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Third molar autotransplantation: A predictable treatment option in the era of dental implants

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ABSTRACT

Prosthetic rehabilitation of grossly decayed teeth is a challenge. The treatment options range from nonsurgical endodontic therapy to extraction and subsequent placement of dental implants. Tooth transplantation involves placement of an impacted, embedded or erupted autogenous tooth from one site into an extraction site. It is a time tested, predictable maneuver with high success rate for replacement of severely compromised natural teeth. This paper documents a successful autotransplantation of an immature mandibular third molar into the socket of a grossly decayed adjacent second molar. Autotransplantation should be considered as a viable treatment option in comparison to dental implants.

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1. Introduction

Currently dental implants are given precedence in the hierarchy of treatment planning for management of grossly decayed teeth. The literature sights a success rate (read as survival rate) ranging between 95% at 5 years to 90% at 10 years.[1] This has led to an exponential increase in the number of natural teeth extraction followed by implant supported prosthesis. However dental implants require strict patient selection criteria and peri-implantitis is a real threat to their long term survival. Financial implications of implants still remain a prohibitory factor especially in developing countries. Autogenous tooth transplantation (ATT) is defined as the transplantation of embedded, impacted or erupted teeth from one site into extraction sites or surgically prepared sockets in the same person. This is a time tested maneuver for replacement of congenitally missing or severely compromised natural teeth. It enjoys a high survival rate of 98–99% at 5 years to 87–95% at 10 years.[2] This procedure has the potential of not only maintaining bone but also creating a new alveolar bone by periodontal ligament induction and the eruption process. Moreover it involves autogenous implantation and is 87% cheaper than a dental implant.[3] This paper documents a successful autotransplantation of an immature mandibular third molar into the socket of a grossly decayed adjacent second molar.

2. Case report

A 16 year old female reported with a chief complaint of pain in right lower teeth. Clinical examination revealed a deep carious lesion in relation to mandibular second molar (#47). The tooth was grossly decayed with the cusps and the marginal ridges involved. A pulp polyp was visible. A pathological perforation was evident on the lingual wall. IOPA X-ray revealed a large open cavity with direct access to the pulp chamber. Pulp

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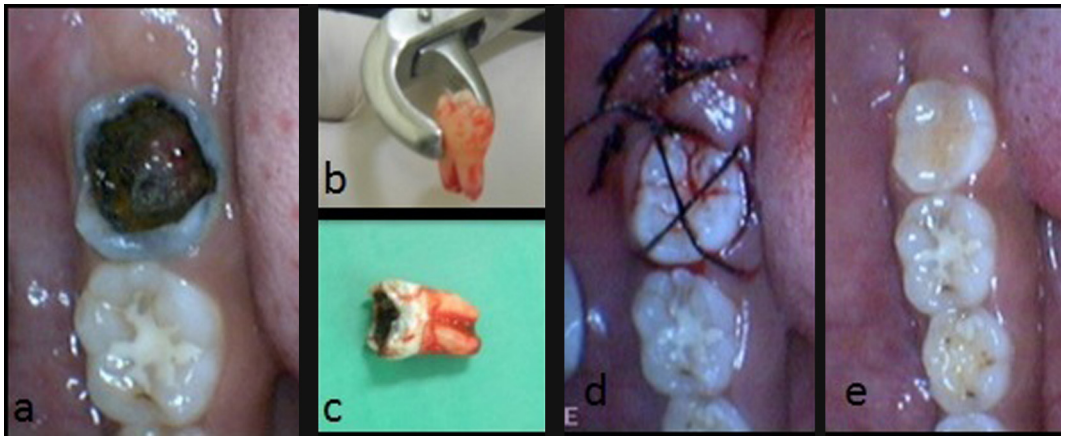


Fig. 1 – (a) Pre-operative, (b) donor tooth (#48), (c) extracted (#47), (d) immediate post-operative, and (e) follow up.

sensibility test divulged a negative response. The tooth was non-tender to percussion and palpation. Based on clinical and radiographic examination a diagnosis of chronic hyperplasic pulpitis was established [Fig. 1a]. An immature third molar (#48) tooth (Moorrees root classification 4) was radiographically evident [Fig. 2a]. The parents were explained regarding the available treatment options. A verbal information regarding ATT was provided. All related queries were explained to their complete satisfaction. Written informed consent was obtained.

