Preprosthetic Orthodontic Intervention for Management of a Partially Edentulous Patient with Generalized Wear and Malocclusion

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ABSTRACT

Prosthodontic management of patients with generalized wear of dentition has been well documented in the literature. Although prosthodontic treatment is designed to correct minor malocclusion and interdental spacing, patients with severe malocclusion accompanied by generalized wear may require preprosthetic orthodontic intervention. Few articles have described the comprehensive treatment of adult orthodontic patients with severe wear of teeth. This article describes the multidisciplinary management of an adult patient with multiple missing posterior teeth, malocclusion, and severe wear of anterior teeth. Preprosthetic orthodontic treatment was planned using occlusograms, visualized treatment objective, and sectioned diagnostic waxing for movement of teeth, according to the prosthodontic treatment plan. Temporary anchorage devices were used to accomplish complex orthodontic tooth movements. The definitive treatment included reestablishing appropriate esthetics, and occlusion and restoration of the entire maxillary arch and posterior mandibular dentition with metal ceramic and full gold restorations. At a 2.5-year follow-up, positions of teeth and integrity of the restorations remained stable. Importance of preprosthetic orthodontic treatment and challenges in management of complex esthetic and functional rehabilitations are discussed in this article.

CLINICAL SIGNIFICANCE

Knowledge of occlusograms, visualized treatment objectives, and temporary anchorage devices can aid in multidisciplinary treatment planning for complex esthetic and functional rehabilitations.

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INTRODUCTION

Common challenges for treating patients with generalized wear of teeth include malocclusion, missing teeth, loss of occlusal vertical dimension (OVD), compromised esthetics, and limited prosthetic space because of compensatory or supra eruption.[1,2] Treatment of a wear patient with full complement of teeth located in appropriate positions may be simpler than treatment of wear patients with multiple missing teeth and severe malocclusion. This is because adverse movement of adjacent and opposing teeth to the partially edentulous spaces can complicate the occlusal plane and restorative space. Any preexisting skeletal and dental malocclusion of the patient adds to the complexity of the situation. The literature is clear that existence of adjacent teeth is important to maintain the position of an unopposed tooth in buccolingual and mesiodistal directions.[3,4] Teeth adjacent to partially edentulous spaces may move mesially and distally.[4,5] Maxillary teeth tend to tip distally and mandibular teeth tend to rotate mesially. Such adverse movements of teeth can cause occlusal interferences.[4–6] Although prosthodontic treatment can correct minor

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discrepancies of interdental spacing and malocclusion related to tooth position, complex situations can benefit from preprosthetic orthodontic therapy.

Orthodontic therapy has been described in the prosthodontic literature mainly with reference to implant planning and for improvement of anterior esthetics.[7–10] Few reports have described the use of preprosthetic orthodontic treatment before full-mouth rehabilitation.[11] Some of the advantages provided by preprosthetic orthodontics are: (1) prevention of excessive teeth reduction by appropriate superior-inferior and buccolingual positioning of teeth, (2) achievement of optimal size and shape of restorations by appropriate mediolateral positioning of teeth, (3) minimal need for elective endodontics, (4) vertical space gain and less drastic changes in OVD by restorations,[1] (5) proper path of insertion for restorations,[10] (6) appropriate direction of occlusal forces,[10] (7) elimination of the need for extractions of multiple teeth and replacement by prosthesis, and (8) cost-effectiveness from the standpoint of producing more stable, durable, and esthetic restorations.[10]

Occlusograms are a treatment-planning tool, first described in 1976 by Marcotte who credits Burstone for this concept.[12] Only a few reports in the literature have described the use of occlusograms in orthodontic treatment planning.[13,14] Occlusograms are a method of representing different treatment alternatives in two dimensions (anteroposterior and transverse) with reference to the existing teeth positions. Specific objectives of the treatment plan are represented on paper, with the silhouette of occlusal surfaces of the original malocclusion used as a reference to evaluate the magnitude of different orthodontic movements in two dimensions.[12–14] Molar and canine expansion or constriction, lingual or labial movements of anterior teeth, and mesial or distal movements of posterior teeth can be easily represented.

The only dimension not represented in an occlusogram is the vertical dimension.[15] A visualized treatment objective (VTO) is used to illustrate the objectives in this dimension by using a lateral cephalometric radiograph. The VTO can also provide confirmation of the anteroposterior objectives from the occlusogram. Thus, the VTO and the occlusogram together represent a three-dimensional treatment plan where the treatment objectives are clearly illustrated.[15] In complex multidisciplinary treatment planning, the two-dimensional occlusogram can serve as the initial step, as it provides the opportunity to explore different options prior to finalization of the treatment plan; additionally, it saves time in the creation of an accurate diagnostic wax-up.[16]

