Autotransplantation of a Mature Mandibular Third Molar to Replace Hopeless Mandibular First Molar

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Abstract

In this case report, a mature third mandibular molar was transplanted in the socket of a hopeless first mandibular molar of the same quadrant. A 32-year-old woman was diagnosed with strip perforation of her left first lower molar. Orthograde and retrograde treatments were unsuccessful. The tooth was extracted and replaced by the third molar of the same quadrant. Following transplantation, the tooth was splinted and the soft tissue was sutured. Removing sutures and pulp extirpation were carried out one week later simultaneously while the splint was left for one month. Prior to root canal therapy completion, calcium hydroxide therapy was considered for the tooth. Root canal treatment was completed after 3 months and the tooth was restored. Despite presence of granulation tissue in the socket of the first molar and closed apex of the wisdom tooth, the 9-months follow up revealed that the treatment was successful and no signs and symptoms were detected. In clinical examination, probing depth was normal and the radiograph indicated no pathological changes. The tooth was not tender to percussion and the absence of metal sound was indicative of no replacement resorption.

Key Words: Root canal treatment, tooth loss, transplantation.

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Introduction

Autogenous tooth transplantation or autotransplantation is the surgical movement of a tooth from one location inthe mouth to another in the same individual. Once thought to be experimental, autotransplantation has achieved high success rates and is an excellent option for tooth replacement (1).

The prognosis of successful autotransplantation is influenced by a number of preoperative and postoperative factors including root development, position of the tooth, and surgical technique (2).

Careful manipulation of the donor tooth and recipient site under favorable preoperative, surgical and postoperative conditions ensures survival of the cells of the periodontal ligament and promotes the reformation of a normal supporting apparatus (3,4).

The most successful procedure involves transplanting premolars before the root is fully formed. In this way, pulp revascularization and health can be preserved, and the tooth retains the potential to erupt and induce alveolar bone growth (5).

Although infection or granulation tissue in recipient site is the contraindicationsfor transplantation, in this case, it was done in an infected mandibular socket successfully.

Case Report

A 32-year-old woman was referred to the Department of Endodontics of Mashhad Faculty of Dentistry for evaluation of the left first mandibular molar.The medical history was non-contributory. The patient's dental history revealed the following:

A general dentist had done root canal treatment for the first mandibular molar four years ago.One yearlater; the tooth was painful and inflamed. The dentist retreated itbut the symptoms were not disappeared. The patient

underwent endodontic surgery 2 years ago. After thorough examination, the diagnosis was strip perforation, whichhad been treated by sealing the perforated site with TMA (Dentsply, Tulsa Dental, OK, USA) duringendodontic surgery. Following the surgery, pain and other complications were completely disappeared, but after two years, the signs and symptoms returned again.The patient was referred to the Department of Endodontics of Mashhad Faculty of Dentistry. The periapical radiograph showed a well-defined radiolucency in the perforated site. The tooth was hopeless so its extraction was suggested (Fig. 1).

The third molar of the same quadrant was considered for autotransplantation. Periapical radiograph of the wisdom tooth was taken. The apex was completely close with no pathological lesion. The pocket depth as well as the vitality tests was normal. The patient signedan informed consent and the first molar was extracted in an atraumatic manner.

There wassome granulation tissue with the mesial root of the first molar, which was eliminated during the extraction.The extracted first molar was substituted with the third molar, which was also extracted in the same atraumatic manner. There was no need for adaptation or socket preservation due to the smaller size of the wisdom tooth comparedto the first molar (Fig. 2). The transplanted tooth had no premature contact in occlusion. It was protected with a figure-8 silk suture and was splinted to the adjacent teeth by a semi-rigid splint and the occlusion was rechecked. Doxycycline and chlorhexidine were prescribed twice daily for 7 days at an appropriate dose for the patient's age and weight andtwice a day for 7 to 10 days, respectively.

The patient was visited one week later. The suture was removed while the splint was remained in place for4 weeks. Root canaltreatment was performed one week after transplantation. Under rubber dam isolation, working length was established and chemomechanical preparation performed with 2.6% sodium hypochlorite solution as the irrigant. After drying the root canal with paper points (Ariadent, Tehran, Iran), calcium hydroxide paste was applied and the access cavity was temporarily sealed with Cavit (3M ESPE, Seefeld, Germany). The patient returned after 3 months (Fig. 3) and calcium hydroxidewas removed andthe canals were filled with gutta-percha (Ariadent, Tehran, Iran) and AH-26sealer (Dentsply, Konstanz, Germany) using lateral condensation technique. A postoperative radiograph was taken.The tooth was restored with amalgam. The patient was recalled for periodic follow-ups. The recall examination after 9 months revealed asymptomatic and healthy periodontal conditions. At this time, the tooth showed no sensitivity to palpation or percussion and the probing depth was normal. No abnormality was detected in radiography and the tooth was completely functional (Fig. 4).

