

CASE REPORT

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Achieving esthetics and occlusion concepts in a limited restorative space utilizing adhesive prosthodontic approach

Doaa Taha Sayed Taha, Ahmed Ezzat Sabet, Tarek Salah Morsi

ABSTRACT

Introduction: The esthetic and functional rehabilitation of teeth should follow the principles of minimally invasive prosthodontics whenever applicable. **Case Report:** This article describes a full mouth rehabilitation using all ceramic full and partial coverage bonded restorations in a patient with worn anterior teeth and multiple lost posterior teeth. The main benefit of this approach is the possibility of restoring the limited restorative space with only strategic reduction of dental structure based on accurate occlusion and esthetic concepts. **Conclusion:** Several techniques of full mouth rehabilitations are available and a clinician should choose the one that best meets the requirements for rehabilitation taking in consideration comprehensive diagnosis of the patient's clinical condition, conservation of the remaining tooth structure and achieving occlusion and esthetics basic principles.

Keywords: Dental bonding, Dental occlusion, Dental, Esthetics, Mouth rehabilitation, Prosthodontics/methods

How to cite this article

Taha DTS, Sabet AE, Morsi TS. Achieving esthetics and occlusion concepts in a limited restorative space utilizing adhesive prosthodontic approach. J Case Rep Images Dent 2017;3:25–30.

Article ID: 100020Z07DT2017

doi:10.5348/Z07-2017-20-CR-6

INTRODUCTION

Full mouth rehabilitation can be considered one of the most challenging interventions the clinicians face during daily practice. Through understanding of various occlusion concepts is substantial in order to properly address the patient's complaint, reach an effective treatment plan and optimize the restorative outcomes especially when all the teeth of one or both arches are involved [1]. Most commonly full mouth rehabilitation is the treatment of choice in cases of collapsed occlusion due to loss of teeth, loss of vertical dimension, developmental anomalies in dentition, malocclusion and unacceptable esthetics. This will help restoring impaired occlusal function, reestablishing the lost vertical dimension, maintaining healthy periodontium and optimizing esthetics [2, 3].

Addressing the problem of limited interocclusal space often creates a challenge for prosthetic treatment because of the unavailability of the space required for restoration which will affect the definitive retention and resistance forms. Surgical crown lengthening and elective devitalization of teeth are used among dentists as

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Received: 25 May 2017
Accepted: 25 July 2017
Published: 22 August 2017

alternatives for restoring such cases. However, presence of any signs of periodontal disease will complicate crown lengthening procedures resulting in further aggravation of the condition. Also, commencing intentional root canal treatments is considered violation of the principles of minimal interventions which should be avoided as possible [4]. A more reliable method to provide space for restorative materials is to increase the vertical dimension of occlusion (VDO), thus minimizing the need for biologically invasive clinical surgery and elective endodontic treatments, enhancing the esthetics teeth display, and rectifying anterior teeth relationships [5, 6].

In modern dentistry, management strategies are focused on the principles of conservatism. Since increasing the VDO by restorative means involves multiple teeth in at least one arch, it is regarded as an extensive procedure. Therefore, it is important to state that increasing the VDO should only be considered where comprehensive prosthodontic rehabilitation is justified [7]. Also, minimally invasive prosthetic options should be considered, since they have become increasingly feasible, due to the introduction of modern adhesive techniques and recent restorative materials with similar properties to those of natural teeth [8].

Mechanical retention of restorations using conventional cementation represents a predominantly subtractive treatment approach that is gradually being substituted by a primarily defect oriented approach in prosthodontics. This is now easily applicable because of the increased knowledge about the importance of planned treatment outcomes by using a wax-up before the treatment is started which is subsequently used as a guidance during tooth preparation [8]. The aim of this study is to describe the adhesive prosthetic strategies that were followed in a patient with worn anterior teeth and early loss of multiple posterior teeth in both arches, resulting in a restricted restorative space.

CASE REPORT

A 28-year-old female patient were referred to fixed prosthodontic department, faculty of Dentistry Ain Shams University, Cairo, Egypt seeking prosthetic treatment after implants placement in another outpatient clinic. The patient's chief complaints were poor chewing function and esthetic appearance. Preoperative facial and lateral views of the patient at rest and full smile are shown in Figure 1. The patient's medical history was noncontributory.

Panoramic radiograph revealed the presence of three implants restoring lost maxillary right second premolar, maxillary left canine and maxillary left second premolar (Figure 2).

