

Establishing Posterior Occlusal Support: A Case Report

Evangelos Ximinis, Maria Tsiafita, Dimitrios Dionysopoulos, Olga Naka*

School of Dentistry, Faculty of Health Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece

*Corresponding author: Olga Naka, DDS, MClintDent, PhD, School of Dentistry, Faculty of Health Sciences, Aristotle University of Thessaloniki, 176 Karamanli Avenue, Thessaloniki, 54248, Greece. E-mail: naka@dent.auth.gr, Tel: +30-2310-307.444, ORCID: <https://orcid.org/0000-0003-2234-4229>

Received: July 02, 2021

Published: July 21, 2021

Abstract

Loss of posterior teeth impacts a patient's function as well as their facial esthetics. Changes in the Occlusal Vertical Dimension (OVD) may result in anterior crossbite or Pseudo-Class III malocclusion. This clinical report describes the prosthodontic management and stabilization of a patient with reverse anterior articulation due to loss of posterior occlusal support. The comprehensive diagnostic approach, the information gathered from the provisional phase and the consistent sequence of clinical and laboratory stages led to a definitive treatment outcome that guaranteed the success of the prostheses and the patient's comfort and satisfaction.

Keywords: Malocclusion; Crossbite; Partial denture; Fixed partial denture; Occlusal guidance

Introduction

Loss of posterior teeth impacts not only a patient's function, but their facial esthetics, as well. Indeed, changes in the occlusal vertical dimension (OVD) did occur, making the management of its consequences remarkably challenging [1,2]. Early loss of posterior teeth could result in anterior crossbite or Pseudo-Class III malocclusion, i.e., a positional relationship related to an acquired neuromuscular reflex necessary for occlusion to be achieved in the posterior area [3-5]. While Class III malocclusion is described as a condition of abnormal maxillo-mandibular relationship, usually of skeletal etiology, Pseudo-Class III malocclusion is associated with dental factors [5-7]. It has been argued that when posterior occlusal support is lost bilaterally, mastication is performed only by the anterior teeth and the temporomandibular joints are displaced into a superior-anterior position [8].

A diagnosis of anterior reverse articulation requires a thorough clinical and radiographic examination to differentiate between dental and skeletal malocclusion [9]. Once patients presenting a Class I skeletal pattern with a forward shift of their mandible on closure, due to loss of posterior occlusal support, are guided to a centric relation (CR) position, they will most likely present an edge-to-edge incisal relationship [4,10,11].

The therapeutic approach of such collapsed occlusion cases and the management of the subsequent OVD increase are challenging and require a detailed rehabilitation protocol. This clinical report describes the therapeutic approach for establishing posterior occlusal support in a patient with anterior reverse articulation.

Case Report

A 52-year-old man sought treatment complaining of chewing

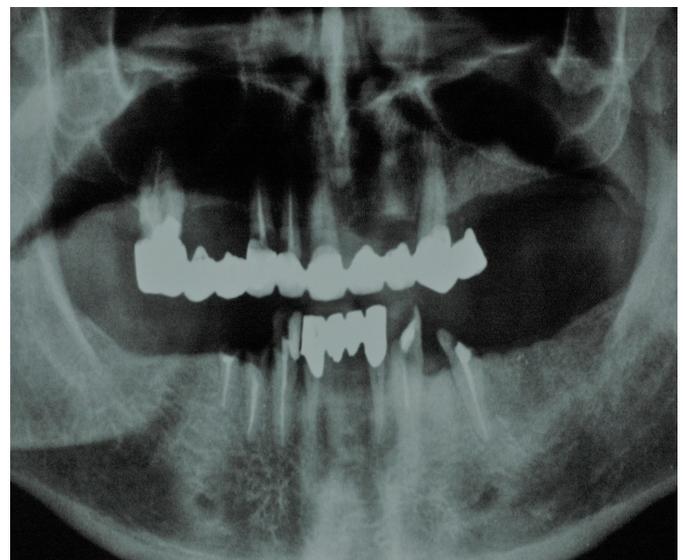


Figure 1. Radiographic image of the patient's pre-treatment status.

difficulty and poor esthetics. The patient's medical history included Hypertension, Hyperlipidemia and Obesity. Extraoral, intraoral and radiographical examinations revealed loss of all but one posterior teeth, a maxillary 10-unit Fixed Partial Denture (FPD) with metal acrylic design, a mandibular 4-unit FDP and severely damaged lower teeth (Figure 1). The patient's oral hygiene was deemed poor. Anterior reverse articulation, corresponding wear of maxillary FPD and reduced OVD were also noted (Figure 2). However, it was observed that when the patient was guided to the CR position, an incisal edge relationship was achieved, while the OVD increased proportionately. Diagnostic data were collected to develop an individualized



Figure 2. Loss of VDO with anterior reverse articulation.



Figure 3. Using the Lucia jig to take an accurate centric relation registration.



Figure 4. Diagnostic wax up; re-establishment of anterior guidance with increased OVD.



Figure 5. Teeth preparations and cast post and cores.



Figure 6. Provisional restorations.



Figure 7. Final result. Porcelain fused to metal FPDs combined with removable partial dentures (RPDs) establishing posterior occlusal stabilization and anterior guidance.

treatment plan for the patient. Preoperative extra- and intraoral photographs, as well as primary upper and lower impressions were taken. The mandible was related to the maxilla using a Lucia jig deprogrammer (Figure 3), in conjunction with bimanual manipulation, and the CR position was recorded [12]. Casts mounted on the semi-adjustable articulator were analyzed. A diagnostic wax-up was fabricated to design the anterior guidance necessary for the increased OVD and to calculate the prosthetic space (Figure 4) [13]. Possible treatment options

were discussed. Implant placement had been rejected by the patient from the outset of treatment. Thus, the treatment plan suggested included porcelain fused to metal FPDs combined with Removable Partial Dentures (RPDs) and extra coronal precision attachments.

