

Use of a Custom Incisal Guide Table for Anterior Guidance Rehabilitation with a Combined Prosthesis: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Author BKS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MY and LA managed the analyses of the study. Author ML managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Restoring anterior guidance in prosthetic rehabilitation should involve both esthetics and function. In fact, the functional aspect must represent the starting point for achieving optimal esthetics. A correct anterior guidance should be comfortable, functional and stable, even without posterior teeth contact.

The anterior guide table is a device used for transferring the unique features of a specific anterior guidance developed in provisional restorations to the final restorations.

The purpose of this article was to describe a technique used for the construction of a customized incisal guide.

Keywords: Anterior guidance; customized incisal guide table; esthetics; function; provisional restorations.

1. INTRODUCTION

Performing any prosthetic rehabilitation of the anterior region usually raises two concerns: the first one is with regard to esthetics and dento-facial harmony, and the second concern involves function. Restoration of anterior guidance is the case combining these two inseparable parameters [1,2,3].

Anterior guidance is described as the sliding of the mandibular anterior teeth against the lingual faces of maxillary anterior teeth during mandibular excursions from maximum intercuspation to edge to edge occlusion. Known as mutual protection concept, this anterior guide plays a very important role in protecting the posterior teeth from protrusive and lateral stress through disclusion, thus avoiding posterior interference [4].

Proprioception, which is at the origin of programming functional movements, enhances energy efficiency and improves the sustainability of the manducatory system [1,2].

Consequently, these functional movements reduce dental overloads (low frequency of contact on the anterior teeth, absence of contact on the posterior teeth), muscle work by the symmetrization of functions (neuromuscular facilitation, phonation and mastication optimization), as well as temporomandibular joint constraints [1,2].

In this article, we present a case report highlighting the steps of anterior guidance restoration.

2. CASE REPORT

A 60-year-old patient with no relevant medical history was referred to the department of prosthodontics at the faculty of dental medicine of Monastir. The patient's main reason for consultation was to restore missing teeth.

Examination of the maxilla revealed the presence of a defective metal acrylic bridge restoration replacing teeth 11 and 24, which was supported by teeth 12,21,21,23,25, and 26. The cervical margin was non-hermetic with a detached acrylic veneer on tooth 12. Tooth number 13 was mesioverted and decayed (Fig. 1).

Panoramic radiograph showed insufficient endodontic treatment of the abutment teeth, with crown to root ratio being equal to 1 for all the remaining teeth, except the 26 with a CR/RR>1. On the radiograph, teeth number 15 and 16 were already extracted at the time of the consultation (Fig. 2).

At the mandibule, all the teeth were present except the 47, 48, and 38. Two defective metallic crowns covering teeth number 36 and 37 were present. On the right side, supra-eruption in teeth number 44, 45 and 46 was noticed with a disrupted spee curve (Fig. 1).



Fig. 1. Pretreatment intraoral view

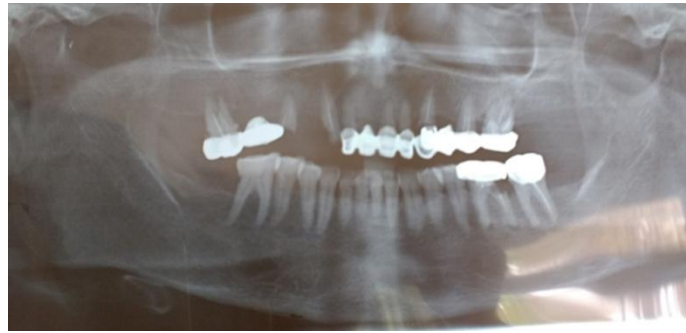


Fig. 2. Panoramic x-ray before treatment

Radiographic examination revealed a defective endodontic treatment of tooth number 37. A massive carious root lesion on the distal side of tooth number 36 with a favorable crown to root ratio for all the remaining teeth was also noticed (Fig. 2).