Careful clinical examination revealed poor oral hygiene with gingival inflammation and calculus depositions on all teeth, multiple decayed teeth that need to be restored and lack of prosthetic space to restore the previously

inserted implants as presented in intraoral occlusal and facial views are shown in Figure 3.

Treatment plan was established and performed on several stages starting with mouth preparation stage. Table 1 presents the treatment steps that were performed throughout the patient treatment. Impressions for diagnostic casts were then made, followed by a centric relation occlusal record using bimanual manipulation technique confirmed by load testing, eccentric records and facebow transfer for mounting on semi adjustable articulator. The VDO was increased by 2 mm to allow convenient space for prosthetic restoration of the inserted implants and to minimize the amount of tooth preparation required to restore the rest of teeth.

With the assistance of a smile analysis performed using software templates (Figure 4), a partial diagnostic waxing-up of the six maxillary anterior teeth was performed followed by intraoral mock-up for the assessment of the appropriate positioning of the incisal edges.

The next step was mock-up fabrication by making a silicon index of the diagnostic wax-up with intraoral adjustment of esthetics and occlusion (Figure 5). A mutually protected occlusion with simultaneous bilateral posterior contacts in maximum intercuspation and disengagement of the posterior teeth by the anterior



Figure 1: Preoperative views (A) Facial view with lips at rest, (B) Full smile facial view, (C) Full smile left lateral view, (D) Full smile right lateral view.

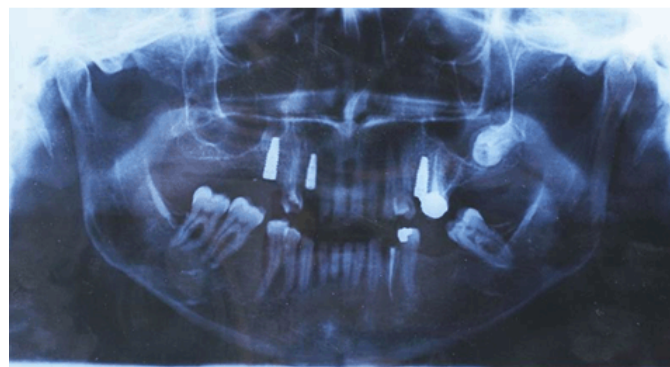


Figure 2: Preoperative panoramic radiograph showing inserted implants.

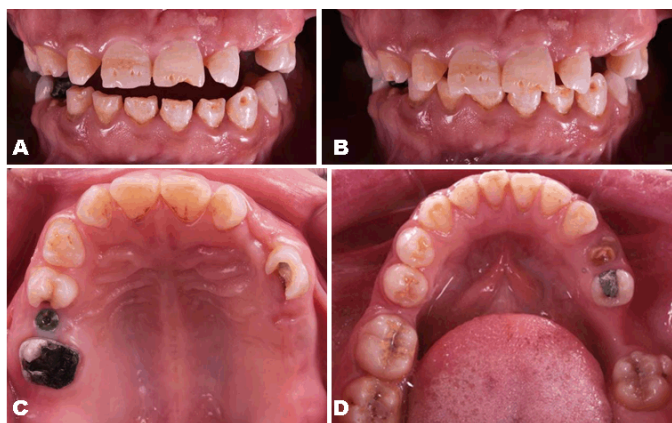


Figure 3: Intraoral views (A) Retracted facial view with separated teeth, (B) Retracted facial view in maximum intercuspation, (C) Occlusal view of the maxillary arch, (D) Occlusal view of the mandibular arch.

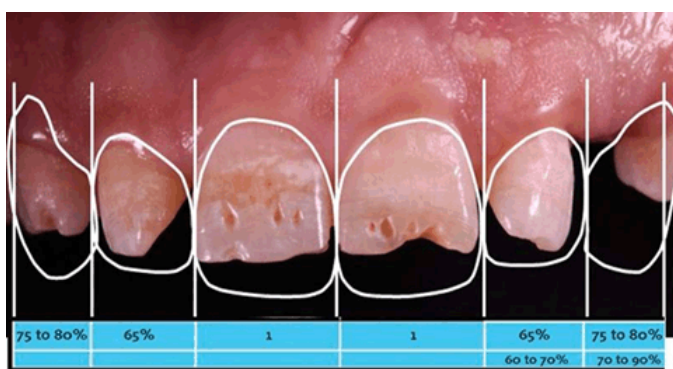


Figure 4: Digital smile analysis to assess in the diagnostic waxing-up.

