CASE REPORT

A systematic approach to full mouth reconstruction of the severly worn dentition

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ABSTRACT
Rehabilitation of a patient with severely worn dentition after restoring the vertical dimension is a complex procedure and assessment of the vertical dimension is an important aspect in these cases. It is necessary to recognizing that form follows function and that anterior teeth play a vital role in the maintenance of oral health. Confirmation of tolerance to changes in the vertical dimension of occlusion (VDO) is of paramount importance. Articulated study casts and a diagnostic wax-up can provide important information for the evaluation of treatment options. Alteration of the VDO should be conservative and should not be changed without careful consideration.Keywords: Crown, dental prosthesis, full mouth reconstruction, gingivectomy, removable appliance

INTRODUCTION

Restoration of the severely worn dentition is oneof themost challenging procedures in dentistry. In order to successfully restore and maintain theteeth, one must gain insight into how the teetharrived at this state of destruction. Tooth wear can result from abrasion, attrition, anderosion.[1-5] Research has shown that these wear mechanisms rarely act alone and there is nearly always a combination of the processes.[1-5] Evaluation and diagnosis should account for the patient's diet, history of eating and/or gastric disorders, along with the present state ofthe occlusion. Emphasis must be placed on the evaluation of occlusalprematurities preventing condylar seating into the centric relation position.[6] Behavioral factors thatmaycontribute to parafunctional habits and/or nocturna lbruxismare also important to understand and manage in order to successfully restore and maintain a healthierdentition.[7]Once a complete understanding of the etiology of thedentition's present state is appreciated, a treatment planof teeth to be treated, condylar position, space availability, thevertical dimension of occlusion (VDO),and the choice of restorative material.[8]While all occlusions wear to some degree over thelifetime of the patient, normal physiological wear usuallydoes not require correction.[6] Severe or excessive wearrefers to tooth destruction that requires restorative intervention.Severe attritional wear can result from occlusalprematurities that prevent functional or parafunctionalmovements of the jaw. This wear can be seen at thesite of the prematurity or on the anterior teeth as a resultof the "hit and slide" forward.[6] Restoration of the wornanterior teeth then becomes a challenge as space availabilityfor prosthetics becomes limited.In 1975, Dahl *et al* [8]reported the use of a removable cobalt-chromium anterior occlusal device to an 18-year-old patient with advanced localized attrition to generate interocclusal space for subsequent restoration. The tooth movement involving a combination of orthodontic anterior teeth intrusion and eruption of the posterior teeth occurred. And long-term observations of this treatment were reported that the vertical relations were practically stable.[9,10] Nowadays this technique is replaced by using the adhesive resin9,10 or an overlay splint[11, 12,13]instead of a cobalt-chromium device.Assessment of the vertical dimension is important for the management, and careful comprehensive treatment plan is required for each individual case. Articulated study casts and diagnostic wax-up can provide important information which is helpful for the evaluation of treatment options. Tolerance of changes to vertical dimension of occlusion is usually confirmed with the clinical evaluation of the patienthaving a diagnostic splint or provisional prosthesis.[1]

CASE REPORT

A 55-year-old male patient presented with the chief complaint of anterior tooth wear and requested

aesthetic enhancement along with difficulty in chewing (Figure 3). Intraoral examination revealed a generalized loss ofdental structure. The anterior teeth had sharp enameledges, dentinalcraters. Maxillary 23 and mandibular 36,37 were missing.(Figure 4 and 5) The facial type of patient was square and his lip seemedto be under tension. The patient did not have temporomandibular disorder history and soreness of the mastication muscles,but the discrepancy betweencentric occlusion (CO) and maximum intercuspal position (MIP)was found when he was guided to CR with bimanual technique.

Figure 3

Figure 4

Figure 5

To determine whether VDO had been altered, the following aspects were investigated:

1. Phonetic evaluation: If the distance between the incisal edgeof the mandibular incisors and lingual surface of themaxillary incisors is about 1 mm, it makes normal /s/ sound.
   The patient's increased space altered /s/ sound to /ʃ/.
2. Interocclusal rest space: The patient's interocclusal rest spacethat was measured between nose tip and chin tip was 5 -6 mm that was greater than the normal value, 2 - 4 mm.
3. Facial appearance: Wrinkles and drooping commissures around mouth were observed.

