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CASE REPORTS

Successful Autotransplantation

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The successful autotransplantation of a maxillary and a mandibular third molar to replace nonrestorable mandibular first molars is reported. Apexification procedures were necessary in order to complete the endodontic treatment. The teeth did not ankylose and the periodontal and periapical tissues appear to be normal after 14 months.

Autotransplantation of third molars was reported in 1950 by Apfel (1) and Miller (2) and has been shown to be a useful procedure to replace badly decayed, nonrestorable teeth (3, 4). Plainfield has cited a number of precautions that will help ensure successful autogenous transplantation:

1. Root development of the donor tooth should be between one-third and one-half of the total root length. This is recommended in hopes that the pulp will retain its vitality.
2. Hertwig's epithelial root sheath covering the root ends should not be injured during surgery.
3. The host site must be prepared sufficiently to avoid injury to the epithelial root sheath when the donor tooth is placed in situ. In addition, it should permit the transplanted tooth to remain out of occlusion.
4. The patient should be healthy and concerned about adequate oral hygiene. Care should be taken postoperatively during mastication so that food is not packed into the crevicular space during the initial stages of reattachment. The patient should keep the operative site clean and protect the transplant from undue trauma (5).

Agnew and Fong (6) have also established third molar autogenous transplantation as a feasible procedure if the roots of the donor teeth are between one-third and one-half formed and trauma to the epithelial root sheaths of the donor teeth can be avoided.

CASE REPORT

An 18-yr-old white female came to the Dental Clinic with impacted third molars. In addition, her mandibular first molars were cariously involved and nonrestorable. The entire crown of the mandibular left first molar was missing and the second molar had drifted mesially and partially filled the created space (Fig. 1). The mandibular right first molar had a sinus tract draining into the buccal vestibule. The crown was decayed into the furcation and was nonrestorable (Fig. 2). It was elected to surgically remove the impacted third molars and use two of them as autogenous transplants to replace the nonrestorable mandibular first molars. The patient wished to have the surgery completed under intravenous sedation. She was admitted to the hospital November 26, 1984, at which time a history, a physical examination, and lab work were completed.

On November 27, the surgery was performed. Fifteen milligrams of Valium (Roche Products, Manati, PR) and 75 mg of Demerol (Winthrop-Breon, New York, NY), followed by 8 mg of Decadron (Merck, Sharp and Dohme, West Point, PA) to minimize the postoperative swelling, were given intravenously. The patient was also given intravenous aqueous Penicillin G (1 million units; (Squibb, Princeton, NJ) because of the infection associated with the sinus tract draining into the buccal vestibule from the mandibular right first molar.

The root development of the maxillary right third molar and the right mandibular third molar was approximately one-third to one-half complete. This is seen in the panorex radiograph of the transplanted third molars (Fig. 3).

It was decided to transplant tooth 32 to the site occupied by 30 because there was a greater mesiodistal width in which to place tooth 32. Tooth 30 was removed initially and the recipient site was prepared. Interseptal bone was removed with a rongeurs, and crestal bone was removed with a bur to produce the proper alveolus size and shape to receive the transplant. The recipient site was prepared initially to decrease the amount of elapsed time between removal and replantation. Studies have shown an inverse relationship between the success rate and the length of time the tooth is out of the alveolus (7).

A full-thickness mucoperiosteal flap was reflected to

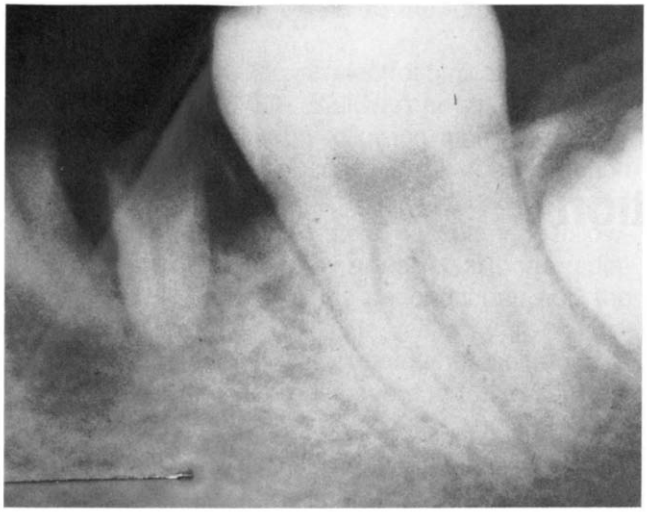

FIG 1. Nonrestorable mandibular left first molar.

