

CASE REPORT

Full Mouth Rehabilitation of a Patient with Overlay Prosthesis – A Case Report

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ABSTRACT

Severe tooth wear with loss of vertical dimension of occlusion (VDO) presents a restorative challenge, particularly when fixed rehabilitation is not feasible. Overlay removable partial dentures (ORPDs) offer a conservative, reversible, and economical alternative. This report describes the rehabilitation of a 49-year-old female with partially edentulous arches, generalized severe tooth wear, and reduced VDO. Treatment comprised maxillary and mandibular heat-cured acrylic overlay removable partial dentures at an increased vertical dimension. Esthetics, masticatory function, lip support, and occlusal harmony were successfully restored, and the patient reported satisfaction with comfort, retention, stability, and appearance at follow-up.

Keywords: *Overlay denture; Tooth wear; Vertical dimension; Removable partial denture; Prosthodontic rehabilitation.*

Introduction

The definition of tooth wear is the progressive, non-carious loss of dental hard tissue, which is caused by attrition, abrasion, erosion, or abfraction; and it is considered a multifactorial condition and influenced by dietary, mechanical, behavioural, and systemic factors.^{1,2} It is a finding that is recognised worldwide, and many will not be aware of it until function (or appearance) is affected.² Various indices have been adapted to evaluate the magnitude of severity of tooth wear, such as the Tooth Wear Index (TWI), developed by Smith & Knight (1984), and the more recent Basic Erosive Wear Examination (BEWE), by Bartlett and colleagues.^{3,4}

Tooth wear may be excessive and could cause a decrease in vertical dimension of occlusion (VDO), esthetic problems, decreased masticatory function, and changes in phonetics.^{5,6} While continuous tooth eruption and alveolar adaptation are physiologic compensations for slow wear, occlusal collapse is a consequence that follows an increase in wear greater than the physiologic rate, and particularly is the loss of posterior support.^{5,7} Severe occlusal wear, decreases lower facial height, angular cheilitis, increases interocclusal distance, and chewing and speech difficulties are all clinical features associated with loss of VDO.^{6,7}

Although a comprehensive fixed prosthodontic rehabilitation may be the ideal and desired treatment of severely worn teeth, it may not always be feasible for many reasons, including patient preference for a more conservative and reversible option, financial concerns, medical status, or too much tooth structure to be removed.^{8,9} Overlay removable partial dentures (ORPDs) offer an alternative in such cases that is more inexpensive, less intrusive, and less complicated. An ORPD can be continuously worn during function (speech and masticatory), unlike an occlusal splint, and enables accurate evaluation of the new VDO before any definitive treatment.^{10,11}

Overlay dentures are partial removable prostheses which replace the occlusal surfaces of stilled teeth whilst at the same time replacing the lost VDO and teeth. Overlay dentures over reduced abutments or roots provide good support, retention, proprioception, and limited residual ridge resorption in comparison to an overdenture for the latter case.^{12,13} This case report shows the prosthodontic rehabilitation of a case with severely worn dentition and diminished VDO using conventional maxillary and mandibular acrylic overlay removable partial dentures.

Case Report

Patient presentation and history

A 49-year-old female patient presented at the Department of Prosthodontics of Jinnah Sindh Medical University Karachi, Pakistan with a complaint of unsatisfactory esthetics and inability to chew food properly. She was also dissatisfied with her overall facial appearance due to the reduced size of the anterior teeth. The patient requested replacement of the missing teeth along with improvement in oral function and esthetics.

The medical history was of importance, including a controlled type 2 diabetes mellitus on a regimen of oral hypoglycaemic drug. History included the removal of both upper lateral incisors about three to four months before presentation. This patient also had a history of nocturnal clenching, which indicated the presence of parafunction.

Extraoral examination

Extra oral examination showed that there was absence of facial asymmetry, gross swelling and deviation, mouth opening was adequate. The muscles of mastication were not tender to palpation, and the temporomandibular joints had no popping or crepitus with opening, closing, or lateral excursions. There were no abnormalities in the movement of the mandibles. The presence of a clinically apparent decrease in the lower facial height with deep nasolabial folds and a reduction in lip support correlated with a reduction in VDO (Figure. 1).



