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Orthodontic space closure of lost traumatized anterior teeth – case report

CASE REPORT

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Avulsion of teeth following traumatic injuries is considered a severe trauma, and the recommended treatment in the permanent dentition is the replantation of the lost tooth, whenever possible (1, 2). The prognosis for each replantation depends on the extra-alveolar period and storage media of the avulsed tooth. Several complications might occur, such as pulp necrosis, internal and external resorption (3–5).

Some favourable reports can be found regarding cases of replantation in which the teeth remain vital and with their periodontal ligament intact for a lifetime (3). However, for those cases in which the adequate protocol could not be applied right after the avulsion, a subsequent root resorption of the reimplanted tooth resulting in a tooth loss is likely to occur (4, 6).

In cases of unsuccessful replantation when the loss becomes an aesthetic and functional problem, particularly for anterior teeth, orthodontic treatment should be considered, along with restorative procedures (6, 7).

Case report

An 11-year-old boy suffered from avulsion of his upper left central and lateral incisors after fallen from a horse. Replantation of the teeth was delayed for 4 h due to a head injury with neuralgic complications. The teeth were kept in saline during the pertinent examinations were being performed in the hospital. In the dental surgery, the teeth were replanted and then immobilized with a semi-rigid splint for a period of 12 days. Removal of the splint and pulpectomy in both incisors were performed, and the root canals were filled with calcium hydroxide in the same visit. The temporary fillings were changed at 60-day intervals for 6 months. The canals were finally obturated with gutta-percha and root canal sealer. There were no signs of root resorption at that stage.

Intra-oral radiographs 2 years after injury showed almost complete external progressive root resorption of the replanted teeth (Fig. 1) and the boy was referred for orthodontic treatment. He had a normal occlusion with spacing in both jaws and slight protrusion of the anterior



Fig. 1. Pre-treatment intraoral photograph.

teeth (Fig. 2). Since two teeth in the anterior region had to be extracted, the treatment objectives were to close some of the spaces by mesial movement of the buccal segments in the upper jaw to minimize bone loss and prepare for a single osseointegrated implant in the future.

Initially, the upper left lateral incisor was extracted. Preadjusted fixed appliance with 0.022×0.028 -in slots (Roth prescription) was bonded to the maxillary and mandibular arches. On the upper left canine was bonded

a bracket with prescription of an upper right canine for helping with mesial movement of the root. Levelling and alignment of the teeth in the upper and lower jaw was performed. A removable plate was used for the mesial movements of the posterior teeth followed by assymetrical elastic traction for the final adjustment of the occlusion (Figs 3 & 4). Finally a good occlusion with coincident upper and lower midlines and upright anterior teeth were achieved. The orthodontic treatment took 35 months. A Hawley plate with an acrylic tooth in the





Fig. 3. Progress: extraction of upper left lateral (left), mesial movement of canine with NiTi coil (right).

Fig. 2. Pre-treatment radiographs.

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Fig. 4. Progress: replacement of extracted upper left central incisor with a removable plate (left), mesial movement of posterior left teeth with coil spring (right).



Fig. 5. Progress: consolidation of anterior spaces.

upper left incisor area was used as an intermediate retainer (Fig. 5). A Maryland bridge was later made as a temporary solution waiting for a future osseointegrated implant when facial growth is completed (8) (Figs 6 & 7).

Discussion

There are different approaches for replacing lost anterior teeth (6, 7, 9). The available treatment alternatives might vary according to the case. Tooth autotransplantation has proved to be a potentially successful technique, once a straight protocol is followed (10, 11). Another option would be the placement of osseointegrated implants when the patient has completed his bone maturation (9). Orthodontic and/or prosthetic rehabilitation would be a third alternative to patients that are still in the growth phase (6).

The option chosen in this case was due to the patient's youth – only 13 years old. Autotransplantation was

considered a risky option because advanced root development of the premolars was present at the time. This option was presented but it was rejected by the family. The immediate replacement of the lost teeth with osseointegrated implants was not a feasible option due to the patient's age. The option to replace two lost teeth for one implant instead of two was based on the fact that, when the posterior teeth adjacent to the lost ones are mesially moved, further bone loss in that area is likely to be minimized, thus avoiding the need for future bone graft in the area (12, 13). Later on, when growth phase is over, the implant option can be considered. Besides, an immediate prosthodontic replacement would be necessary for only one tooth instead of two. The patient would still benefit from orthodontic treatment with some retraction of anterior teeth.

Selecting the appropriate option depends on the occlusion, specific space requirements, tooth-size relationship, and size and shape of the canine. Orthodontics was focused on positioning the canines to satisfy functional requirements and achieve proper aesthetics (8). Once orthodontic treatment was concluded, a transitory restorative approach was carried out with a Maryland bridge, recovering the aesthetic appeareance and preserving tooth structure.

From an aesthetic point of view it is possible to recontour most canines to a clinically satisfactory shape. Perhaps more important are the functional considerations, since the replacement of upper lateral with canines usually create an excess of upper maxillary teeth (14). At this moment a more extensive grinding of the upper left canine was performed on the canine cusp and on the labial.

Thordarson et al. (15) have demonstrated that extensive cuspal, labial, lingual, and interproximal recountouring by the grinding of young teeth associated with orthodontic treatment can be performed with no



Fig. 6. Post-treatment intraoral photograph (left) and radiograph (right).

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Fig. 7. Hawley retainer with replacement of upper left central (a, b). (c) The post-treatment panoramic radiograph.

discomfort to the patients and with only minor or no long-term clinical and radiographic reactions.

Despite the awareness of the possibility of root resorption on a severe traumitized dentition, the option of treating the patient orthodontically was also to prevent future trauma on a patient that has proclined teeth (16).

The upper left canine was reshaped to appear like the upper lateral incisor, and the first pre-molar lingual cusp was adjusted to the patient's occlusion. Intrusion of the upper left first premolar and composite resin built up on the incisal could be also have been done on this case, for further aesthetic improvement as previously described by other authors (8, 17, 18).

Prosthetic rehabilitation occurred only 6 months after the completion of orthodontic treatment, allowing some teeth to move. As a consequence of occlusion adaptation, there was a slight shift in the upper midline. Even so, both patient and parents were very pleased with the achieved results.

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