The possible causes of patient's worn dentition that might include posterior interferences, parafunction, eating habit,and dental ignorance were explained to the patient. And theoptions of treatment plan were restoring mandibular edentulousposterior region with implants or removable partial denture with or without attachment, full mouth rehabilitation with metal ceramic restorationwith crown lengthening procedure in lower anterior region as well as endodontic procedure for upper and lower anterior teeth. The patient was scared of implant surgery, so the option of implant placement was excluded. As there was clinicalevaluation of reduced VDO, full mouth rehabilitation withincreasing VDO was planned.

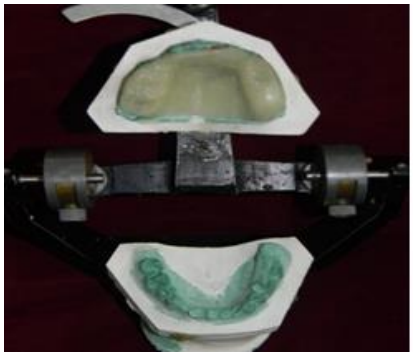

Figure 6

Figure 7

The patient's casts were mounted on a semi-adjustablearticulator (HanauTM Modular Articulator; Whip Mix Corp.,Louisville, USA) using a face-bow record and an interocclusalrecord that was made with the aid of a Lucia jig and polyvinylsiloxaneocclusal registration material (EXABITE II; GC Corp., Tokyo, Japan). The new VDO was set by 5 mmincrease in the incisal guidance pin of the articulator. Becausethe patient's interocclusal rest space was 2 - 3 mm larger onthe premolar area than normal distance, the actual increase weredetermined 3 mm in the anterior teeth and 1 - 2 mm in the posteriorteeth. The splint was designed to offer bilateral contactsof all posterior teeth in centric relation and guides of theanterior teeth in excursive movement (Fig. 6). The anterior guidancedisoccluded the posterior teeth in all jaw position exceptcentric relation. The adaptation of patient to the increased VDO was evaluatedduring 1-month trial period. No muscle tenderness and temporomandibular discomfort was found. The method of increasingVDO with the splint was used to determine desirableVDO of the fixed interim prostheses. After taking CR recordusing Lucia jig and Allu wax, diagnostic wax-up was performed after mounting on a semi adjustable articulator.(Fig. 7) Autopolymerizing acrylic resin (Protemp 3M) provisional crowns were fabricated usingaputty and light body matrix that was produced from the diagnosticwax-up (Fig. 8). The provisional fixed restorations were cemented with temporary cement (3M Relyx X Temp NE), and the patient's adaptationwas monitored.

Figure 8

For two months, interim restorations were adjusted, and usedas a guide for the definitive oral rehabilitation. During this period,the patient's muscletenderness, discomfort of TMJ, mastication, range of the mandibular movements, swallowing, and speech, were evaluated. Improvement in mastication, speech, and facial estheticsconfirmed the patient's tolerance to the new mandibular positionwith the restored VDO. The anterior guidance and posteriordisclusion on excursive movement were established. Adjustedocclusion was transferred to customized anterior guide table,which was made with acrylic resin (PATTERN RESIN; GC Corp, Tokyo, Japan)[15] Final preparation was performed, and definitive impressionswere made with polyvinylsiloxane impression material(3M Imprint VPS). Bite registrationwas taken using provisional crown and occlusal registration material (3M Imprint bite registration material)by half and half . Porcelain fused to metal restorationswere made using customized anterior guide table and cemented with resin modified glass ionomer cement (FujiCEM; GC America, Alsip, USA) (Fig 10). Because the patient's anterior guidancetable was used in the production of definitie restoration, theamount of occlusal adjustment on the lingual surface of maxillaryanterior teeth was minimal. Removable partial denture with extracoronal attachment was planned for edentulous region in mandible. The attachment system was selected on the basis of available space. (OT CAP, Rhein 83 Inc, USA).

Tooth preparation was done on mandibular 1st and 2nd premolar to receive PFM crowns . Impression was made and poured in die stone. Following which crowns have been waxed to full contour and milled in wax for maximum guiding plane surface. The patrices was added to the axial surfaces of the abutment using a dental surveyor. Following which casting, finishing, and veneering of the fixed component was done. The fixed component including veneered metal-ceramic crowns & the patriceswere tried in the patient mouth (Fig 9).

