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Multidisciplinary Management of Limited Interocclusal Space: A Clinical Report

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Abstract

Prosthetic management of partial edentulism can be challenging with the presence of limited interocclusal space. The extrusion of opposing teeth combined with the alveolar extrusion of the edentulous areas reduces the space needed for fabricating a removable or fixed prosthesis when edentulous areas are present in the maxilla. This clinical report describes the treatment provided to a patient who presented with a limited interocclusal space on the posterior right quadrant. Before prosthetic rehabilitation, mandibular right posterior teeth were intruded, and the maxillary right posterior alveolar crest was reduced by alveoloplasty. After gaining adequate space, prosthetic rehabilitation was completed with a maxillary removable partial denture. During the 2-year follow-up period, the patient's chewing functions and physical appearance improved, and no complications occurred.

The prosthetic rehabilitation of partially edentulous patients may be challenging when the interocclusal space is limited. When posterior teeth are extracted, and the emergent edentulous space is left untreated for a long period, supraeruption, drifting, tipping, and rotation of neighboring and opposing teeth and/or the alveolar extrusion of the edentulous areas can reduce the space needed for fabricating removable partial dentures.[1-3] Due to supraeruption of teeth, the mucosa of opposing edentulous segments may come in contact, making prosthetic treatment with conventional methods impossible.[4] Regaining the lost interocclusal space is a requirement for successful treatment in these cases. Interdisciplinary approaches, such as reduction of the overerupted teeth, which may require a combination of endodontic treatment, periodontal surgery, and fixed prosthesis afterwards; extraction of the overerupted teeth; surgical reconstruction of the edentulous space; and orthodontic intrusion of the extruded teeth have been suggested for regaining the original space.[1,3,5-7] Clinical examination should include the observation of specific wear patterns that may have affected the decrease in occlusal vertical dimension (OVD). If an increase in OVD is feasible for regaining lost interocclusal space, this modality should be followed up by provisionalization for several months before final treatment.[5] Intrusion of the extrusive opposing teeth orthodontically is the most conservative, but also the most difficult and long-acting, treatment option;[6,7] however, it is ideal to replace supraerupted teeth to their original position by orthodontic intrusion without damaging them.[4] Anchorage from dental implants can be used not only to restore edentulous areas, but also to achieve extrusion or intrusion of natural teeth, improving difficult situations for prosthodontic treatment and offering a constructive long-term prognosis.[8]

This clinical report illustrates an interdisciplinary approach for the rehabilitation of a patient with a limited interocclusal space requiring implantology, orthodontics, and prosthodontics teamwork.

Clinical report

A 52-year-old partially edentulous female patient with a limited interocclusal space on the right posterior region presented to the Faculty of Dentistry at Istanbul University for prosthetic rehabilitation. Her medical situation revealed menopause, and she was undergoing hormone replacement therapy. Clinical examination, panoramic radiograph, and mounted diagnostic casts transferred to a semiadjustable articulator (IML ARTI S4, IML-Instrumenta Mechanik Labor System GmbH, Wiesloch, Germany) after face-bow transfer, revealed a partially edentulous maxilla (Class II Prosthodontic Diagnostic Index for Partial Edentulism classification, American College of Prosthodontists)[9] and a fully dentate mandible, excepting teeth 19 and 20,

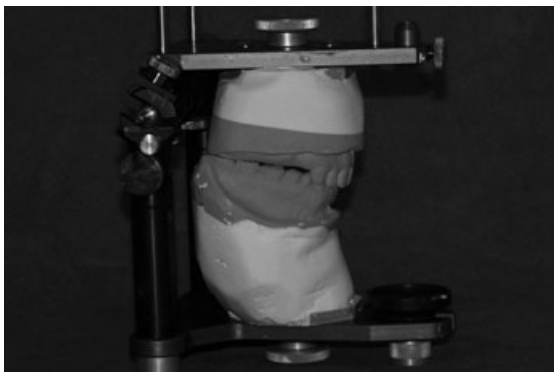

Figure 1 Right view of mounted diagnostic casts, which were transferred to a semiadjustable articulator using a face-bow transfer.

which had been rehabilitated with a 4-unit fixed partial denture (FPD) (Figs 1 and 2). A limited interocclusal space was seen in the posterior right side due to the extrusion of teeth 29–31 toward the maxillary edentulous alveolar crest (Fig 3). Adequate interocclusal clearance for prosthodontic management was observed on the left posterior maxillary segment.

