

Auto Transplantation of Ectopically Erupted Maxillary Premolar: A Case Report

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ABSTRACT

Background: Auto transplantation of tooth is a viable option for replacement of lost tooth or ectopically erupted tooth, especially in children and young adults. Root growth completed up to two-third with open apex is an indication for transplantation and shows good prognosis. This case report presents a clinical case of auto transplantation of maxillary right second premolar in a 15 year old child, who had ectopically erupted 15 with more than two third of root length and open apex and over-retained deciduous second primary molar. The procedure involved transplantation of palatally erupted 15 into its own socket which is occupied by 55. The concept of atraumatic extraction was used, disruption of root sheath was avoided with the minimal time interval for replacement. After replacement, splinting was done and followed up for 8 months. The tooth was found asymptomatic. This report reveals successful transplantation of ectopically erupted maxillary second premolar into its own place.

Keywords: Auto transplantation, ectopic eruption, splinting.

INTRODUCTION

Transplantation of teeth has been carried out for hundreds and perhaps thousands of years. The earliest reports of tooth transplantation involve slaves in ancient Egypt who were forced to give their teeth to their pharaohs.¹

In 1772, John Hunter conducted experiments in transplantation and reported an incidence of a successful tooth allotransplant. However, allotransplantation (transplantation of a tooth from one individual to another) was eventually abandoned because of problems of histocompatibility and replaced with auto transplantation.² Auto transplantation refers to the repositioning of autogenously erupted, semi-

erupted or unerupted tooth; from one site into another in the same individual.³

Auto transplantation of teeth was first described in the dental literature by the Swedish dental surgeon Vidman in 1915.³ In 1950s, immature third molars were used to replace decayed first molars. However, it was first well documented in 1954 by M.L. Hale.⁴

More than four decades ago, the method for auto-transplantation of immature premolars was developed by Dr. Slagvold and Bjercke and they reported successful results in publications from the University of Oslo about 30 years ago. The major principles of his technique are still followed today. Survival rates vary from 74-100% and depends on careful management, especially of the periodontal

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Fig 1: Pre-operative maxillary occlusal view – blue arrow showing showing retained 55 and black arrow shows ectopically erupted 15 (palatally placed to 16).



Fig 2: Pre-operative Occlusal radiograph (lateral view- maxillary right side) – red arrow shows palatally erupted 15 to 16. 15 had 2 roots buccal and lingual almost complete root length with open apex.



Fig 3: Shows socket after extraction of 55.



Fig 4: Extracted 55.



Fig 5: Preparation of socket by drilling the interdental bone with straight hand piece along with coolant.



Fig 6: Atraumatically extracted ectopically erupted 15.



Fig 7: Extracted ectopically erupted 15 placed immediately in the recipient site with the help of forcep.



Fig 8: Patient asked to bite and occlusion was checked after placing 15.



Fig 9: Splinting was done for 2 weeks and suturing for stabilization.

ligament, during the surgical procedure. Maintaining an intact periodontal ligament during transplantation aids bone induction, prevents root resorption (replacement and surface resorption)

and creates the possibility of orthodontic movement.⁵

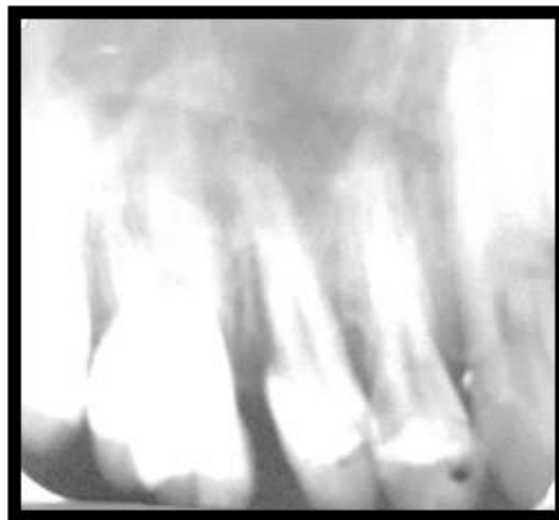


Fig 10: IOPA of 8th month follow up.

CASE REPORT

A 15 year male patient reported to Department of Pedodontics and Preventive Dentistry, New Horizon Dental College, Bilaspur, Chattisgarh with a chief complaint of additional tooth in the upper right back teeth region. Examination revealed that there was retained 55 and 15 was ectopically erupted (palatal to 16) due to which patient was having difficulty in mastication. An occlusal and IOPA radiograph revealed that 15 was present palatal to 16 and 15 had more than 2/3rd of root length with small open apex. The decision was made to extract the retained 55 and auto-transplantation of 15 to be done. Occlusal and periapical radiographs of the donor tooth was used to determine its labiolingual and mesiodistal dimensions.

The procedure was performed in a single visit. Antibiotic prophylaxis was given 1 hour prior to the procedure. Under local anesthesia and aseptic conditions, the tooth at the recipient site 55 was extracted and the recipient socket was prepared with No. 4 surgical carbide round bur in a low-speed hand piece under sterile saline irrigation. After preparation of the recipient socket, the donor tooth 15 was extracted atraumatically and immediately placed into the recipient socket. The root surface of transplanted tooth was not touched so that the vitality of periodontium should be

maintained. The transplanted tooth was held at the crown with the help of forceps. After placement of the transplanted tooth, the patient was asked to bite and the occlusion was evaluated. Interrupted suturing was done with 3-0 nylon sutures. Stabilization was achieved by splinting the transplanted tooth along with its adjacent teeth for 2 weeks. Splinting was done with twisted 26 gauge stainless steel wire and composite resin.

