

Extraction of Three Premolars and One Implant to Reduce Bimaxillary Protrusion in an Adult Patient

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ABSTRACT

The purpose of this article was to illustrate the orthodontic treatment in a case of implant removal. When an implant is used as anchorage the treatment alternative does not require patient compliance, but sometimes it becomes a problem in case of removal indication of a good implant made to provide a more functional and attractive alternative than removable prostheses to achieve orthodontic treatment strategy. The results seem to suggest that the extraction of the implant provide a valid treatment procedure for orthodontic purposes in case of osseointegrated implant. Successful treatment results were achieved in the reduction of the bimaxillary protrusion of Angle Class II division 1 subdivision malocclusion with a good gingival and dental result in an adult patient.

Keywords: Protrusion, Extraction, Orthodontic treatment.

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INTRODUCTION

The use of dental implants to treat edentulous and partially edentulous patients with fixed prostheses during orthodontic treatment has increased in recent years.

Ailing and failing implants may be treated in an attempt to preserve the implant. Failed implants must be removed because they are nonfunctional and bone loss will continue otherwise.¹ Some lesions in the apical regions of the implants can be treated successfully using an intraoral apicoectomy procedure.² Antibiotics and detoxification³ are recommended prior to implant removal. However, what should be done in the case of a successfully osseointegrated implant that presents an indication for removal for orthodontic purposes?

An ideal treatment plan should address the patient's chief complaint, provide the longest-lasting and most cost-effective treatment, and meet the patient's expectations. The restoration of function and esthetics to patients has been the main goal of all dental disciplines for decades.⁴ Traditionally, teeth are extracted and replaced with fixed or removable prostheses.⁵ However, problems sometimes arise because dental longevity and health are directly dependent on good oral hygiene and on conscientious dental monitoring and control. In the absence of these practices, tooth loss and pathological periodontal changes may occur.⁶

These esthetic alterations can also affect patients with dental implants and, if the soft tissue anatomy of the buccal

region where the implant is inserted is inadequate, the procedure necessary to achieve corrected esthetics is even more delicate.⁷

In this case, several factors, such as the patient's concern for his or her dental appearance and perhaps the clinician could determine each patient's level of awareness⁸ and the lack of information in the literature regarding dental implant replacement by another implant, reinforce the necessity of individualized treatment plans.^{6,9}

The purpose of this case report was to illustrate the orthodontic treatment provided after successfully osseointegrated implant removal and the extraction of three premolars to reduce bimaxillary protrusion in a Class II division 1 subdivision malocclusion.

CASE REPORT

A healthy 49-year-old female was referred by her clinician with complaints of profile protrusion and difficulty sealing her lips. Her medical history had no contraindications to orthodontic therapy. Her dental history included endodontic treatment in her first left maxillary molar and multiple prosthetic procedures.

An intraoral examination indicated an Angle Class II, 1 subdivision with a mild overjet and overbite. Her maxillary midline was shifted 2.0 mm to the left, and her mandibular midline was deviated 1.0 mm to the right. A facial analysis revealed a convex profile, marked nasolabial lines, with bimaxillary incisor protrusion, and increased lower facial height (Figs 1A to G).

A panoramic radiograph revealed generalized horizontal bone loss and multiple restored teeth. There was no evidence of bone or dental pathology and no defective restorations. The patient had a dental implant in the place of her maxillary right first premolar. All of her third molars were present (Figs 1A to G).

A lateral cephalogram revealed a skeletal Class II relationship (ANB angle, 5°), mandibular retrognathism and a high mandibular plane angle (FMA, 35°). The maxillary incisor-to-NA angle was 24°, and the maxillary incisor-to-NA distance was 10.0 mm. The patient had protruded anterior maxillary teeth, with a mandibular incisor-to-NB angle of 41° and a mandibular incisor-to-NB distance of 14.0 mm, which confirmed the presence of protruded mandibular teeth and a convex profile (Z-angle of 71°; Table 1).