After clinical evaluation, consultation with the Department of Orthodontics, and discussion with the patient, intrusion of the mandibular right second premolar and molars was planned prior to prosthetic rehabilitation. Three microimplants (Ortho-C Implants, IMTEC Corp., Ardmore, OK) were placed on the buccal side of each tooth to be intruded for orthodontic anchorage (Fig 4). Since only 3 to 4 mm of interocclusal distance was assumed to be gained by orthodontic treatment, the reduction of the maxillary right posterior alveolar crest by alveoloplasty was performed to gain an additional 3 mm at the same time.

Two weeks after the insertion of microimplants, the 4-unit FPD on the mandibular left posterior quadrant was removed and cut into three pieces. The pontics were eliminated, and the remaining two crowns were recemented to teeth 18 and 21. A lingual holding arch with 1-mm diameter (3M Unitek, St. Paul, MN) was used for support. A medium intrusive force (150 to 200 g) was applied with the elastic chain (3M Unitek) between the microimplants and attachment of the molar band. The intrusion process was completed in 4 months, and sufficient interocclusal space was obtained in the posterior right side. Following the removal of the microimplants under local anesthesia, leveling of the adjacent teeth was performed with the appliance of Roth appliances (3M Unitek) and by using Ni-Ti and SS archwires (3M Unitek) in regular sequence (Fig 5). Four months later, sufficient correction was obtained. Roth appliances and archwires were removed, and the patient was ready for prosthetic rehabilitation (Fig 6).

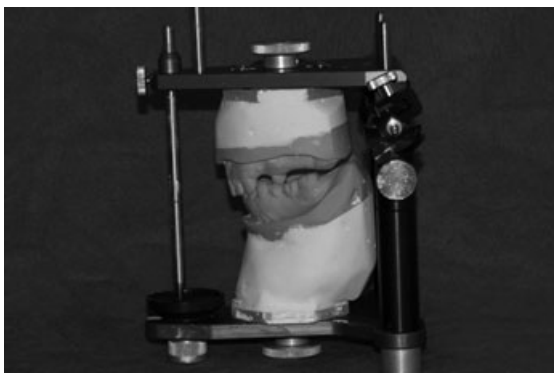

Figure 2 Left view of mounted diagnostic casts.

Since a slight mobility was observed on tooth 21, the authors decided to substitute the 4-unit FPD on the mandibular left side with a 5-unit FPD including tooth 22. Following the preparation of teeth 6, 11, 13, 18, 21, and 22 with chamfer margins, definitive impressions were made using vinylpolysiloxane impression material (Brecision; Bredent, Senden, Germany). The master casts were poured in die stone (Moldano, Heraus Kulzer, Hanau, Germany), and a 3-unit FPD and single crown with distally incorporated attachments (Ceka; Alphadent, Antwerpen, Belgium) for the maxillary arch (Fig 7) were cast with a base metal alloy (Wiron 99, VMK 68; Bego, Bremen, Germany). After the try-in of the metal casting for passive fit, an impression was made with the metal castings using an irreversible hydrocolloid (Alginoplast, Heraeus Kulzer, Hanau, Germany). The impression was poured in dental stone (Moldano), and the maxillary removable partial denture (RPD) framework was cast in a Co-Cr alloy (Vitallium 2000; Dentsply Austenal, York, PA), finished and polished on the external surfaces only. Following the maxillomandibular relationship record[11] and transfer into a semiadjustable articulator (IML ARTI S4) by using a facebow transfer, the single crown and the 3-unit FPD were veneered with low-fusing dental ceramic (Omega 900, Vita Zahnfabrik H. Rauter GmbH & Co. KG, Bad Sackingen, Germany), and artificial teeth were arranged. The trial arrangement was evaluated intraorally for esthetics, phonetics, OVD, and centric relation. The metal porcelain single crown and 3-unit FPD were glazed, and the maxillary RPD was processed using a heat-polymerized denture base acrylic resin (Meliodent Heat-cure Denture Base Material, Heraus Kulzer), and finished (Fig 8). The mandibular edentulous space was rehabilitated with a 5-unit metal ceramic FPD using routine clinical procedures. The crowns were cemented (Harvard cement, Richter & Hoffmann, Berlin, Germany), and the maxillary RPD was delivered (Fig 9). The patient was instructed in maintenance and hygiene procedures associated with the maxillary RPD. The routine recall appointments were scheduled on a monthly basis, and no complications occurred during the 2-year follow-up period (Fig 10).

