

Immediate autotransplantation of immature maxillary third molar: A case report with 4-year clinical and radiographic follow-up

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Abstract

Autotransplantation of teeth is an option, which is not often taken into account by dentists, for managing early loss of teeth. It is a possible less-cost viable alternative to dental implantation when the case is well selected, and the surgical procedures are properly performed. This case report presents a 15-year-old female with infected badly destroyed mandibular right first molar making it nonrestorable. The maxillary left third molar was selected and evaluated for compatibility as a donor's tooth. Subsequently, atraumatic extraction of the compromised tooth, debridement, and disinfection along with preparation of its socket and transplantation of the donor's tooth into the receiving site was done. Radiological and clinical follow-up shows treatment success for 4 years without any considerable complications or patient's complaints. Immediate autotransplantation of tooth satisfactorily restored the functional condition of the patient, principally after good healing of periodontal and pulp tissues.

Keywords: Autogenous dental transplantation, manuka honey, oral rehabilitation, panoramic radiography, pulp obliteration, pulp revascularization

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INTRODUCTION

The first permanent molar erupts as early as 6 years old so that it is more liable to dental caries, destruction, and extractions.^[1,2] Consequences of this tooth loss are undesirable and more critical in the mandible than in the maxilla and depend on the patient's age.^[2,3] The mesial drift of teeth and postextraction space reduction may compromise later oral rehabilitation.^[3,4]

Dental autotransplantation can be defined as the transfer of a tooth from one site (donor site) to another (recipient site) in the same person.^[5] Autogenous tooth transplantation is a treatment option and more often than not is overlooked by most dentists. In contrast, dental implantation has become routine in oral surgery clinic and has developed hugely over the past decades. A retrospective study resulted in a 10-year titanium implant survival and success rates of more than

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96%.^[6] Although this high rate of survival, there is still great controversy over when to extract a tooth for an implant or it is better to restore and keep a natural tooth, and over placement of implants in children and adolescents.^[7,8] What if extraction is unavoidable due to severe tooth destruction and the patient is still young? Dental autotransplantation is a good alternative to implant placement when the case is selected properly and surgical procedure is well performed.

All studies regarding dental autotransplantation identified success and survival rates of not <81%.^[5] Moreover, management of the periodontal ligament is the key factor for successful autotransplantation of teeth.^[9] Failure of autotransplanted tooth is defined as its need to be extracted because of untreatable complications.^[10] Surgeons always try their best to minimize symptoms, complications, and failure as low level as possible.^[11] Even if this treatment fails, dental implant placement may still be possible. Deciduous dentition, donor's teeth with restorations, and transplantation into infected sites were considered as contraindications of dental transplantation.^[5,10]

This case report demonstrates that immediate dental autotransplantation to replace infected nonrestorable tooth may be successful when the infected extraction socket is well treated, that is, debrided, prepared, and heavily irrigated with saline and disinfectants.

CASE REPORT

A 15-year-old female patient presented with constant pain, that increases by chewing and consuming hot foods and beverages, in the right lower jaw with unpleasant mouth odor and taste. She was a nonsmoker with moderate oral health and plaque control, and her case history revealed no medical problems. The clinical and radiographic examination showed compromised mandibular right first molar due to severe decay without any possibility of performing restorative treatment and so the extraction was mandatory [Figure 1a]. The patient and her parents asked about the available treatment options, and all choices were suggested and explained in details, including dental autotransplantation. They opted to undergo dental autotransplantation, and written informed consent was obtained.

Case planning included the evaluation of possible donor tooth with compatible root anatomy and proper mesiodistal width. Although its roots were incompletely developed, the maxillary left third molar was selected as a donor to be transplanted into the mandibular right first molar site [Figure 1a].

