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Auto-transplantation of teeth: 2 case reports

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Abstract
Auto-transplantation procedure, to replace lost tooth, where implant or fixed/ removable prosthetic option isn't recommended/ possible, as in child patients and young adults, have wide range of success rate. Not only proper case selection including transplantable tooth selection with ideal stages of root completion and root configuration, available bone and soft tissue; but also the surgical skill and post-surgical care play important roles for the success of the procedure. Here, 2 cases of auto-transplantation have been discussed.

Keywords: auto-transplantation, implant, prosthetics

Introduction
Autogenous tooth transplantation is surgical transposition of vital or endodontically treated tooth from its original site in oral cavity to a natural or surgically prepared socket in same individual[1]. It is a fairly-established surgical treatment. Successful auto-transplantation of immature lower third molar was reported by Fong as early as 1953 [2], though it was first well documented in 1954 by M.L. Hale. It is a viable option for replacing a non-restorable or missing tooth when a suitable donor tooth is available; offering most economical, yet fixed, natural prosthesis compared to implant. Auto-transplantation is specially indicated for congenitally missing teeth, non-restorable teeth, lost tooth in growing patients as well as adults. Though Implant is a good option now-a-days for dental rehabilitation, but its high cost and contraindication in growing patient make auto-transplantation a better alternate.

Surgical Technique
Materials required
Instruments for surgical dis-impaction, and high speed micro-motor hand piece with straight and round football bur, and peizo-surgical unit for bone surgery.

Methods applied
Pre-operative evaluation of tooth decided for auto-transplantation and the recipient site was done clinically and radiologically. Number of roots, mesio-distal and bucco-palatal width, length, curvatures, and proximity to vital structures; position and difficulty involved in removal were assessed for tooth subjected to transplant. SAP (standard antibiotic prophylaxis) was given before surgery for 3 days. Standard extra-oral skin preparation was performed by 5% povidone-iodine; and 0.2% chorhexidine was used for oral rinse for 2 minutes before surgery. The non-restorable tooth was extracted as usual under local anaesthesia. If required, the extraction socket was modified by a large round bur (Group A) or SG3 piezoelectric tip (Group B) to accommodate for transplanted tooth. In case of already lost/ missing tooth, an osteotomy was made following incision, to prepare the recipient site. Thereafter the recipient site was covered with gauze pack to prevent accumulation of saliva and hence, contamination, till the graft, i.e. the tooth subjected to auto-transplantation, is harvested and ready to implant. Precise exposure, luxation, atraumatic removal of graft was done (conventionally or by piezo-surgical unit) and the it is immediately transplanted into the recipient. In some cases, the graft was rotated for 90 - 180 degrees to fit into the recipient site.

The transplanted tooth with closed apexes were put into level of occlusion or slightly below the occlusal plane (infra-occlusion) and the one with open apexes was positioned in infra-occlusion. The gingival flap around the transplant was tightly closed and stabilized with a suture cervically. Splinting was done if initial stability was in doubt. Immediate post-operatively all patients received IV Injection of dexamethasone (8mg) as pulse dose.

Case No. 1

A 19 year old male reported with retained root stump of mandibular left first molar. He wanted to get it replaced with fixed one but he also had financial restriction for implant and prosthesis. So immediate transplantation with impacted lower third molar from same quadrant was planned (Fig 2A-F).

Case No 2

A 25 year old male presented with similar type of problem as depicted in case 1. But orthopantamogram revealed horizontally placed impacted lower third molar in that quadrant, while the impacted upper third molar showed a more favourable position. So non-restorable 36 was replaced with 28 (Fig 3A-F).

Discussion

Auto-transplantation of tooth is a surgical procedure for replacing a non-restorable tooth or already lost tooth, especially in minors (below 18 years) and young adults, where implants and other fixed prosthetic options are not suitable for various reasons [1-3]. The success of auto-transplantation is governed by numerous factors like patient's age, developmental stage of transplanted tooth, recipient site, surgical technique, post-operative care etc. Case selection remains the most important factor for the success of the procedure. Candidates must have no systemic illness. They should also have an optimum good oral hygiene and also be amenable to regular dental care. The tooth should be positioned such that extraction would be as atraumatic as possible [2, 4]. Root configuration remains also crucial in this regards. Teeth with either open or closed apices – both can be selected as transplant; however, the more predictable results are obtained with teeth having between one-half and two-thirds completed root development [3, 5, 7]. An important factor involving the recipient site is adequacy of periodontal support. There must be sufficient bone all around with adequate width of attached keratinized tissue. Surgical precision is also essential with minimum handling time. Post-transplant splinting is very much vital for achieving good stability.

Auto-transplantation of impacted or erupted third molars has been used with varying degree of success in an aim to replace non-restorable, already lost first or second molars for years. Case selection and proper preoperative assessment of the patient including donor teeth and recipient site play a vital role in such transplantation cases. One must abide by the scopes and limitations before planning the surgery.

Indications:

- Younger age group of subjects.
- Patient with non-restorable/ already lost tooth.
- Congenital missing tooth
- Presence of suitable donor tooth for transplantation

Contraindications

- Acute peri-apical infections at recipient site.
- Lack of adequate periodontal support at recipient site
- Patients with systemic illness, those affecting teeth, bones, post-surgical healing etc.
- Patients with poor oral hygiene.

Rehabilitation for non-restorable or lost tooth are accomplished by implant and prosthetic treatment quite often now a days, but those option are not suitable for young and growing individuals. In addition, those treatments are costly also. In such condition, auto-transplantation provides feasible option, and it acts as 'biological prosthesis [8].

