

Orthodontic treatment of relapse using the preinserted endosseous dental implants

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ABSTRACT

In contemporary dentistry, endosseous implants are widely used to replace missing teeth with a survival rate of 90-95%. With a proper diagnosis and treatment plan, osseointegrated implants can also be used as an absolute anchorage in order to obtain orthodontic tooth movement. The aim of this case report is to present the multidisciplinary treatment of a patient whose teeth were relapsed after comprehensive orthodontic treatment and endosseous implant insertion. A 16 year –old caucasian female patient with two congenitally missing lateral incisors and retrognathic maxilla had been treated with fixed orthodontic appliances. Following the orthodontic therapy 2 endosseous implants were inserted and Hawley retainers were fabricated and prescribed for full time wear. During the osseointegration period of the implants patient did not use the retainers and a relapse occurred as a result. After consultation with the prosthodontists dental implants were decided to be used as anchorage unit to align the relapsed teeth and detail the occlusion. Temporary crowns were fabricated over the implants and maxillary teeth were banded and bonded. After 6 months of treatment an acceptable occlusion was reestablished. The stability of the dental implants were not affected during the orthodontic force application. Full length porcelain veneer crowns were inserted at the end of orthodontic treatment. When the implants are used as an anchorage unit, formation of a horizontal force vector due to rotational moments is inevitable. However, weak horizontal forces (25-50 gr.) in order to obtain tooth movement did not affect the stability of the dental implants.

Keywords: Endosseous implants, congenitally missing lateral incisor, face mask, relapse, absolute anchorage.

INTRODUCTION

In contemporary dentistry, endosseous implants are widely used to replace missing teeth with a survival rate of 90-95%. They have been accepted in the literature as a very good alternative to conventional prosthetic restorations. With

a proper diagnosis and treatment planning, osseointegrated implants can also be used as an absolute anchorage in order to obtain orthodontic tooth movement.¹ In orthodontic treatment, anchorage control is the key for successful outcomes. Dental implants, due to their osseointegration in bone, are known to serve as firm anchorage devices.²

Decades ago, the idea of using dental implants to reinforce orthodontic anchorage has led to encouraging results.^{3,4} This case report presents the multidisciplinary treatment of a patient whose teeth were relapsed after endosseous

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implant application following a comprehensive orthodontic treatment.

MATERIALS AND METHODS

A 16-year-old Caucasian female patient presented with a chief complaint of two congenitally missing maxillary lateral incisors. She had concave profile due to retrognathic maxilla (fig 1A-H). Treatment plan consisted of opening of the spaces for lateral incisors, leveling and aligning the

dental arches. She was treated by fixed orthodontic appliances. Following the orthodontic therapy, two endosseous implants (Frialit, Xive; diameter: 3, 4 mm, height: 13 mm) (fig 2) were inserted in maxillary anterior region for rehabilitating laterally edentulous spaces and Hawley retainers were fabricated and prescribed for full time wear.

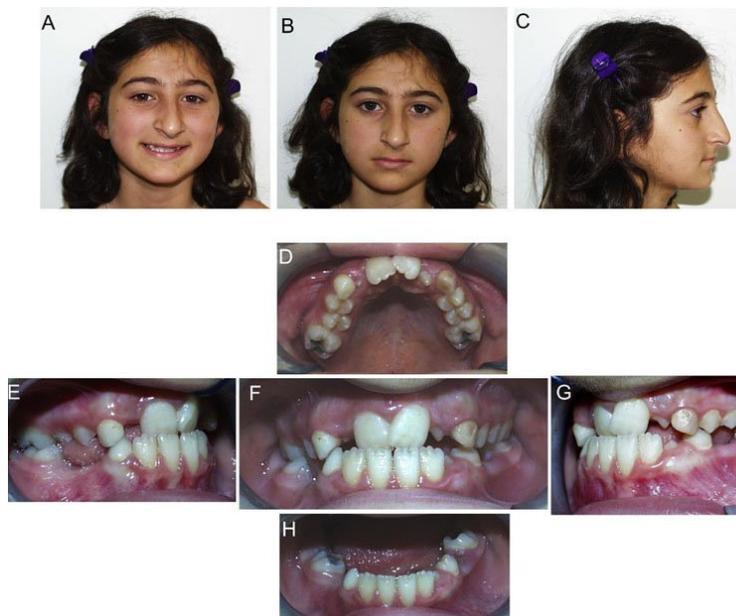


Figure 1. Pretreatment view of the patient.



