



Management of Generalized Tooth Wear by Increasing the Vertical Dimension of Occlusion Using Adhesive Occlusal Table Veneers: A Case Report

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Abstract

Generalized tooth wear may lead to a reduction in the vertical dimension of occlusion (VDO), potentially compromising masticatory function, occlusal stability, and facial esthetics. Rehabilitation of such cases often requires restoration of the lost vertical dimension while preserving as much remaining tooth structure as possible. Advances in adhesive restorative dentistry have enabled more conservative treatment strategies compared with conventional full-coverage reconstructions.

This case report describes the management of a patient presenting with generalized tooth wear associated with decreased VDO using adhesive occlusal table veneers. Following comprehensive clinical and radiographic assessment, the proposed increase in VDO was initially evaluated with a removable occlusal splint and subsequently verified through a provisional phase to assess patient adaptation, phonetics, and comfort. After confirmation of neuromuscular tolerance to the new vertical dimension, definitive restorations were fabricated from lithium disilicate and adhesively bonded to restore posterior support and stabilize the occlusal scheme.

The treatment resulted in restoration of functional occlusion, improved anterior tooth display, and preservation of tooth structure through a minimally invasive restorative approach. Adhesive occlusal table veneers may represent a predictable and conservative treatment option for the rehabilitation of patients with generalized tooth wear requiring an increase in vertical dimension of occlusion.

Keywords: Tooth Wear; Vertical Dimension of Occlusion; Occlusal Veneers; Adhesive Dentistry; Lithium Disilicate; Full-Mouth Rehabilitation

Abbreviations

VDO: Vertical Dimension of Occlusion; CR: Centric Relation; TMJ: Temporomandibular Joint; CAD/CAM: Computer-Aided Design/Computer-Aided Manufacturing.

Introduction

Tooth wear is a common clinical finding characterized by the progressive and irreversible loss of dental hard tissues

resulting from processes such as attrition, abrasion, and erosion. In advanced stages, generalized tooth wear may lead to marked changes in tooth morphology, reduced clinical crown height, and potential alterations in the vertical dimension of occlusion (VDO). These changes can compromise masticatory function, occlusal stability, phonetics, and facial esthetics, and may ultimately present considerable restorative challenges if left unaddressed [10].

Rehabilitation of patients with advanced tooth wear frequently involves restoration of the lost vertical dimension to reestablish functional occlusion and provide sufficient restorative space. Nevertheless, increasing the VDO requires careful clinical judgment. The clinician must consider the patient's adaptive capacity as well as the functional stability of the stomatognathic system. For this reason, diagnostic occlusal splints and provisional restorations are commonly used as transitional tools to evaluate neuromuscular adaptation, phonetics, and patient comfort before proceeding with definitive restorative treatment [2,3].

Recent advances in adhesive dentistry and high-strength ceramic materials have facilitated more conservative approaches to the rehabilitation of worn dentitions. Instead of relying solely on conventional full-coverage restorations, which often require extensive tooth reduction, additive restorative strategies can be employed to rebuild lost tooth structure while preserving remaining tissues. Occlusal table veneers and other partial-coverage restorations represent such minimally invasive options, allowing restoration of occlusal morphology with limited preparation [13]. Conservative preparation strategies have gained increasing attention in restorative dentistry because they allow preservation of tooth structure while providing adequate restorative space for indirect restorations [5].

The present case report describes the management of a patient with generalized tooth wear associated with decreased vertical dimension of occlusion using adhesive occlusal table veneers to restore posterior support and reestablish the vertical dimension of occlusion.

Case Report

A 72-year-old male patient presented to the restorative clinic with concerns regarding the appearance of his smile. The patient reported that he was dissatisfied with the limited visibility of his teeth during smiling and noted that his lower anterior teeth appeared noticeably short. His chief complaint was expressed as: "When I smile, I don't show teeth, and my lower front teeth are too short".

The patient was generally healthy and reported no significant medical conditions. His medical history was noncontributory, and he was not taking any medications that could influence dental treatment or healing.

A comprehensive clinical and radiographic examination was subsequently performed. Intraoral assessment revealed generalized tooth wear involving both arches, with the anterior teeth showing the most pronounced changes. The mandibular incisors exhibited marked loss of incisal length, contributing to reduced tooth display during smiling and speaking (Figure 1). The maxillary anterior teeth also demonstrated signs of wear and previous restorative intervention.



Figure 1: Frontal intraoral view demonstrating generalized anterior tooth wear with marked reduction in incisal length of the mandibular incisors, contributing to decreased anterior tooth display.

Posterior teeth in both arches presented with occlusal wear characterized by flattened cuspal morphology and loss of occlusal anatomy (Figure 2). Several posterior restorations were present, including metallic restorations in the maxillary and mandibular posterior segments. Despite the generalized wear pattern, no active carious lesions were detected, and periodontal evaluation revealed healthy gingival tissues with no signs of active periodontal disease.



