

Autogenous Transplantation of Teeth: A Case Report

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DOI: 10.31080/ASDS.2022.06.1476

Received: September 07, 2022

Published: September 24, 2022

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Abstract

The autogenous tooth transplantation is a modified treatment replacing a missing tooth when a suitable unerupted or nonfunctioning tooth is available. It is also a suitable option saving time and cost compared to implants or conventional prosthetics. These cases, which required single tooth extraction due to deep caries or periapical infection, could have good results by transplanting a sound nonfunctional donor tooth to the extraction site. It can be applied in cases like impacted or ectopic positioned teeth, congenitally missing tooth, large endodontic lesions.

Autotransplantation can be considered better than dental implant treatment, because it can save time, provide faster healing, function, and esthetic advantages. Moreover, it also have advantages of maintaining unique sensory system and promoting proper healing of the periodontal environment to sound tissue. Also can be applied to replace missing teeth for young patients where dental implants or fixed prosthesis are contraindicated.

However, several complications, such as root resorption, ankylosis, failure of the autotransplanted tooth, or root fracture during the extraction can occur.

The purpose of this article is to review indications, advantages and criteria of success and to discuss 4 cases of successful autotransplantation for replacing lost teeth.

Keywords: Healing; Teeth; Autotransplantation; periodontal

Introduction

Autogenous tooth transplantation, or autotransplantation, is the surgical movement of a tooth from one location in the mouth to another in the same individual. Despite current scientific evidence indicating that autotransplantation has favourable long-term survival rates, autotransplantation is still not generally regarded as mainstream practice outside of Scandinavian countries. Successful autotransplantation can offer many advantages in a growing patient, including a normally functioning periodontium, proprioception. Proponents of autotransplantation emphasize its ability to maintain and permit continuation of alveolar bone growth. A successfully transplanted tooth erupts with growth and can also

be moved orthodontically. In the event that the autotransplantation eventually fails, the bone and soft tissue conditions would still be likely to be favourable for subsequent implant treatment.

Careful patient selection coupled with an appropriate technique can lead to exceptional esthetic and functional results. One advantage of this procedure is that placement of an implant-supported prosthesis or other form of prosthetic tooth replacement is not needed. In addition it's an excellent solution to replace non restorable teeth for young individuals where dental implants and fixed prosthesis are contraindicated.

This article review indications, advantages, criteria for successful transplantation and discuss 4 clinical cases performed in Fujairah specialized dental center with follow up more than 2 years.

Indications

While there are many reasons for autotransplanting teeth, tooth loss as a result of dental caries is the most common indication, especially when mandibular first molars are involved. First molars erupt early and are often heavily restored. The first permanent molar has been reported to be the most caries-prone tooth in the permanent dentition. More than 50% of children over the age of 11 years have some caries experience in this tooth. Autotransplantation in this situation involves the removal of a third molar which may then be transferred to the site of an unrestorable first molar [2]. Other conditions in which transplantation can be considered include tooth agenesis (especially of premolars and lateral incisors), traumatic tooth loss, atopic eruption of canines, root resorption, large endodontic lesions, cervical root fractures, localized juvenile periodontitis as well as other pathologies [1]. Successful transplantation depends on specific requirements of the patient, the donor tooth, and the recipient site.

For a variety of reasons, some adolescent patients with compromised molars may not be willing or able to undergo comprehensive orthodontic treatment. Such reasons may include poor oral hygiene and/or low motivation for orthodontic treatment or be financial or geographical in nature. Third molar autotransplantation may be a very reasonable option for such patients. In contrast to anterior autotransplantation cases, no further cosmetic restorative procedures are generally required, thus improving the cost-benefit perspective of this treatment modality.

Criteria for successful autotransplantation

- Medically healthy patient, non-smoker, able to follow post-operative instructions, available for follow-up visits. and less than 30 years.
- Donor tooth with normal morphology that matches the recipient site without complicating the occlusion
- One half to three quarters root formation with underdeveloped root apex (over 1 mm wide open apex)

- Atraumatic extraction technique preserving Hertwig's epithelial root sheath, periodontal ligament and the apical portion of the developing tooth bud
- Keeping extraoral time for the donor tooth to an absolute minimum (preferably less than 1 min)
- Transplanted donor tooth placed into a well-prepared recipient site (preferably a fresh extraction site prepared using a 3D surgical tooth template if possible)
- Avoid trauma post-transplantation and maintain excellent oral hygiene

For a successful outcome, preservation of the periodontal ligament of the transplanted tooth is the key to successful autotransplantation through prevention of ankylosis. An appreciation and respect for the biology of the periodontal ligament and the pulp is essential when considering this procedure. The technique is dependent on case selection and surgical skill.

