

# ESTHETIC AND FUNCTION REHABILITATION OF SEVERELY WORN DENTITION WITH PROSTHETIC-RESTORATIVE APPROACH AND VDO INCREASE. CASE REPORT

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## SUMMARY

**Objective.** The aim of this study is to report a case of restorative treatment of severely worn dentition. In this case report, the erosive/abrasive worn dentition have been reconstructed with metal ceramic crown on the posterior teeth and with ceramic veneers on the anterior teeth 1.3 - 2.3 and 3.4 - 4.3.

**Methods.** A prosthetic treatment was proposed to a male patient of 58 years old having a clinically significant tooth wear. After clinical exam, impressions of maxillary and mandible arches were taken with alginate to obtain preliminary casts for diagnostic waxing to all maxillary and mandibular teeth and fabrication of all provisional crowns in acrylic resin for posterior teeth, and from the diagnostic wax-up were fabricated a silicone guide masks for anterior teeth.

An increase in VDO should be determined on the basis of a need to accomplish satisfactory and aesthetically pleasing restorations; it was proposed to increase the incisal length of the maxillary anterior incisors, together with alteration of the VDO 3 mm anteriorly.

The posterior teeth 1.6 - 1.5 - 1.4 - 2.4 - 2.6 - 3.5 - 3.6 - 3.7 - 4.4 - 4.7, where the amount of tissue lost was greater, were reconstructed with metal ceramic crowns. Two implants (Nobel replace 4.3x10) was placed. The implant were located in the area 4.5 - 4.6.

The anterior teeth were restored with veneers.

**Discussion and results.** The prosthetic challenge with restoring severely worn dentitions is to preserve as much of the already diminished tooth structure as possible for retention while also providing enough interocclusal space for the restorative material.

**Key words:** full-arch rehabilitation, VDO, veneers.

## Introduction

Tooth wear represents a frequent pathology with multifactorial origins. Behavioral changes, unbalanced diet, various medical conditions and medications inducing acid regurgitation or influencing saliva composition and flow rate, trigger tooth erosion, awake and sleep bruxism, which are widespread nowadays with functional disorders, induce attrition (1).

It can be generalized throughout the dentition, but is often localized to the incisor and canine teeth (2).

Significant loss of tooth structure caused by attrition can result in flattened occlusal surface with little original form remaining and significant proportion of exposed dentine (3).

Tooth wear treatment consist of three fases: 1) etiological, clinical, functional and aesthetic valuation for a treatment strategy based on etiology; 2) preventive and restorative fase; 3) maintenance program (4).

A diagnostic wax-up can help the determination of occlusal plane and the evaluation of correct height of vertical bite (VDO) that compensates for the loss of tissue and creates space for the anterior restorations with a better guide of anterior teeth (reducing the potential excessive incisal overbite) (4).

In the presence of a worn dentition with or without signs of altered passive eruption, there is still the need to maintain as much of the remaining tooth structure as possible and attempt to alter the VDO to create space for the restorative material prior to tooth preparation. This would be beneficial to avoid the aggressive reduction of tooth structure and preserve the maximum amount of enamel.

The vertical dimension when the mandibular teeth are occluding with the maxillary teeth is defined as the occlusal vertical dimension (VDO). The VDO for dentate individuals is mainly determined by the remaining dentition hence loss of tooth substance might influence the VDO. A loss of VDO can significantly affect patient function comfort and aesthetics (5).

