

Third Molar Autotransplantation: An Alternative to Dental Implant - 9 Years Follow up of a Case

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Abstract

Autogenous tooth transplantation is the surgical movement of tooth from one location in the mouth to another in the same individual. It is an excellent option with good functional and esthetic outcome for rehabilitating young patients with growing alveolar bone and replaces missing tooth with a natural tooth rather than a prosthesis or an osseointegrated implant. This case reports discusses a 9 years follow up of a successful autotransplantation case of third molar in place of first molar justifying autotransplantation to be a viable treatment option in present day implant dentistry practice.

Keywords: Atraumatic extraction, autotransplantation, mandibular molars, periodontal ligament regeneration

INTRODUCTION

Autogenous tooth transplantation or autotransplantation first well documented in 1954 by M. L. Hale,^[1] is the surgical movement of impacted, embedded or erupted tooth in one individual from its original location in the oral cavity to another extraction site or surgically prepared socket.^[2] History dates back to 1050, when Abulcassis^[3] first documented tooth transplantation by slaves in ancient Egypt who were forced to give their teeth to their pharaohs.^[1] In 1564, French dentist Ambroise Pare did the first surgery of tooth bud transplantation.^[2] In 1915, a Swedish surgeon Vidman described autogenic transplantation of teeth in dental literature.^[3]

Since placement of osseointegrated implants is contraindicated in growing patients, autotransplantation remains a good choice for replacing missing teeth. It maintains the morphology of alveolar ridge through proprioceptive stimulation and prevents natural space loss with little or no alveolar bone volume reduction.^[4] Apart from reducing the financial burden of the patient it also has esthetic advantage as tooth of same individual is being used.

Indications

Tooth loss due to excessive carious invasion is the most common indication for autotransplantation, especially mandibular first

molars which often get grossly decayed due to eruption at early age.^[2] Other conditions in which transplantation can be considered include tooth agenesis (especially of premolars and lateral incisors), traumatic tooth loss (auto transplantation of the developing mandibular second premolar to the place of avulsed maxillary incisors), atopic eruption of canines, uncontrolled root resorption, large endodontic lesions, cervical root fractures, localized juvenile periodontitis and after jaw reconstruction surgeries.^[1,3]

Contraindications

Careful patient selection is important for successful autotransplantation. Poor oral hygiene, acute infection or chronic inflammation at the recipient site may leads to delayed healing and persistence of inflammation thus leading to transplant failure. Whereas insufficient width of the receptor bed may lead to postoperative resorption of the alveolar ridge at

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Received: 18-10-2019

Revised: 15-08-2020

Accepted: 17-08-2020

Published: 23-12-2020

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How to cite this article: Kumar S, Jain M, Sogi S, Shahi P, Dhir S, Rana S. Third molar autotransplantation: An alternative to dental implant - 9 years follow up of a case. *Ann Maxillofac Surg* 2020;10:529-32.

Access this article online

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DOI:
10.4103/ams.ams_237_19

the recipient site.^[2] Thus such patients should not be considered for autotransplantation.

Therefore, successful autotransplantation depends on specific requirements of the donor tooth and the recipient site.

Recipient site criteria

Sufficient alveolar bone support in all dimensions with adequate attached keratinized tissue for stabilization of the transplanted tooth and the site with good vascularity^[2] and free from acute infection or chronic inflammation is required for successful auto transplantation.^[4]

Donor tooth criteria

Extraction should be atraumatic. Donor tooth with abnormal root morphology requiring tooth sectioning for removal should not be considered. For the root development of donor tooth several opinions are there. Teeth with either open or closed apices may be donors. The most predictable results are obtained with teeth having one-half to two-thirds root development.^[1] The best result can be anticipated with tooth having full length developed roots, but with potential for pulp regeneration i.e., apex opening >1 mm.^[2]

CASE REPORT

A 19-year-old female patient reported with chief complain of pain in left lower back region of the jaw. Oral examination revealed grossly decayed 36 which was nonrestorable and a vertically impacted 38 [Figures 1 and 2]. On patient approval an autotransplantation of 38 was planned to 36 site. The patients was in good health with no systematic or local contraindications for surgical treatment. Radiograph was used to assess the recipient site, stage of root development of 38 which was complete with open apex and mesio-distal width of the crown and length was adequate for recipient site [Figures 3 and 4].

Prior to surgery 0.02% chlorhexidine mouth-rinse for 1 min was done and then local anesthesia was obtained. Thirty-six was extracted preserving alveolar bone and the socket was prepared by removing the inter-radicular septum and considering measurements of donor tooth [Figure 5]. Flap was elevated and donor tooth was removed as atraumatically as possible [Figure 6] and was immediately placed at prepared recipient bed [Figure 7]. It was stabilized with splinting and the occlusion was adjusted. The flap was sutured by 3-0 black silk sutures. Patient was recalled at 2 weeks for suture removal and the splint was removed at 4 weeks postoperatively. Clinical evaluation by periodontal probing, marginal gingival attachment and tooth mobility was done at 2 weeks, 4 week, 3 months, 6 months, 1 year, 3 years [Figure 8], 7 years and 9 years [Figure 9], which showed successful transplantation. Patient did not undergo any endodontic therapy and the tooth was vital with electric pulp testing at 9 years follow up also.