Candidate Criteria

The stage of root development has been shown to be one of the primary factors affecting the prognosis of an autotransplanted tooth. The average autotransplantation success rate is reported to be more than 80% if the root of the transplant is immature at the time of surgery or at one-half to three-quarters of the normal root length. For autotransplantation cases, continued root development most likely depends on the health of Hertwig's epithelial root sheath. If Hertwig's root sheath is damaged, future root growth is likely to be limited or inhibited. Revascularization will usually occur for an immature tooth. This represents a significant advantage when transplanting immature teeth because subsequent endodontic treatment is generally not required.

Less reliable revascularization occurs if the apex is smaller than 1 mm. [9,11] Despite this, autotransplantation with a closed apex may still be an option in some cases, where high quality endodontic procedure and restoration can be performed. An 87% survival rate and a 63.1% success rate was recorded in mature teeth with a closed apex with a follow-up of an average of 10 years.

Extraoral time prior to transplantation

Autotransplantation is effectively a planned avulsion and replantation. It is critical to keep the extraoral time before transplantation to an absolute minimum. It has been shown that

less than one minute of extraoral time significantly reduces the risk of pulp necrosis. The most important factor for success is the vitality of the periodontal ligament, which decreases significantly with increased extraoral exposure. To reduce extraoral time and handling of the periodontal ligament, a template or a tooth replica can be used to create the recipient site.

Three-dimensional printing has the potential to provide customized pre-surgical tooth templates from a segmented cone beam image. Some studies reported a reduction of extraoral time to less than minute as compared to a historical control method of 3 to 10 minutes. The first cone beam computed tomography (CBCT) assisted template reported an extra-alveolar time of seven minutes, which is similar to the time reported for the traditional techniques.

Advantages of autotransplantation

In comparison to restorative implants

- A Suitable option for adolescent patients (continue to erupt with ongoing vertical facial growth).
- Normal proprioception and thermal feedback.
- Can be moved orthodontically.
- Preserves alveolar bone volume (even in the event of failure, the autotransplant can be replaced with an osseointegrated implant when facial growth is complete).
- It has been estimated that autotransplantation is 87% less costly than a restorative dental implant

Case 1

Patient M is 16 years old, periapical infection of #26 retained root with intraoral swelling and pus discharge. Treatment plan was discussed with the patient and her mother regarding replacement of #26 as she is not interested in orthodontic treatment. After extraction of # 26 and curettage of the socket, it was left for 10 days. Autotransplantation of #28 after surgical extraction into #26 socket. Figure of 8 wiring was used for splinting followed by orthodontic splint.

Transplanted tooth stable in position with normal PDL. Optimal result for adolescent patient that preserve bone, allow early esthetic and function result and normal growth.