Figure 2: Occlusal views demonstrating generalized posterior tooth wear.

Clinical examination of the temporomandibular joints revealed no tenderness, joint sounds, or limitation of mandibular movement. The patient did not report symptoms suggestive of temporomandibular disorders.

Evaluation of the vertical dimension of occlusion revealed clinical findings suggestive of a reduced vertical dimension. Phonetic assessment demonstrated an increased closest speaking space of approximately 4–5 mm, exceeding the range typically observed in normal speech. In addition, the interocclusal distance, defined as the difference between the vertical dimension at rest and the vertical dimension of occlusion, was measured at approximately 15 mm. These findings were consistent with a collapse of the vertical dimension associated with the generalized pattern of tooth wear.

Centric relation (CR) was recorded using the leaf gauge technique. The initial point of occlusal contact was identified using eight leaf gauge sheets to allow mandibular deprogramming and facilitate seating of the condyles in centric relation. Subsequently, an additional sixteen leaf gauge sheets were introduced to increase the vertical dimension by approximately 2 mm. During this phase, the patient reported mild muscular tension, particularly on the left side, which was carefully monitored throughout the procedure.

Once a comfortable and repeatable mandibular position was achieved, a centric relation bite registration was obtained. This record was then used to mount the diagnostic casts on a semi-adjustable articulator to allow further evaluation of the occlusal relationship and facilitate diagnostic planning (Figure 3).



Figure 3: Leaf gauge technique for centric relation registration. (A,B) Laboratory demonstration of mandibular deprogramming and centric relation recording using a leaf gauge. (C) Diagnostic casts mounted on a semi-adjustable articulator using the centric relation bite registration at the proposed vertical dimension of occlusion.

Following articulation of the diagnostic casts in centric relation, a full-mouth diagnostic wax-up was performed at the proposed increased vertical dimension of occlusion. The wax-up allowed evaluation of the planned occlusal scheme, restoration of anterior tooth proportions, and assessment of the restorative space created by the increase in vertical dimension. This diagnostic step also served as a guide for subsequent restorative planning and fabrication of provisional restorations (Figure 4).

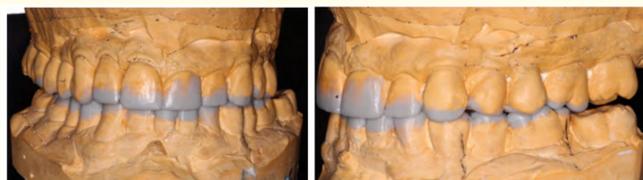


Figure 4: Diagnostic full-mouth wax-up at the proposed increased vertical dimension of occlusion.

Based on the diagnostic wax-up, a trial removable occlusal guard was fabricated at the proposed increased vertical dimension of occlusion and delivered to the patient (Figure 5). The appliance was used to evaluate the patient’s adaptation to the planned increase in vertical dimension and to monitor comfort, function, and muscular response prior to initiating definitive restorative treatment. The patient was instructed to wear the appliance both during daytime and during sleep. After two months of use, the patient reported no temporomandibular discomfort or muscle soreness, suggesting satisfactory neuromuscular adaptation to the new vertical dimension.



Figure 5: Trial removable occlusal guard fabricated from the diagnostic wax-up to evaluate patient adaptation to the proposed increase in vertical dimension of occlusion.

Following successful adaptation to the increased vertical dimension, a full-mouth intraoral mock-up was fabricated using a bis-acryl provisional material (Protemp™, shade A1) based on the diagnostic wax-up (Figure 6). This mock-up allowed clinical visualization of the proposed restorative outcome and served as a guide for evaluating the planned occlusal scheme and anterior tooth proportions.



Figure 6: Intraoral mock-up fabricated with bis-acryl resin based on the diagnostic wax-up to evaluate occlusion, esthetics, and phonetics at the proposed vertical dimension of occlusion.

Occlusion and esthetics were evaluated and refined chairside to ensure stable intercuspation and harmonious anterior tooth display. The patient reported satisfaction with both the new occlusal position and the improved shape and visibility of the anterior teeth.

Following confirmation of the proposed vertical dimension, a second diagnostic wax-up was prepared at the established VDO to facilitate fabrication of fixed provisional restorations. Based on this wax-up, a full-mouth provisional prosthesis was fabricated using a bis-acryl provisional material (Protemp™, shade A3) and delivered intraorally (Figure 7).



Figure 7: Fixed provisional restorations fabricated from bis-acryl resin and delivered at the confirmed vertical dimension of occlusion to evaluate functional stability and patient adaptation.

