

Aesthetic and Psycho-Social Improvements of a Patient Suffering from Unaesthetic Maxillary Prosthesis and Deep Bite Utilizing Full Mouth Rehabilitation of All Ceramic and PFM Prostheses

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Abstract

A 41-year-old male accountant patient was referred to the comprehensive care clinic with the chief complaint of "ugly upper front prostheses which resulted in self-stress". Also, he complained of some sounds of his teeth during sleeping. On clinical examination, generalized attrition of teeth, many extracted and decayed teeth, spacing between anterior maxillary bridges and decrease in vertical dimensions of occlusion were seen. After mounting of the diagnostic casts, the patient was presented with the diagnostic mock-up to restore the lost vertical dimension. On patient acceptance, a full mouth rehabilitation with a combination of all-ceramic and metal ceramic crowns and bridges were planned. Bite raising appliance was used for a period of time to gain the lost vertical dimension. Then full mouth rehabilitation with a mutually protected occlusion and canine guidance were established for the patient. During follow-up appointments, the patient was extremely satisfied and he well tolerated his new prosthesis and restored vertical dimension in occlusion. His colleagues and family had noticed the improvement in his psychosocial attitude. At sixth months follow-up, the prostheses were approved to function well.

Keywords: Full Mouth Rehabilitation; All-Ceramic; PFM; Vertical Dimension

Introduction

Unaesthetic existing old metal ceramic restorations (MC) might be a cause of patient social depress. Therefore, all-ceramic zirconia-based computer-aided design and computer-aided manufacturing (CAD/CAM) system are preferred for anterior teeth. This can be used as an alternative for replacing the existing restorations since it has no metal substructure, allow superior translucency and can be used in an area of high aesthetic demands [1,2]. In addition, it has a high flexure strength, fracture resistance, and superior mechanical properties [3,4].

Anterior esthetic rehabilitation with all ceramic restorations will improve the self-esteem and self-confidence of the patient and enable him to return to normal social life [5]. Hence, the dentist and ceramist should find a proper protocol to achieve high esthetic and long-lasting restorations [6].

Excessive occlusal wear can result in decreasing the vertical dimension of occlusion (VDO), unaesthetic, pulpal pathology, occlusal disharmony and impaired function [7]. Therefore, it is essential to identify the factors that contribute to excessive teeth wear, which, in turn, will finally lead to decreasing of the VDO [1].

Successful treatment of patients requires a combination of many aspects including: patient education, sound diagnosis, periodontal therapy, operative skills, occlusal considerations, endodontic treatments, achieving a harmony between the temporomandibular joint (TMJ) and occlusion and maintaining the health of the entire oral cavity [8-10].

An occlusal appliance or splint is a removable device, usually made of hard acrylic, that fits over the occlusal and incisal surfaces of all teeth in one arch, creating precise occlusal contacts with all opposing teeth [11]. It is usually used to prevent teeth wear, stabilize the occlusion and treat TMJ disorders [12].

The treatment plan for full mouth rehabilitation (FMR) should be done in harmony with the new VDO, aesthetic needs, condylar position, interocclusal relationship, the number of restored teeth as well as the type of the restorative material [3,12].

This article demonstrates the use of a combination of CAD/CAM zirconia bridges and MC prostheses to replace existing clinically unacceptable maxillary anterior PFM bridges. Other goals of this treatments were to maintain the bone level and restore the facial appearance after reestablishment of lost VDO.

Case Report

A 41-year-male, accountant, married patient was referred to comprehensive dental clinics by the diagnostic unit in the College of Dentistry, at Jazan University. His chief complain was " my existed prosthesis looks ugly and I would like to change it". The patient was medically fit. His dental history had started early with amalgam restoration for tooth # 36 and PFM bridge for anterior maxillary teeth 5 years ago. He had teeth # 18,15,12,12,22, 28, 38, and 47 extracted during the last years without any complications. His oral health is also well controlled.

The extra-oral view showed improper face height portions especially the lower 1/3, with a competent lip (Figure 1a-1d). No TMJ or muscles problems were detected. The clinical intra-oral examination showed normal soft tissues. Also, it showed 2 maxillary anterior bridges, multiple missing teeth, and defected restorations. Class I molar occlusion with canine guidance was noticed (Figure 2a-2e).