Examination of occlusion revealed a maintained occlusal vertical dimension, an uneven occlusal plane due to the supra-eruption of tooth 46, a dysfunctional anterior guidance, an insufficient prosthetic space, and a disruption of the spee curve on the right side (Fig. 1).

Before proceeding with prosthetic rehabilitation, a sanative phase was initially performed:

The patient was motivated to have a good oral hygiene. Later, extraction of the compromised teeth number 36 and 26 was performed. The defective metal acrylic bridge was removed. Later, endodontic treatment was performed on teeth 37, 23, 25, and 12. Teeth 23 and 25 were reconstructed by an inlay core to improve retention.

Following the clinical and radiographic examination our decision was to make a fixed metal ceramic bridge at the maxilla, supported by teeth number 13, 12, 21, 22, 23, and 25, replacing teeth number 11 and 24, associated with a removable partial prosthesis replacing the

missing teeth. With regard to the mandible, the decision was to make a fixed metal ceramic bridge replacing tooth 36, supported by teeth 35 and 37. A metal ceramic crown covering tooth number 46 was also made.

First of all, a diagnostic wax up was used to evaluate and predict the feasibility of the treatment plan and to restore the occlusal parameters (Fig. 3).

Temporary acrylic fixed restorations and provisional removable prostheses were fabricated using the diagnostic wax up. They were clinically evaluated and adjusted based on the criteria dictating esthetics, phonetics and occlusion (Fig. 4) [5].

After reestablishing the anterior guidance in mouth, sliding of the mandibular incisors over the palatal faces of the maxillary incisors, with a minimal posterior disclusion was necessary (Fig. 5).

Once validated by both the dentist and the patient, impressions of these temporary restorations were taken. The casts issued from these impressions were articulated on a semi – adjustable articulator. Later, a custom incisal guide table was fabricated for an accurate reproduction of the anterior guidance (Fig. 6).



Fig. 3. A mounted diagnostic casts and wax up



Fig. 4. Provisional anterior fixed restorations and removable posterior restorations



Fig. 5. Anterior guidance developed in provisional restorations



Fig. 6. Custom guide incisal table

Custom incisal guide table illustration:

1. Lubrication of the incisal guide table with vaselin to prevent adherence to resin (Auto-Cured Acrylic Material, Tab 2000™).
2. Placement of resin on the incisal guide table with a locked condyle. This allows the incisal pin to be firmly positioned on the incisal table, and to establish the initial position representing maximum intercuspation.
3. Unlocking the condyles and moving the articulator through prostrusive and lateral excursions.

This process was repeated until resin was set.

This custom incisal guide table guides the dental prosthetist in making the final restorations (Fig. 6).

After completion of teeth preparation, gingival retraction was performed using a single cord technique, and impressions were made using silicone of low and heavy viscosity (Fig. 7).

Casts were poured using gypsum type IV. Later, bite registration was performed. The occlusal references used in the present study were centric relation at correct occlusal vertical dimension. Casts were then mounted on a semi adjustable articulator using a face bow. At the laboratory, the crowns were waxed according to the custom incisal guide table and casting of the wax pattern was performed. The metal copings were verified and adjusted in the patient's mouth. Then, the cervical margins were examined and the space needed for ceramic build up was also evaluated. Later, unglazed ceramic was clinically tried to confirm the shade matching of the ceramic and to adjust occlusion. Final fixed restorations were tried in the patient's mouth and then cemented.

In the next appointment, a coronoplasty was carried out for teeth 44 and 45 to reestablish the correct occlusal plane. Then, an anatomical and functional impression with a custom tray and a border molding using silicone impression material was made for the maxilla and cast was poured (Fig. 8).