The provisional restorations were maintained for six weeks to allow further evaluation of patient comfort, functional stability, and adaptation to the new vertical dimension. During this period, occlusion, phonetics, and esthetics were monitored, and no signs of temporomandibular discomfort or muscular fatigue were reported.

Occlusal veneer and onlay preparations, where applicable, were performed on posterior teeth with the aim of preserving as much enamel as possible. The preparations were conservative in design and took advantage of the additional restorative space created by the increased vertical dimension of occlusion (Figure 8). Particular emphasis was placed on maintaining enamel margins to enhance the predictability of adhesive bonding.

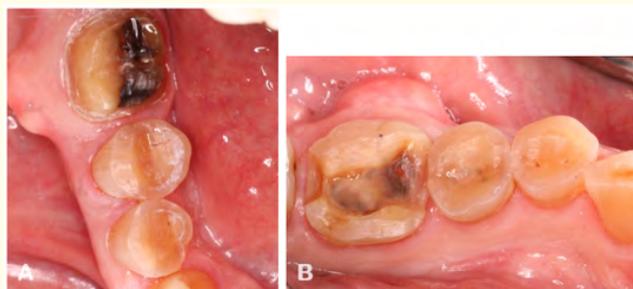


Figure 8: Conservative occlusal veneer and onlay preparations on mandibular posterior teeth demonstrating minimal reduction and preservation of enamel margins. (A) Lower right quadrant. (B) Lower left quadrant.

This minimally invasive approach was selected to conserve tooth structure while allowing adequate thickness for the definitive ceramic restorations.

All definitive restorations were fabricated from lithium disilicate ceramic (IPS e.max, Ivoclar Vivadent). Occlusal veneers and partial coverage restorations were adhesively cemented under strict isolation using resin cement (Variolink®, Ivoclar Vivadent), following the manufacturer's recommended bonding protocol. Both light-cure and dual-cure resin cements were utilized depending on the thickness and location of the restorations.

In areas where full-coverage crowns were indicated, cementation was performed using a resin-modified glass ionomer cement (FujiCEM™ II, GC Corporation). After cementation, final occlusal adjustments were carried out to establish stable and evenly distributed occlusal contacts and to ensure harmonious functional movements (Figure 9).

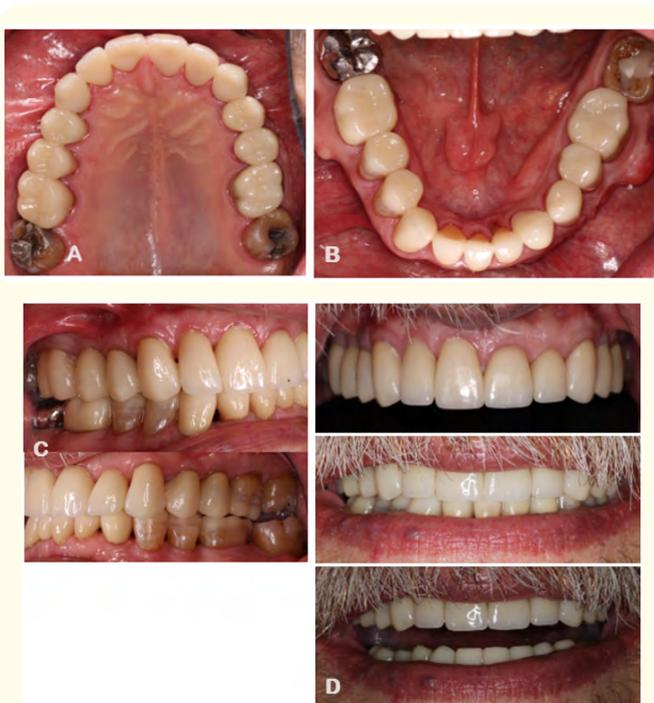


Figure 9: Final intraoral views after cementation of lithium disilicate restorations and establishment of stable occlusal contacts. (A-D) Postoperative intraoral views demonstrating the definitive restorations and the restored occlusal scheme.

Discussion

Assessment of whether generalized tooth wear has resulted in a true loss of vertical dimension of occlusion remains one of the more debated aspects of restorative treatment planning. Severe occlusal wear does not necessarily lead to a reduction in VDO, as compensatory eruption and alveolar adaptation may partially preserve the vertical relationship over time [14]. Therefore, the decision to increase VDO should not rely solely on the presence of tooth wear but should instead be based on a combination of functional, phonetic, and esthetic findings. In the present case, the increased interocclusal rest space, enlarged closest speaking space, and reduced anterior tooth display collectively supported the diagnosis of decreased VDO and the need for vertical reestablishment. This approach is consistent with recommendations that VDO increase should primarily be guided by restorative requirements and patient esthetic demands, provided that the new mandibular position can be physiologically

tolerated [2]. The use of a removable occlusal guard as a reversible diagnostic step allowed the proposed increase to be tested before definitive treatment, facilitating evaluation of neuromuscular adaptation and patient comfort.