Figure 1: Preoperative extra-oral view.



Figure 2: Preoperative intra oral view.

The panoramic radiograph showed a mild bone loss, normal anatomy of glenoid fossa and normal position of the condyles on both sides (Figure 3). The complete mouth intraoral radiographs had been taken for the patient and shown localized horizontal bone loss, multiple caries and restored teeth (Figure 4).



Figure 3: Preoperative panoramic radiograph.



Figure 4: Pre-operative intra complete mouth survey.

The different vitality tests for the pulp (electric pulp tester, cold, percussion and palpation tests) for the questionable teeth were applied and presented in (Table -1).

Tooth #.	EPT	Cold	Percussion	Palpation
14	linear Response	< 30 sec	-ve	None
35	Prolong Response	> 30 sec	-ve	None
36	linear Response	< 30 sec	-ve	None
37	linear Response	< 30 sec	-ve	None
38	No response	No response	-ve	None
46	Prolong Response	> 30 sec	-ve	None
48	linear Response	< 30 sec	-ve	None

Table 1: The Response of Caries Teeth to the Different Vitality Tests.

Treatment phase 1 was firstly started with taking maxillary and mandibular alginate impressions for diagnostic casts. Later on, those casts were mounted on semi-adjustable Whip-Mix articulator (Waterpik Technologies, Fort Collins, Co, USA) utilizing face bow (Hanau Spring bow) transfer (Figure 5a) and bite registration (Take 1, Kerr, Romulus, MI, USA) in centric and eccentric movements (Figure 5b).

After collecting all diagnostic data, a multidisciplinary team (prosthodontist, psychologist, preventive dentist, periodontist, endodontist and dental ceramist) were involved in formulating of the treatment plan. The patient was diagnosed with generalized chronic gingivitis, reversible pulpitis for teeth #17,16,14,24,37,36,48,47 and, irreversible pulpitis for tooth # 35. Additionally, partial edentulism areas and multiple decayed teeth recognized, generalized severe attrition with decreased the VDO and anterior deep bite were noticed (Figure 1, b, d, e). The treatment plan and its sequences were discussed with the patient. It was applied according to Rosenstil, *et al.* [12]. It was started with oral prophylaxis and disease control. Scaling and root planning, polishing, motivation and education of the patient were done. The patient was advised to use Chlorhexidine mouthwash 0.12% (INTERMED CHLORHEXIL, Greece) as a mouth rinse, three times per a day for 2 weeks.

A hard-acrylic raising appliance was constructed on the mandibular cast (which was mounted in the articulator) to restore the lost vertical dimension (Figure 5c1 and 5c2). During the try-in and delivery of this splint, the premature contacts were identified and adjusted intraorally with articulating paper 8 microns thick. The patient was instructed to use the bite raising appliance for 2 months. During the follow-up appointments, there was considerable improvement in the VDO with a slight stiffness in the TMJ in the early morning. After complete relief of such stiffness, phase II was started.



Figure 5: Face bow transfer (A); Mounting of diagnostic casts (B); Construction of bite raising appliance (c).

During this phase, a diagnostic wax-up make-up was made on the mounted casts in harmony with centric occlusion, protrusive and extrusive movements (Figure 6a1-6a5) using inlay wax (Harvard, Germany). Then, a rubber base indexes were prepared, which would be utilized later in the fabrication of provisional restorations (Figure 6b).



Figure 6: Diagnostic wax-up for full mouth with the new VD.

Crown lengthening of the mandibular anterior teeth was done and post-operative zinc oxide dressing (Wards, Wohdrpack, Kirkland-Ksisen Box Parke, Periodress PPC) was applied after suturing the area (Figure 7a1-7a4). The extraction of teeth # 38 was done under local anesthesia (Figure 7b1-7b2). Then root canal treatment for tooth # 35 was also done (Figure 7c1-7c4).