Temporary anchorage devices (TADs) have been described in the literature for treatment of various orthodontic problems, especially in adults. They are mainly indicated for tooth movements that are considered challenging to achieve with traditional orthodontic mechanics. Significant intrusion of the posterior segments is perhaps the primary indication of all. Corrections of anterior open occlusion (open bite) through molar intrusion have shown excellent results with TADs, such as miniplates and miniscrews.[17–22] Because intrusion of posterior segments has been associated with treatment of anterior open occlusion, the same concept can be applied to a tooth or group of teeth that have shown supraeruption to the opposing arch.[23,24] The advantages of a TAD over regular endosseous implants is that they afford the opportunity to be placed right from the beginning of orthodontic treatment and provide the necessary anchorage for tooth movements. Although definitive endosseous implants can be used to accomplish the same objective, they require careful planning, ideal execution, and, sometimes, osseous site development prior to implant placement. This can often prolong the duration of the treatment and increase treatment expenses. Furthermore, malposition or misangulation of the implant by even a few millimeters in order to obtain the best bony support may jeopardize the final treatment outcome.[16] Additionally, if a patient receives traditional fixed dental prostheses (i.e., without implants), TADs become the sole option for anchorage to achieve intrusion in the buccal segments.[16]

The purpose of this clinical report is to describe the technique and application of preprosthetic orthodontic intervention for management of a complex esthetic and functional rehabilitation.

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FIGURE 1. Pretreatment smile of the patient showing compromised esthetics and occlusal plane.

FIGURE 2. Pretreatment frontal view of the teeth in maximal intercuspation.

CASE REPORT

History and Findings

A 48-year old man presented to the prosthodontist seeking evaluation for spacing in his maxillary anterior region (Figure 1). His medical history was noncontributory without contraindications for dental treatment. Clinical examination revealed that the patient had multiple restored, fractured, and missing teeth in the anterior and posterior region (Figure 2). He had been missing teeth #4, #7, #16, #19, #30, and #31 for several years. Teeth adjacent to the edentulous spaces showed rotation and migration in mesial, distal, and occlusal directions (Figures 3A and 3B). Tooth #32 had tipped mesially into the edentulous space of #31, giving the impression that it was a second molar.

The patient revealed a history of bruxism, with clinical signs of wear in the anterior and posterior regions. The length and shape of the maxillary incisors had been compromised due to wear. Based on analysis of occlusal contacts, facial profile, esthetics, phonetics, and interocclusal space, it was ascertained that there was no loss of OVD. The patient's maxillary midline showed a right side deviation of 4 mm from the midline of the face, which was determined by using the tip of the philtrum as the reference.[25] The mandibular midline was coincident with the midline of the face. The left canine region had a Class II relationship, and the right canine had a Class I relationship (Figures 4A and 4B).

The occlusal plane was compromised and a deep vertical overlap was noted. Multiple laterotrusive and mediotrusive interferences were noted, which may have contributed to the patient's bruxism.[1] The patient's maximum intercuspal position and centric occlusion were not coincident, and the discrepancy was less than 0.5 mm. Radiographic examination confirmed tipping of the posterior teeth and also revealed horizontal bone loss in multiple regions (Figure 5). None of the teeth exhibited any mobility. Clinical attachment loss was noted on all molars with maximum probing depth ranging from 3 mm to 4 mm, and oral hygiene of the patient was good. No active dental caries was detected, but the patient's caries risk was high because of the number of restored teeth in the past few years. Clinical photographs were made, and diagnostic casts were prepared and mounted on a semi-adjustable articulator (Hanau Wide Vue, Whip Mix Corp, Louisville, KY, USA).

Treatment Planning

A multidisciplinary team consisting of a prosthodontist, orthodontist, endodontist, and periodontist was involved in formulating treatment options for the patient. A definitive treatment plan was presented after a careful analysis of the clinical situation, patient's expectations, and finances. The patient desired fixed prosthetic solutions and wanted to retain as many teeth as possible, which had a favorable long-term prognosis. Therefore, he was educated and counseled to first

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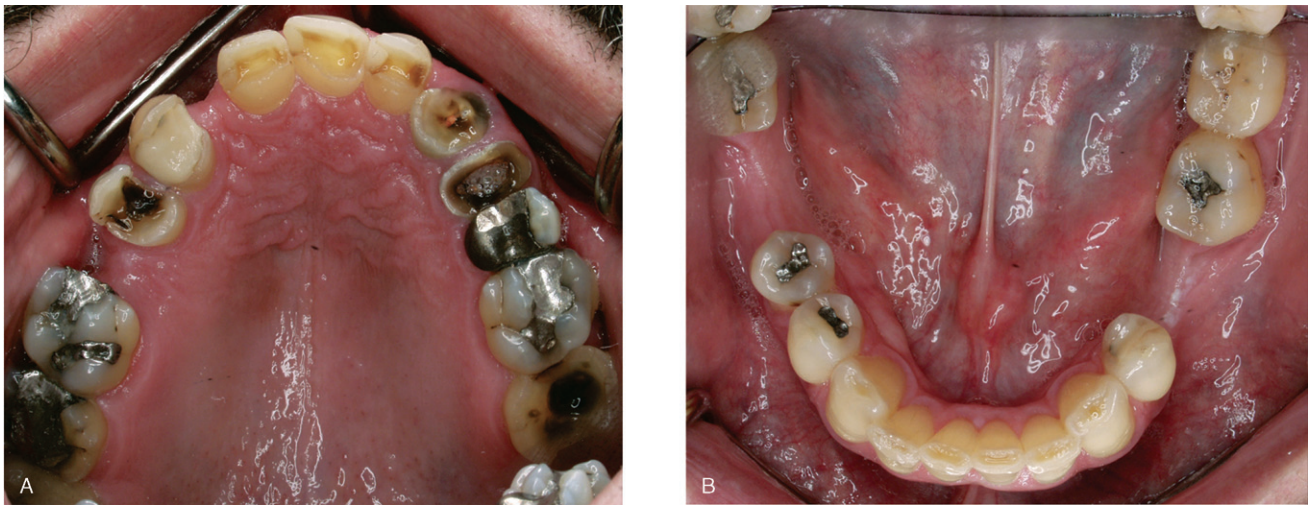