Table 1: Treatment plan steps

Steps	Performed treatment
1	Patient examination and diagnosis
2	Scaling and oral hygiene measures
3	Extraction of maxillary left first premolar and mandibular right first premolar
4	Restoration of maxillary right first premolar, mandibular right second premolar and mandibular right second molar with composite restorations
5	Endodontic retreatment of maxillary right first molar with placement of post and composite core
6	Primary impressions, centric relation occlusal records for mounting of casts on semi adjustable articulator and assessment of the vertical dimension of occlusion (VDO) to be used in the future rehabilitation
7	Diagnostic waxing of the planned prosthesis for visualization of treatment plan, planning types of restorations and adjusting esthetics and occlusion
8	Mock-up fabrication with intraoral adjustment of esthetics and occlusion
9	Functional temporary stage: Follow-up sessions for phonetic tests and check presence of muscle pain and temporomandibular joint discomfort
10	Fabrication of the definitive restorations
11	One year follow-up session

teeth in all mandibular excursive movements was achieved. This mock-up shown in (Figure 6) was used as functional provisional restoration for one month with follow-up appointments twice per week to evaluate phonetics and check for presence of muscle pain and temporomandibular joint (TMJ) discomfort. No symptoms of abnormal muscle activity were found and the phonetic test revealed normal characteristics.

This was followed by guided preparations of the teeth through the mock-ups. This technique of guided preparations helps determining the proper type of restoration and amount of coverage that provides the required function without unnecessary preparation. For the mandibular arch, mandibular left first, second premolars and first molar were prepared to receive partial coverage lithium disilicate glass ceramic restorations covering occlusal surfaces with buccal extensions for adjusting the vertical dimension of occlusion and the buccal corridor. Mandibular right canine, second premolar and second molar were prepared to receive five units posterior full contour zirconia partial fixed dental prosthesis. Mandibular anterior teeth were prepared to receive lithium disilicate glass ceramic full coverage crowns for adjusting the anterior guidance and esthetics. A full arch impression was then made with vinyl polysiloxane impression material (Express™ STD, 3M Center, St. Paul, USA) followed by the fabrication of provisional restorations with temporary crown and bridge material (Structure 3, VOCO GmbH, Cuxhaven, Germany) by an index of the diagnostic wax-up created in three sections: two posterior sections from molar to first premolar, and an anterior section from canine to canine.

For the maxillary arch, maxillary anterior teeth were prepared to receive lithium disilicate glass ceramic full coverage crowns for adjusting the anterior guidance and esthetics. Maxillary right first premolar was prepared to receive partial coverage lithium disilicate glass ceramic restoration covering occlusal surface with buccal extension for adjusting the vertical dimension of occlusion and the buccal corridor. Maxillary right first molar was prepared to receive lithium disilicate glass ceramic full coverage crown. Definitive abutments were placed in the implants restoring maxillary left canine, maxillary left second premolar for fabricating 3 units full contour zirconia partial fixed dental prosthesis and in the implant restoring maxillary right second premolar for fabricating full contour zirconia crown. A full arch impression and provisional restorations were performed like the mandibular arch.

The full mouth rehabilitation in this situation followed the systematic approach adopted by Lerner [9]. Lithium disilicate reinforced glass ceramic crowns and partial coverage restorations were fabricated using e.max ingots (IPS e.max Press, Ivoclar Vivadent, Schaan, Liechtenstein), and the zirconia partial fixed dental prosthesis and crowns were designed using

exocad software and milled using VHF CAM 5-S1 milling machine (vhf camufacture AG, Ammerbuch, Germany) and BruxZir full contour zirconia blanks (BruxZir, Glidewell laboratories, California, USA).

Finally, the restorations were first tried and evaluated for esthetics, occlusion, and phonetics followed by definitive delivery stage. Proper isolation, surface treatments of the restorations, surface treatments of teeth and cementation were performed following proper adhesion protocols and manufacturer recommendations (Figure 7). The same occlusal scheme that was established in the provisional rehabilitation was followed in the final prosthetic restoration. Follow-up of the restorations and surrounding tissues was done every two months for a year, and during the one year follow-up session, there were no clinical symptoms or signs of temporomandibular disorder, no signs of recurrent caries around the restorations, and no debonding. The patient expressed satisfaction with the significant improvement in chewing function and esthetic appearance. Thus, it is concluded that the treatment goals of rehabilitation were successfully met till further follow-up sessions are done.

