

Endodontic Treatment After Autotransplantation of Tooth with Complete Root Formation

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Case Report

Received: 14/09/2016

Accepted: 05/10/2016

Published: 12/10/2016

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Keywords: Autotransplantation, Mature third molar, Vertical bone growth

ABSTRACT

The dental autotransplantation consists in the surgical transposition of a tooth from its original site to another, replacing a compromised tooth, in the same individual. It is a viable treatment option for tooth replacement when a suitable donor tooth is available. Autotransplantation should be considered as one of the most biologic techniques for replacing a missing tooth with minimal cost and can be carried out even after complete root formation in the donor tooth. This case report described significant vertical bone growth after autotransplantation of a mature third molar. In the follow-up period averaged 24 months, radiographic and clinical observations indicated a satisfactory outcome as follows: absence of progressive root resorption, bone regeneration and the emergence of lamina dura around the transplant were obvious in the postoperative radiograph. Clinically, the transplanted tooth functioned normally without mobility or discomfort.

INTRODUCTION

Autotransplantation is defined as the surgical transposition of a tooth from its original site to another, replacing a lost or compromised tooth, in the same individual ^[1]. A single tooth replacement because of dental loss includes dental implant, fixed partial denture and tooth autotransplantation that is advised as a suitable alternative to conventional prosthetic rehabilitation or implant treatment ^[2].

Autotransplantation is a viable option for the treatment of a missing tooth or for replacement of an avulsed and traumatized tooth when a donor tooth is available ^[3].

Tooth autotransplantation exhibits a number of advantages compared to other treatment options (i.e., dental implants or fixed partial prostheses), such as greater resistance to occlusal loading, maintenance of the periodontal ligament (PDL) and surrounding bone, and potential for better esthetics ^[4].

The success of dental transplants is influenced by a number of factors such as case selection, age of the patient, developmental stage and type of tooth transplanted, surgical trauma during extraction and storage after removing the donor tooth and skill of the surgeon ^[5].

However, the highest success rate involves teeth with developing roots with open apices ^[6], which restricts the application of tooth autotransplantation to younger patients, teeth with complete root formation could be considered for use as donor teeth ^[7].

The purpose of this study was to report a successful autotransplantation case of a mature third mandibular molar.

CASE REPORT

A 21-year-old woman visited our clinic referred for a clinical evaluation of tooth # 30 that was diagnosed as symptomatic periodontal disease and the extraction was planned. Written informed consent was obtained from the patient. A thorough dental history was recorded and a clinical examination of the donor tooth was performed. A periapical radiograph image (**Figure 1A**) was taken to analyze the size of the donor tooth and an impacted mature third molar (#32) was observed and scheduled for transplantation.



Figure 1A. Periapical radiographic examination of the donor tooth.

Crown and root length and the cervical dimension of the donor tooth were measured and compared with the residual bone height and the width of the recipient site. Anatomic relationships with the inferior alveolar nerve were also determined preoperatively.

Under local anesthesia with 3.6 mL 2% lidocaine with 1:100.000 epinephrine (Alphacaine, DFL, Rio de Janeiro- Brasil), tooth #30 was extracted and the recipient site was prepared. The alveolus was curetted and irrigated with saline. After that, the donor tooth was luxated passively with forceps and extracted. The use of elevators was minimized to prevent any damage to the cementum and the PDL. The extracted donor tooth was immediately transferred to the recipient site (**Figure 1B**).



Figure 1B. Immediately after autotransplantation.

During the extraoral procedure, the donor tooth was handled only by engaging the crown portion by forceps, and the root surface was not touched manually.

A resin-wire splint was applied and maintained for 2 weeks to stabilize the donor tooth. Nonsurgical root canal treatment of the donor tooth was initiated within 2 weeks after the surgery (**Figure 1C**) and calcium hydroxide medication was performed by 30 days.



Figure 1C. After endodontic treatment.

At the 24 months follow-up, vertical bone growth was observed on the transplant distal and mesial area on radiographic examination (**Figure 1D**). The transplant was asymptomatic.



