

## AN ANTERIOR RECONSTRUCTION: INCREASE THE OCCLUSAL VERTICAL DIMENSION OR REDUCE PERIODONTAL SUPPORT?

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### ABSTRACT

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**Aim** The aim was to document a clinical situation which was managed at minimal biological cost and with straightforward implementation.

**Summary** Challenges of space management may arise in prosthetic dentistry as a minimum height is needed for the supporting tissues and the restorative material.

While increasing the vertical occlusal dimension allows an increase in the height of the prostheses, the option may be complex and has disadvantages, including the need to modify the entire occlusion. Crown lengthening is an alternative therapeutic option, but it results in a decrease in periodontal support. Nevertheless, it allows less extensive prostheses to be provided without impacting the rest of the arch. Managing complex clinical situations with moderate biological cost and straightforward implementation is possible, as illustrated in this clinical report.

### Key learning points

1. Crown lengthening is a solution to increasing the tooth surfaces necessary at prosthetic rehabilitation.
2. Increasing occlusal vertical dimension (OVD) is a solution to providing the occlusal space necessary for the restorative material without reducing the supporting tissues.
3. Crown lengthening reduces periodontal support but can be considered when the root length of the affected teeth is sufficient.
4. Increasing the OVD requires modification of the entire occlusion.
5. Crown lengthening offers the advantage of not modifying OVD or intercuspal position (ICP).

### KEYWORDS

Crown Lengthening; Deep Bite; Prosthodontic Treatment Planning; Dental Occlusion; Therapeutic Decision

### 1. INTRODUCTION

The management of dental wear is frequently encountered in prosthodontic practice [1]. Interventions can range from straightforward lifestyle advice to complete-mouth rehabilitation [2]. While contemporary dentistry advocates the conservation of tooth structure and pulpal vitality [3] and the application of adhesive dentistry with minimal tooth preparation [4], complete-mouth rehabilitation typically involves extensive tooth preparation. The purpose of this clinical report was to document a clinical situation which was managed at minimal biological cost and with straightforward implementation.

her smile (Fig. 1). However, she wished to avoid extensive or invasive procedures and categorically declined orthodontic treatment such as intrusion of the front teeth.



**Figure 1A.** Pretreatment: (A) Intercuspal position.

### 2. CASE PRESENTATION

A 76-year-old woman sought treatment in 2011 because she was concerned about the wear of her mandibular anterior teeth which were sensitive to cold, leading to mastication difficulties, and also because the patient's chief concern was to improve

Clinical examination showed, on palpation, large and dense masseter muscles but less complaints from the patient, suggesting oral habits like frequent parafunctional muscle activity, observed by family

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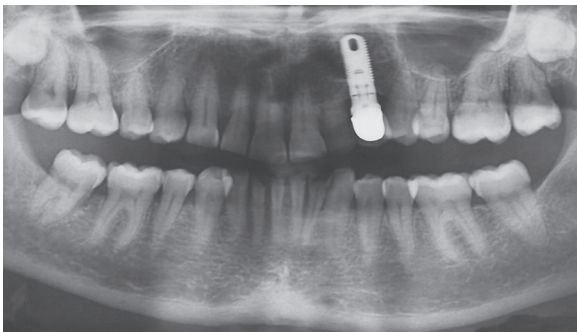
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members. She had a reproducible, stabilized, and nondeflected intercuspal position (ICP), despite worn incisors and mandibular canines. The posterior teeth were in good condition and unrestored, were in good alignment, and had a seemingly unaltered occlusal vertical dimension (OVD). She had group function eccentric guidance on the right side and canine disclusion on the left side. Some mandibular anterior teeth were worn almost to the gingival margin, with the dental pulp almost exposed by wear (Fig. 1B). The maxillary incisors and canines also showed wear, and the location of their gingival margins suggested extrusion. The maxillary incisors completely overlapped the mandibular incisors in the intercuspal position (ICP). (Fig. 1A) The periodontal examination, with normal probing depth and zone of attached gingiva, and the radiological examination did not reveal any periodontal lesions and none of the teeth had received or required endodontic treatment. The teeth had roots of normal size, and the left maxillary canine had been replaced by an implant-supported crown a few years previously. (Fig. 1C) The skeletal and dental relationships were Angle class I with normal mandibular movements, with no temporomandibular joint (TMJ) sounds or complaints from the patient. In addition, the patient had no medical history of gastroesophageal reflux disease, xerostomia, consumption of excess acidic soft drinks and her conventional diet habits did not appear to affect the anterior teeth.



**Figure 1B.** Pretreatment: Extensive wear particularly on anterior mandibular teeth and more extensive on the right side.



**Figure 1C.** Pretreatment: Initial panoramic radiograph.

A diagnosis of bruxism (including attrition) was made with increased occlusal loading of the anterior teeth. Complete restoration of the anterior teeth was indicated to address esthetic [5], sensitivity, and functional concerns and also to preserve these teeth from further damage.

The treatment plan involved the reconstruction of the anterior teeth to recreate the correct anatomy of the maxillary and mandibular incisors and canines and to restore the anterior vertical and horizontal overlaps, approaching average values of 3 to 4 mm with optimized mandibular function [6]. A major difficulty was the lack of space available at the anterior sector; the maxillary and mandibular gingiva appeared to meet in the frontal plane in the ICP (Fig. 1A).

