CASE REPORT

Traumatic avulsion management by allotransplantation. A rare case report with two years of successful follow-up

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Abstract

Auto and allotransplantation of teeth have been done since ancient times, but very few cases are documented in the literature. Here is a rare case report of a 9-year-old female patient, in whom supplemental lateral incisor and mesiodens were used as an allotransplant, to replace the missing upper incisors. Of the two allotransplants, one tooth was rejected due to long storage of more than 6 h, while the other allotransplant, which was freshly extracted and transplanted, showed good periodontal healing, and proper functioning. The patient was followed up for a period of 2 years, and the accepted allotransplant showed good prognosis both clinically and radiographically with uneventful bone healing and maintenance of periodontal ligament space. The aim of this paper is to emphasize on the age old method of allotransplantation as a better treatment options, in compromised conditions.

Keywords: Allotransplantation, avulsion, mesiodens, supplemental lateral incisor

Introduction

Allotransplantation is the transplantation of teeth from one person to another. It is one of the earliest performed dental procedures and may as well represent the first transplant between individuals.[1,2] Pare an outstanding French surgeon described this procedure as early as in the 16th century.[3] Pioneers like Fauchard and Hunter retraced the procedure in the 17th and 18th century.[4,5] Josiah Flagg had popularized the method by offering cash for handsome and healthy live teeth in a Boston newspaper advertisement for donors in 1796.[2] The reason for the early popularity of allogeneic tooth transplantation, was not only the lack of better prosthetic substitute for lost teeth and the ease of the transplant procedures itself, but also the naturally prolonged survival of tooth allografts and the minimal morbidity associated with their rejections.[6]

Dentistry is now growing in leaps and bounds, but the advances also increase the expenses of the treatment. Nevertheless, implants stand the best option to replace the missing teeth with extraordinary aesthetics, but in children the use of implants is limited. Bjork reported that implants that were in the path of erupting teeth got displaced and those placed in receptive areas were lost.[7] In the Scandinavian consensus conference in Jonokoping, Sweden, there was a general agreement that implants should be postponed until the skeletal growth is completed or nearly completed in adolescents.[8]

During these compromised conditions, allotransplantation proves to be the best option. Despite a progressive replacement resorption, which is a frequent complication of transplanted tooth, allografts function effectively, often symptomless with clinically normal gingiva for many years. In a study published by Schwartz et al., the mean functional time of allografts was 6.8 years, with the teeth remaining free of symptoms.[9]

The present case report emphasizes on the importance of allotransplantation in the management of avulsion.

Case Report

A 9-year-old female patient reported to the Department of Pedodontics, college of dental sciences, Davangere, with a chief complaint of missing upper front teeth. The patient’s parent gave a history of trauma due to road traffic accident 24 h ago and first aid treatment in a local hospital for the laceration of the upper and lower lip. Tetanus prophylaxis was administered in the same hospital. The patient was referred to our department for further treatment. Her medical history was non-contributory.

On extra oral examination, there were swollen and lacerated lips with no signs of other dental alveolar fractures. Intra orally there was avulsion of upper right central incisor and upper left lateral incisor [Figure 1], no other signs and symptoms of fracture
were seen and there was no retrieval of the avulsed teeth from the accident spot. After assessing the patient's condition and the available treatment options and feasibility, allotransplantation was planned to replace the missing teeth.

The allotransplanted teeth were a freshly extracted supplemental lateral incisor and 1-day old mesiodens which was stored in milk and refrigerated, with the patient's consent for future use. The donor's blood were negative for HIV and hepatitis B. Both the donors and the recipient's consent were taken and the procedure of transplantation was explained to the patients and the parents. Single sitting intentional root canal treatment was done in supplemental lateral incisor and then carefully extracted with minimal trauma and placed immediately in chilled solution of 2% chlorhexidine. Holding the tooth by crown, the root surface was thoroughly cleaned off all the blood in same solution. The root apex was then sealed with glass ionomer cement (GIC). The same procedure was followed with the mesiodens and then apex sealed with GIC. All through the procedure care was taken to ensure that the root surface was undisturbed to avoid damage to the periodontal ligament cells (PDL) cells. Before transplantation the socket was irrigated with saline to clean any debris following which fresh bleeding was induced. The teeth were then transplanted and temporarily stabilized with GIC. Intra oral peri-apical radiograph [Figure 2a] was taken to confirm the position of transplanted teeth in the socket, this was followed by semi rigid splinting with 0.9 mm stainless steel wire [Figure 2b] and all occlusal interferences were relieved.

