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CASE REPORT

Tooth Auto-Transplantation: A Case Report

Alireza Shahsavari[1], Gholamreza Shahsavari[2], Maryam Zare Jahromi[3*], Amirreza Mokabberi[4]

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Abstract

Background: Autogenous tooth transplantation (ATT) is the technique of transplanting embedded, impacted, or erupted teeth from one site into another in the same individual. It is a cost-effective and practical solution for managing severely compromised teeth when a suitable donor tooth is available; therefore, it is a favorable alternative treatment option for young patients.

Case Report: This case report presents a unique and successful ATT procedure performed on a 17-year-old female patient. In this study, the patient had an unrestorable first right mandibular molar, which was replaced by a third molar. Both first and third molars were atraumatically extracted, and the immature wisdom tooth was immediately transplanted. After adjusting the recipient socket and checking occlusal fit, it was splinted for 2 weeks. To prevent root resorption, two weeks later, root canal treatment was performed on the replanted tooth, and the splint was removed.

Conclusion: A one-year clinical examination revealed a symptom-free patient with the transplanted tooth in proper occlusion, fully functional, and without any marginal periodontal issues. Also, radiographic assessments during follow-up appointments demonstrated bone regeneration, a healthy periodontal ligament, and the absence of external root resorption. A minimum of 2 years of follow-up was considered for the patient.

Keywords: Transplantation; immature posterior teeth.

Introduction

Dental auto-transplantation refers to the replacement of a tooth in another tooth extraction site or a surgically provided recipient site where the tooth was missed due to congenital deformity, periodontal disease, trauma, or endodontic failure. This procedure is classified into autogenous, homogeneous, and heterogeneous grafting. Clearly, in autogenous transplantation, the tooth is inserted from one socket into another cavity in the same person (1-5).

The first clinical report of this case appeared in the 1950s, describing the surgical enucleation of third molars into the extraction site of compromised permanent molars (6). Therefore, clinicians are becoming interested in auto transplantation, which is a great option for those patients with missing or significantly compromised teeth. Also, for adolescent patients who are not suitable candidates for placement of restorative implants, auto transplantation can bring a useful consequence for growing people if a suitable donor tooth and a skilled surgeon are accessible (7,8).

Corresponding author: Maryam Zare Jahromi

Department of Endodontics, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
Email: maryamzare@iau.ac.ir

1. Faculty of Dentistry, Isf.C. Islamic Azad University, Isfahan, Iran
2. Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
3. Department of Endodontics, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
4. Department of Endodontics, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran

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Furthermore, it has many advantages over osseointegrated implants, such as a short treatment period, allowing the replacement of a missing tooth with a completely natural tooth with the periodontal ligament and, sometimes, a vital pulp (9,10). Additionally, a successfully transplanted tooth has a very good longevity and the potential to eliminate the need for a dental implant (1, 11, 12).

The long-term prognosis of tooth autotransplantation, particularly with an immature donor tooth, is comparable to that of dental implants (13,14). In the study conducted by Tsukiboshi *et al.* (15), the results showed a tendency toward higher success rates in younger patients; the success rate was highest in ATTs performed on immature teeth (about 95%), about 90% in patients younger than 30 years of age, and approximately 80% in patients older than 30. When appropriate case selection for this procedure is performed well, tooth autotransplantation provides an enormous cost-benefit advantage. Additionally, the Long-Term outcomes of autotransplanted teeth have been reported in the literature, with impressive longitudinal follow-up spanning up to 26 years (16). Studies show that this treatment procedure is more consistent than earlier studies, due to a better understanding of the healing mechanisms of periodontal tissues (17-19). The present case report aims to demonstrate the success of dental autotransplantation as a desirable treatment option, especially in young patients who are not suitable candidates for implant treatment.

Case presentation

A 17-year-old female patient presented with a complaint of pain in her right mandibular first molar. According to the patient's medical history, no significant findings were noted, and a clinical examination revealed good oral hygiene. However, the first right mandibular molar (tooth #30) was severely damaged, and upon consultation with a restorative specialist and radiographic evaluation, it was determined to be unrestorable, rendering it beyond repair (Figures 1A & 1B). Therefore, the patient was informed of the compromised condition of the tooth, and extraction was recommended.