Accurate recording of centric relation is an essential step in full-mouth rehabilitation, particularly when alterations in vertical dimension are planned. Several techniques have been described to obtain a reproducible centric relation record, among which the leaf gauge is widely used for mandibular deprogramming. By separating posterior tooth contacts, the leaf gauge reduces proprioceptive input from periodontal receptors and promotes muscular relaxation, allowing the condyles to seat in a more stable position [3]. In the present case, the leaf gauge technique provided a controlled method for obtaining a reproducible centric relation record while permitting gradual opening of the vertical dimension. This facilitated reliable mounting of the diagnostic casts and accurate evaluation of the occlusal relationship at the proposed vertical dimension.

The rehabilitation of this patient was carried out using a segmented simultaneous approach to full-mouth reconstruction. This strategy allowed treatment to proceed in controlled stages while maintaining continuous evaluation of occlusion, esthetics, and functional comfort. By restoring selected segments while preserving stable reference contacts in untreated areas, the clinician can maintain better control over the developing occlusal scheme [4]. Dawson described this approach as advantageous for establishing occlusal plane relationships and intercuspation gradually while maintaining a predictable mandibular position [3]. Such an approach may be particularly beneficial in cases involving VDO increase, as it allows verification of occlusal stability and patient adaptation throughout treatment.

Validation of the proposed vertical dimension is a critical step before definitive restorative procedures. In this case, patient adaptation was first evaluated using a removable occlusal splint and subsequently confirmed through an extended provisional phase. This staged protocol provided a reversible method for assessing functional tolerance to the altered mandibular position. Provisional restorations at the proposed VDO allow clinicians to evaluate phonetics, esthetics, masticatory function, and patient comfort over time before definitive treatment is undertaken [2].

In addition, this phase provides an opportunity to refine occlusal relationships and confirm functional stability in a controlled clinical environment [1]. The absence of muscular tenderness or temporomandibular symptoms during the provisional phase in the present case suggested satisfactory neuromuscular adaptation.

Occlusal veneers represent a conservative alternative to traditional full-coverage restorations for the management of worn dentitions requiring an increase in vertical dimension. Unlike conventional crowns, these restorations rely on additive or minimally invasive preparation designs that prioritize preservation of remaining tooth structure. Maintaining enamel margins is advantageous in adhesive dentistry because it enhances bonding predictability and reduces the biological cost associated with extensive tooth reduction [6]. Several laboratory investigations have demonstrated favorable mechanical performance of thin occlusal restorations when adhesively bonded to sound tooth structure [12]. Biomechanical analyses have also demonstrated favorable stress distribution and load transfer in adhesively bonded restorations when appropriate restorative design and bonding protocols are applied [11].

Lithium disilicate ceramics have become widely used in minimally invasive restorative dentistry because of their favorable combination of strength, esthetics, and adhesive bonding capability. Their relatively high flexural strength allows the material to be used in thin restorations while maintaining resistance to functional loading. In addition, lithium disilicate ceramics have demonstrated favorable mechanical reliability and fatigue resistance when used in adhesively bonded restorations [8]. Experimental studies have shown that adhesively bonded lithium disilicate restorations can withstand occlusal forces even at reduced thicknesses [9], while clinical reports have demonstrated favorable outcomes for lithium disilicate restorations in worn dentitions [7]. In the present case, the use of lithium disilicate occlusal veneers allowed restoration of occlusal morphology and vertical dimension while preserving the remaining tooth structure and achieving satisfactory functional and esthetic outcomes.

Conclusion

Management of generalized tooth wear requires careful diagnosis and a structured approach to restoring both function and esthetics. In the present case, a structured diagnostic sequence,

including evaluation of vertical dimension, reversible testing with an occlusal appliance, and a provisional phase allowed safe and predictable establishment of an increased vertical dimension of occlusion. This staged approach enabled continuous assessment of patient comfort, neuromuscular adaptation, and occlusal stability prior to definitive treatment.

The use of adhesive occlusal veneers provided a conservative restorative solution that preserved remaining tooth structure while restoring occlusal morphology and posterior support. When combined with appropriate material selection and meticulous adhesive protocols, lithium disilicate restorations offered both functional durability and favorable esthetic outcomes. Within the limitations inherent to a single clinical report and the relatively limited follow-up period, this case suggests that minimally invasive rehabilitation using adhesive occlusal veneers may represent a predictable treatment option for patients with generalized tooth wear requiring an increase in vertical dimension of occlusion.

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Conflict of Interest

The author declares no conflicts of interest.

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