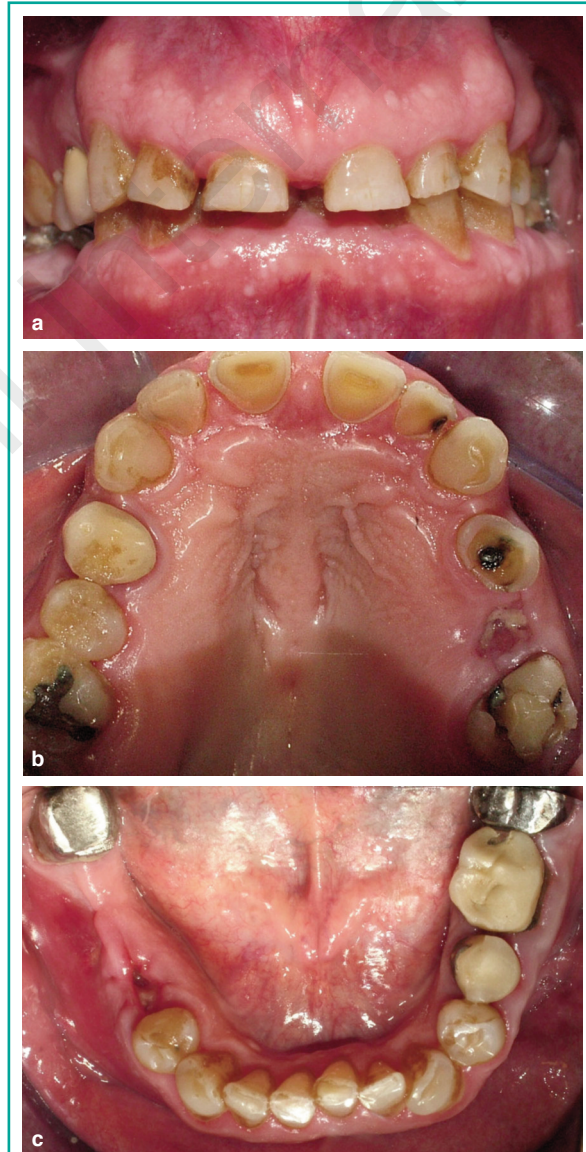
It's the state of the posterior teeth which determines the most appropriate restoration option: 1) in case of limited loss of tissue and small fillings using only direct restorations; 2) in case of moderate loss of tissue and medium-sized restorations using a combination of direct and indirect resin restorations; 3) in case of severe loss of tissue, loss of dental anatomy and large restorations using mainly indirect restorations (crowns and veneers) (4, 6).

Dental treatment improves the patient's oral hygiene, reduces thermal sensitivity, prevents pulpal involvement and further abrasion, and aesthetics are improved (7).

This paper presents a case report of prosthetic rehabilitation in a patient with a generalized tooth wear.

icant tooth wear, with dentine exposure and with a reduction in clinical crown height. He had a stable periodontal condition but a poor oral hygiene (Figs. 1 a, b, c and 2).

The patient is in good general health, he doesn't have allergies to medications, he doesn't smoke. In this case report, the erosive/abrasive worn dentition have been reconstructed with metal ceramic crown on the posterior teeth and with ceramic veneers on the anterior teeth 1.3 - 2.3 and 3.4 - 4.3.



**Figure 1 a, b, c**

a) Frontal preoperative view; b) Upper occlusal preoperative view; c) Lower occlusal preoperative view.

## Methods

A prosthetic treatment was proposed to a male patient of 58 years old having a clinically signif-

Before the treatment, the patient signed the informed consent and periodontal evaluation and prophylaxis were done for removing any signal of plaque accumulation.

He was unhappy with the appearance of his teeth and he experienced difficulty in chewing and sensitivity to cold.

After clinical exam, impressions of maxillary and mandible arches were taken with alginate to obtain preliminary casts for diagnostic waxing to all maxillary and mandibular teeth and fabrication of all provisional crowns in acrylic resin for posterior teeth, and from the diagnostic wax-up were fabricated a silicone guide masks for anterior teeth (Fig. 3).

The wax-up were the guide of teeth restoration and a silicon guide were fabricate from the wax-

up to transfer in the mouth the correct occlusal plane and the smile line.

It was proposed to increase the incisal length of the maxillary anterior incisors, together with alteration of the VDO 3 mm anteriorly. These modifications were evaluated with a direct mock-up in the anterior segment using a flow-able composite resin material (Systemp Flow, Ivoclar Vivadent). The direct mock-up was subsequently removed.

The posterior teeth 1.6 - 1.5 - 1.4 - 2.4 - 2.6 - 3.5 - 3.6 - 3.7 - 4.4 - 4.7, where the amount of tissue lost was greater, were reconstructed with metal ceramic crowns. Two implants (Nobel replace 4.3x10) was placed. The implant were located in the area 4.5 - 4.6.

The posterior teeth were prepared to adjust the temporary crowns.