FIGURE 3. A, Pretreatment occlusal view of the maxillary teeth. Note multiple restored, fractured, and missing teeth. B, Pretreatment occlusal view of the mandibular teeth.

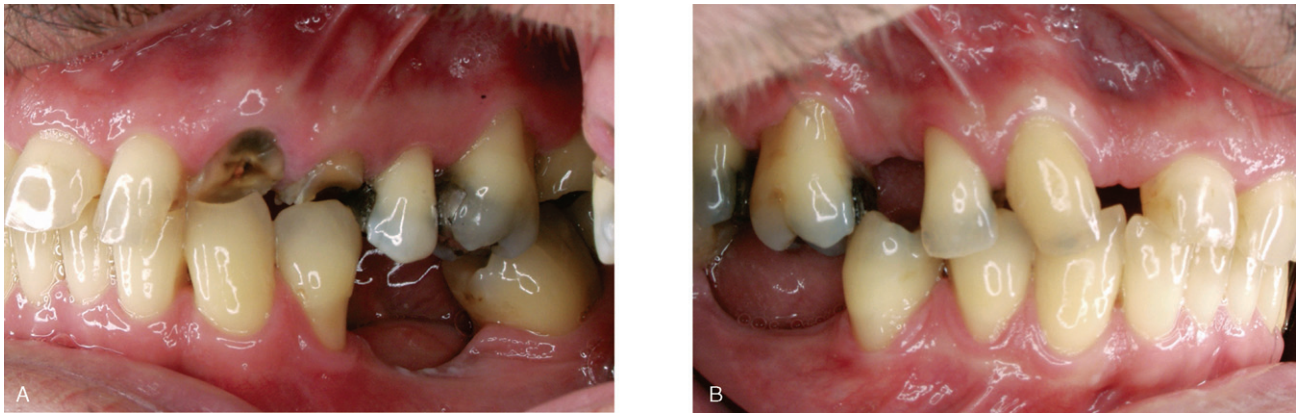

FIGURE 4. A, Pretreatment left lateral view of the teeth in maximal intercuspation. Note compromised occlusal plane. B, Pretreatment right lateral view of the teeth in maximal intercuspation.

undergo preprosthetic orthodontic treatment for correction of the occlusal plane, vertical overlap, midline discrepancy, and appropriate distribution of edentulous spaces.

Periodontal and surgical treatment plans included extraction of teeth #1, #2, #12, #15, #17, and #32. A connective tissue graft was planned in the region of tooth #7 to augment the planned pontic site. Finally, the prosthodontic treatment plan involved restoration of the entire maxillary and posterior mandibular dentition. A metal-ceramic fixed partial denture (FPD) was planned from #6 through #8. The remaining maxillary teeth #3, #5, #9, #10, #11, #13, and #14 were

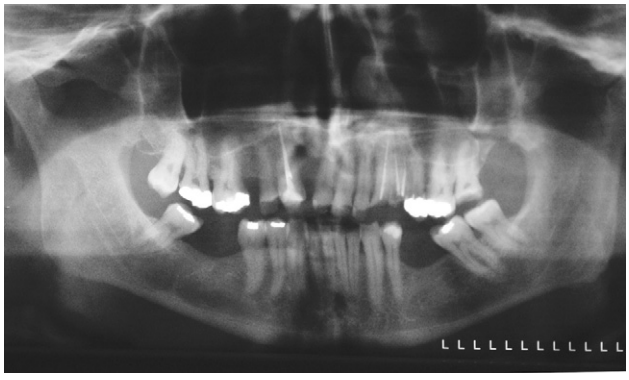

FIGURE 5. Pretreatment panoramic radiograph.

