Spontaneous Alveolar Bone Growth In Ankylosed, Infra-Occluded Teeth After Elective Decoration - A Clinical Case-Series

M. Musaab Siddiqui¹, Mital Patel², Shakeel Shahdad²
¹MClIndent Prosthodontics, ²Consultant in Restorative Dentistry

Introduction

Following an avulsion injury anterior teeth are often re-implanted back into the socket. If the extra-oral time has been greater than an hour, ankylosis and replacement resorption of the root dentine often takes place. In adolescents where growth is still not complete this results in infra-occlusion of the tooth and localized arrest of alveolar bone growth. This results in a significant orthodontic challenge in terms of trying to replace the tooth, once the patient has stopped growing, with a fixed restoration that is aesthetically in harmony with the surrounding dentition in terms of the dento-gingival complex.

The aim of this case series is to present three cases in which infra-occluded maxillary central incisors were treated with elective decoration to promote vertical alveolar bone development whilst preserving bone to allow replacement of the tooth with a dental implant in the correct 3D position and result in an aesthetically acceptable outcome.

Case Description

Case 1: 17 year old male suffered avulsion of his UR1 at the age of 13. Following replantation, the tooth was discoloured, infra-occluded with compromised aesthetics.

Case 2: 16 year old male with traumatic luxation to UR1 which maintained a position palatally and apically compared to the remaining anterior dentition. UL1 had avulsed and not replanted. Attempts at distraction using orthodontic forces to correct the vertical bone deficiency had failed. Aesthetic challenge owing to missing centrals and space constraints.

Case 3: 17 year old male suffered avulsion of UR1 at the age of 11. Following replantation the tooth became infra-occluded due to ankylosis. Again, attempts at distraction using orthodontic forces to correct the vertical bone deficiency had failed.

Decoration Technique

Based on a modification of the technique described by Malmgren et al., 1984

- Minimal flap elevated buccal and lingual to ankylosed tooth
- Crown of the tooth removed leaving no enamel
- Root is left at the level or just below the bone crest
- The pulp or existing root filling is fully removed with endodontic files
- Bleeding induced within canal to encourage internal replacement resorption
- Socket seal achieved using a free gingival graft from palatal or porcine collagen matrix (Macrograft®)

Once the patients reached skeletal maturity, dental implants were placed with simultaneous guided bone regeneration (GBR) using deproteinised bovine bone and porcine collagen membrane.

The implants were restored after 8 weeks of submerged healing.

Changes In The Dento-Gingival Complex

<table>
<thead>
<tr>
<th>Discrepancy in gingival zenith between ankylosed tooth and adjacent central incisor</th>
<th>CASE 1</th>
<th>CASE 2</th>
<th>CASE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-decoronation</td>
<td>3mm</td>
<td>8mm</td>
<td>5mm</td>
</tr>
<tr>
<td>Post-decoronation and pre-implant surgery</td>
<td>0mm</td>
<td>3mm</td>
<td>1mm</td>
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<tr>
<td>Post restoration</td>
<td>0mm</td>
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Discussion

- Ankylosis or replacement resorption replaces the tooth with bone to allow bone volume to be maintained
- In adolescent patients ankylosis can arrest vertical bone growth
- Extraction at this age results in extensive horizontal & vertical bone loss
- Extraction of ankylosed teeth in older patients results in significant alveolar trauma
- Decoration allows the tooth to be replaced by replacement resorption whilst preserving horizontal volume and allowing vertical bone growth
- The cases presented illustrate the improvement in soft and hard tissue following decoration and implant placement
- All cases showed vertical bone apposition coronal to the retained root
- As well as clinical advantages decoration is cost effective as none of the cases presented required invasive staged or vertical augmentation procedures
- The success of decoration encourages re-implantation of avulsed teeth where the extra-oral time has been greater than one hour and the risk of ankylosis is high

References