Further examination revealed that the adjacent third molar (tooth No. 32) was in excellent health but impacted, not fully erupted, and poorly positioned within the dental arch. However, the degree of curvature of the tooth roots suggests it could be a suitable option for replacing the first right mandibular molar. Hence, before starting treatment, the patient was provided with detailed information about the treatment procedures, including associated benefits and risks, as well as potential complications, including treatment failure. Informed consent for treatment and publication of the case was obtained, and the treatment was scheduled.

Throughout the treatment session, oral disinfection was performed with a 0.2% chlorhexidine gluconate solution. Then local anesthesia was administered with Lidocaine HCL 2% with Epinephrine 1⁄80000 (Darou Pakhsh Pharmaceutical CO, Iran), and the procedure began with an atraumatic extraction of tooth no 30. The tooth was sectioned with a tungsten carbide bur (Komet, USA), and the extraction was performed using forceps. In the next step, the recipient socket was surgically modified through a surgical round bur at a slow speed with copious irrigation for delivery of the wisdom tooth, and a radiograph was taken to ensure the absence of any remnant of bone or tooth. Thereafter, the atraumatic extraction of the third molar was accomplished (Figure 1C). To prevent damage to the cementum and the PDL, the use of elevators was avoided during extraction. After that, the tooth was repositioned in the recipient socket, and a radiograph was taken to ensure it did not interfere with the opposing teeth (Figure 1D). Finally, the composite

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wire was applied to splint the tooth to the adjacent teeth (Figures 1E & 1F). Remarkably, the entire procedure, from extraction to transplantation, was completed in just 8 minutes of extraoral time.

The patient was instructed to take 500 mg of Amoxicillin® tablets three times daily for 5 days and an analgesic drug. Standard post-extraction hygiene measures were recommended, including the use of a chlorhexidine mouthrinse and gentle brushing until the wire composite splint was due to be removed. The splint was removed after 14 days, and satisfactory gingival health and primary stability of the transplanted tooth were noted. No signs of infection were evident. The surgeon instructed that no hard or sticky foods be chewed on that side for three months. Then the patient attended scheduled follow-up appointments at one day (post-operative check-up), two weeks, two months, six months, and one year, including both clinical and radiographic assessments.

Two weeks later, during the second appointment, the root canal treatment was performed on the replanted tooth by gently instrumenting the canal and using calcium hydroxide as an intraappointment dressing; the splint was removed (Figure 1G). In the next session, the root canal treatment was completed with MTA, and the final restoration was performed with full cusp coverage composite (20). Radiographic and clinical evaluations at the two-month, six-month, and one-year follow-ups revealed that the transplanted tooth is in normal occlusal position, with physiological mobility and effective masticatory function (Figure 1H, 1I, & 1J and Figure 1K). Periodontal probing indicated no pockets or pathological signs, and the patient remained symptom-free. The PDL appeared intact, the periradicular area was healthy and normal, and there was no evidence of root resorption or periapical lesions.