Figure 1. Preoperative radiograph

Figure 2. After autotransplantation

Figure 3. Recall radiograph

Figure 4. Final follow up

Discussion

The earliest reports of tooth transplantation involved slaves in ancient Egypt who were forced to give their teeth to their pharaohs (6). This science has progressed, as evidenced by the highsuccess rates reported in studies over the past decade (1).

While there are many reasons for autotransplanting teeth, tooth loss as a result of caries is the most common indication, especially when mandibular first molars are involved.

Autotransplantation in this situation involves the removal of athird molar which may then be transferred to the site of anon-restorable first molar (7). Other conditions in which transplantationcan be considered include tooth agenesis (especiallyof premolars and lateral incisors), traumatic tooth loss, atopiceruption of canines, root resorption, large endodontic lesions, cervical root fractures, localized juvenile periodontitis as wellas other pathologies (8). Successful transplantation dependson specific requirements of the patient, the donor tooth, andthe recipient site.

Patient selection is too important for the success of autotransplantation. Candidates must be healthy and available for follow-up visits. They should also have an acceptable level of oralhygiene and be amenable to regular dental care. Most importantly, the patients must have a suitable recipient site anddonor tooth. Patient cooperation and comprehension arevital for predictable results (1).

Regarding the recipient site, the most important criteria for success is the adequacy of bone support. Sufficient alveolar bone support in all dimensions with adequate attached keratinized tissue to allow for stabilization of thetransplanted tooth is necessary. In addition, the recipient site should befree from acute infection and chronic inflammation (9).

The donor tooth should be in such a position that extractionwill be as atraumatic as possible. Abnormal root morphology, which makes tooth removal exceedingly difficult and may necessitate tooth sectioning, is contraindicated for this surgery (6).

Teeth with either open or closed apices may be donors;however, the most predictable results are obtained if half to two-thirds of the root lengths are formed (2). Surgical manipulation of teeth with less than half root formation is too traumatic and could compromise further root development and alter root morphology. When root development is more than two-thirds, the increased length may cause encroachment on vital structures such as the maxillary sinus or the inferior alveolar nerve (10). Furthermore, a tooth with complete or near complete root formation will generally require root canal therapy, while a tooth with an open apex will remain vital and continue root development after transplantation.

Recently, single-standing implants have been found to be a reliable substitute for missing teeth (11). The crucial questions are whether transplanted teeth become and remain healthy and functional, and to what extent suitable transplants are available (1). Optimal contact of the autotransplanted tooth with the alveolar boneof the recipient site may provide better blood supply and adequate nutrition to the periodontal ligament cells and may be one of the most important factors for a successful prognosis (12,13).

The most common complications in autotransplantation of teeth are inflammatory or replacement resorption. Inflammatory resorption could lead to tooth loss without proper endodontic treatment. Ankylosis is visible on radiograph as disappearance of periodontal membrane space, with or without resorption of the root. Clinically, an ankylosed tooth produces a high metallic sound under the percussion test. This complication is untreatable, can be symptomless, and the tooth can function normally for as many as 10-15 years (14). The most relevant factor for inflammatory root resorption after transplantation is the presence of an infected root canal system. The use of a calcium hydroxide medication,because of its high pH that provides an antimicrobial effect and stimulates the healing process, is expected to favor bone repair and inhibit root resorption (15). Also, long-term root canal treatment with calcium hydroxide is the method ofchoice in preventing and treating inflammatory resorption (16). Therefore, the combination of instrumentation and the use of calcium hydroxide appear to be sufficient. Autotransplantation of teeth has evolved as an accepted treatment option inorthodontics over the last 3 or 4 decades (17).

Although there are recent publications from countries in northern Europe, autotransplantation is still an underused method for replacing missing teeth.Single tooth implants are becoming more common (18).

Although autotransplantation has not been established as a traditional means of replacing a missing tooth, the procedure warrants more consideration. 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 (1).

Conclusion

This case demonstrates that autotransplantation of a mature mandibular third molar may provide the potential to replace a hopeless molar tooth with a natural tooth instead of a prosthesis or osseointegrated implant. Transplantation is much more economical than implant.At the 9-months follow-up, the transplanted third molar was clinically healthy and continued to satisfyaesthetic and functional demands. Inflammatory resorption may become evident after 3 or 4 weeks, while replacement resorption may not become evident until 3 or 4 months after transplantation. So it seems that the treatment has been successful. However, longer period follow-up are necessary.

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