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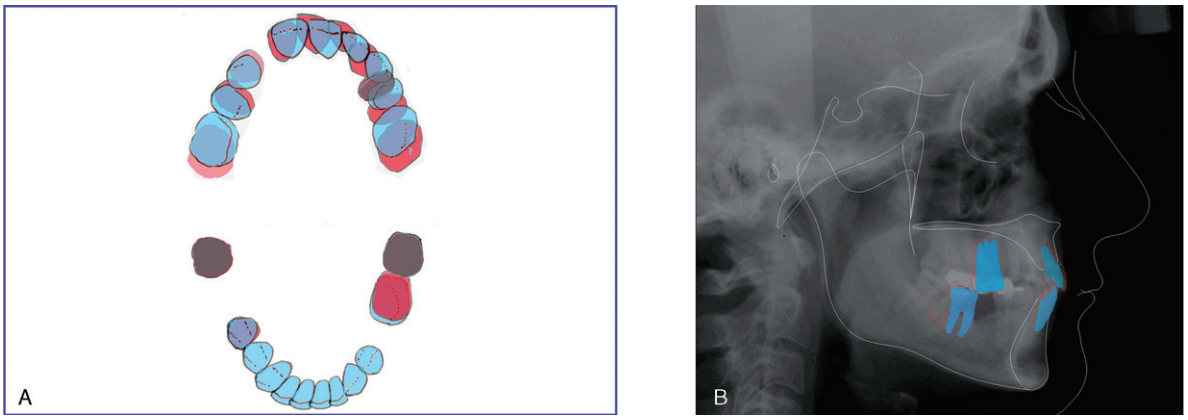

FIGURE 6. A, Occlusogram representing the two-dimensional planned movement of teeth. Red depicts the original malocclusion, blue depicts the planned teeth movement, and brown depicts the teeth to be extracted. B, Lateral cephalogram representing the orthodontic visualized treatment objective (VTO). Red represents pretreatment and blue represents planned positions after treatment.

planned for single crown restorations. A type III gold FPD was planned for #18 through #21, and an implant supported gold crown in the site of #30.

Preprosthetic Orthodontic Treatment

Orthodontic treatment commenced after the patient received full-mouth supragingival and subgingival scaling and detailed oral hygiene instructions. The authors closely monitored the patient's oral health and hygiene during the entire course of treatment. He was prescribed with 1.1% sodium fluoride dentifrice (Prevident 5000 Plus, Colgate-Palmolive, Morristown, NJ, USA) for use twice daily. Thereafter, the authors performed an occlusogram and VTO analysis (Figures 6A and 6B).

The occlusogram revealed that the most significant magnitudes of orthodontic tooth movement were to be achieved in the maxillary arch. Tooth #12 was to be extracted in order to correct the midline and retract the left canine into a Class I relationship. Teeth #5 and #6 were to be retracted approximately 2 mm, and tooth #3 protracted approximately by 3 mm and close the space. The anteroposterior position of the incisors was to be maintained even after extraction of #12 and space closure of #4 edentulous site. This was feasible because of the planned increase of mesiodistal width of the incisors in the final optimal restorations, creation of adequate space for #7, and the protraction of #3 and #14. The mandibular occlusogram showed that the anterior segment was to remain unchanged, and only uprighting and slight protraction of #18 was to be accomplished. Teeth #17 and #32 were to be used as anchorage for intrusion of the anterior segment and then extracted after orthodontic treatment. All data from the occlusogram and VTO were then communicated to the prosthodontist, and an approval was obtained. Diagnostic waxing was then accomplished by the prosthodontist by sectioning the cast and appropriately positioning the teeth in three dimensions according to the plan (Figures 7A and 7B).

The greatest challenge in this patient was addressing the vertical dimension. The patient had a significant impinging vertical overlap with incisor wear and minimal incisor display. From an esthetic perspective, the maxillary incisal edge needed to be elongated by approximately 3 mm. The mandibular incisors needed to be intruded approximately 3 mm to decrease the vertical overlap. Intrusion of the incisors was accomplished with a cantilever system consisting of a 0.017 in.×0.025 in. titanium molybdenum alloy sectional wire extended from the lower molars, as described by Burstone.[26] A stabilizing 0.017 in.×0.025 in. stainless steel wire with distal extensions connected the lower incisors (Figure 8A). By placing a stabilizing anterior wire with small distal extensions, it was possible to deliver a force from the cantilever system, which was close to the center of resistance of the incisors and minimizing

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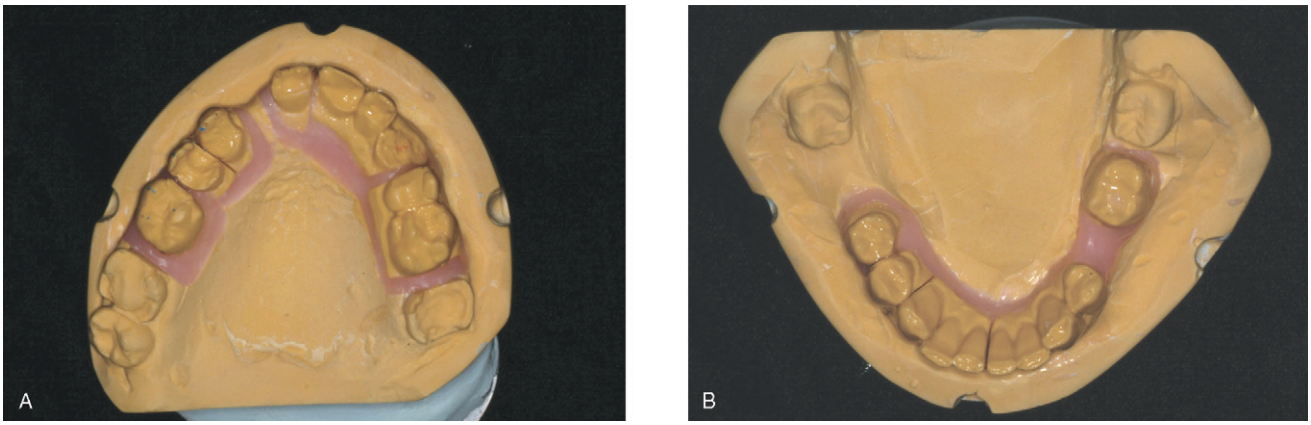