Figure 2. Panoramic radiograph after implant replacement.



Figure 3. Intraoral view of the patient after replacement of gingiva former.

During the osseointegration period of the implants patient failed to use the retainers and as a result relapse occurred (fig 3A-D). After consultation with Department of Prosthodontics and Department of Oral & Maxillofacial Surgery, dental implants were decided to be used as an anchorage unit to align the relapsed teeth and to detail the occlusion. Temporary crowns were fabricated over temporary abutments by using cold cure acrylic. Then temporary crowns were banded (fig 4A, B).



Figure 4. Temporary crowns were banded.

Maxillary teeth except the lateral incisors were bonded with 0.018×0.30 inch edgewise brackets. Initial leveling and alignment were treated by performing 0.016 inch NiTi arch wire, 0.016×0.16 NiTi arch wire, 0.016×0.022 stainless steel, in sequence; and a lingual arch was placed on the patient's mandibular arch (fig 5). After the leveling of maxillary anterior teeth, patient was prescribed to wear class II elastics in order to detail the posterior occlusion. A force of 200 gr. for each side was applied from maxillary anterior to mandibular posterior region.



Figure 5. Lingual arch was placed.

At the end of treatment, another osseointegrated implant insertion for the lower left second molar region was recommended to the patient. However, due to economic reasons patient opted out of this treatment plan.

RESULTS

No movement of the implants occurred during force application and they were radiologically and clinically intact at the end of the orthodontic loading. After 4 months of orthodontic treatment an acceptable occlusion was reestablished.

Patient was then referred to the Department of Prosthodontics for the fabrication of implant fixed prosthesis. In-Ceram all ceramic crowns were inserted over the implants at the end of orthodontic treatment for the relapse (fig 6A-H).

DISCUSSION

Optimal anchorage control is considered to be a major factor at success of orthodontic treatment procedures.⁵⁻⁸ Clinician could prefer extraoral and/or intraoral anchorage appliances, dental or skeletal anchorage as treatment progress of the patient. However, traditional anchorage resources, such as headgear or facemask, require patient compliance, which if not forthcoming may result in unpredictable treatment outcomes.⁹ Thus recently, due to supplying absolute anchorage and independent from patient compliance, the use of various types of implant including bone screw, bone plates, palatal implants and endosseous dental implants for orthodontic anchorage became widespread.

Osseointegrated palatal implants have been used for molar distalization in the literature.¹⁰⁻¹² These palatal implants were also stable after the application of orthodontic force; but at the end of the distalization these were removed with a drill. First aim of using osseointegrated palatal implants is to create absolute anchorage unit for applying orthodontic forces. In the current case, orthodontic