The treatment objectives were to correct the skeletal discrepancies between the maxilla and mandible, retract the

incisors, maintain a satisfactory overbite and overjet, correct the midline deviation, obtain a stable occlusal relationship, and improve the patient's facial and dental esthetics. Initially, the patient was referred to a maxillofacial surgeon to remove the osseointegrated first maxillary premolar implant and, later, perform space closure.

The surgical implant removal and postsurgical healing phase were uneventful; pain and swelling were the only complaints mentioned by the patient. The subsequent movement proceeded with only intratooth side effects.

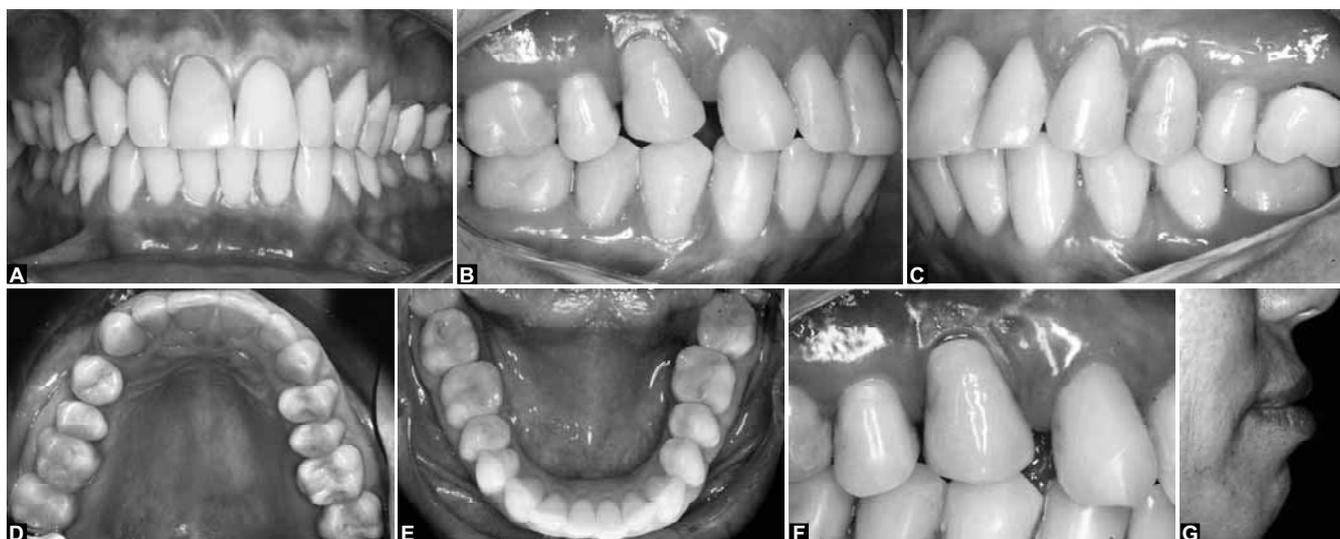
Because the prognosis for implant removal was favorable, the orthodontic treatment began by performing bracket bonding (ROTH prescription 0.022 inch slot). During the alignment and leveling, Class III intermaxillary elastics were used to assist in the space closure of the extraction site and achieve maximum anterior retraction (Figs 2A and B). Asymmetric headgear was used in combination with elastics to correct the right Class II molar relationship. Panoramic and periapical radiographs were used to assess the progress of the treatment and to control for any possible adverse effects in the implant removal region and surrounding healthy tissue. Both the mandibular

and maxillary archwires were closely coordinated in the final stages of treatment (Figs 2A and B). Retention was performed using a wrap around the upper arch and a lingual arch bonded between the canines (Figs 3A to D).