Figure. 1. Preoperative extraoral views. (A) Frontal view showing reduced lower facial height, missing maxillary lateral incisors, and worn anterior dentition. (B) Profile view demonstrating decreased lip support and prominent nasolabial folds consistent with loss of vertical dimension of occlusion. (C) Maxillary occlusal view demonstrating partial edentulous maxilla with remaining anterior teeth exhibiting attritional wear. (D) Frontal view of worn dentition showing collapsed occlusal vertical dimension

Intraoral examination

Intraoral examination revealed healthy oral mucosa with no overt soft-tissue lesions. In the maxillary arch, there was the presence of teeth #6, #8, #9, and #11 (using the Universal Numbering System), with loss of the tooth structure in the mesial aspect of the left canine, which was

asymptomatic and lacked sensitivity. In the mandibular arch, teeth # 22 to #24, #26 to #27, and #29 were present, with all these teeth suffering from severe reduction in the clinical crown height as a result of generalized attrition. There was an increased overbite with minimal overjet (Figure. 2). Proximal arrested caries was seen with tooth #29, with no symptoms.



Figure 2. Clinical and Laboratory stages. Top row: (A) Facebow record using a Hanau spring-bow. (B) Diagnostic mounting on a semi-adjustable articulator at the proposed increased vertical dimension. (C) Wax try-in showing the double-row labial arrangement of the mandibular anterior teeth. (D) Extraoral view of patient smile with wax trial of overlay denture

Diagnosis and treatment planning

Based on the findings from the clinical examination, the diagnosis of generalised severe tooth wear with reduction in the VDO and partial edentulism (Kennedy Class I modification 2 in the maxilla and Kennedy Class I modification 1 in the mandible) was made. Both long-term attrition from nocturnal grinding and dietary habits were thought to have been relevant, and subsequent loss of posterior occlusal support was considered to be an aetiological factor.

The proposal treatment options explained to the patient were full-mouth fixed prosthodontic rehabilitation, implant-supported restorations, and conventional overlay removable partial dentures at increased VDO. With her financial parameters, controlled diabetic status, and wanting something conservative, Maxillary and Mandibular Acrylic ORPDs were planned. Initially diagnostic jaw record at corrected VDO was taken and diagnostic teeth setup was performed followed by

diagnostic clinical trial. After patient's approval of the appearance with the trial ORPD was finalized and proceeded as the interim prosthesis. After patient conditioning, definitive cast partial denture is planned. Since tooth #29 was not causing any symptoms, the patient refused endodontic treatment. Oral prophylaxis was performed, and after that, written informed consent was taken.

Clinical procedure

Impressions of both arches were made using irreversible hydrocolloid (alginate) impression material, and diagnostic casts were poured in dental stone. A wax occlusion rim was used to establish an increased vertical dimension of occlusion by approximately 6 mm, determined using phonetic evaluation, esthetics, and interocclusal rest space assessment. A facebow record was achieved with a Hanau spring-bow facebow, and the casts were set in a semi-adjustable articulator (Figure. 3).



Figure 3. Postoperative outcome. Top row: (A) Postoperative smile after delivery of the overlay removable partial dentures and composite build-up of tooth #11. (B) Maxillary occlusal view with the maxillary overlay denture in place. (C) Mandibular occlusal view with the mandibular overlay denture seated; note the C-clasp retainer on tooth #29 and occlusal coverage of the remaining short clinical crowns.

Acrylic overlay removable partial dentures were indicated for both arches. A C-clasp was added on #29 for extra retention of the mandibular denture. The maxillomandibular relationship records were taken at the established VDO and transferred to the articulator. Teeth arrangement was carried out in the laboratory, deliberately arranging the mandibular anterior teeth labially to the rest of the natural anterior teeth (so-called double row anterior dentition) to disguise the mildly worn natural anterior teeth and to provide an added lip support and esthetics in facial functions.

The esthetics, phonetics, occlusion, and patient comfort were assessed through a wax try-in. After patient consent, the dentures were processed in the conventional way of flasking, dewaxing, and packing with heat-polymerised polymethyl methacrylate (PMMA) acrylic resin. At the appointment for insertion, the prostheses were adjusted intraorally to obtain occlusal contact, stability, and retention. To further enhance the smile contour, a direct composite resin build-up of tooth #11 was placed. The patient was made aware of oral hygiene maintenance protocol, guidelines for maintenance of the dentures, and provided with a recall schedule.

Outcome and follow-up

The patient was reviewed after 24 hours, one week, and one month following insertion. The patient reported significant improvement in mastication, facial appearance, lip support, and self-confidence following insertion of the prostheses. Clinical examination at insertion and subsequent recall visits demonstrated satisfactory retention and stability of both maxillary and mandibular overlay removable partial dentures.

Occlusal contacts were evenly distributed bilaterally after intraoral adjustment, and the patient was able to achieve comfortable intercuspation at the increased vertical dimension of occlusion. No sore spots, mucosal ulcerations, or temporomandibular discomfort were observed during follow-up visits.