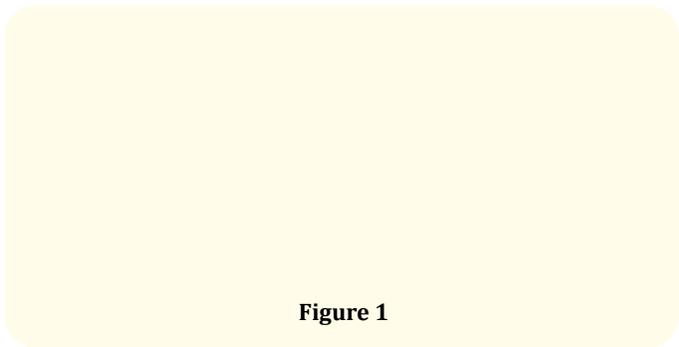


Figure 1

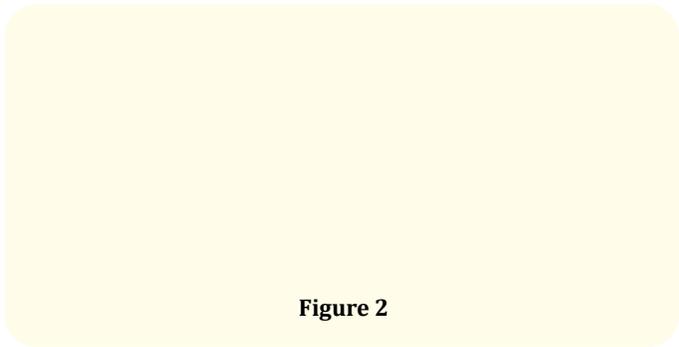


Figure 2

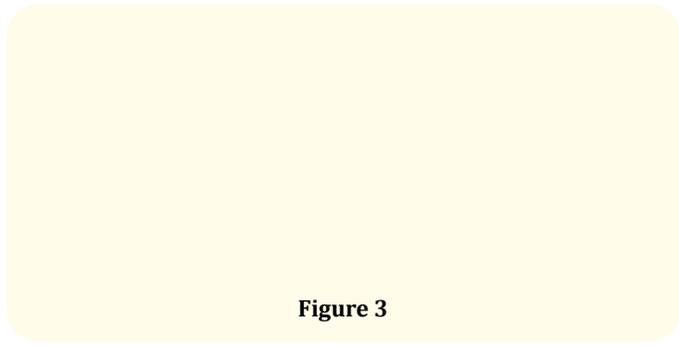


Figure 3

Case 2

Patient M A has multiple carious teeth and not ready for orthodontic treatment. Treatment plan discussed with patient to use the impacted #45 to replace # 36 retained root. She is 17 years old has malocclusion and complaining from pressure and pain from partially impacted malposed #45.

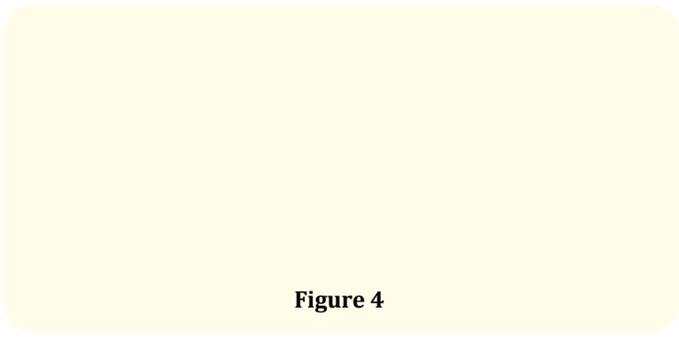


Figure 4

Preparation of the socket after extraction of #36. Extraction of #45 is not completed until socket preparation is done to reduce the time outside the socket.

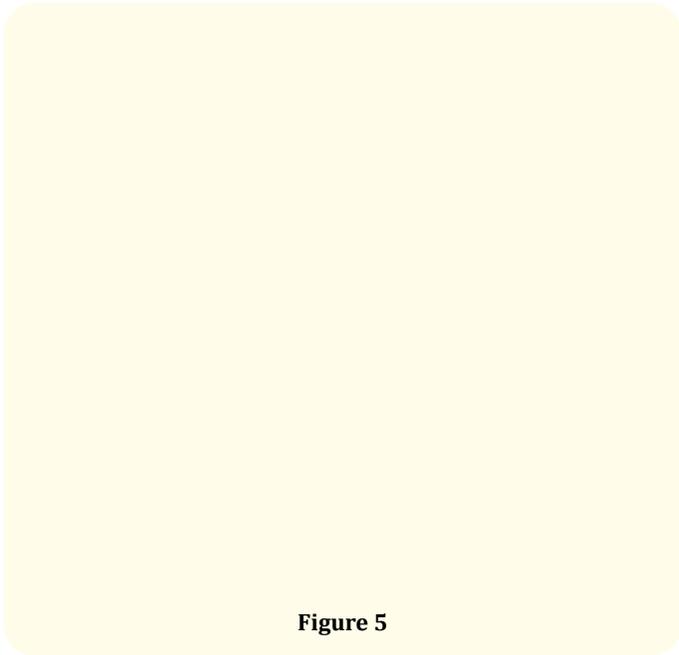


Figure 5

Follow up show normal healing and function of transplanted tooth in the new socket.

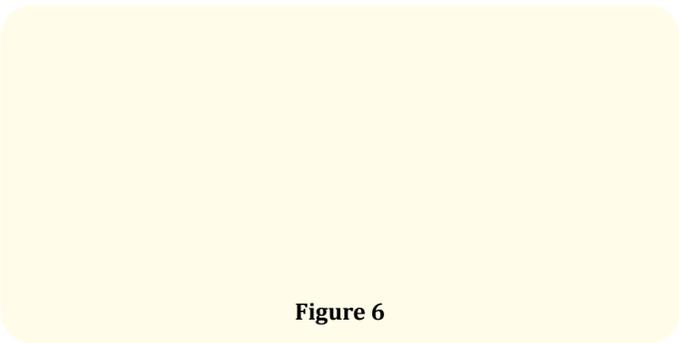


Figure 6

Case 3

Patient S is 16 years old has badly carious #36 with root resorption and periapical infection and not willing for orthodontic treatment. One week after extraction and socket curettage, no signs of infection and the recipient site is ready for transplantation of tooth #38.