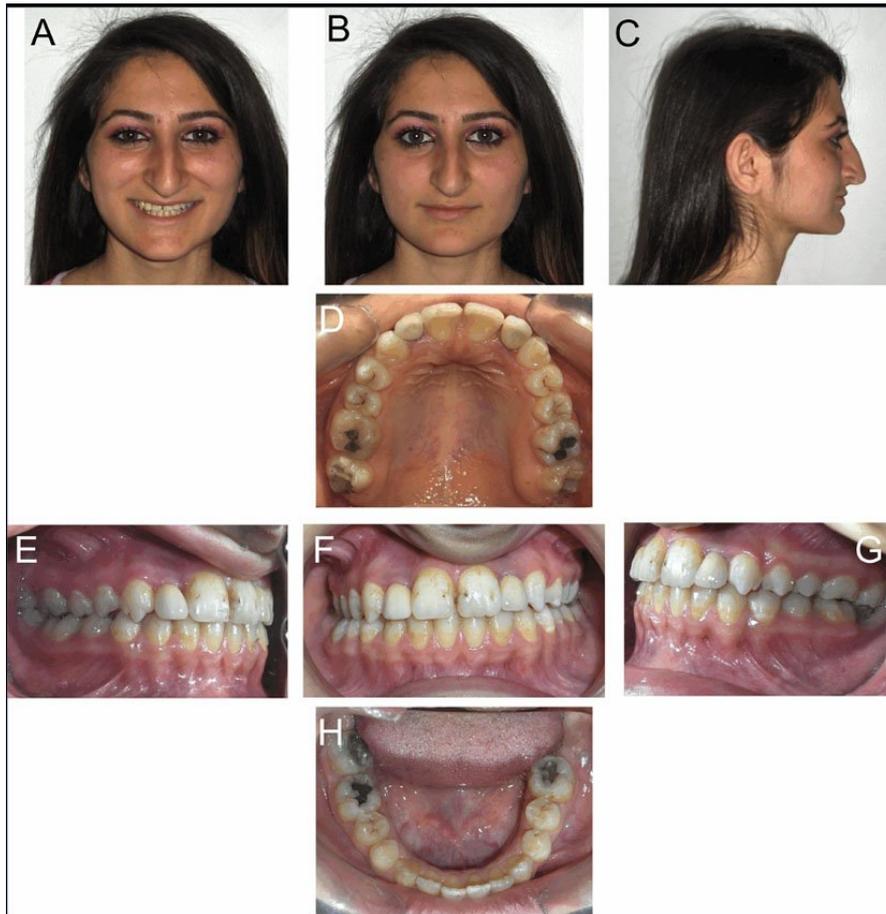


Figure 6. Final view of the patient after orthodontic and prosthetic treatment.

treatment of the patient was finished and relapse was treated using an endosseous dental implant, which was already placed for prosthodontics treatment of the congenitally missing maxillary lateral regions.

A few case reports, especially about patients with partial edentulous regions, concerning the use of endosseous implants for orthodontic anchorage have been reported in the literature.^{2,13-15}

Odman et al. used osseointegrated implants for performing tipping, torquing, rotation, intrusion, extrusion, and those associated with bodily movements in nine partially edentulous adult patients.¹³ After obtaining the desired teeth movement, osseointegrated dental implants were left in place for further dental restorations.

Uribe et al. used endosseous dental implants for intrusion of the anterior

teeth.¹⁶ In their report, the adult patient, who had excessive gingival display on smiling and at rest, was treated. Two maxillary endosseous dental implants were placed, one in the right first molar area and the other in left first premolar site. And he expressed that significant tooth movement was achieved when intruding the incisors from endosseous molar implants without any complications around the implants.

CONCLUSIONS

Vertical loading of an implant produces the lowest stress to the supporting bone. When the implants are used as an anchorage element, formation of a horizontal force vector due to rotational moments is inevitable. However, weak horizontal forces (150-200 gr.) in order to obtain tooth movement compared to heavy chewing forces did not affect the stability

of the dental implants.^{17,18} In the present case, we have not observed any detrimental effect on stability of the implants and any bone resorption on necks of the implants.

The principles concerning the use of dental implants as part of a multi-disciplinary approach for dental treatment are illustrated. Titanium implants were placed in the maxillary lateral incisor area and following the osseointegration period the implants were used for orthodontic tooth movement. After the completion of orthodontic treatment, the fixtures served as abutments for permanent prosthetic constructions. Although initial results are encouraging, the risks and benefits must be thoroughly evaluated. Further investigations are needed to standardize the treatment protocol.

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