Fig. 7. Impressions of prepared teeth

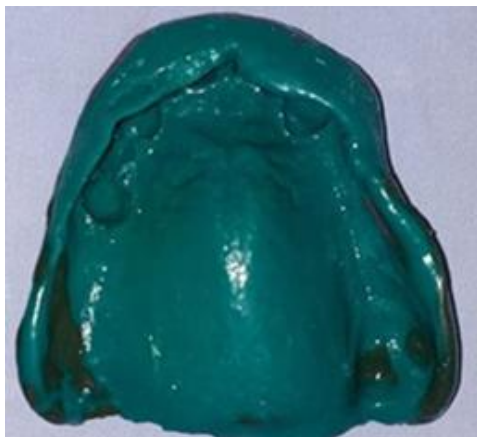


Fig. 8. Anatomical and-functional impression of the maxilla after cementation of final fixed prosthesis

The metal framework of the removable partial prosthesis was fabricated and try-in was carried in the patient's mouth (Fig. 9).

Acrylic teeth were sculpted on the prosthesis saddle due to the lack of sufficient prosthetic space. Finally, occlusion and esthetics were verified in the patient's mouth (Fig. 10).

Follow-up appointments were scheduled to ensure long term preservation.

3. DISCUSSION

Restoration of a functional anterior guidance is fundamental to the success and sustainability of any prosthetic treatment of the anterior region. This goal cannot be achieved without a proper clinical examination of anterior occlusal contacts [6].

Anterior teeth play a major role in protecting posterior teeth during protrusive and lateral movements. This is due to their biomechanical

and proprioceptive features: First, anterior teeth have a biomechanical advantage over posterior teeth because they are far away from the fulcrum (condyles). Since the mandible is considered as a type III lever (like a nut cracker), the occlusal forces on these teeth are less than those imposed on the posterior teeth, thus minimizing the force of muscle contractions. Secondly, the importance of the proprioceptive sensitivity of anterior teeth compared to posterior teeth allows the central nervous system to program and reprogram the speed and the envelope of the mandibular functional movements [7,8].

During maximum intercuspation, contacts must be distributed symmetrically on either side of the sagittal plane, and the incisal edges of mandibular teeth should be in contact with the marginal ridges of maxillary anterior teeth [9].

During protrusion, the incisal edges of mandibular teeth should slide forward from the maximum intercuspation, following continuous linear paths against the proximal marginal ridges of maxillary anterior teeth with minimal posterior disclusion [9].

During lateral excursions, the cusp of the mandibular canine slides against the maxillary canine with disclusion of posterior teeth on the working and non-working side. It is called the canine guidance [9,10].

The anterior guidance clinical evaluation makes it possible to determine whether to maintain or to recreate the existing anterior guidance.

The anterior guidance is considered functional and should therefore be kept if the predetermined characteristics are existent. Otherwise, it must be recreated. However, it is considered non functional in case of an open bite, excessive overjet, edge to edge occlusion,



Fig. 9. Try-in of removable prostheses metal framework



Fig. 10. Final restorations: fixed and removable partial prostheses

or if it does not ensure immediate disclusion during the movement of protrusion and lateral excursions in the presence of interferences. The anterior guidance is considered dysfunctional when it constitutes an obstacle to mandibular movement in case of class II division 2, with reduced functional freedom [9].

When the anterior guidance is judged clinically unsatisfactory, only the posterior determinants of occlusion can be used to recreate it. Thus, by recording the protrusive relation, we can register the patient's condylar path and adjust the condylar guides of the articulator. The adjustable incisor table of the articulator is then tilted by 10° from the angle of the condylar path ($I=C+10$). This allows the provisional prosthesis to be elaborated on a finely programmed articulator and to be later adjusted in the patient's mouth. However, axiography that provides more accurate measurements is the best way to register the condylar path [6].

Anterior guidance developed in the provisional restorations and manufactured according to the diagnostic wax up provides an opportunity to evaluate esthetics and function. Moreover, communicating the custom incisal guide table to the dental prosthetist is a valuable aid in making the final restorations [11].

4. CONCLUSION

Restoration of the anterior region should imperatively meet the esthetic as well as the functional criteria. In adults, there are luckily some adaptive capacities of the temporomandibular joint with the potential of flexibility and resilience; however, there is neither flexibility nor resilience with the fixed prosthetic elements. It is therefore necessary to ensure that the anterior prosthetic elements are in functional agreement with the skeletal frame [12].

CONSENT

Patient's consent was obtained, as per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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