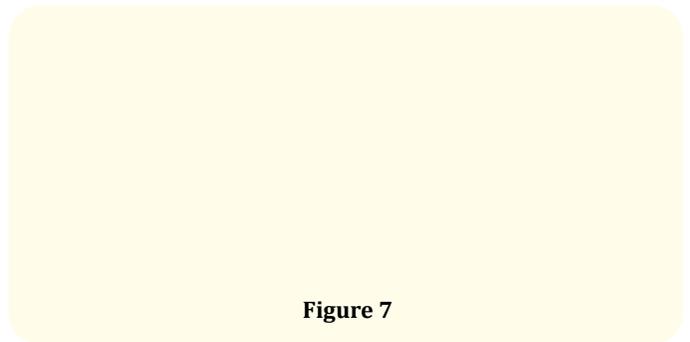


Figure 7

Mattress and figure of 8 suturing used to stabilize the transplanted #38 in submerged position to allow root formation. After 6 months transplanted #36 started eruption to reach normal occlusal level.

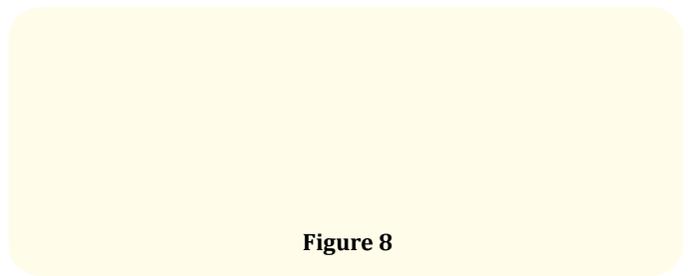


Figure 8

Case 4

Patient She is 27 years old has non restorable #47 with deep subgingival caries, and horizontally impacted #48. As its not convenient to scarify both molars, treatment plan discussed with the patient to transplant #48 into socket of #47. Figure of 8 wiring was used for splinting.

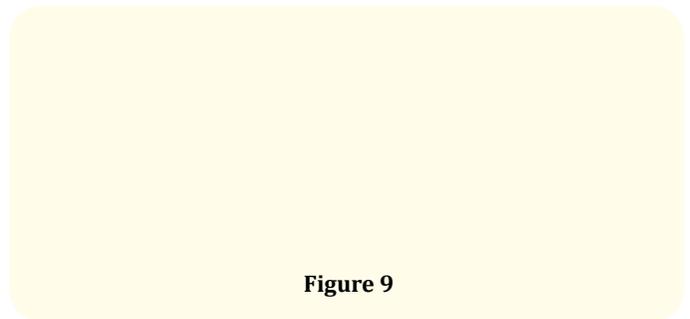


Figure 9

After 6 months, healing in new position and in occlusion.

Figure 10

Follow up protocol

Many clinicians recommend that patients be seen the day after surgery to ensure the transplant has retained its new position without mobility, the splint is stable, and that swelling, edema, and hematoma formation are within normal limits. The patient should then be seen at weekly intervals for one month if there are no complications. After one month, the patient should be seen every 6 months for 2 years. During this period the tooth should be evaluated for the onset of pulpal breakdown seen as intrapulpal calcification, periapical radiolucency, or root resorption [1-13].

Conclusion

Although autotransplantation has not been established as a traditional means of replacing a missing tooth, the procedure warrants more consideration. Recent studies clearly demonstrate that autotransplantation of teeth is as successful as endosseous dental implant placement. Minimum acceptable success rates for endosseous titanium dental implants are 85% after 5 years and 80% after 10 years. For younger patients, autotransplantation may also be considered as a temporary measure. The transplant can replace missing teeth to ensure preservation of bone until growth has ceased and then, if necessary, the patient can become a candidate for implants. With appropriate patient selection, and presence of a suitable donor tooth and recipient site, autogenous transplantation should be considered as a viable option for treatment of an edentulous space.

It is expected that the use of CBCT data and further developments in rapid three-dimensional prototyping is likely to improve the survival and success rates of this technique, through production of a highly accurate surgical template and reducing the extraoral exposure time for the donor tooth.

Tooth autotransplantation is not a new concept. It is hoped that through greater clinician awareness and future technological advancement, autotransplantation will become a very reasonable and viable treatment option for appropriately selected adolescent patients.

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