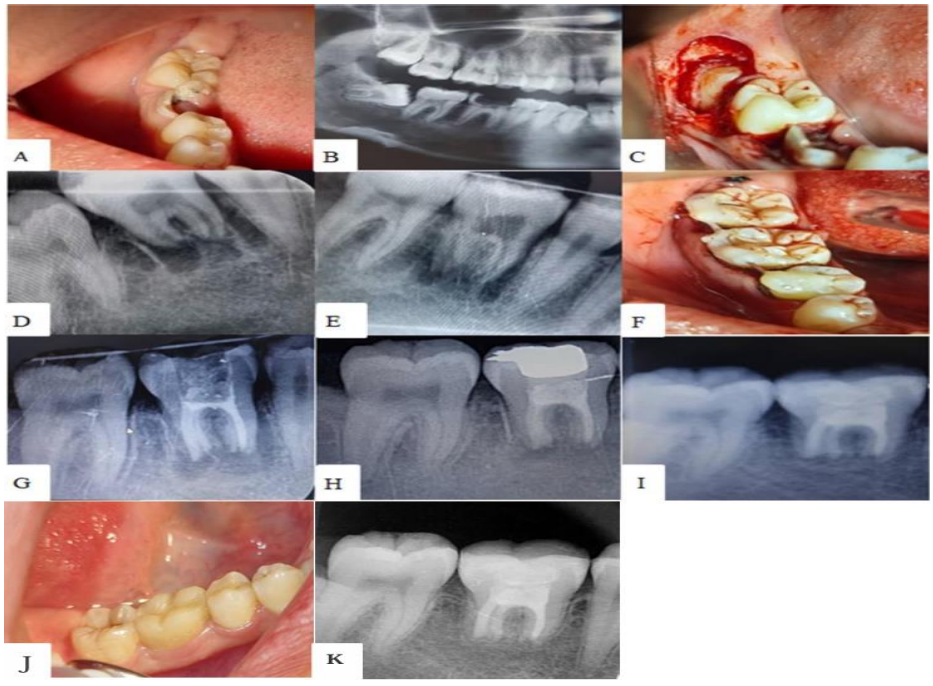


Figure 1: (A) A clinical view of first right mandibular molar with severe decay; (B) The panoramic radiograph; (C) The atraumatic extraction of the third mandibular molar; (D) The wisdom tooth repositioned in the recipient socket; (E&F) The radiograph and clinical view of transplanted tooth that splinted to adjacent teeth with composite wire; (G) Root canal treatment on transplanted tooth; (H) The two-month follow up of transplanted tooth; (I) The six-month follow up of transplanted tooth; (J) The clinical view of transplanted tooth; (K) The one year follow up of transplanted tooth

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Discussion

Auto transplantation has been used as a feasible treatment option for compromised teeth. Since dental implant placement can only be considered once the patient has reached skeletal maturity, which ranges from 18 to 25 years, depending on the type of growth, it was not considered a suitable treatment option in this case (21). Unlike dental implants, successfully auto-transplanted teeth behave identically to natural teeth. The presence of PDL allows both the continued formation of bone and soft tissue at the recipient site and orthodontic tooth movement. Additionally, economically, it is less costly for the patient than implant treatment (16).

The tooth under consideration here had a questionable prognosis, and the availability of a wisdom tooth made autotransplantation a practical, economical, and viable treatment option. The remarkable quality of the transplanted tooth is its biological nature and its ability to erupt in harmony with adjacent teeth and growing jaws, which is of particular concern in children and growing adolescents (22).

One of the most popular complications of autologous tooth transplantation is inflammatory root resorption (23). Therefore, timely completion of root canal treatment and the proper fixation of transplanted teeth are important factors for controlling post-operative complications. Hence, early root canal treatment can prevent root resorption. In the study conducted by Andreason *et al*. (23), 28 premolar teeth with fully developed roots underwent root canal treatment within 4 weeks of transplantation, yielding a 5-year survival rate of 98%. Researchers have also revealed that root canal treatment within two weeks is significant. When an extracted tooth is immediately reimplanted into the alveolar socket, optimal healing of the periodontal ligament can be achieved, and "reattachment" of the root surface connective tissue to the recipient socket wall occurs within 2 weeks (24). Hence, premature root canal treatment after surgery can cause additional damage to the periodontal ligament, and if delayed for more than 2 weeks, infection of the root canal system may lead to root resorption (25).

In this case, two weeks after the surgery, the transplanted tooth underwent endodontic treatment and recovered well. To increase root survival in autologous tooth grafts, rapid periodontal ligament healing is important. Kristerson and Andreason *et al.* (26) reported that the physiological micromovement of autologous teeth is conducive to periodontal revascularization. After transplantation, small tooth movements can help regenerate periodontal blood vessels, whereas rigid fixation can inhibit movement, impede periodontal revascularization, and even increase the risk of plaque accumulation. So, the use of flexible wire for elastic fixation is recommended, which can not only keep the tooth fixed in the alveolar socket but also provide sufficient flexibility for the donor tooth to receive proper periodontal stimulation.

Conclusion

This case report offers valuable insights into the successful ATT of a third molar to replace an unrestorable first molar. The efficient surgical procedure and favorable one-year follow-up results underscore the potential of this approach for addressing severe dental issues. Further studies and long-term follow-ups are warranted to validate and refine this promising technique in dentistry.

Conflict of Interests: The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial, in this article

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