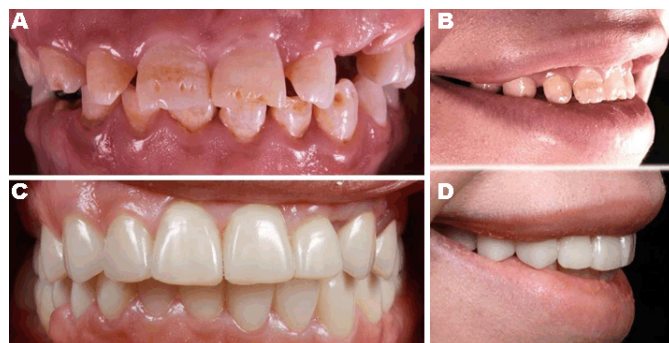


Figure 7: Comparison between preoperative and postoperative views (A) Preoperative retracted facial view, (B) Postoperative retracted facial view, (C) Preoperative full smile lateral view, and (D) Postoperative full smile lateral view.

DISCUSSION

Full mouth rehabilitation continues to be one of the most difficult challenges that clinicians face because it requires comprehensive diagnosis and systematic treatment planning to reach the best outcome that optimize function, health and esthetics. This clinical report demonstrates a systematic approach for full mouth rehabilitation to create restorative space using minimum dental preparation when applicable and adhesively bonded restorations. The approach have been described earlier in literature by Lerner [9] but using full coverage porcelain fused to metal restorations only. With the recent advances of materials and adhesion protocols, minimally invasive prosthodontic concepts are becoming mandatory whenever applicable. The treatment presented has demonstrated that the required space may be obtained by seating the condyles in centric relation position followed by development of proper anterior guidance that allows for posterior disclusion within the patient's envelope of function for long-term occlusal stability.

There is a considerable dispute in literature regarding different treatment techniques used to increase VDO for treating patients presenting with complex dental abnormalities such as generalized tooth wear and significant occlusal irregularities [6]. It was assumed by some authors that the VDO is constant throughout an individual's life, and if subjected to any alteration this may interfere with the physiology of the masticatory system resulting in masticatory muscles hyperactivity, increased occlusal forces, bruxism and temporomandibular disorders (TMDs). On the other hand, it was reported by other authors that such symptoms if happened, are only transient [10]. It has been reported that the clinical techniques to assess VDO loss like the use of pre-treatment records, incisor height measurements, phonetic evaluation, patient relaxation and assessment of facial appearance, though useful, are of limited predictability and reliability and cannot be used to estimate the magnitude of increasing VDO [5]. That is why an increase in VDO should be decided

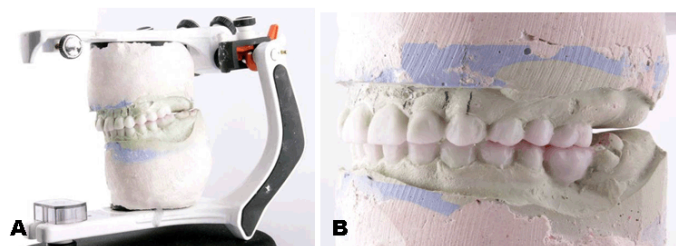


Figure 5: (A) Diagnostic casts mounted on semi adjustable articulator using centric relation and face bow records, (B) Diagnostic wax-up.



Figure 6: Lateral view of the mock-up.

based on the need to achieve restorations that meet the functional and esthetic needs with especial consideration of the remaining tooth structure, the space available for the restoration, occlusal variables and esthetics [7]. The functional provisional restoration should contain the occlusal scheme intended for the final restoration. This will help predicting the long-term success of the final restoration.

CONCLUSION

Although novelty as a concept is not represented in the idea of the report, but it is clearly emphasized in the management by applying techniques which combine the basic well established concepts of occlusion with the recent trends of modern adhesive ceramic technologies. Also, such technologies accompanied with smile designing and using pre-evaluative functional temporary restorations were used to overcome the problem of limited restorative space without jeopardizing conservation of tooth structure and patient's high esthetic demands. More importantly, the report here emphasizes on the importance of the interdisciplinary comprehensive treatment planning to visualize the final treatment outcome before any surgical intervention.

Acknowledgements

We are thankful to Digital Dental Academy (DDA, Cairo, Egypt) for the dental lab work, Dr. Kareem Nagi for his assistance in the digital photography and Dr Ahmed Hany for his support in the surgical field.

Author Contributions

Doaa Taha Sayed Taha – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ahmed Ezzat Sabet – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Tarek Salah Morsi – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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