Discussion

Reduced interocclusal or interarch distances are often encountered in patients who lost their teeth at different times and did not have any rehabilitation.[1,2] This situation is a challenge for clinicians, especially when the OVD cannot be increased. Understanding OVD and how and when it can be changed has always been a difficult prospect for the clinician. The decision whether the OVD can be elevated can be made by evaluation of the freeway space and extraoral examination of the patient.[10–12] Although some authors suggest that in some cases a 3- to 4-mm rise of the OVD is tolerated well by the temporomandibular joint and the masticatory system,[13] it is often preferable to keep the ideal OVD,[14] as in the present case.

Figure 3 Limited interocclusal space in the posterior right side of the patient.

Figure 4 Intraoral view of the microimplants after insertion.

Figure 5 Leveling of the adjacent teeth with the appliance of Roth appliances.

Figure 6 Intraoral view of the treatment site after intrusion and alveoloplasty.

Figure 7 View of 3-unit FPD and single crown with distally incorporated Ceka attachments.

Figure 8 View of the finished maxillary RPD.

Insufficient space for prosthodontic treatment can sometimes be improved by the combination of several treatment modalities, as successfully done in the present case. Since the teeth where orthodontic intrusion was planned had been healthy, extraction was not considered. A massive alveolar resection for the generation of interarch distance is not indicated, unless excessive tissue amount is present as in a tuberostosis situation, since the residual alveolar crest would be necessary for denture

Figure 9 Final intraoral view of the patient after treatment.

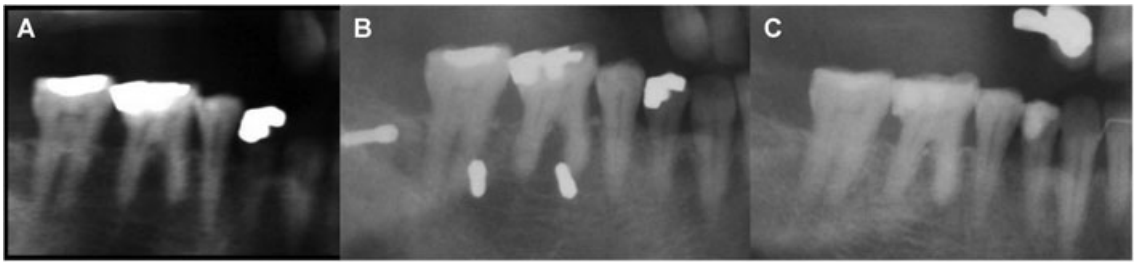

Figure 10 Radiographs of the patient during treatment showing the amount of intrusion. A: initial radiograph before treatment B: radiograph after the insertion of microimplants C: final radiograph after intrusion.

support or a prospective implant treatment. Therefore, such an extensive alveoloplasty was not considered in this case.

The use of a precision attachment-retained maxillary RPD eliminated the use of visible clasps and improved the esthetic appearance of the patient. Additionally, the choice of Ceka as the attachment type made it possible to use the single tooth 6 as an abutment, since the crown-root ratio was favorable. It is known that this attachment type reduces stresses to the abutment tooth to a minimum, as it is positioned close to the center of rotation of the tooth and eliminates the dogmatic use of double abutments.[15]

Successful orthodontic intrusion can only be achieved by a stable anchorage. Using extraoral appliances for anchorage requires wearing the appliance more than 12 hours a day. Therefore, this treatment method is rarely preferred by patients.[2] Various types of dental implants have been proposed for orthodontic anchorage.[8,16] Endosseous implants can only be placed in edentulous areas and retromolar regions, and osseointegration, which usually takes several months, should be perfectly achieved before the use of an implant as an anchorage. Microimplants were preferred as an anchorage in this case because they can be placed in any area of alveolar bone and require minor surgical intervention. The ease of application and reduction of treatment time made the microimplants preferable for use as anchorage.[2,4,5,16]

The disadvantage of a longer duration treatment may be tolerated by the patients easily if they are informed about the stability of the obtained result. The multidisciplinary approach in the management of complicated prosthetic cases seems to reveal successful esthetic and functional results.

Summary

Management of limited interocclusal space represents a challenge in the field of prosthetic dentistry. In the presented case, the result of orthodontic treatment with the use of microimplants showed satisfactory amount of teeth intrusion, which in turn provided sufficient interocclusal space for prosthetic treatment.

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