Figure 9

The matrices of the attachments was placed in the receptacles (patrice of the attachments) which were in the crowns on the refractory cast .The wax up of framework of the removable partial denture was done, invested and casted. The framework was evaluated in the patient mouth and jaw relation was done using occlusalrims.Try-in was done and acrylisation of removable partial denture was performed.The prostheses weredesigned using mutually protected occlusion. The anterior teeth protected the posterior teeth from excursive force and wear, and posterior teeth supported the bite force. Oral hygiene instructionand regular check-up were administered.

Figure 10: Definitive restoration was delivered. A: frontal view, B: maxilliaryocclusal view, C: mandibular occlusal view.

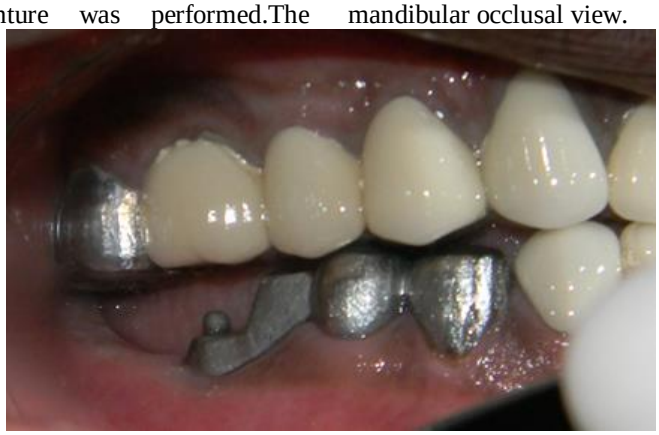

Figure 10

DISCUSSION

In1984, Turner[16]classified the treatment of a severely worn dentition by the amount of the loss of VDO and available space to restore. His classification and conventional treatment, which includes raising VDO with multiple crown-lengthening procedures, have been widely used up to present. However, the etiology of tooth wear is multifactorial, and clinical controlled trials of restorative and prosthodontic approaches are limited in quantity and quality. In addition, lack of evidence regarding the long-term outcomes of treatment methods and materials cause difficulty in clinical decision-making.[17] Because of these unclear guidelines, adhesive strategy, that is more conservative and reversible, is increasing.[17,18,19] Nonetheless, the composite resin restoration could not be used for the patient in this case. The remaining tooth structures were too small to have sufficient retention of composite resin, and the surveyed crowns to support RPD were necessary. Therefore,the conventional treatment modality that includes a trial overlay splint, provisional restoration, careful monitoring, and definitive prosthesis, was chosen.In previous literature, the wearing time of overlay splint and provisional crown is various. The trial period of overlay prostheses which are reversible and conservative is between 3 weeks and 5 months, and that of intensive fixed provisional prostheses is 2 - 6 months.[16,11,18,12,20] In this case, the patient was carefully monitored for 1 month to evaluate the adaptation to the removable occlusal overlay splints.[21]Also the patient' s adaptation to the provisional restoration was monitored for 3 months.[22] The trial period is relatively shorter than the other case report, but discomfort, wear, and muscle fatigue were not observed during that period. The increase of VDO was determined not by standardized esthetic golden proportion of anterior teeth but by patient's physiologic factor like interocclusal rest space and speech. If the increase of VDO was decided arbitrarily without close evaluation, multiple complications would happen and longer treatment period might be needed. Depending on the patient's situation and adaptation ability, the interim period can be modified, and the careful evaluation and monitoring may shorten the overall treatment duration.The rehabilitation using restoration of anterior crowns and RPD providing posterior support is affordable and common for many patients who require the treatment of teeth wear because of reasons of economics and tradition.[17]

CONCLUSION

In this clinical report, raising vertical dimension of occlusion using removable occlusal overlay splint and following fixed provisional based on accurate diagnosis showed successful full mouth rehabilitation for severely worn down dentition.

CLINICAL SIGNIFICANCE

Management of worn dentition using fixed or removable prostheses is complex and among the most difficult to rehabilitate. Assessment of the vertical dimension is important and a comprehensive treatment plan is required for each individual case. Articulated study casts and a diagnostic wax-up can provide important information for the evaluation of treatment options. In this case, tolerance to changes in VDO was confirmed with clinical evaluation of the patient after having worn a diagnostic splint and provisional prosthesis.

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