Figure 7: Crown lengthening of mandibular anterior teeth (A); extraction of tooth # 38 (B); RCT for tooth # 35 (C)

Excavation of caries, temporization and then final restoration with composite resin (Tertic-N-Ceramic, Ivoclar Vivadent, Lichenestine) for teeth # 17, 16, 14, 37 (Figure 8a and 8b), and with glass ionomer (Ketac Silver, 3M ESPE; Miracle Mix, GC America) for tooth # 48 (Fig-

ure 8c) according to manufacturer instructions. Glass fiber post (Relaxy Fiber Post, 3MESPE, Germany) and composite resin core were accomplished for tooth #35 (Figure 8d).



Figure 8: Composite restorations (A and B): GI filling for tooth # 48; (c): glass fiber post and composite buildup of tooth # 35.

In treatment phase III, sectioning of the existing maxillary anterior PFM bridge (Figure 9a1 and 9a2) were done with course diamond burs (Meisinger, Germany), by making a vertical cut in the middle of the buccal surface of each abutment, started from the crest of free gingival margin to the bucco-incisal line angle of the crown and then extended to the palatal surface. The sectioning of maxillary bridges was done as recommended by Rosenstiel, *et al.* [12], Al Moaleem, *et al.* [13]. Then, preparation of maxillary and mandibular teeth were finalized (Figure 9b1 and 9b2). All-ceramic bridges were planned for maxillary anterior teeth, while the PFM crowns and bridges were planned for the remaining indicated teeth. Bite registration was done using putty rubber base and face bow transfer (Figure 9c1). After that, maxillary and mandibular final impressions (Figure 9c2 and 9c3) were taken with addition Silicon (Virtual Ivoclar Vivadent, Lichtenstein) using double mixing techniques.

(2M2 - 3D master; shade guide) with VITA VM(R)9 (VitaZahnfabric /Germany) was selected by the patient and dentist (Figure 9d) were selected for porcelain build-up. Then from the rubber base indexes which were prepared earlier from the diagnostic wax-up models, provisional crowns (Figure 6b and Figure 9e) were constructed with the new obtained vertical dimension (Success SD, Promedica Neumunster, Germany) and then cemented with temporary cement (Temp-Bond NT, Italy).



Figure 9: sectioning of maxillary bridges (A); preparation of maxillary and mandibular teeth (B1 and B2); bite registration (C1); final impressions (C2 and C3); Shade selection (D); and Provisional restoration cemented in the patient mouth with the new VD (E).

The final impressions were poured and dies were ditched. Laser scanner (CYNOPROD/CANADA) was used for scanning and capturing the preparation. The scanner was connected to a computer screen by software program I. 3 EVOLUTION (CYNOPROD/CANADA) for milling the zirconia core with Vita In-Ceram YZ Disc (VitaZahnfabric/ Germany). While the metal castings were constructed from a nickel-chromium dental casting alloy (Wiron99, Bego, Germany). All the laboratory procedures were carried out as per the manufacturer’s instruction. The all ceramic coping were tried in the patient mouth and MC metal frames were tried in. The summary of the treatments done was presented in the chart (Figure 10).

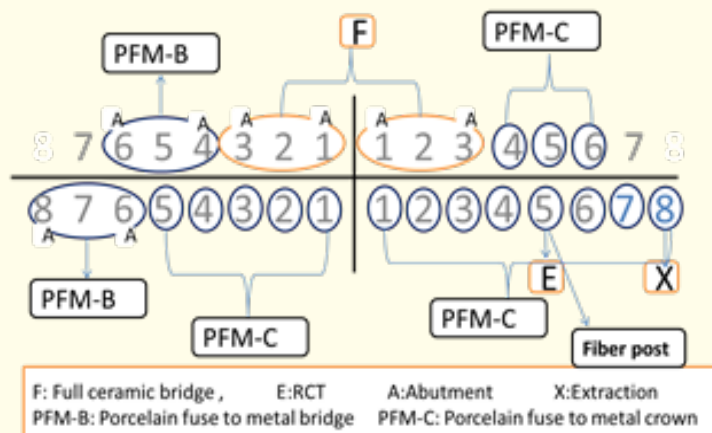


Figure 10: Post-treatment chart.