Tooth structure removal on the occlusal surface was limited to only 0.3 mm in the posterior teeth because 0.5 mm of space was gained in both arches by increasing the VDO by 1 mm posteriorly.

The finish line on the cervical area was positioned in the sulcus.

The shell of the provisional restorations was fabricated at the new VDO with the modified indirect technique, then relined and cemented temporarily with zinc oxide noneugenol cement (Freegenol, GC Dental). The patient's comfort, speech, and appearance were reassessed after 1 month, and the final impression was fabricated.

After a week was taken the precision impression with polyvinylsiloxane (Aquasil Ultra Monophase, Aquasil Ultra XLV, DENTSPLY Caulk, Milford, USA) through single-step technique and two components with different viscosities.

For the recording of the beyond preparation have been used 2 different sizes of wires retraction: size "00" more deeply in the gingival sulcus and size "1" more superficial. The first wire was moistened with ferric sulfate at 25% of concentration and the second with aluminum chloride at 20% of concentration. After the test of the structure (Fig. 4 a, b) and the aesthetic valuation, the crowns were cemented with zinc oxide noneugenol cement.



**Figure 2**  
Pre operative rx opt.



**Figure 3**  
Diagnostic wax-up with alteration of the VDO 3mm anteriorly.



The anterior teeth were restored with veneers. The preparation of teeth 1.3 - 1.2 - 1.1 - 2.1 - 2.2 - 2.3 - 3.4 - 3.3 - 3.2 - 3.1 - 4.1 - 4.2 - 4.3 was performed taking into account the technique described by Magne et al. (8, 9), according to which the preparation depth has to be guided by the final volume of the restoration.

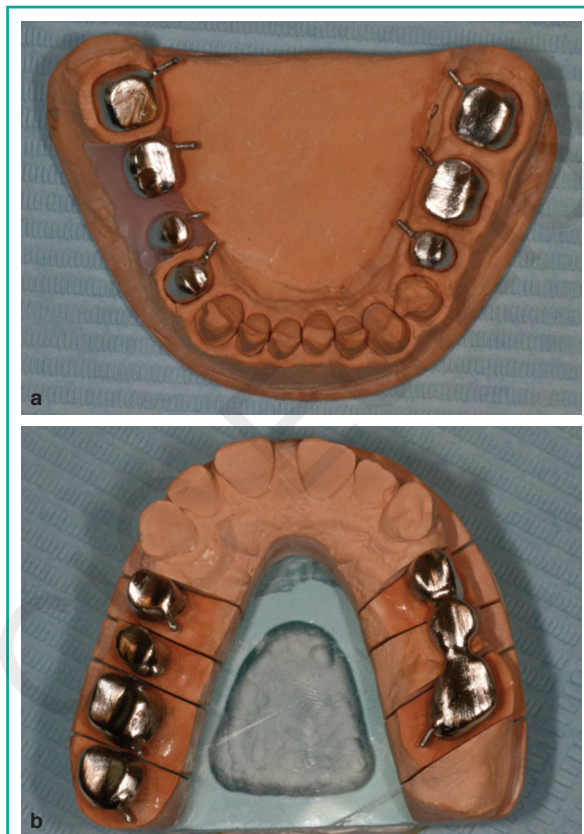
Silicon matrices derived from the diagnostic wax-up were sectioned in different planes and used to constantly check for an adequate preparation depth. Butt joint preparations as described by Stappert et al. were carried out. The incisal edge was always included in the preparation. All the finish-line margins were placed supragingival.

Ceramic thickness in the middle third of 0.7 mm and incisal ceramic thickness of 1.5 mm were ensured for veneer restorations. Proximal prepa-

ration was extended through the contact areas. After preparation impressions were taken using a VPS impression material (Aquasil Ultra Monophase, Aquasil Ultra XLV, DENTSPLY Caulk, Milford, USA). A direct resin mock-up was adapted.