Silva *et al* (2013) reported a case of auto-transplantation with 5 years follow up, where a right lower second molar was successfully transplanted by an impacted third molar of same quadrant of a 19-year old female [9]. Kobayashi presented a successful case of auto-transplantation of a 50-year old male, where a maxillary third molar was transplanted for second molar of same quadrant. In both cases, the transplanted tooth underwent endodontic therapy following the transposition. Maintanance of physiologic tooth mobility, normal PDL space, integrity of lamina dura and absence of root resorption represent the clinic-radiological signs of a successful therapy.

Auto-transplantation of teeth is a predictable and reliable surgical procedure to replace a non-restorable/ missing tooth. Data clearly shows good prognosis for transplanted tooth with both open and closed apex, some teeth also showed root completion even post-transplantation. The transplanted tooth can serve as a bridge abutment or as an orthodontic anchorage. Auto-transplantation doesn't interfere with the growth and development of maxilla or mandible. Hence it offers special benefits to growing children. Once the transplanted tooth accomplishes normal periodontal healing, patient have a natural biological response. Even if the transplantation process fails with time, it conserves bone and hence keeps the option for future implant alive [10].

Fig 1A: Equipment for surgical extraction

Fig 1B: Clinical micro-motor, handpiece and burs

Fig 1C: Piezo-surgical unit

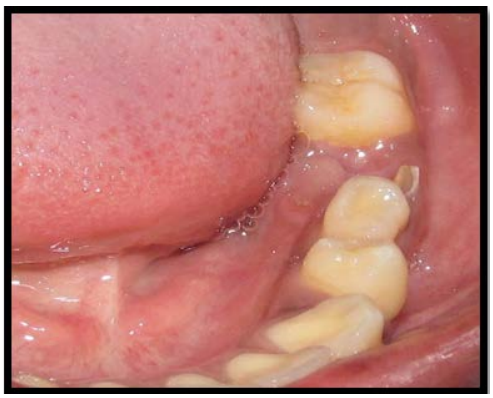

Fig 2A: Pre-operative image showing root stump of mandibular left first molar

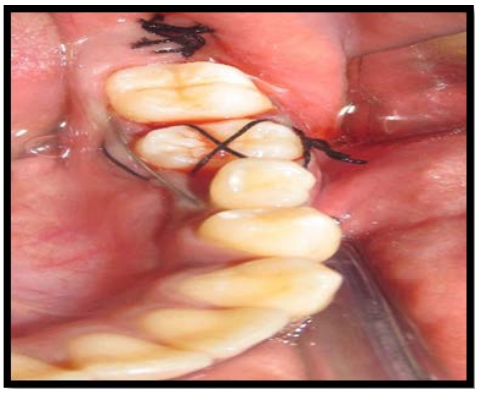

Fig 2B: Immediate post-operative image showing transplantation of mandibular left third molar

Fig 2C: 2 months post-operative image

Fig 2D: Pre-operative OPG

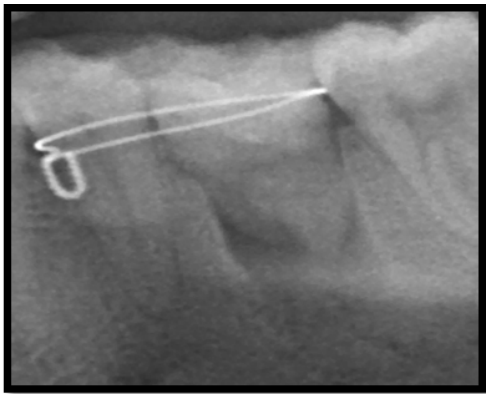

Fig 2E: Immediate Post-operative OPG

Fig 2F: 2 months post-operative OPG

Fig 3A: Pre-operative image showing root stump of mandibular left first molar (left picture) and showing partially erupted maxillary left third molar (right picture).

Fig 3B: Immediate post-operative image showing transplantation of maxillary third molar with subsequent splinting

Fig 3C: 2 months post-operative image, after the splinting is removed

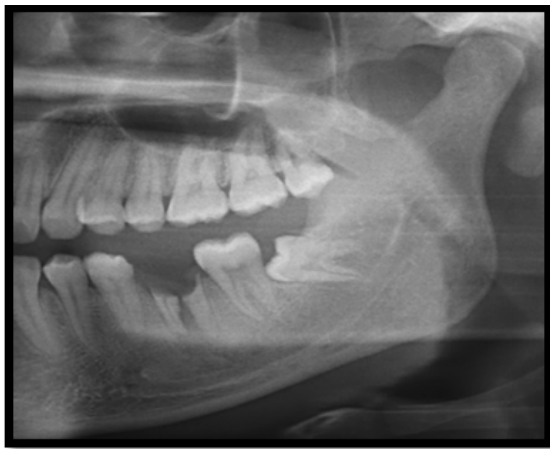

Fig 3D: Pre-operative OPG

Fig 3E: Immediate post-operative OPG

Fig 3F: 2 months post-operative OPG

Conclusion

Ideal donor teeth with open apex, minimal trauma during extraction, less extra oral handling time of transplant, its snugly fitting at recipient bed, good apposition of gingival margin, keeping the transplant at infra-occlusion and proper splinting can provide with predictable outcomes of auto-transplantation. Autogenous tooth transplantation offers an economic, ethical, minimally invasive solution alternative to implant/ prosthesis.

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