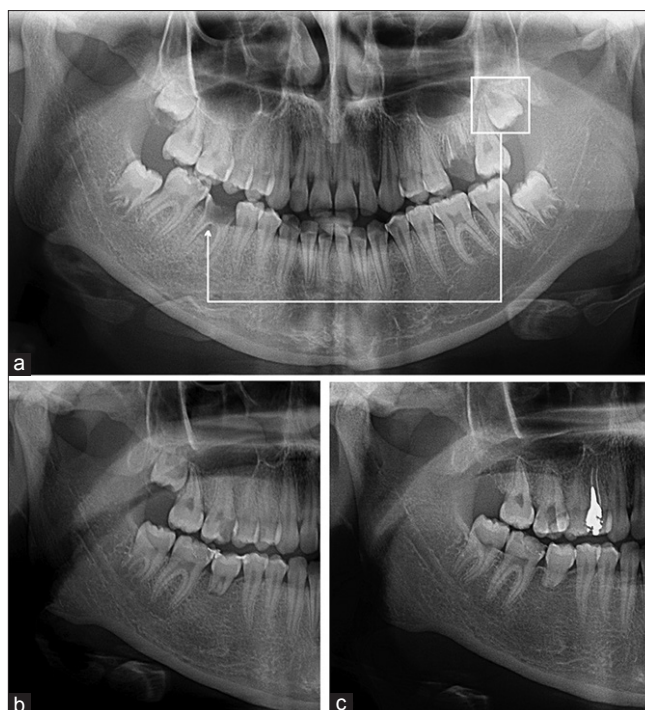


Figure 1: Patient's panoramic radiographs showing the case just before surgery and procedural planning (a), 8 months postsurgery (b), and follow-up after 4 years (c)

After local anesthesia with 2% lidocaine with 1:80,000 epinephrine, the mandibular right first molar was atraumatically extracted; its roots were splitted and extracted separately to avoid unnecessary trauma to the alveolus. The infected extraction socket was gently curetted and heavily irrigated with saline and 0.12% chlorhexidine solution in an alternating manner to remove the radicular lesion and disinfect the socket. To ensure the best condition of the recipient socket, medical antimicrobial manuka honey (activity level 25; Auckland, New Zealand) dissolved in 1:9 saline was additionally used as an irrigant. The alveolus was then adjusted and prepared using surgical burs with slow-speed handpiece (15,000 rpm) under copious saline irrigation. Interradicular bone was drilled and removed 7 mm in the apical direction, and the peripheral bony walls were also reshaped and smoothed to receive the autotransplant with the least friction with the donor root surface to avoid periodontal ligament damage. After that, the recipient bed was flushed with saline solution along with good suctioning to ensure the removal of bone debris. Not only that but also bone bleeding was then gently induced using bone curette, ensuring that socket never left to dry before and during autotransplantation.

Thereafter, the left maxillary third molar was surgically extracted under local anesthesia with the same mentioned anesthetic solution by elevating envelope flap and using a straight elevator only. There was no need to use surgical

handpiece to remove bone. The extracted third molar was placed lightly into the recipient socket and fit well after very few trials and modifications [Figure 2]. Although the third molar was not washed before transplanting, it was immersed in saline solution each time adjustment was needed to prevent dryness of periodontal tissues. Modifications included little adjustment and reshaping of peripheral bone walls to adapt the transplant. There was no need for an alteration in crown dimensions, that is, neither in occlusal nor proximal surfaces. The transplant was treated very carefully in a way that root and attached periodontal tissues were not touched at all. The total extraalveolar time was 7–8 min. Surgeon’s assistant was instructed not to suction blood from the recipient bed to avert autotransplant periodontal ligament dryness and damage. Then, figure-of-eight mattress suturing technique with 3–0 silk suture over the autotransplanted tooth was performed to hold it in place and to ensure close adaptation of the gingival flap to it. A small piece of composite on the mesial surface of the right mandibular second molar was used to fix the vertical axis of the transplant and to prevent mesiodistal angulation. There was minimal occlusal contact at this stage [Figure 2b].

The patient was instructed to follow a soft foods diet and given a prescription that included 500 mg amoxicillin (capsule each 8 h for 7 days), 50 mg diclofenac-potassium

(tablet each 8 h for 3 days), and 0.12% chlorhexidine (mouthwash each 12 h for 10 days). An appointment was scheduled after 10 days to remove stitches [Figure 3a].