Cementation followed a precise protocol (Fig. 5). Retraction cords were placed in the sulcus of every abutment to minimize the humidity from the crevicular fluid and to act as a barrier for the penetration of the resin cement to the base of the sulcus. The inner surfaces of the restorations were etched with hydrofluoric acid 4.5% (Ivoclar Vivadent) for 20 seconds, thoroughly rinsed with water, and put in an ultrasonic bath with distilled water for 3 minutes. After thorough air drying, the intaglio surface was silanized (MonobondS, Ivoclar Vivadent) and dried for 60 seconds. Tooth preparations were cleaned with pumice and rubber burs (Opticlean, KerrHawe), etched for 30 seconds on enamel and 10 seconds on dentin with 37.5% phosphoric acid (Ultra-Etch, Ultradent Products), rinsed, and dried. Both fitting surfaces, restorations, and teeth were coated with the adhesive system (OptiBond FL, Kerr Italia s.r.l. Scafati, SA), and a dual composite resin cement (Relyx Unicem 2, 3M ESPE, Neuss - Germany) was selected to lute the veneers.

All the bonding procedures were carried out using rubber dental dam (Fig. 5).



**Figure 4 a, b**  
a) Lower master model and structures; b) Upper master model and structures.



**Figure 5**  
Veneers cementation saliva non contaminated.

## Discussion and results

The prosthetic challenge with restoring severely worn dentitions is to preserve as much of the already diminished tooth structure as possible for retention while also providing enough interocclusal space for the restorative material.

The increase in VDO requires less tooth structure removal and permits the creation of more interocclusal space that can be used for the restorative material. The preservation of tooth

structure and remaining enamel should improve resistance strength.

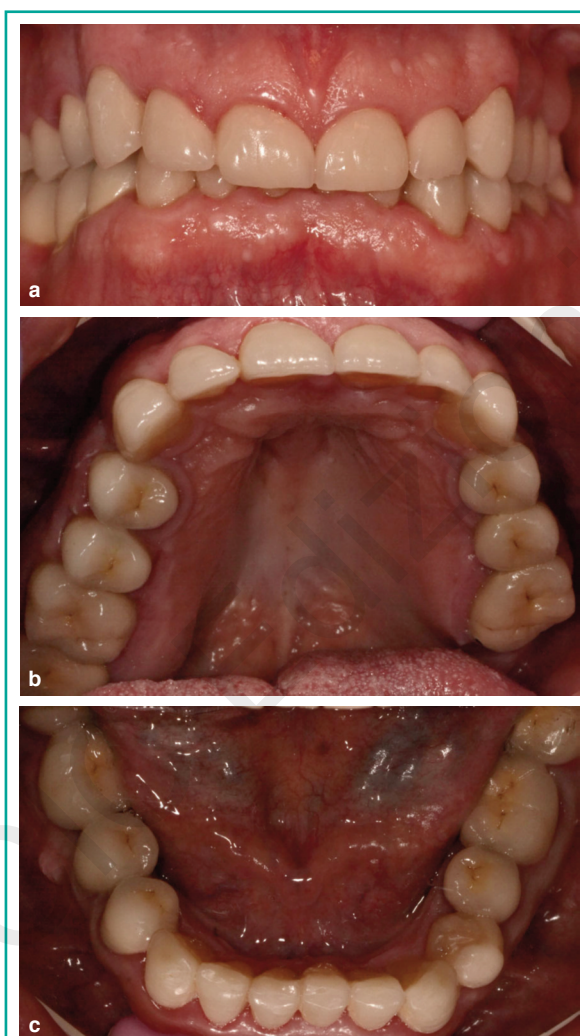
The idea of increasing vertical bite for tooth wear restoration was described and popularized by Dhal (4, 6).

There is still considerable debate in the literature about treatment modalities used to increase VDO (10, 11).

An increase in VDO should be determined on the basis of a need to accomplish satisfactory and aesthetically pleasing restorations.

The factors that should be considered as determinants for increasing the VDO are the remaining tooth structure, the space available for the restoration, occlusal variables and aesthetics. Minimizing the increase in VDO is useful to reduce the overall complexity of the prosthodontic treatment. Increasing VDO by more than 5 mm is rarely indicated (10).

At the end of therapy the patient was satisfied with the aesthetics of your teeth and noted significant improvements in masticatory function and lost sensitivity to cold (Fig. 6 a, b, c).



**Figure 6 a, b, c**

a) Frontal view of cemented restorations; b) Upper occlusal view of cemented restorations; c) Lower occlusal view of cemented restorations.

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