

Autotransplantation of a mandibular third molar: A case report

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Abstract

Tooth autotransplantation defines as transition of one tooth from one position to another, in same individual. It is a biological procedure in which teeth have the potential to induce alveolar bone growth. It can be applied in patients before adolescence growth is finished. It significantly reduces time and cost compared to implants. Healing rapidly occurs and function is regained almost immediately. Our case was a 15-year-old male that his left mandibular third molar transplanted to the second molar sight after extraction of second molar because of unrestorable crown. During 9 month follow up transplanted tooth was asymptomatic, functional and responsive to sensibility tests. (Cold test, EPT).

Key words: Autotransplantation, mandibular molar, unrestorable crown, case report.

Introduction

Tooth autotransplantation (AT) is defined as transposition of one tooth from one position to another, in a same individual. (1) The primary reports of tooth autotransplantation was from slaves in ancient Egypt who were forced to donate their teeth to their pharaohs. (2)

For the first time, Hale well documented autogenous teeth transplantation in 1954. (3) Schwarts reported approximately low success rates of this method in 10 years. (4) Andreasen found very high long-term survival rates for incomplete and complete root formation of transplanted premolars during a 13 year follow up. (5, 6) In 1939 transplanting anterior teeth with closed apices resulted in very high survival rates over 5 years but dropped down over 10 years. (2) One investigator found high success rates for transplanting premolars with incomplete and complete root formation during a 4-year observation. (7)

A systematic review in 2015 reported 75%-91% survival rates. The percentage of ankyloses ranged from 4.2% to 18.2% and the percentage of root resorption ranged from 3% to 10%. (8)

The most common indication of replantation is for replacement of teeth extracted because of advanced caries, (1) tooth agenesis (especially premolars and lateral incisors), traumatic tooth loss, atopic eruption of canines, root resorption, localized juvenile periodontitis, cervical root fractures, large endodontic lesions and other pathoses. There are specific requirements for a successful transplantation such as patient selection, donor tooth and the recipient site. (9)

Sufficient alveolar bone support in all dimensions with adequate attached keratinized tissue for stabilization of the transplanted tooth are the most important criteria for successful autotransplantation. (10) The recipient site should be free from both chronic and acute inflammation. (11) The donor tooth extraction should be as atraumatic as possible.

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Abnormal root morphology which necessitates sectioning of the tooth for removal is contraindicated for this procedure. (2) When root development is about one-half to two-thirds completed, success rates are highest; however, when root development is less than half, transplantation may be too traumatic and could impact further root development. (1) Increased root length may cause infringement to vital structures such as maxillary sinus or the inferior alveolar nerve. (12) Transplanting a tooth with complete root formation generally requires root canal therapy within 2 weeks after surgery. (13) Vital and intact periodontal ligament fibers play an important role in the healing process and is a contributing factor to successful transplantation. (1)

Another significant factor for successful auto-transplantation is patient selection. Patient must be in a good health status and have an excellent oral hygiene condition, should be inclined to regular dental care and be capable of following post-operative instructions and follow up visits. In addition to all the above factors, suitable recipient site and donor tooth must exist. (1) Our purpose is to report a successful case of auto transplantation of a tooth with incomplete root formation in a teenage boy.

Case report

A 15 year-old male referred to Department of Endodontics, Mashhad Dental School, complaining from advanced mandibular left second molar caries. Medical history was non-contributory.

Clinical and radiographic examinations were performed. The left mandibular second molar was restored with an interim restorative material and the third molar was impacted under soft tissue, periodontium appeared normal and probing depth was between 1 to 3 mm around the second molar with no sign of acute or chronic infection. The periapical radiograph of the mandibular left molars revealed that the second molar had lost most of its coronal structure and restored with an opaque material; the third molar had two roots with open apices. There were no evidence of bone/root resorption and periodontal disease in the area of the second and third molars.



Figure 1. Pre-operative radiograph

Caries of the second mandibular molar were removed. As the tooth was unrestorable, it was restored with an interim restorative material and then referred to the endodontic department.

After explaining the procedure including extraction of the second molar teeth and transferring the wisdom tooth to the prepared socket, patient's guardians were asked to sign the informed consent; the prognosis of the treatment plan was also explained.