FIGURE 7. Sectioned diagnostic waxing of the (A) maxillary cast and (B) mandibular cast according to the occlusogram and visualized treatment objective (VTO). The teeth have been repositioned in three dimensions according to the treatment plan.

incisor proclination. The interocclusal space for restoring #5 and #11 was absent; thus, premolar intrusion in the lower arch was required. To gain space for definitive restorations, the OVD needed to be increased by approximately 2 mm. The intrusion and leveling of the mandibular arch reduced the magnitude of OVD increase, which would also favor stability of the orthodontic correction.

In order to obtain significant intrusion of the premolars and canines, two TADs (Microscrew, Stryker, Kalamazoo, MI, USA) were placed in the edentulous mandibular ridges. An extended arm from each TAD was projected from an acrylic resin coping cemented to the attachment head with glass ionomer cement (Ketac-Bond, 3M ESPE, St. Paul, MN, USA). (Figures 8B and 8C). These extended arms were used to initially intrude both canines and first premolars. During the later stages of orthodontic treatment, the patient had a fracture of the lingual cusp of tooth #5 at the level of the crestal bone. This left inadequate coronal tooth structure to lend itself for a restoration and was therefore extracted prior to removal of the orthodontic appliance. Intrusion of tooth #29 was then accomplished by bonding a bracket to the cemented acrylic coping covering the microscrew and placing a light NiTi wire while maintaining an intrusive force on the canine and first premolar (Figure 8D). The intrusion of the buccal segment yielded the necessary interocclusal space to fabricate a temporary post with a short composite resin build-up on tooth #11. A bracket was then bonded to retract this tooth and obtain the desired occlusal position.

Post-orthodontic Treatment

After 33 months, movements of teeth were deemed satisfactory, and the orthodontist removed the orthodontic appliance in consultation with the prosthodontist (Figure 9). Superimposition of post-orthodontic lateral cephalogram confirmed that treatment objectives related to vertical and anteroposterior dimensions were met (Figure 10). Namely, no evidence of an increase in the OVD and intrusion of the mandiblar incisors and premolars was achieved. The only minor discrepancy with the VTO was the slight extrusion of the maxillary incisors that could have been prevented by a more incisal bracket position on these teeth. In the anteroposterior dimension, the maxillary molars moved mesially, and the incisors maintained their original position as planned. The uprighting of tooth #18 was significantly less than that planned in the VTO. Therefore, it was planned on being corrected in the planned FPD. New maxillary and mandibular casts were prepared from diagnostic impressions and were mounted on a semi-adjustable articulator. Thereafter, the correct length of the maxillary incisors was determined by esthetics, phonetics, and assessment of the lips in repose.[27,28] This information was transferred to the diagnostic casts, and a new diagnostic waxing was accomplished (Figure 11).

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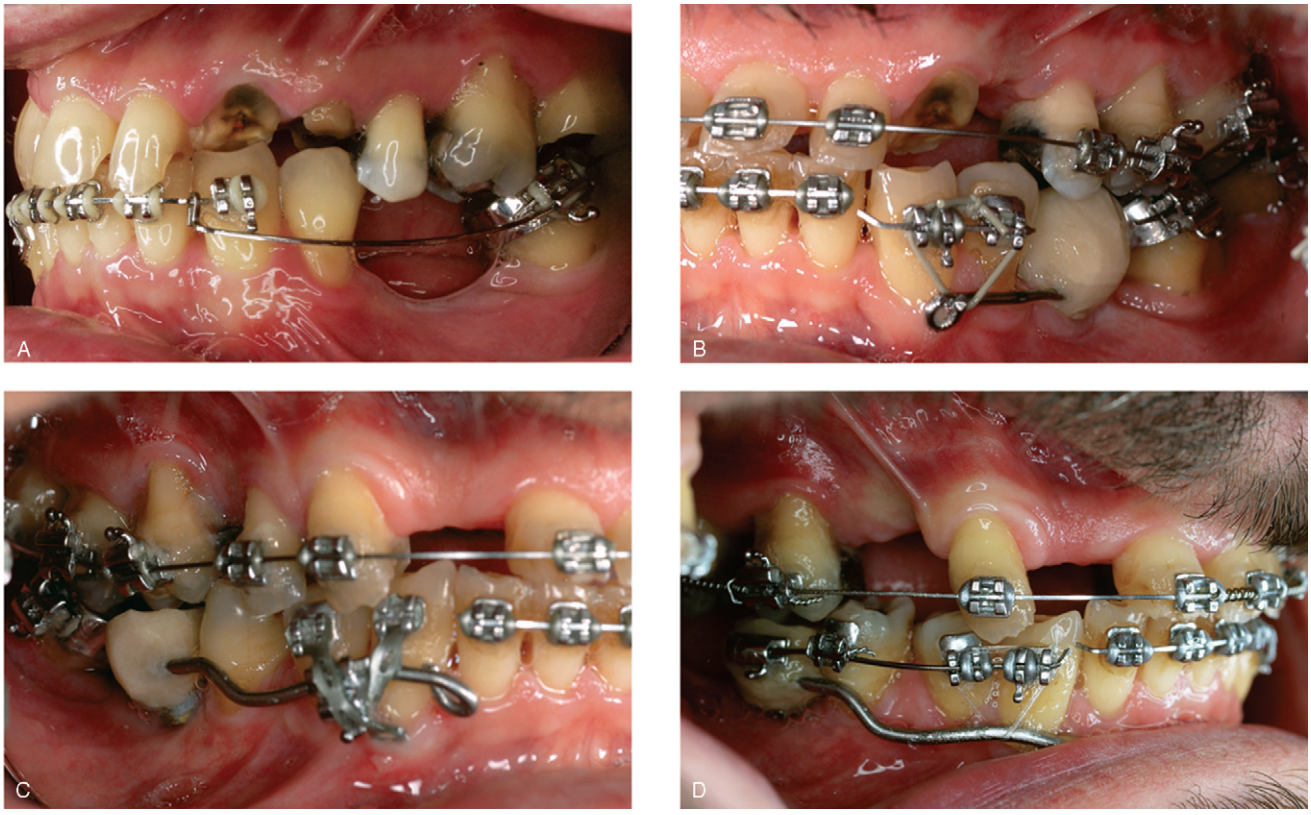