Figure 1D. Twenty four months after autotransplantation.

DISCUSSION

Transplantation of a natural tooth into the site of another tooth has significant advantages over dental implants, particularly for periodontal ligament (PDL) and alveolar bone development [5,6].

Autogenous tooth transplantation is a procedure used in cases when restoration is impossible because of severe dental caries, root fracture, alveolar problems, or the failure of endodontic treatment. If the cases are selected properly and an appropriate surgery is performed, even if the donor tooth has complete root formation, the success rate can be relatively high, and it contributes greatly to prolonging the function of the natural teeth [7].

The prognosis of autogenous tooth transplantation depends on the level of root development, the formation of the root apex, the viability of PDL cells of the transplanted tooth [8], the method of tooth fixation [9], the match between the transplanted tooth and recipient socket, and the time of endodontic treatment [10]. Based on long-term follow-up observations, when extra efforts are made for proper case selection and PDL cell survival, both clinically acceptable outcomes and improved clinical results such as vertical bone growth can be expected [11].

A mature tooth exhibits several factors that could be disadvantageous in autogenous transplants compared with immature tooth. The regenerative potential of PDL cells is reduced with aging, which might interfere on a normal adaptation of the donor tooth on the recipient site [12]. In addition, when considering that the mineralization density of the mandible is increased with aging [13], surgical trauma during donor extraction could be increased in elderly patients. Previous studies determined no large difference in the success rate of autotransplantation between mature and immature teeth [14].

The pulp of a completely mature tooth cannot regenerate. The endodontic treatment should be initiated 1 or 2 weeks after autogenous tooth transplantation because if endodontic treatment is performed too early after autotransplantation, additional injury to the PDL may occur, whereas after 2 weeks, inflammatory resorption may develop from the infected root canal [15]. The use of a calcium hydroxide medication is expected to favor bone repair and inhibit inflammatory root resorption because of its high pH, providing an antimicrobial effect and stimulating the healing process [16].

The most important factor for the success of autogenous tooth transplantation is the vitality of the PDL attached to the transplanted tooth ^[17] and, to increase the success rate, infections should be absent in the recipient site, the extraoral period should be short and trauma should be minimized ^[18].

An extraoral time of less than 15 minutes were associated with significantly higher tooth survival. An immediate transplantation after the extraction of the tooth from the recipient's site and a low initial stability were associated with a significantly lower incidence of ankylosis ^[19]. In this case, the transplant was performed within 6 minutes and the splint was maintained for 2 weeks.

The tooth transplantation was judged successful as the tooth was fixed in its socket without residual inflammation. Masticatory function was satisfactory and without discomfort, the tooth was not mobile, no pathological condition was apparent radiographically, the lamina dura appeared normal radiographically, the tooth showed radiographic evidence of root growth and the depth of the pocket, gingival contour, and gingival color were all normal ^[20].

In relation to the donor tooth position, maxillary teeth showed significantly higher cumulative survival compared with mandibular teeth. Therefore, additional considerations are required to reduce the surgical trauma during the extraction of the donor tooth, especially for mandibular molars, in order to improve tooth survival after tooth autotransplantation ^[21]. Excessive extraoral time has been reported to have a detrimental effect on the survival of PDL cells ^[22].

In the present case, in the follow-up period averaged 24 months, radiographic and clinical observations indicated a satisfactory outcome as follows:

1. Radiographically: Absence of progressive root resorption, bone regeneration and the emergence of lamina dura around the transplant were obvious in the postoperative radiograph.
2. Clinically: The transplanted tooth functioned normally without mobility or discomfort.

CONCLUSION

The tooth autotransplantation is not usually included in treatment plans that are presented to patients. However, the good results obtained by this technique, when indicated, and its low cost makes it a good alternative to conventional treatments or implants supported by prosthetic rehabilitation. Immediate transplantation after the extraction of the recipient's tooth from its site and extraoral time of less than 7 minutes were associated with significantly tooth survival.

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