Speech adaptation was satisfactory after a short adaptation period, and the patient reported improved chewing efficiency with restoration of posterior occlusal support. Soft tissues remained healthy, with no evidence of inflammation or tissue irritation at recall appointments. Esthetic improvement, including enhanced lip support and smile appearance, was also clinically evident (Figure. 3D–F).

Discussion

The effect of posterior occlusal support has been known to be one of the many conditions that initiate extensive tooth structure loss, and consequent reduction in VDO, which can influence quality of life.^{9,14} In the present case, the occlusal collapse was produced by generalised severe attrition of the mandibular dentition, bilateral posterior edentulism, and parafunctional clenching habit, and created the classic clinical picture of occlusal collapse with reduced lower facial height. The removable partial dentures had been adjusted for the restoration of the posterior occlusal contact, positioning the mandible into a more stable and repeatable occlusal position, and reestablishing a comfortable VDO.

In the present case, the vertical dimension of occlusion was increased by approximately 6 mm, which was well tolerated by the patient without signs or symptoms of

temporomandibular dysfunction. Although there have been some concerns about the potential adverse effects of increased VDO on the masticatory system in the past, recent studies suggest that increasing VDO in dentate and partially dentate patients is a safe procedure, if indicated, and that it is not a primary cause of dysfunction related to the temporomandibular dysfunction.^{11,15} Being a removable and reversible prosthesis, the use of ORPDs before any irreversible treatment was performed allowed the new vertical dimension to be tested in function, in keeping with the current recommendation for handling severely worn dentitions.^{8,11}

Although natural teeth must be preserved under an overlay prosthesis, this is of great biological value as opposed to standard full dentures. Retained natural teeth help to preserve the periodontal proprioception, act as a way of redistributing the occlusal load between the remaining ridge and the teeth, and lessen the alveolar bone resorption, especially in the mandibular arch.^{12,13,16} These attributes make ORPDs are an attractive choice for partially edentulous individuals with severe tooth wear, particularly for the resource-poor populations where definitive fixed rehabilitation is beyond their financial means.^{9,17}

The inclusion of a double row of anterior teeth to the current prosthesis not only added to lip support but also helped to camouflage the morphologic defect of the remaining anterior teeth, improving the facial esthetics. These types of modifications have been reported as effective when surgery, orthodontics, or bone augmentation is not an option for financial, systemic, or time reasons.^{8,17}

The heat-polymerized acrylic resin was chosen as the polymeric material to be produced because it was easy to manipulate, cheap, easy to repair, and therefore had a reasonable esthetics. Some disadvantages of acrylic ORPDs include occlusal wear of the artificial teeth, caries, increased periodontal disease in the natural teeth (in the absence of proper hygiene), mucosal irritation, and the possibility of prosthesis breakage under excessive occlusal loads.^{10,18} Patient compliance with oral hygiene and routine recall are therefore essential for long-term success. Finally, some patients might not prefer a removable prosthesis over a fixed one, which should be discussed at the time of informed consent.

Advances in future prosthodontics with cast metal frameworks for overlay prostheses, digital workflow, and CAD/CAM and additive (3D-printed) fabrication may increase the strength, accuracy of fit, occlusal accuracy, and longevity of the overlay prosthesis, and enable the conversion of an interim ORPD to make it into a definitive prosthesis when the new VDO is validated.^{11,19} Although overlay removable partial dentures have their drawbacks, they can be a viable, cost-effective, technically acceptable, and minimally invasive rehabilitative treatment choice in the patient with severely worn dentition with a limited vertical dimensional change (VDO) crisis, especially if the patient is medically compromised or cannot afford fixed dentures.^{9,20}

Conclusion

Removable partial dentures overlaid on natural teeth are always a possibility for effective rehabilitation of severe tooth wear cases with reduced vertical dimension of occlusion in an economical, conservative approach. As the

prosthesis described in this case, esthetics, mastication, phonetics, and facial support were restored, and a large amount of irreversible preparation was avoided. Partially edentulous patients with financial constraints, medical disorders, or those who opt for a reversible treatment option rather than a complex fixed prosthodontic rehabilitation will greatly benefit from this treatment option. The key to a long life is careful case selection, determination of increased VDO at the correct time, meticulous lab work, and structured maintenance recall.

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Conflict of Interest

The authors declare no conflict of interest related to this manuscript.

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Patient Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The patient's identity has been protected through anonymization of clinical photographs.

Authors' Contributions

MI: Conception & design, data collection, data analysis, manuscript writing

MK: Data analysis, manuscript writing, supervision

MH: Conception & design, data analysis

MKK: Data collection, data analysis tools

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