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Restoration of the Occlusal Vertical Dimension with an Overlay Removable Partial Denture: A Clinical Report

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Abstract

The process of tooth loss throughout life associated with severe occlusal wear may pose a challenge in the rehabilitation of partially edentulous arches. In these cases, many therapeutic procedures are necessary because each tooth must be restored to obtain the correct anatomical contour and recover the occlusal vertical dimension (OVD). A removable partial denture (RPD) with occlusal/incisal coverage, also known as an overlay RPD, is an alternative treatment option with fewer interventions, and, consequently, lower cost. This clinical report reviews the principles involved in the clinical indication for an overlay RPD, as well as the necessary planning and execution, to discuss the feasibility and clinical effectiveness of this treatment, identifying the indications, advantages, and disadvantages of this procedure through the presentation of a clinical case. The overlay RPD can be an alternative treatment for special situations involving partially edentulous arches in patients who need reestablishment of the OVD and/or realignment of the occlusal plane, and it can be used as a temporary or definitive treatment. The main advantages of this type of treatment are its simplicity, reversibility, and relatively low cost; however, further studies are needed to ensure the efficacy of this treatment option.

Occlusal dental wear is a physiological process that can be aggravated by pathological conditions such as bruxism. The type of food ingested can also have an effect, as harder, more acidic foods can accelerate tooth wear.[1] However, in terms of the physiological question, the amount of tooth wear can be used to estimate age with a high level of accuracy.[1,2] With respect to the area that suffers the largest amount of loss, anterior tooth wear is greater than that in the posterior region, involving not only physiologic, but also esthetic alterations.[3] The body response to tooth wear seems to have two paths according to the alterations in the occlusal vertical dimension (OVD). The former supports the notion of bone compensation, especially in the lower jaw. In this way, occlusal bone remodeling and growth would promote passive tooth eruption while there is wear.[4] The latter indicates that the bone would not be remodeled,[5] leading to a loss in the OVD and facial alterations. With these two situations in mind, the first step in oral rehabilitation involving severe tooth wear is to determine whether the OVD is appropriate. The initial diagnosis of any type of alteration is fundamentally important to the choice of treatment, because the clinical procedures may vary. If the OVD concept is correct, rehabilitation planning should consider periodontal surgical corrections associated with restorative treatment[6] to restore the correct contour and crown length in the gingival way, assuming that the occlusal limit is correct; however, if there is OVD loss, the periodontal surgical procedures may not be necessary, because restorative treatment resolves the clinical symptoms (Fig 1).

Regardless of the need for periodontal surgical procedures, worn teeth need to undergo a restorative procedure. The most important issue is correct diagnosis. Thus, the OVD reestablishment procedures involve very similar steps that may be repeated for different patients, such as the wax-up and provisional stages. There seems to be no consensus regarding the best choice of long-term treatment, which can range from direct composite resin restoration or laminated veneers to metal ceramic crowns.[7] Unfortunately, these treatment options still pose a financial challenge for the patient once many dental elements are involved. Some alternative must be considered to correctly plan treatments. The overlay removable partial denture seems to be cost-effective.[8]

Clinical report

A 62-year-old white man with good general health was referred to the Removable Partial Denture Clinic at the School of Dentistry, University of São Paulo, São Paulo, Brazil, for treatment. His chief complaint was to replace some lost teeth in the posterior inferior region and restore the anterior worn

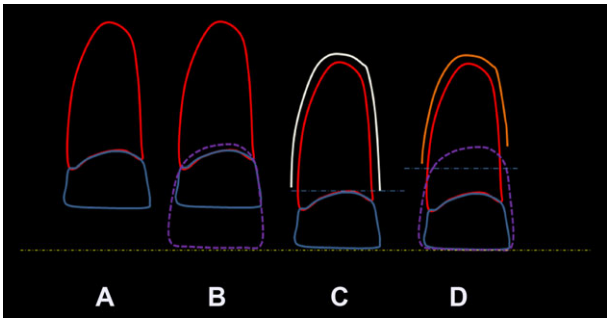

Figure 1 Classical situations involving tooth wear: (A) initial conditions of tooth wear and OVD loss; (B) restorative solution for case A; (C) initial condition of tooth wear without OVD loss; and (D) periodontal surgical procedures and restorative treatment for correction.