The mandibular incisors and the right canine teeth had minimal coronal height, and enamel was almost entirely missing. The left mandibular canine was intact but was extruded above the occlusal plane. The mandibular and maxillary anterior teeth required restoration, and the maxillary anterior teeth also needed reshaping to correct their extrusion. Various treatment options were considered, but first the occlusal vertical dimension (OVD) was considered. An increase in the OVD would minimize the preparation of the maxillary anterior teeth and provide the occlusal space necessary to restore the coronal anatomy of the mandibular anterior teeth. However, an increase in OVD would require restoration of the posterior occlusion. In addition, esthetics would be compromised with the lengthened maxillary posterior teeth.

Because the posterior teeth were unrestored and in good functional occlusion, her existing OVD was preserved.

Bonded anterior ceramic restorations were problematic in the absence of sufficient enamel to ensure a durable and effective adhesion [7]. However, cemented ceramic crowns were also problematic because of the lack of resistance and retention form. Maintaining her OVD and intercuspal position (ICP) required the exposure of sufficient tooth structure to provide resistance form.

This could only be achieved by reducing the periodontal support with maxillary and mandibular anterior crown lengthening [8]. Crown lengthening and retaining OVD and ICP created sufficient resistance and retention, at least 4 mm in height (Fig. 2) [9].

Also, respecting the interproximal papillary area, the gingival margins of the anterior teeth were aligned with those of the posterior teeth to improve esthetics.



**Figure 2A.** Tooth preparations 3 months after crown lengthening: Mandibular



**Figure 2B.** Tooth preparations 3 months after crown lengthening: Maxillary

Ceramic crowns (IPS e.max Press MO, A3 shade; Ivoclar Vivadent) with minimal tooth preparation were provided, although 2 teeth required endodontic treatment (Fig. 3).



**Figure 3A.** After treatment: Clinical photograph showing harmonious smile line and occlusion.



**Figure 3B.** After treatment: Panoramic radiograph, two teeth required endodontic therapy.



**Figure 3C.** After treatment: Mandibular occlusal view.



**Figure 3D.** After treatment: Maxillary occlusal view.

A recall appointment after 11 years confirmed that the patient's complaints (wear, sensitivity, function, and esthetics) had been addressed and that crown lengthening instead of an increase in OVD was an appropriate choice (Fig. 4).



**Figure 4.** Eleven years after treatment.

### 3. DISCUSSION

Clinical situations may require deciding between the need for space management to accommodate the restorative material or reducing the supporting tissues. Crown lengthening is a solution to increasing the tooth surfaces necessary and increasing OVD is a solution to providing the occlusal space necessary for the restorative material without reducing the supporting tissues.

Crown lengthening reduces periodontal support but can be considered when the root length of the affected teeth is sufficient and reduces the prosthetic dentistry required. It offers the advantage of not modifying OVD or ICP and therefore simplifies the prosthetic treatment. Increasing the OVD should be reserved for complete dental arch rehabilitation. It is more complex because it requires modification of the entire occlusion

### 4. CONCLUSION

A 76-year-old woman patient sought treatment in 2011 because her mandibular anterior teeth were worn, sensitive to cold, nonfunctional and unesthetic. Despite a complex clinical situation caused by the extrusion of the maxillary anterior teeth causing a lack of space in the anterior teeth, the posterior teeth were in good condition. Crown lengthening of the anterior teeth was chosen to simplify treatment, without an increase in OVD, which meant that the entire occlusion did not have to be modified. Clinical follow-up at 11 years, accompanied by behavioral counselling but without splint therapy, confirmed the durability of a classic prosthetic treatment, despite the development of new techniques, and that the patient's concerns had been addressed.

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### AUTHOR CONTRIBUTIONS

**JPR, AG, EC:** wrote the manuscript in consultation with **JDO**. All authors provided critical feedback and helped shape the manuscript.

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**CV**

Dr. Ré, DDS, PhD has been an occlusodontist and Associate Professor at the Department of Oral Functions/Dysfunctions, School of Dental Medicine, Aix-Marseille University, France since 2008. He runs a private practice oriented to prosthodontics in Toulon. He is good at treating prosthetic patients, especially complex case treated with the multidisciplinary approach. He authored the book titled "Orthèses orales".

**Questions**

**1. What is the recommendation of contemporary dentistry?**

- a. No conservation of teeth;
- b. No conservation of pulpal vitality;
- c. Extensive tooth preparation;
- d. Adhesive dentistry.

**2. What is the diagnosis of dental wear?**

- a. Bruxism;
- b. Absence of gastroesophageal reflux disease;
- c. Absence of consumption of excess acidic soft drinks;
- d. Conventional diet habits.

**3. What is the consequence of dental crown lengthening?**

- a. Cannot be a solution to increasing the tooth surfaces necessary for prosthetic retention;
- b. Reduces periodontal support;
- c. Alters OVD or ICP;
- d. Cannot be sectorial.

**4. What is the consequence of increasing OVD?**

- a. Does not avoid reducing the supporting tissues;
- b. Should be reserved only for complete both dental arches rehabilitation;
- c. Requires modification of the entire occlusion;
- d. Is not a solution to provide the occlusal space necessary for the restorative material.