For the post-surgical period - soft diet, mouth rinses with a 0.12% Chlorhexidine gluconate solution and antibiotics were advised. The patient was recalled the day after surgery to ensure that the transplanted tooth was in its position. Splinting was removed after 2 weeks. The auto-transplanted tooth had morphologic disharmony at cervical area of crown distally, composite build up was done after 2 weeks. The patient was reviewed at weekly intervals for a month. After 1 month, clinical examination showed satisfactory esthetics and an IOPA radiograph revealed that the transplanted tooth was well adapted in the socket and no signs of root resorption were seen.

Following the first month, the patient was reviewed every month till 8 months. During the follow-up period, tooth was responsive with signs of vitality and no signs of root resorption or periapical infection was seen.

DISCUSSION

Dental rehabilitation after the loss of one or more teeth may be achieved with several techniques, including removable or fixed prostheses, osseointegrated implants and auto-transplantation.¹ Auto-transplantation is defined as the transplantation of teeth from one site to another in the same individual into extraction sites or surgically prepared sockets.² It is indicated in cases of impacted teeth, ectopically erupted teeth, premature tooth loss, traumatic tooth loss, congenitally missing tooth with crowding in the opposing arch, after extraction of teeth with bad prognosis. The advantages of auto transplantation include the possibility of maintaining the viability of the periodontal ligament, proprioception, preservation of the alveolar bone, single sitting and low cost procedure as compared to other.⁶ The success criteria were adapted from Schwartz et al, Kristerson and Lagerström and Kugelberg et al, and

included (i) the absence of progressive root resorption, (ii) normal hard and soft periodontal tissues adjacent to the transplanted tooth, and (iii) a crown-to-root ratio less than 1 (i.e., the suprabony part shorter than the infrabony part).⁷⁻⁹

However, auto-transplantation has some disadvantages, like it is technically sensitive because surgical trauma can cause irreversible damage to the periodontal ligament, a donor tooth compatible with the recipient socket must be available, the long term success rates of auto-transplantation may not equal those of osseointegrated implants, endodontic therapy is required in cases of donor teeth with fully developed roots, and complications such as ankylosis, inflammatory root resorption and dental caries may occur.¹⁰

A key factor for the success of the procedure is to maintain the viability of periodontal ligament cells of the transplanted tooth.¹¹ Because periodontal ligament cells are very sensitive to osmotic changes, their viability may be reduced if extra oral dry time is long. It is believed that the preservation of the epithelial cell rests of Malassez prevents root resorption and maintains the periodontal ligament space, thereby preventing ankylosis.^{10,11} Other factors, such as patient age <20 years, donor tooth with immature roots, atraumatic surgical procedures and operator's experience are associated with a good prognosis. The success of the procedure also depends on adequate bony support at the recipient site and absence of acute or chronic inflammation.¹¹

In this case the patient was 15 years old, had adequate bone support at the donor site, the root development of the donor tooth was almost completed but had open apex, so auto transplantation was chosen as a treatment of choice and the surgical procedure performed was atraumatic and 15 was placed immediately after extraction. In a retrospective study on the survival of autologous tooth transplants, Yoshino et al.¹² reported that the main reasons for auto transplantation failure were periodontal attachment loss (54.9%), root resorption (26.5%), dental caries (4.0%), root fracture (2.9%) and other causes (11.8%). In the present case, there were no signs of periapical inflammation, external resorption and ankylosis at 8 months follow-up.

However on clinical examination, there was no periodontal pocket and mobility and also the vitality of transplanted tooth was maintained. The recipient site was prepared with round burs in low-speed surgical hand pieces under sterile saline irrigation and the donor tooth was maintained in its own socket until the preparation and adjustment of the recipient site was completed. This was in accordance to the case reported by Teixeira et al¹³. Long-term rigid splinting of transplanted teeth may negatively affect the healing process. On the other hand, the use of a non-rigid splint for 7 to 10 days may stimulate periodontal ligament and alveolar bone regeneration.¹⁴ Non-rigid splint was maintained for 2 weeks in present case.

Yoshino et al.,¹² in a retrospective study of 614 autotransplanted teeth reported that the cumulative success rate of transplanted teeth with mature roots was 90.1% at 5 years, 70.5% at 10 years, and 55.6% at 15 years. These studies suggests that autotransplantation is a viable treatment option with good prognosis for the replacement of missing or ectopically erupted teeth. This rehabilitation technique may play an important role in situations where patients have limited financial resources, in public health services and for restoration of function and aesthetics in growing patients.

The high cost of osseo-integrated implants and preparation of healthy teeth to provide support for fixed partial dentures are factors that may discourage the patient to replace a missing tooth, causing aesthetic and masticatory problems.^{2,3} Autotransplantation is a relatively simple, low-cost treatment option for missing and ectopically erupted tooth with good success rates.¹⁰ In the present case, the technique was effective in restoring function and aesthetics.

CONCLUSION

The science of autotransplantation has progressed, as evidenced by the high success rates reported in studies over the past decade. Successful tooth transplantation offers improved esthetics, arch form, dentofacial development, mastication, speech and arch integrity. A transplanted tooth also maintains natural space, with little or no root resorption, alveolar bone volume, and the morphology of the alveolar ridge through

proprioceptive stimulation. The outcome of ATT depends on wise case selection and consideration of all biological aspects. A prerequisite for this method, however, is a thorough knowledge of the factors that influence the long-term success rate. Preservation of the periodontium of the grafted tooth is the key to a successful clinical outcome. Autotransplantation possesses many distinct advantages over fixed prosthesis or implants in terms of function, cost, time, esthetics, and ease with which complications can be managed.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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