Local anesthesia was achieved by inferior alveolar nerve block and long buccal injection with lidocaine-epinephrine (Persocaine-E, Darou Pakhsh, Tehran, Iran)

The second molar was extracted. It is urgent to get good access to the socket and modify it. The third molar had to be extracted as atraumatically as possible too and stored in Minocycline powder (14) till socket modification completed. The bone at the floor of the socket and a little of the buccal wall was removed with a fissure carbide drill in a straight surgical handpiece (SAEYANG MICROTECH, MARATHON-3, Serial No.1320940, Daegu, KOREA). The third molar was transplanted, occlusion adjusted and figure eight suture applied on the tooth.



Figure 2. Photography after transplantation and suturing.



Figure 3. Post-operative radiography

Post-operative instructions were provided following the procedure; patient was advised to rinse twice daily with 15 milliliter chlorhexidine digluconate 0.12% for

14 days after surgery. Ibuprofen (400 mg) was prescribed to be consumed four times a day for 2 days after surgery to control swelling and pain. In the follow up session after one week, the patient did not have any complaint, the transplanted tooth had grade two mobility, suture removed, the tooth did not respond to sensitivity tests such as cold test (Frisco Spray, ad-Arztbedarf GmbH, Frechen, Germany) and electric pulp test (Parkel, Ca, U.S.A). On the second follow up after one month, the patient did not report any discomfort, tooth was in function but did not respond to pulp tests.



Figure 4. One month follow-up photograph

In the next recall after approximately five months, clinically, the tooth was functional without any abnormal sign or symptom or mobility and response to sensitivity tests (Cold and EPT) was positive. Radiographically, root development was clear and some degrees of canal obliteration was observed.



Figure 5. Second follow-up radiography

Four months later (9 months after operation) the patient was asked to refer to the clinic and the third follow up visit was performed; clinically there was no change in tooth condition, similar response to sensitivity tests was observed, radiographically, root development was approximately completed and canal obliteration had progressed.



Figure 6. Third follow-up radiography
Discussion:

Although implantology has achieved considerable predictability in success rates and esthetic outcomes, comparison between auto-transplantation and implantation as a treatment options is evitable.(1)

Transplantation is a procedure during which teeth potentiate the induction of alveolar bone growth. It can be applied in patients before adolescence growth is finished. (1) Osteointegrated implants will not grow with patient's jaw and result in infraocclusion. Transplantation of a tooth with open apex and intact Hertwig epithelial root sheath permits healing and regeneration of the pulpal tissue and can prevent subsequent root canal therapy.(15-17) immediate transplantation provides significant time saving compared to implants. Healing occurs rapidly and function is regained almost immediately, (18) thus reduces time and cost significantly compared to implants. (19) Although, osteointegrated implants are now the therapeutic alternative of choice, transplantation and implantation techniques are equally difficult with high prognosis, supported by scientific evidence (more than 95% of implants survive at 10 years) (16, 20, 21) and a success rate of over 90% has been documented for transplantation at 17 to 41 year studies. (17, 22-24) In our case, as the second molar was unrestorable and the patient was 15 years old and maturation of jaws was not complete, implant placement could not be a treatment plan options. Thus, the treatment of choice was auto-transplantation of the third molar. According to the radiographic examination, the third molar demonstrated an optimal developmental stage (approximately one-half of the root development had occurred).

The literature report excellent success rates following tooth transplantation when the appropriate protocol is followed. Andreasen found 95% and 98% long-term survival rates for incomplete and complete root formation of 370 transplanted premolars observed over 13 years.(5) . Another study reported success in 94% and 84% of 278 autotransplanted cases for open and closed apices over 5 years respectively.(25)

Success rates of over 90% for 68 mature teeth transplanted with a 2-stage technique over 5 years was found by Nethander (26). Another investigator yielded success rates of only 76.2% at 5 years and 59.6% at 10 years. (4) Pogrel, similarly reported that his success rate was 72%. (12)

The factors leading to success have been extensively investigated. The continued vitality of the periodontal membrane is the most significant determinant for survival of the transplant. If periodontal ligament is traumatized during transplantation, external root resorption and ankylosis is often noted. (2, 12) The most common cause of failure of an autotransplant is chronic root resorption. (9) Inflammatory resorption may become evident after 3 or 4 weeks, while replacement resorption may not become evident until 3 or 4 months after transplantation. (2) Recent studies clearly demonstrated that autotransplantation of teeth is as successful as endosseous dental implant. Minimum acceptable success rates for endosseous titanium dental implants are 85% after 5 years and 80% after 10 years. (27)

Generally, tooth auto-transplantation can be considered as an alternative approach in oral rehabilitation for some clinical situations, especially in young patients. (1) This treatment option may also be valued as a temporary contraption in young patients because of replacing lost teeth in order to preserve ridge volume of bone for at least the next 5 years. (1)

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