Figures 1 and 3 present the radiographic and clinical case follow-ups, respectively. Endodontic treatment was not performed. Eight months after the autotransplantation surgery [Figures 1b and 3b], the transplanted molar was evaluated with the aid of panoramic X-ray, mobility testing, and periodontal probing. Favorable healing was obtained and examinations revealed no periodontal or functional problems. Furthermore, the tooth was submitted to thermal and electrical pulp sensitivity tests presenting a positive response to both tests. The 4-year follow-up examination [Figures 1c and 3c] found no radiographic or clinical signs of root resorption or periodontal disease. The patient presented no complaints and the autotransplanted tooth was found to be stable with good occlusion. Radiographs showed root development, apex closure, and calcification of root canals through the follow-up period.

DISCUSSION

Reports indicated that the first known people who transplanted teeth were the ancient Egyptians, who were



Figure 2: The autotransplant tooth fit in the prepared extraction socket in mouth-opened position (a) and within occlusion (b)



Figure 3: Clinical follow-up after 10 days’ postsurgery (a), 8 months (b), and after 4 years (c)

forced to give their teeth to pharaohs.^[12] However, the first documented autogenous molar transplantation reports describing procedural techniques were in the middle of the twentieth century.^[13] Since then until today, protocols for this procedure and their success rates have been widely varied in relation to donor site, handling of donor's tooth, surgical technique, indications, and contraindications.^[14] One challenge was how to deal with infected recipient area of implantation or transplantation, and many authors stated that it is contraindicated to transplant into the infected site.^[5,15] This case report placed question marks around this mentioned criteria and pointed out the possibility of autogenous dental transplantation to immediately replace an infected nonrestorable tooth with radiolucent radicular lesion if managed properly. Curettage, debridement, and copious irrigation were the key factors to achieve acceptable recipient bed for an autotransplant.^[9] Manuka honey and chlorhexidine gluconate solutions were used in this case. They have a well-known potent antimicrobial activity.^[11,16] Moreover, provoking the socket to bleed after these procedures, rather than autotransplanting into dry bed, and maintaining a bloody socket were important to preserve the periodontal ligament. Patient recall visits and follow-up demonstrated a good gingival and periodontal healing of the autotransplanted molar.

In this particular case, endodontic treatment of the transplanted tooth was not necessary. This was because of the fact that there is a very high probability for continued root growth and revascularization of autotransplanted teeth with incomplete root formation.^[17] Radiographic follow-up after 8 months and 4 years confirmed that this was true. It showed considerable root formation in comparison with the initial autotransplant immature roots. In addition, positive pulp sensitivity testing also confirmed the revascularization phenomena of the autotransplanted tooth. The 4-year X-ray evaluation showed pulp and root canals calcification. Etiological factors for calcification of dental pulp have not been well understood yet.^[18] Pulp irritation due to operative procedures, periodontal disease, or trauma may have alterant influence on the pulp.^[19] However, apical development, thickening of dentinal walls, and root maturation of the immature autotransplanted tooth may be a clear indication of pulp revascularization.^[20] Pulp canal obliteration of the transplanted tooth is a typical sign of normal periodontal healing and pulp vitality.^[21] Andreasen *et al.*^[22] found that pulp canal obliteration was a common occurrence in almost all autotransplanted teeth giving positive pulp testing responses. Pulpal revascularization appeared to be strongly related to the apical foramen dimensions.^[22]

At the present time, implant-supported restorations are regarded as the touchstone of the management of a missing tooth in adult patients.^[23] In children and adolescents, it is advisable to prolong the life of a tooth, rather than implant placement, to allow normal development.^[18,23] Dental autotransplantation is a good alternative when it is not possible to preserve the tooth and to overcome concerns regarding dental implantation in young adolescents. The successful transplantation of the immature maxillary third molar accompanied by healthy supporting soft and hard tissues in addition to pulp revascularization in this report confirms that this treatment option can be recommended for restoring the functional and morphological role of the mandibular first molar in young patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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