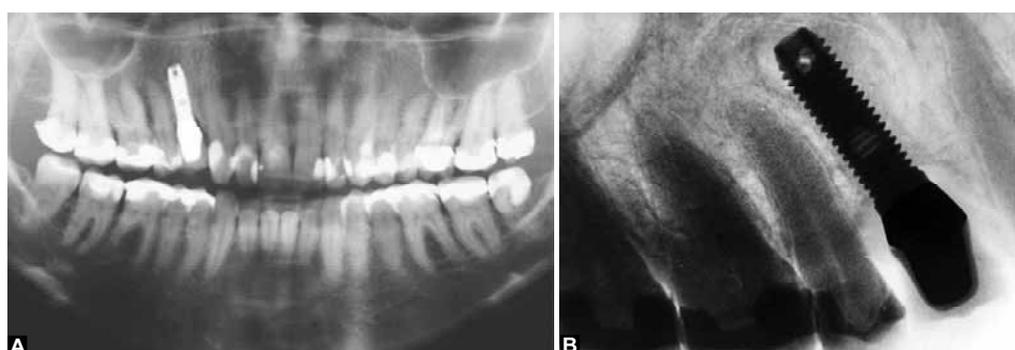
The initial objectives of the orthodontic treatment were achieved through complete occlusal guidance and a Class I molar relationship on the right side. However, a small midline deviation was still present. The implant removal space was closed without any damage to the teeth, alveolar bone, and periodontal and gingival-adjacent tissues. However, compared to the left side, the 'depressed' bone and gums were slightly more pronounced (Figs 3A to D). The main requests of the patient were to reduce the protrusion, improve the sealing of her lips and balance her lower profile, mainly because incisor retrusion (Table 1) has been achieved, as illustrated in Figs 4 to 6. The total treatment time was 35 months.

DISCUSSION

The elapsed time between the installation and failure of the implant should be taken into consideration when deciding a new treatment plan because the decision to replace the



Figs 1A to G: Pretreatment intraoral photographs



Figs 2A and B: Pretreatment panoramic and periapical radiographs

implant is often made when the implant fails quickly. In contrast, patients whose implants fail after a prolonged period of time do not opt for implant replacement. Many factors influence this decision, including advanced age, systemic changes, the need for a bone graft, time for rehabilitation, cost and a low success rate.⁹ Consequently, the premature removal of a failed dental implant, followed by reimplantation, may promote the improved positioning of the new implant and an improvement in esthetic factors, with an emphasis on gingival health and stability.⁹

In the case presented here, unfavorable baseline conditions were present. These conditions included the presence of a dental implant to address the patient's main complaint, which was the convexity of her lower facial profile due to a bimaxillary protrusion. Osseointegrated titanium implants may be used successfully as abutments for prosthetic rehabilitation, and peri-implant tissues may be kept clinically stable for prolonged periods^{10,11} or for a lifetime.