The patient (recipient) was advised on regular chlorhexidine mouth rinse and no antibiotics were prescribed, so as to evaluate the host response to allograft. Oral hygiene instructions were given and the patient was recalled for follow-up every 15 days upto 6 months. Splint removal was done after 4 weeks. During the follow-up period it was noticed that clinically and radiographically the supplemental lateral incisor was firm and adjacent gingiva was healthier, but the mesiodens [Figure 3] was mobile in the socket, without signs of attachment and infection, hence the mesiodens was removed, and no attempts to re-transplant was done. Periodic intra oral peri-apical radiography were taken to check for any changes and prognosis. The failed allograft was replaced with a temporary partial denture [Figure 4] and porcelain crown was placed with the supplemental lateral incisor after 6 months. The patient is under follow-up since then every 6 months. After 2 years of follow-up [Figure 5a], no signs of rejection are seen with the allotransplanted tooth and the patient is healthy and happy with the results of the treatment [Figure 5b].

Figure 1: Pre-operative photo with avulsion of upper right central incisor and upper left lateral incisor

Figure 2: (a) Post-operative radiograph after transplantation. (b) Extraoral photo after splinting

Figure 3:Rejected mesiodens

Figure 4:Removable temporary partial denture after removal of rejected mesiodens

Figure 5: (a) Follow-up photo with rejected mesiodens. (b) Follow-up photo with porcelain crown.
Discussion

Allotransplantation is an age-old method, which is not followed nowadays because of lack of proper protocol, but in recent years it has been experimented and accepted by the clinicians as many successful cases are now documented.

The principal factors for successful allotransplantation according to Cserepfalvi are, the tooth may be erupted or partially erupted, but must be in the stage of early development, the tooth sac must be uninjured, the tooth must be stored at 2°C in a balanced saline solution, the socket must be deep enough to permit firm contact between the tooth and the alveolar wall proper, the surface of the socket must be smooth and free of blood clots and proper precautions must exist to avoid undue strain on the tooth received by the recipient patient for a period of 3 weeks following transplantation.[10] He also stated that patients should not brush for the first 2 weeks and during the 3rd week are advised to masticate with the tooth, since mastication is an excellent stimulant for osteoblastic activity and proper healing. After the 3rd week the patient can begin normal use without any restrictions. Nordenram and Björnesjö were the first to present a series of 32 human allografts including systematic post-operative clinical and radiographic data.[11] They reviewed 26 cases and found a mean function time of 2.3 years, however the longest function time recorded to be 16 years, was seen in 6 cases and they were all expected to continue functioning for years. Hansen and Fiabaek in 54 allografts, found cases still in function for 13 years.[12] Schwartz, et al., mentioned that removal of pulpal tissue (root canal therapy) of allografts actually may reduce the amount of inflammatory root resorption, thus increasing the life expectancy of dental transplants.[8] Ivanzy and Kominek indicated that normal periodontal space and lamina dura were signs of survival and that resorption was a sign of graft failure in their extensive study of 90 transplantations.[13] Schended, Lohr, and Chomskey stated that when microscopic periodontal reattachment of transplanted teeth takes place, it is a signature of clinically successful treatment.[14] Andreasen showed if replantation is done immediately, the tooth will remain in the dental arch without resorption and with normal function.[15]

In the present case, supplemental lateral incisor showed good prognosis, as it was freshly extracted and transplanted, but 1-day old mesiodens were rejected. The reason for rejection could be the loss of viability of the PDL cells due to long storage and choice of storage media i.e., milk, which is the only storage media that is easily available. Trope and Friedman concluded that milk is an excellent storage medium for up to 6 h, after which it loses its effectiveness. Rejected allograft was replaced with a temporary partial denture.[16]

Now, the controversial subject that strikes when we talk about allotransplantation is antigenic reactions. The tooth allografts are weakly antigenic and removal of pulpal tissue enhances the survival of the allograft. The tooth transplants need not be staying alive to continue to function, and their acellularity, high density and low reusability, and their capacity to function asymptotically in spite of extensive resorption makes allografts the best choice in compromised conditions.

Patients when presented with the information necessary for informed consent, often choose the older, less expensive procedure, rather than procedures which they may not be able to afford.

Conclusion

It can be concluded that allotransplantation with endodontic therapy proves to be a better option for replacing the missing teeth, rather than wait for the appropriate time to carry out the right method. Clinicians should always look into the pros and cons and the benefit of every procedure to the patient.

References