FIGURE 8. A, Orthodontic treatment in progress—left lateral view. Note the mechanics used to intrude the lower incisors without flaring them. The force system also provides an uprighting moment to the left second molar. B, Orthodontic treatment in progress—left lateral view. Note the temporary anchorage device (TAD) with an acrylic resin coping being used for anchorage. C, Orthodontic treatment in progress—right lateral view. Note improvement of occlusal plane and vertical overlap. Compare with Figures 4A and 4B. D, Orthodontic treatment in progress—right lateral view. Note the mechanics used to intrude and align the right buccal segment using the TAD with an acrylic coping site #30. Note missing tooth #5 that was extracted due to fracture.

FIGURE 9. Post-orthodontic treatment—frontal view of teeth in maximal intercuspation. Note correction of midline, occlusal plane, and vertical overlap. Compare with Figure 2.

Prosthodontic Treatment

Subsequently, all maxillary teeth and left mandibular posterior teeth were prepared, and interim restorations were fabricated according to the new diagnostic waxing. Tooth #11 underwent endodontic re-treatment because of mechanical exposure of the endodontic obturation material with potential contamination. Thereafter, cast dowels and cores were fabricated on both maxillary canines using noble alloys. At this stage, it was noted that tooth #13 had questionable amount of tooth structure left to retain a core and crown; therefore, the authors decided that the best long-term prognosis could be achieved by extraction and replacement by an implant rather than the expensive alternative of endodontic treatment and crown lengthening, followed by dowel and core supported crowns. Periodontist's

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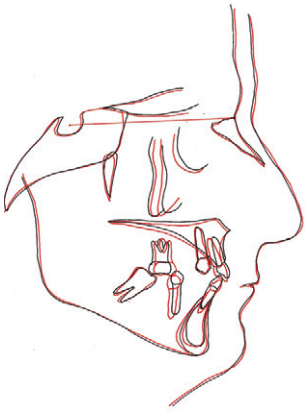

FIGURE 10. Superimposition of the pretreatment (black) and post-treatment (red) lateral cephalometric radiographs representing only the orthodontic treatment. Note maintenance of vertical dimension during treatment and intrusion of the mandibular premolars and incisors. In the anteroposterior dimension, the maxillary molars were protracted mesially, and the incisors maintained in their position as planned. Uprighting of #18 was not achieved as planned, and inclination of this tooth was corrected through prosthodontic treatment.

FIGURE 12. Frontal view of finalized maxillary teeth preparations. Both canines have been restored with cast dowels and cores.

consultation was obtained for extraction of this tooth along with additional teeth included in the treatment plan. After 2 months, a 4 mm×11 mm implant (Osseospeed, Astra Tech, Waltham, MA, USA) was placed at #12 region, and a 5 mm×9 mm implant (Astra Tech) was placed in the region of #30. Both implants had good primary stability. A connective tissue graft was accomplished in #7 region at the same time. After

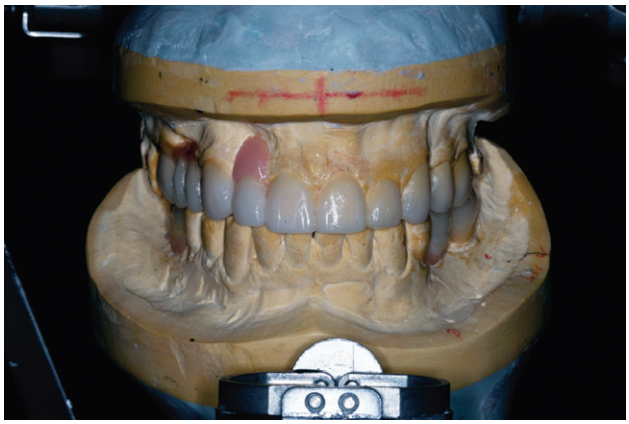

FIGURE 11. Second diagnostic wax-up performed on new diagnostic mounting, prior to start of prosthodontic treatment.