Tooth #48 (donor) was surgically extracted atraumatically under local anesthesia (Lox 2%, Neon Lab Ltd., Mumbai, India) and placed back in the socket. Tooth #47 was extracted. Precaution was taken to minimize damage to the cortical plates [Fig. 1b and c]. The recipient site (socket of #47) was prepared with a #4 surgical carbide bur operated in a slow speed hand-piece, under copious saline irrigation. The donor tooth was then placed into the recipient socket [Fig. 2b]. The occlusion was evaluated for premature contacts and rehabilitated. The donor site was sutured. 3-0 silk suture in a figure-of-eight technique was used to stabilize the soft tissue and the transplanted tooth [Fig. 1d]. A periodontal pack was applied. Antibiotics and analgesics were prescribed. Strict oral hygiene maintenance was recommended. The recovery was uneventful and the sutures were removed on day seven. At four years follow up the tooth was clinically asymptomatic and responded to pulp sensibility tests. The patient was able to perform normal masticatory function and the tooth exhibited



Fig. 2 – (a) Pre-operative, (b) post-operative, (c) three months follow up, and (d) four years follow up.

healthy periodontal attachment. The radiograph revealed complete root formation with mature apex [Figs. 1e and 2d].

3. Discussion

ATT was preferred to endodontic intervention due to a guarded post-endodontic prognosis. In such teeth restorability is a dilemma. It has been documented that endodontic access cavity combined with MOD preparation results in maximum tooth fragilization resulting in catastrophic post-treatment fractures. The patient's guardians were given the alternate option and ''patients' autonomy'' was respected.

The root development stage of donor tooth is a critical factor for success. A half to three-quarter or seven to nine millimeters root length with a wide open apical foramen (greater than one mm in diameter) is ideal.[4] Surgical manipulation of teeth with less than one-half root formation may be too traumatic and could compromise further root development. An increased root length (>2/3) may cause encroachment on vital structures. Furthermore, a tooth with complete root formation will require endodontic intervention, which should be initiated two weeks post-transplantation. In the reported case, the donor tooth had three-fourth root developed with an immature apex. This condition is ideal for pulp revascularization which aids in normal physiologic root development. The follow up radiograph revealed pulp chamber and canal narrowing which is a sequence following revascularization. The recipient site must have sufficient alveolar bone support with adequate attached keratinized tissue to allow for stabilization of the transplanted tooth. The receptor bed must be approximately two mm deeper and one mm wider than the donor-tooth to ensure the clinical success.[5] In the present case these criteria's were adhered to.

Periodontal ligament (PDL) attachment is crucial to prevent post-transplant ankylosis. The survival of PDL cells depends upon the extra-oral time and the extent of trauma during extraction. Sixty seconds of wet extra-oral time is considered ideal, however five minute period is acceptable.[6] The donor tooth should be exarticulated but allowed to remain in the socket till the recipient site is prepared. This ensures that the PDL cells maintain their vitality. A minimally traumatic 'forceps' extraction with the beaks contacting the tooth below the cemento-enamel junction is preferred, as this is the area prone to resorption. For the same reason the use of elevators is not recommended. Initial stability of the transplanted tooth dictates the choice of splinting technique. A snugly fitting tooth requires a mattress suture. Slight to moderate mobility necessitates a physiologic splint of 7–14 days. Prolonged splinting duration and rigid splints may contribute to the development of ankylosis. Above all, the most critical factor for post transplant success is patient's compliance. The patient should be sufficiently motivated and adhere to strict oral hygiene maintenance measures.

The success rate of ATT when executed judiciously is comparable to that of other modalities of prosthetic rehabilitation. This procedure is specifically beneficial in young adult patients where continuous skeletal growth is expected. Moreover an autotransplanted tooth maintains a vital periodontium and can be subjected to orthodontic movement.[4] To summarize, ATT should be considered as a viable treatment option in comparison to dental implants.

Conflicts of interest

The authors have none to declare.

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