DISCUSSION

Autotransplantation is a viable option when compared to fixed partial denture or implants especially in young patients in whom growth has not ceased. Due to osseointegration,

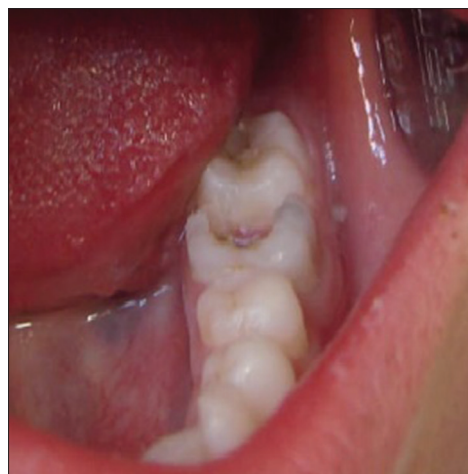


Figure 1: Preoperative view showing grossly decayed 36 and impacted 38



Figure 2: Preoperative cast



Figure 3: Preoperative intraoral periapical view of 36

dental implants in these patients does not erupt along with growing alveolar arch thus staying in infra-occlusion whereas autotransplantation helps in bone induction and the reestablishment of a normal alveolar process.^[3] Thus, autotransplants can replace missing teeth along with preservation of the bone until growth has ceased for implants.



Figure 4: Preoperative intraoral periapical view of 38



Figure 5: Socket after preparation

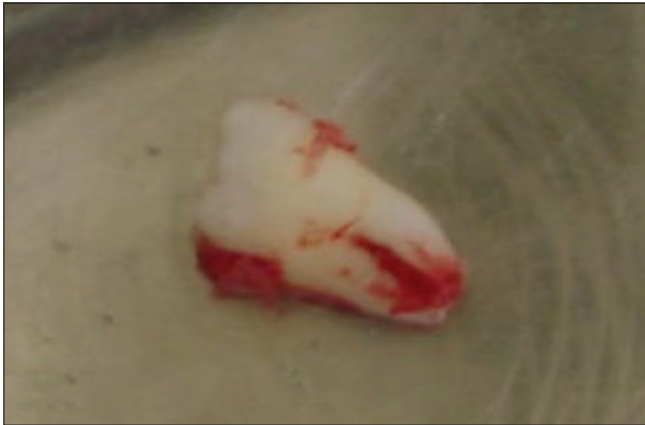


Figure 6: Extracted third molar with intact follicle



Figure 7: Immediately after transplantation of 38

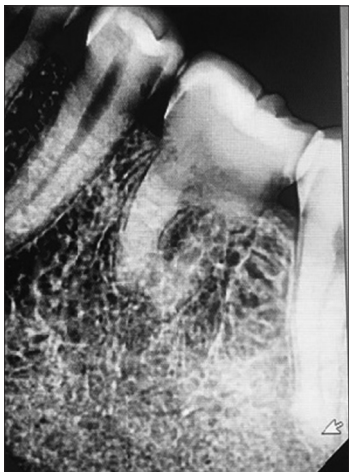


Figure 8: Intraoral periapical view of 3 years follow up

Success of a case depends on careful patient selection and atraumatic surgical procedure along with good postoperative care.

Donor teeth selection depends upon its root development. Donor with 1/2-3/4 of root formed can be considered but



Figure 9: Intraoral periapical view of 9 years follow up

extraction should be performed without harming Hertwig's epithelial sheath as trauma can compromise further root development, stunting maturation or altering morphology.^[3] Donor with more than three-fourth of root's length gives more successful results, but greater or complete root development may cause encroachment on vital structures such as the maxillary sinus or the inferior alveolar nerve. The transplant that has a full length developed roots with apex opening >1 mm radiographically^[2] as in our above case report also has the

potential for pulp regeneration and are known to give best results as they can be revascularised postoperatively whereas a tooth with complete apex will require root canal therapy.^[3,4] Andreasen found 95% and 98% long-term survival rates for incomplete and complete root formation of 370 transplanted premolars observed over 13 years.^[1]

Gentle removal of the donor tooth with follicle along with minimal handling is necessary for the protection of pulpal tissue and Hertwig's root sheath.^[4] Adequate periodontal ligament regeneration should be there for integration of transplant at the recipient site. Traumatic injury to the root surface of the donor tooth will interfere with periodontal ligament regeneration, thus can lead to compromised root growth leading to ankylosis or root resorption.^[1,5]

Further there should be minimal delay between extraction and transplantation.^[3] The periodontal ligament cells are sensitive to pH changes and its viability is reduced if extra oral time is extended.^[4,6] When donor tooth is immediately placed into a fresh extraction socket as in our case, periodontal ligament healing is greatly increased.^[4] Khan *et al.* reported that extra-alveolar time exceeding 18 min will affect the survival rate of periodontal ligament (PDL) cells significantly.^[3]

Splinting of transplant is another important factor to be considered. Flexible splinting allows functional movement of teeth stimulating activity of PDL cells whereas too rigid splint will force the tooth against the bony walls of the alveolus, thus damaging the periodontium.^[3] The tooth should be splinted for 2 weeks to 2 months depending on the mobility reduction. The gingival flap should also adapt tightly around the transplanted tooth to enhance reattachment and block bacterial invasion into the blood clot between the tooth and socket.^[3,7]

Correction of occlusal discrepancy allowed proper healing of the periradicular tissues.^[3,5] The tooth should preferably be in infraocclusion to prevent extra pressure on the tooth.

The successful transplants shows normal periodontal probing depth, physiological mobility, no clinical discomfort, normal function, normal PDL space and lamina dura, tight gingival margin without signs of inflammation.^[4] The transplants could bear normal chewing load within 3 months.^[8]

The most common cause leading to failure is chronic root resorption. Inflammatory resorption, replacement resorption or ankylosis, marginal periodontitis and apical periodontitis

can also occur. Inflammatory resorption become evident after 3–4 weeks, while replacement resorption may not become evident until 3 or 4 months after transplantation.^[1,9]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

CONCLUSION

Transplantation of mature third molar can be considered for replacing a lost permanent molar tooth, thus restoring esthetics and function but careful patient selection and appropriate technique is necessary for a good functional and esthetic outcome.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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