8 weeks, it was noted that the implant in #30 was mobile and had to be removed. However, the maxillary implant demonstrated no mobility, bone loss, or clinical signs of infection and was deemed to be successful. It was decided to proceed with the fabrication of definitive restorations and reattempt to place a new mandibular implant in #30 region after the site healed.

Individual tooth preparation was evaluated and refined (Figure 12). Standard prosthodontic procedures were then followed, and definitive restorations were fabricated according to the treatment plan. A custom abutment made of noble alloy was fabricated on implant #12. The restorations were cemented using a resin-modified glass ionomer cement (RelyX Luting Plus, 3M ESPE) (Figures 13A and 13B). The patient was restored to a centric relation position with a mutually protected occlusal scheme (Figures 14A and 14B).

Post-treatment

After definitive cementation of restorations, another unsuccessful attempt was made to place a new implant in #30 region. The implant failed again after 7 weeks (Figure 15). The patient was offered a third opportunity for implant placement at the same site, but refused this option as he was satisfied with the function and esthetics of his rehabilitated dentition. The patient was provided with an occlusal device to be worn during the night. He was given oral hygiene instructions and was

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FIGURE 13. A, Post-treatment occlusal view of the maxillary teeth. Note the non-rigid connector between the right canine and the first premolar. Left first premolar is an implant crown. B, Post-treatment occlusal view of the mandibular teeth. Right molar site shows healing after failure of implant.

FIGURE 14. A, Post-treatment frontal view of the teeth in maximal intercuspation. B, Post-treatment close-up smile of the patient.

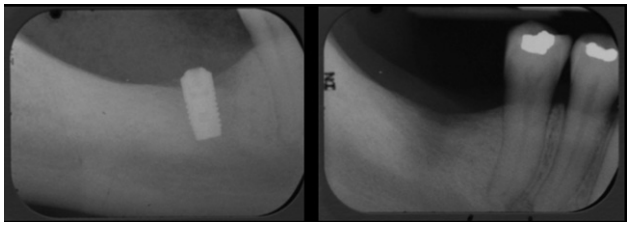

FIGURE 15. Periapical radiographs showing second attempt of implant placement in the right molar region and failure after 7 weeks.

advised to continue using 1.1% sodium fluoride dentifrice twice daily for the rest of his life. The patient was educated about oral hygiene maintenance around the FPD using superfloss and proxabrush. He was placed on 6-month recalls for maintenance of oral health. At a 2.5-year follow-up, positions of the teeth and the integrity of the restorations remained stable (Figures 16A and 16B). The patient remained satisfied with the esthetics and function of his teeth.

DISCUSSION

The initial treatment plan chosen for this patient was based on a number of factors related to patient's desires, expectations, finances, and motivation. Though the authors attempted to execute the treatment as planned, a number of clinical variables inevitably changed the course of the plan (Table 1). Teeth #2, #5, #13, and #15 had severely compromised coronal structures and were clinically deemed as nonrestorable. Attempting to restore them would have necessitated endodontic and crown-lengthening procedures, followed by dowel and

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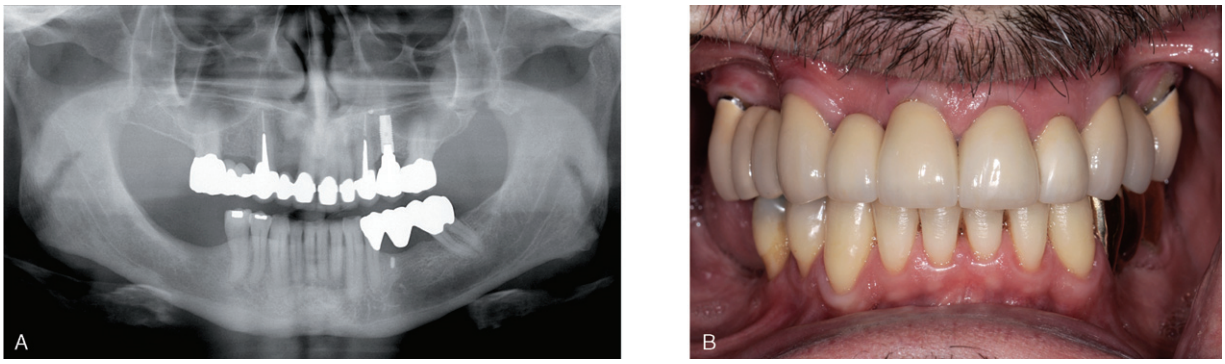

FIGURE 16. A, Post-treatment panoramic radiograph taken at a 2.5-year follow-up shows stable bone levels. Note the retained tip of the broken mini-screw that was not removed, as the risk-benefit ratio was high. Also note acceptable healing of bone at failed implant site #30. B, Post-treatment frontal view of the teeth in maximal intercuspation at 2.5-year follow-up examination. Compare with Figures 2, 9, and 14A.