Figure 2 Intraoral view of the patient's initial condition.

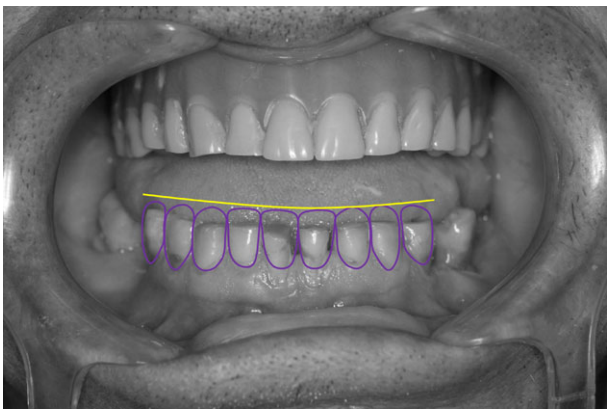

Figure 3 Virtual planning performed to assist in the predictability of the restorative procedure.

teeth. During the clinical exam, no pain was reported during muscle and joint palpation. The patient reported that his wife hears some "strange noise as if something was scraping" during the night. The intraoral exam revealed moderate wear in the inferior arch with good and healthy periodontal insertion and a complete denture in the maxilla (Fig 2). The OVD reduction could be seen because of the thin aspect of the lower lip. The tooth wear reduced the clinical crown to half its size, resulting

Figure 4 Incisal restoration of the anterior teeth and the occlusal rest seat.

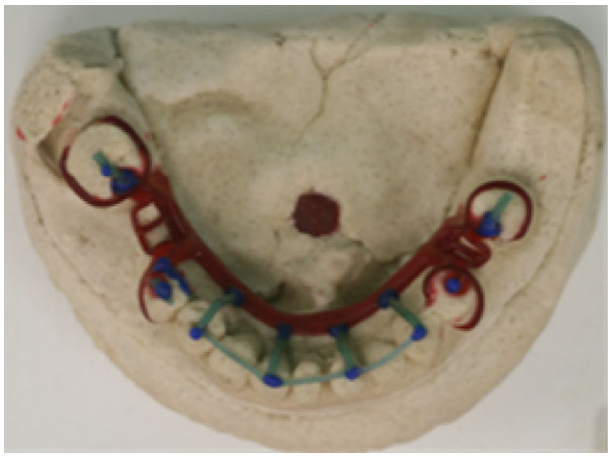

Figure 5 Framework wax-up with a simple occlusal retention for the acrylic resin.

Figure 6 ORPD final aspect.

in dentin exposure on the cervical region. The first and second molars were absent on both sides. The left second premolar migrated to a distal position, creating a space for a hypothetical "third" premolar.

Figure 7 (A) Right lateral view; (B) frontal view; (C) left lateral view; (D) occlusal plane view; (E) final esthetic result.

Because of the number of support teeth present in the mandible and the necessity for reestablishing OVD to treat the moderate dental wear, we suggested dental implants for the missing tooth, laminated veneers for the anterior teeth and a porcelain overlay for the posterior region. Due to the high cost of the treatment, the patient requested an alternative option; as a result, an overlay removable partial denture (ORPD) was indicated. Once the patient agreed on the cost, the treatment began.