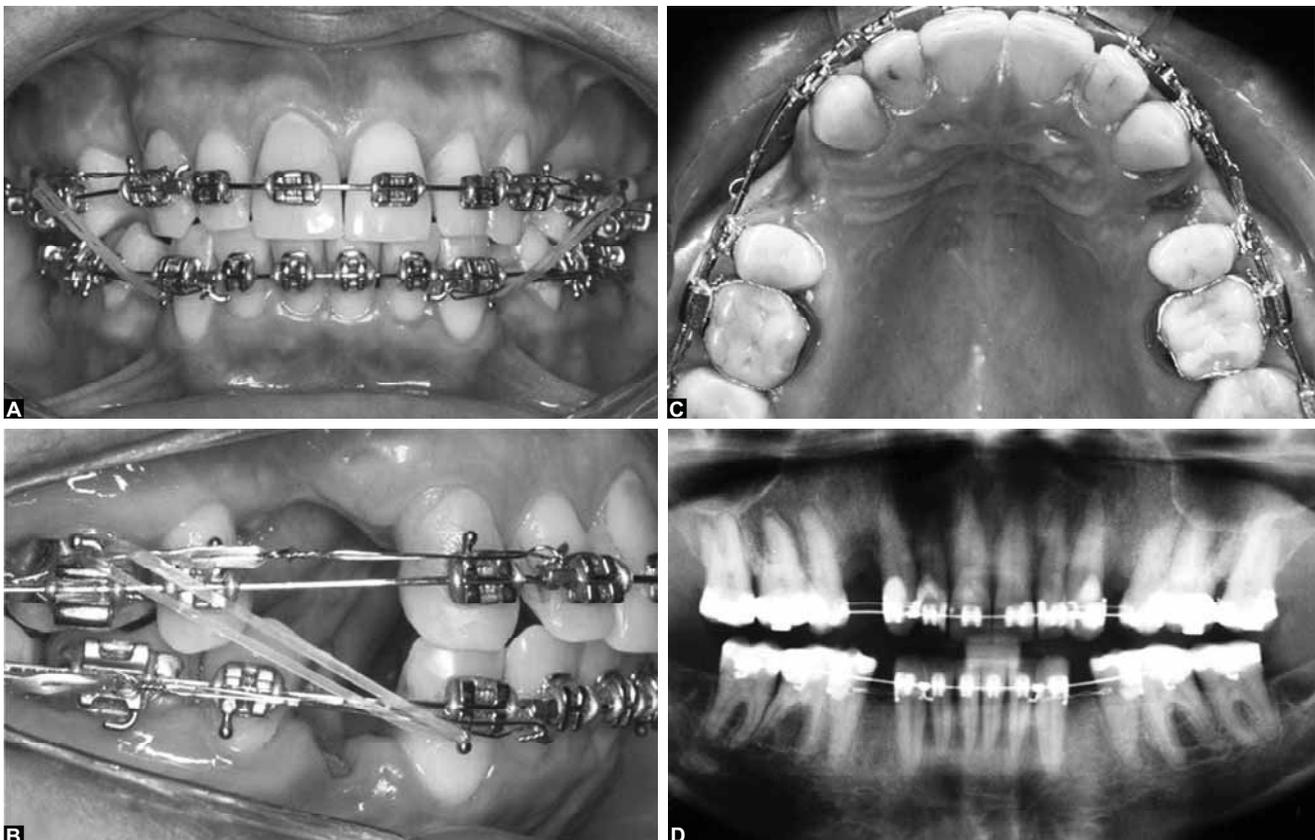
Particular attention must be paid in these situations because, although high success rates have consistently been reported for many implant systems, complications leading to implant loss still occur.¹²

Many of these failures are unrelated to bone quality or to the diameter of the implant. Rather, these failures are related to the operator's experience with various implant

designs, changes in technique and indications for the use of short implants.¹³

The decision of the clinician and patient to remove a dental implant should take several factors into account: age, health, the patient's comfort with and perceptions of the orthodontic treatment, the condition of the surrounding bone and anatomical structures, an assessment of any potential procedural complications, any required adjunctive procedures and their additional cost, and data regarding treatment outcomes.⁹