TABLE 1. Summary of changes in the patient's final treatment outcome compared with the initial treatment plan

Tooth number	Initial treatment plan	Final outcome	Reason for change in plan
Tooth #5	Single crown	Extraction and conversion to a pontic	Tooth fractured during later stages of orthodontic treatment
Tooth #6	Terminal abutment of a three-unit FPD from #6 through #8	Pier abutment of a six-unit FPD from #3 through #8	Fracture of tooth #5 and to decrease expenses by avoiding implants and related ridge development procedures
Tooth #13	Single crown	Extraction and replacement by an implant-supported crown	Tooth preparation revealed inadequate coronal structure and dictated endodontic treatment followed by dowel and core supported crowns, which was more expensive than an implant
Tooth #30	Implant-supported crown	Unrestored	Repeated implant failure

FPD = fixed partial denture.

Multiple changes occurred due to clinical variables that were beyond the control of the clinicians.

core supported crowns. This option was refused by the patient because of increased treatment expenses. Therefore, a shortened dental arch (SDA) concept was used in the rehabilitation of this patient. SDA has been well documented in the literature as an accepted norm of treatment, when it is not possible to restore a patient to first molar occlusion.[29] Though the treatment plan chosen for this patient included restoration to first molar occlusion, repeated failure of the implant at site #30 impeded this possibility on the right side. The patient was informed of the option of future implant placement at his discretion.

The number of implants chosen for this patient was determined by his finances, availability of bone, strategic position of the teeth, and need for restorations on adjacent teeth. Based on these factors, it was decided to utilize a dental implant only in the right mandibular region (#30). However, as tooth #13 was deemed nonrestorable at a later stage, replacement by implant was considered. Placement of implants in other edentulous spaces was presented as an option to the patient but was declined due to additional ridge augmentation procedures required to ameliorate the surgical sites.

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A nonrigid connector was used in the maxillary region because of the design of the FPD and to obtain a proper path of draw along the arch. As tooth #6 was endodontically treated, adequate space was available for a conventional design with the keyway on the distal surface of the abutment and key on the mesial surface of the pontic.[30] Plastic patterns (T-type tapering design) of the connectors were incorporated into the wax patterns, and the metal framework of the FPD was cast as two separate pieces. Because of the patient's history of bruxism, metal-ceramic and gold restorations were the preferred restorative material of choice to reduce the chances of fracture of these restorations. The maxillary posterior restorations had metal occluding surfaces for the same reason. Porcelain facial margins were prepared on all teeth except the molars, which had clinical attachment loss requiring margins to be close to the furcation. Therefore, supragingival metal margins were used on these two teeth.

Although diagnostic waxing could have been accomplished without using occlusograms, the latter provided a blueprint that could be easily altered to depict different treatment alternatives before attempting the more involved process of waxing. Digital software (Orthocad, Cadent Inc., Carlstadt, NJ, USA) is now available, where the occlusogram can be manipulated digitally and thereby simplifying the process. Another significant advantage of the occlusogram was the possibility for superimposition of pretreatment teeth positions with post-treatment teeth positions for comparison of teeth movement accomplished. This would have been difficult to accomplish with a diagnostic wax-up.

An advantage of orthodontic treatment with TADs was the possibility of intruding the premolars and canines in the mandibular arch. Hence, the OVD was not increased beyond 2 mm, thereby reducing the possibilities of unstable results; significant increases in the OVD have been associated with relapse tendencies in the long term.[31] Additionally, intrusion of mandibular dentition reestablished the occlusion prior to compensatory eruption of these teeth and prevented aggressive teeth preparations in order to achieve the required restorative space. Finally, maintaining the maxillary second molars and mandibular third molars during orthodontic treatment allowed using these teeth for good anchorage. The unique orthodontic mechanics used in this patient by a combination of natural teeth and TADs allowed achieving difficult tooth movements and creating an optimal setting for prosthodontic treatment. Conventional endosseous dental implants could have been placed during the initial stages of orthodontic treatment[16]; however, this option was not favored in this patient, because the initial treatment plan called for only a single implant at site #30. The decision to place implant at site #12 was made towards the end of the orthodontic treatment.

A clear disadvantage of the chosen treatment option was the amount of time needed for orthodontic treatment, which may be objectionable to many adult patients.[32] However, the authors believe that this is an appropriate form of treatment, if patients with such complex problems are properly counseled about their alternative treatment options; the alternatives may include multiple extractions or even making the patient edentulous followed by replacement with a prosthesis.

CONCLUSION

This clinical report described the multidisciplinary management of a complex case with multiple esthetic and occlusion issues. Preprosthetic orthodontic treatment was followed by endodontics, periodontics, and prosthodontics procedures. Though a satisfactory treatment was accomplished, multiple changes had to be made in the treatment plan because of clinical variables that were beyond the control of the clinicians. Nevertheless, the treatment outcome served to retain as many natural teeth as possible and avoiding the alternative of extractions and replacement with prosthesis. Close communication among different specialties is needed for management of such complex situations.

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