At the subsequent appointment, all ceramic bridges for maxillary anterior teeth were placed in its positions (Figure 11a). Then MC crowns and bridges were seated and adjusted in the patient mouth. The occlusion adjustment during centric and eccentric movements were done (Figure 11b and 11c). The canine guidance was verified at both sides (Figure 11d and 11e) before glazing and cementation of all prostheses. The used cement was modified glass ionomer type cement (Relaxy, 3M ESPE, Germany). A new alginate impressions were taken for relaxation soft splint 2mm thickness which constructed and given to the patient to be used for a month.



Figure 11: Maxillary and mandibular restoration (A and B); during maximum intercuspation occlusion (C) and during canine guidance left and right (D and E) cemented in patient mouth with the new VD.

In treatment phase IV, the patient was recalled after 1, 3 and 6 months intervals. Post-operative panoramic radiograph was taken after 6 months and kept in the patient file record (Figure 12). Also, post-operative photos were taken for the patient in anterior views during smiling (Figure 13a), extra oral to had shown the improvement of the lower 1/3 of the face (Figure 13b) and lateral views from right and left during smiling (Figure 13c and 13d). The patient was also free of any pain or stiffness. During the follow-up visits a marked improvement were noticed in the aesthetic and facial appearance, improvement in his social life and high confidence was conveyed by patient's colleagues and partners.



Figure 12: Post-operative panoramic radiograph with the cemented prostheses.



Figure 13: Post-operative views frontal (a1) and at smile (A2), lateral views left and right (A3 and A4).

Discussion and Clinical Significant

In a full mouth treatment for a complex case, a proper sequences of the treatment are essential to be considered. So, in this complex case we follow the sequences mentioned and described by Mattoo, *et al.* [14] which consists of the following phases; during the diagnostic phase (Phase I) we determined the tolerance towards restoring the lost VDOs by using hard splint for two months, psychological evaluation of patient's and the need for oral hygiene motivation and education. In the preparatory phase (Phase II), oral hygiene maintenance program with fluoride application, restoration of caries teeth, endodontic treatments for tooth #35 and extraction of 48. While in the restorative phase (Phase III), a two maxillary zirconia all ceramic bridges, and MC crowns and brides were constructed and cemented as shown in (Figure 10). In the maintenance phase (IV), evaluation of all prostheses during different periods. A good psychological improvement in the patient was observed as mention by his family and works collages.

A minimum period of wearing of the raising appliance is about 4 to 6 weeks, after which the restoration of occlusion process starts. In restoring the occlusion, the posteriors teeth were restored in the beginning. Interim temporary restorations cemented for a period of a weeks tell us whether the patient's neuromuscular components have acclimatized to the newly established skeletal and dental alterations. A sound knowledge of the role played by various variables in the clinic and laboratory procedures and skillful accuracy in work are prerequisites when starting occlusal rehabilitation restoration work. Clear communication and understanding between the dentist and the ceramist is a must to achieve the set goals [15].

The existing bridges were sectioned from the gingival portion, extend to the bucco-incisal, then lingually to the end of the crown. The technique was slight comfort to the patient and non-traumatic. It had been selected to preserve the underlying tooth structure, the surrounding gingiva and periodontal tissues as mentioned by Al Moaleem., *et al.* [13], and al Moaleem MM [16].

Always the treatments of anterior teeth in the aesthetic zone presented a challenge in dental practice. As dental materials continue to evolve, new all ceramic materials with superior mechanical properties, such as aesthetic, biocompatibility, high flexure strength and hardness are continuously introduced to the market, such as zirconia based CAD/CAM systems [17]. In this circumstance, dentists and patients must choose the best alternative to achieve maximum esthetic [18].

The posterior crowns and bridges were constructed from MC restorations, because MC are still the choice for posterior and anterior teeth for their aesthetic, strength and the limited economic status of the patients [19].

The clinical significance of the this case are restoring the lost vertical dimension, sectioning of the existing maxillary bridge without harming to the underling abutments, All-ceramic bridges in the aesthetic zone and MC restoration for the remaining crowns and bridges, formulated occlusion was coincided with the existing canine guidance and positive psycho-social changes.

Conclusion

In FMR cases: organization the treatment plan by a multidisciplinary team results in excellent aesthetic improvements and recognized positive changes in psycho-social life of the patient; combination of all ceramic and MC prostheses is preferred in some cases; restoring tolerated VDO can be well conducted by using occlusal splints.

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