FIG 2. Nonrestorable mandibular right first molar.

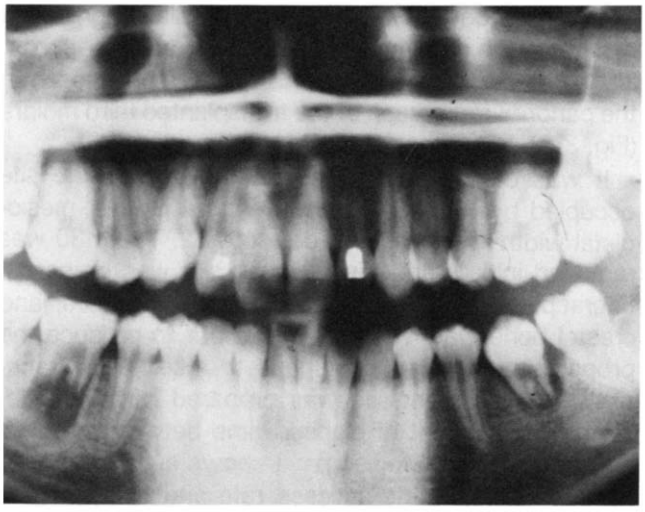

FIG 3. Orthopantomograph showing transplanted third molars in the first molar sockets.

expose tooth 32 which was carefully removed from the donor site with elevators and forceps. The mesial and distal aspects of the donor tooth crown were stripped to create space for its insertion. Care was taken not to disturb the root of the tooth as Moss (8) recommends that the donor tooth be manipulated only by its crown. Topical tetracycline was applied to the alveolus of both the recipient and donor sites. The tooth was firmly inserted into the recipient site and held in position with a constant occlusal pressure for 3 to 5 min. Interrupted sutures were placed mesially and distally and the occlusion was checked to ensure there would be no occlusal forces on the tooth. Circumdental ligation was avoided because Cook (9) and Vanarsdall (10) found that the most common sequelae of circumdental ligation is external root resorption and ankylosis.

The recipient site occupied by the remains of tooth 19 was prepared in the same manner. Because tooth 18 had drifted mesially, there was insufficient mesiodistal space to consider using tooth 17 as the transplant. The maxillary right third molar (tooth 1) was chosen because the root development was more complete than that of tooth 16 and we felt the extraction of tooth 1 could be more easily accomplished. A procedure similar to the one described was followed. The donor tooth was firmly held in the recipient site for 3 to 5 minutes, suturing was completed, and the occlusion was checked.

The patient was discharged from the hospital the following day. At that time, a panorex radiograph was taken and the occlusion of both transplanted teeth was rechecked and adjusted (Fig. 3) to maintain the teeth in infraocclusion. No splinting was necessary. Synalgos-DC (eight tablets, one every 4 h for pain) and Penicillin VK (500 mg, 20 tablets, one four times a day) were prescribed when the patient was discharged.

Initially, the patient's progress was checked at weekly intervals. At each appointment, the occlusion of the teeth was checked and adjusted if necessary. Three weeks postoperatively, the teeth were no longer mobile. At the end of 10 wk the transplanted teeth were asymptomatic and there was no clinical evidence of periapical inflammation. However, both teeth were still negative to thermal pulp tests and test cavities so apexification procedures were initiated. The pulp tissue in both teeth was diagnosed as necrotic and it was felt that waiting longer would jeopardize the prognosis due to possible periapical inflammation. Anesthesia was not required and access revealed necrosis of the pulp tissue. These findings are different from those of Andreasen et al. (11), who found that a development of three-fourths of the root length is the optimal stage for transplantation to obtain further root development and preserve pulp vitality. Filling the pulp chambers and canals with a $Ca(OH)_2$ paste of powered $Ca(OH)_2$ USP (Eli Lilly, Indianapolis, IN) and sterile saline initiated the

formation of apical stops so that definitive root canal therapy could be completed.