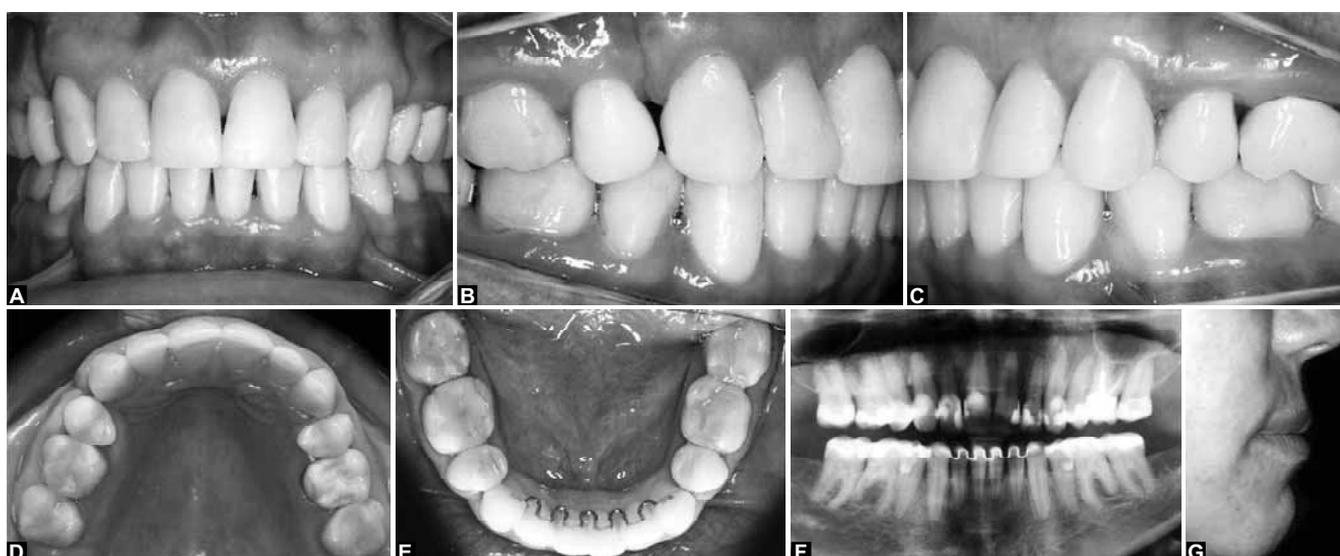
Normal	49.3	52.6	
SNA	82	82	82
SNB	80	77	77
ANB	2	5	5
SnGoGn	32	44	42
FMA	25	35	32
IMPA	90	98	84
1.NA	22	24	14
1-NA	4	10	4
1.NB	25	41	24
1-NB	4	14	8
Pog-NB		10	3
1.1	130	110	137
1 A-PO	1	10	3
LS-S	0	3	0
LI-S	0	6	2
Z angle	75	62	71



Figs 3A to D: Progress photograph after the extraction



Figs 4A to D: Photograph after the closing of the intermediate spaces and panoramic radiographs



Figs 5A to G: Post-treatment intraoral photographs and panoramic radiographs

In the case study discussed here, the need for alveolar bone augmentation was also considered. Excellent soft tissue healing occurred, with a stable mucogingival junction relative to the adjacent teeth. This healing helped preserve the interproximal papilla.

This case report suggests that implant extraction is a procedure that can provide satisfactory clinical success in some patients and demonstrates the importance of a multidisciplinary approach.¹⁴ The extraction site had

fenestrations or dehiscences in the bone walls, and a residual gap was present between the surrounding bone walls of the maxillary canines and molars.

It is important to remember that the conclusions drawn from this case report cannot be generalized. More cases and longer term cases are needed to support the hypothesis obtained here and to support the use of this technique for other clinical cases of successfully osseointegrated dental implants.

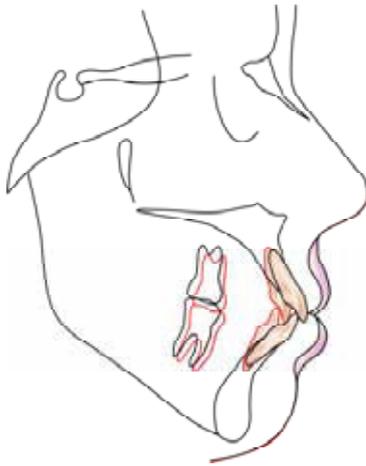


Fig. 6: Final superimposition

The decision to remove the implant achieved bilateral symmetry. The asymmetric alterations make teeth more unattractive to not only dental professionals but also the lay public and as clinicians; we must remember that not everything that we believe should be corrected in the name of esthetics will be perceived by most of the lay public. Our concluding words should probably be: alter tooth position and restore with caution.⁸

CONCLUSION

These results suggest that implant extraction is a valid orthodontic treatment for osseointegrated implants. The authors emphasize that a successful treatment resulted in a reduction in Angle Class II bimaxillary protrusion and subdivision malocclusion with good gingival and dental results in an adult patient.

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