The first step was to create impressions of the maxillary and mandibular arches using irreversible hydrocolloid; then, the casts were assembled in a semi-adjustable articulator for initial evaluation. The Willis gauge was used to obtain the correct OVD. The apparatus was positioned at the pupil and in the junction of the lips. From the initial measurement, 3 mm was reduced, respecting the interocclusal space posteriorly, as verified by the Silverman phonetic test. The final measurement was transposed to the subnasion to the gnathion in the correct OVD, which in turn was 2 mm higher than that presented by the patient's occlusion. The second step was to acquire intraoral photographs to apply the digital smile design concept[9] as an auxiliary diagnosis method to facilitate the diagnosis and communication with the laboratory (Fig 3).

Basic periodontal procedures were used at the start of the clinical treatment. The incisal surfaces were restored with composite resin, providing the anterior teeth with a regular surface. A modified back-action circumferential clasp was used on 35 and the circumferential clasp on 34, 45, and 47. After tripoding the casts, the survey line was drawn, and a critical analysis of the components was selected according to the need for axial recontouring. A resin guide, made on the cast by milling a resin block adapted over the dental crown of the supports, inscribed the path of insertion when reduced to the gypsum surface, outlined those areas where a reduction was necessary, and indicated the extent and location on the tooth; however, the measured undercut was obtained on the buccal surface of the abutments (34, 35, 45, and 47), where the retentive potential was less than 0.25 mm (Fig 4).

After mouth preparation, a working cast was obtained with an alginate impression on which the framework was directly outlined. The cast Co-Cr clasp assembly was fit onto the patient, and minor discrepancies were removed with a round bur (Fig 5).

After the appropriate framework seating was achieved, the acrylic resin teeth were assembled. Each tooth was worn out until it became like a veneer for the anterior teeth and could act as an overlay for the posterior teeth. The goal in this case was to recover the incisal loss and cover the buccal area, allowing for tooth uniformity to promote a better esthetic result. The mandibular tooth mounting followed an ideal Curve of Spee. Once this contour was corrected, the new complete denture was constructed on the maxilla. After the initial analysis and with the patient's agreement, the piece was polymerized with two colors: the overlay area was polymerized with heat-polymerizing acrylic resin in the same color as the teeth, and the other areas were subjected to the regular procedures (Fig 6).

During the installation of the prosthesis, the patient was informed about correct hygiene procedures, because this type of prosthesis may accumulate more detritus because of its larger contact area with the teeth. Since the Curve of Spee was respected, it was possible to have an appropriate occlusion with the new complete denture (Figs 7A–D). Patient satisfaction was immediate regarding the final esthetic result (Fig 7E). The patient did not report any pain or discomfort during the weekly follow-up.

Discussion

Clinicians can use a variety of tools to assist with the start point determination[9] and make the treatment more predictable. Oral rehabilitation must follow some specific steps that are very similar, regardless of the type of the definitive prosthesis. The best restorative treatment option for the patient with tooth wear is not clear, and the ORPD is not mentioned as a definitive treatment.[7] Because of its lower cost, this type of treatment

can be indicated for solving several tooth situations that require only one prosthesis.[8]

The following are three ways to perform an ORPD: (I) with occlusal metallic covering and complete resin or ceramic veneer;[8,10,11] (II) with an occlusal resin covering and partial resin veneer;[12] (III) with an occlusal resin covering and a complete buccal veneer, as described in this report. Types I and III are very similar with respect to the final esthetics once there is a color and contour pattern: they lack a visible line between the worn tooth and the prosthetic tooth. However, this type of buccal covering may not be acceptable in all patients due to the level of tooth wear and the possibility of an increase in the buccal volume. Treatment workflow was favored by the maxilla. All these alterations were made easier because once the mandible was corrected it was only necessary to fabricate a new complete denture on the maxilla.

Conclusion

The overlay RPD treatment seems to be satisfactory, restoring the OVD and esthetics and providing greater muscle comfort for the patient with low cost and shorter working time. Further randomized clinical trials are suggested to compare the long-term effectiveness of different treatment options for the worn teeth associated with OVD loss.

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