Six months after transplantation, a definite apical stop was evidenced by sounding in tooth 32 and the $Ca(OH)_2$ was replaced with gutta-percha (Hygienic Corp., Akron, OH) and Roth Root Canal Cement (Roth Drug Co., Chicago, IL) using the lateral condensation technique (Fig. 4). The apical stop had not yet formed in tooth 1 so additional $Ca(OH)_2$ paste was placed. There was no evidence of any periodontal pockets greater than 2 mm in depth and the teeth were in occlusion and not ankylosed.

After 7 months, sounding also proved that tooth 1 had formed an osteodentinal periapical bridge and it was also obturated with gutta-percha and Roth's sealer using the lateral condensation technique (Fig. 5). A full gold crown provided cuspal coverage for tooth 19 as did an onlay for tooth 32. At the 14-month recall evaluation, the transplanted teeth were within normal periodontal limits (1 to 2 mm) and were not ankylosed (Figs. 6 and 7). The patient's oral hygiene was excellent.

DISCUSSION

Although it is not possible to perform autogenous transplants in all patients with nonrestorable molars, it may be a viable alternative in some instances. Apfel (4) and Plainfield (5) have reported a success rate of 95% in autogenous tooth transplantation. It is recommended that root development of the donor tooth be one-third to one-half complete to have any chance of the pulp remaining vital for further root development.

Hertwig's epithelial root sheath covering the root should not be injured during transplantation and the host site must be prepared so that the epithelial root sheath will not be damaged when the tooth is inserted.

FIG 4. Six-month recall of mandibular right first molar with root canal treatment completed.

FIG 5. Seven-month recall of the transplanted mandibular left first molar with root canal treatment completed.

FIG 6. Fourteen-month posttransplantation radiograph of mandibular left first molar.

FIG 7. Fourteen-month posttransplantation radiograph of mandibular right first molar.

The transplanted tooth should be out of occlusion and the patient must practice excellent oral hygiene (5).

Massler (12) found that tetracycline applied to an implanted tooth causes marked alveolar bone growth and ankylosis. His findings were not evident in this case as the teeth gave no evidence of ankylosis when percussed and radiographs showed the developing periodontal ligament to be intact.

In a study of third molars transplanted with a vital pulp, Andreasen et al. (11) have reported that the first positive vital pulp responses occurred within 8 months after the transplantation in cases where root formation was one-third to one-half complete. In eleven of eighteen cases, the pulp was necrotic. Similarly, there was no further root development in 12 of the 18 cases. In the case reported here, at the end of 10 wk all of the thermal tests and test cavities indicated that the pulp was necrotic. Access preparations also showed that the pulp tissue was necrotic. Because of the results of the study by Andreasen et al. (11), the negative pulp tests, and the possibility of failure from periapical inflammation, apexification treatment was started and endodontic treatment completed later.

In autotransplantation cases it is important to transplant the tooth as quickly and as atraumatically as possible to diminish the chance of ankylosis and root resorption. In all cases of transplantation, patient selection, minimal operating time, and good oral hygiene will increase the chances for a successful prognosis.

SUMMARY

This case presents the successful autogenous transplantation of a maxillary third molar and a mandibular third molar to replace nonrestorable mandibular first molars in which apexification was necessary. The transplanted teeth were restored with cuspal coverage. A 14-month recall showed that the transplanted teeth were fully functional with no periodontal or periapical disease.

The opinions expressed herein are those of the authors and are not those of the United States Air Force or the Department of Defense.

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