a and 16b Radiographs of the maxillary left lateral incisor *(a)* before and *(b)* directly after the treatment.

Fig 17 Clinical view of the transreplanted maxillary left lateral incisor 3 years postoperatively.

Fig 18 Radiograph of the transreplanted maxillary left lateral incisor taken 8 years postoperatively. There is clear vertical bone gain and no evidence of advanced root resorption.

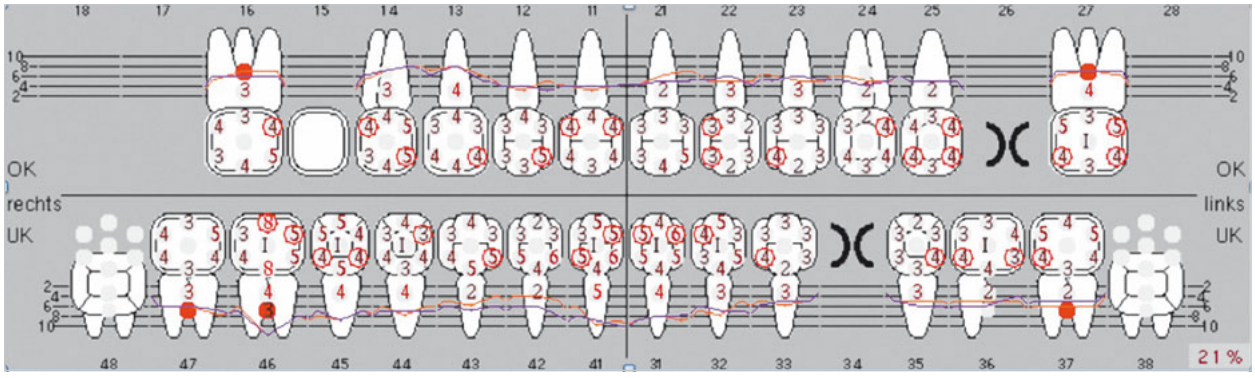


Fig 19 Postoperative periodontal status approximately 8 years after transreplantation (22 Oct 2013).

Postoperative care

The patient was admitted to an intense periodontal recall program and received professional tooth cleaning as well as oral hygiene instructions every 3 months by a trained professional dental hygienist. Periodontal reevaluation was performed by the periodontist once a year. The clinical situation about 3 years postoperatively demonstrated non-inflamed conditions and very good preservation of the gingival levels of the maxillary left central incisor to canine (Fig 17). The radiographic evaluation and the latest periodontal measurement about 8 years postoperatively demonstrated stable soft and hard tissue levels around the transreplanted maxillary left lateral incisor. The bone level even improved significantly compared with the preoperative findings, the pocket probing depths varied between 2 and 4 mm, and no bleeding on probing was detectable in the operated area (Figs 18 and 19).

DISCUSSION

Transreplantation is a relatively unknown but promising treatment alternative for teeth with a poor prognosis due to advanced periodontal disease in combination with significant tooth mobility and/or elongation, which can therefore not be maintained or only be maintained with a significant amount of expensive treatment with an uncertain prognosis.[7,8] With extraoral removal of the remaining necrotic desmodont on the root surface and in combination with root canal treatment (if necessary), ankylosis of the tooth is induced.[10] This leads to predictable vertical bone gain, a signifi-

cant reduction in pocket probing depth, and complete stability of the tooth.

This method is not recommended in younger patients because the active bone metabolism would lead to rapid root resorption until the root is completely replaced by bone, and thus the tooth would be lost.[11] In order to delay this root resorption in younger patients, an intentional replantation with retrograde post insertion would be a recommended alternative.[12] In the elderly patient, however, it takes years to decades until a root resorption can be detected radiologically,[13,14] as demonstrated in the present case.

The use of Emdogain leads to a better prognosis after transreplantation, because the invasive cervical root resorption is observed significantly less.[15,16] In most cases of advanced chronic periodontitis, root resorptions already exist, and can have varying degrees of clinical relevance.[17] In general, a good dentogingival closure resulting in healing by primary intention at the time of reimplantation is of upmost importance for the success of this promising treatment.[8]

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