An informed consent form was signed by the patient. Mouth preparation, including oral hygiene measures, periodontal treatment and extractions of ‘hopeless’ teeth (#32, #42) and the root of the right mandibular second premolar (#45), was performed. Subsequently, the upper and lower prostheses were removed, and the remaining teeth were assessed. The maxillary right molar underwent endodontic treatment and root resection therapy, while the palatal root was preserved. Endodontic re-treatment was performed on #12, #13, and mandibular canines and premolars (#33, #35, #43, #44) were treated with cast post

and cores (Figure 5). The teeth were prepared, impressions were taken and record bases with wax rims were used to orient the occlusal plane, to define the appropriate OVD and to record the postural position of the mandible in relation to the maxilla. Provisional acrylic resin prostheses reinforced with metal casting and interim RPDs with metal clasps were placed until complete soft tissue healing took place (Figure 6). Anterior guidance, phonetics and esthetics were carefully checked at this stage to ensure the patient had adapted to the new situation. After 12 weeks, the experience of the provisional treatment was reviewed and, once stability had been achieved and the patient was satisfied with the esthetics, the final prosthetic phase could be initiated. Tooth preparations were refined, and definitive impressions taken using addition silicone impression material. Centric relation recording and registration ensued. During the laboratory steps care was taken to render all elements of interim restorations, namely the shape, the contours, the incisal edge position and the anterior guidance and occlusal parameters satisfactorily. The metal framework was constructed according to this information. The subsequent bisque try-in step was performed, forocclusion, marginal integrity, and anterior ceramic contours to be evaluated. The RPDs were connected to the FPDs via extra coronal precision attachments that provided increased retention and enhanced the esthetics of the definitive restoration. Moreover, porcelain denture teeth were selected to maintain the OVD achieved more securely, as occlusal stability was considered a high priority [14]. At the delivery appointment, final occlusal adjustments were made to ensure posterior stability [15] (Figure 7). The patient was delighted with the outcome and was accepting of the esthetics and function. He was given instructions regarding oral and denture hygiene, while regular follow-up appointments were scheduled.

Discussion

There is no norm that works for every patient who has lost posterior support of the occlusion and suffers from consequent reduced dimension and anterior reverse articulation. Although a tailored approach is required, standard, established clinical and laboratory steps can methodically and predictably lead to the result anticipated. A thorough occlusal analysis is a fundamental step for the differential diagnosis of Pseudo-Class III malocclusion [4]. As in this case of reduced dimension with anterior reverse articulation, the OVD increase alone is the key step for the successful management of the case [15]. The diagnostic wax up is an essential tool that provides all necessary information to build an individualized, full mouth rehabilitation, while the final prostheses intended are designed and confirmed through the reversible and modifiable provisional phase [13]. Finally, appropriate recall and maintenance intervals ensure the longevity of hard and soft tissues, as well as that of the restorations.

Conclusion

The clinical case described above indicates that the prosthodontic management of pseudo-Class III malocclusion, when carefully planned, can be a safe procedure that aims to ensure the immediate and longitudinal improvement of a patient's function and esthetics.

Author Contributions

Conceptualization: Ximimis E. Data curation: Ximimis E. Formal analysis: Naka O. Funding acquisition: N/A. Investigation: Tsiafitsa M. Methodology: Ximimis E. Project administration: Tsiafitsa M, Naka O. Resources: N/A. Software: Tsiafitsa M. Supervision: Naka O. Validation: Dionysopoulos D. Visualization: Ximimis E, Tsiafitsa M. Writing - original draft: Ximimis E, Tsiafitsa M. Writing - review & editing: Dionysopoulos D., Naka O.

Conflict of Interest

No potential conflict of interest relevant to this article has been reported

References

1. Turner KA, Missirlian DM. Restoration of the extremely worn dentition. *J Prosthet Dent* 1984; 52: 467-474.
2. Abduo J, Lyons K. Clinical considerations for increasing occlusal vertical dimension: a review. *Aust Dent J* 2012; 57: 2-10.
3. Moyers RE. *Handbook of Orthodontics*. 4th ed. London: Year Book Medical Publishers; 1988.
4. Cardoso AC, Ferreira CF, Oderich E, Pedrosa ML, Wicks R. Occlusal rehabilitation of pseudo- Class III patient. *J Prosthodont* 2015; 24: 78-82.
5. Giacotti A, Maselli A, Mampieri G, Spanò E. Pseudo-Class III malocclusion treatment with Balters' Bionator. *J Orthod* 2003; 30: 203-215.
6. Angle EM. Classification of malocclusion. *Dental Cosmos* 1899; 41: 248-264, 350-357.
7. The Glossary of Prosthodontic Terms. 9th ed. *J Prosthet Dent* 2017; 5S: e1-e105.
8. Igarashi Y, Yamashita S, Kyroiwa A. Changes in interarch distance and condylar position related to loss of occlusal support for partially edentulous patients. A pilot studies. *Eur J Prosthodont Restor Dent* 1999; 7: 107-111.
9. Ngan P, Hu AM, Fields HW. Treatment of class III problems begins with differential diagnosis of anterior cross bites. *Pediatric Dentistry* 1997; 1: 386-395.
10. Hagg U, Tse A, Bendeus M, Rabie ABM. A follow-up study of early treatment of pseudo class III malocclusion. *Angle Orthodontist* 2004; 74: 465-472.
11. Bowman SJ. A quick fix for pseudo-class III correction. *J Clin Orthod* 2008; 42: 691-697, 727.
12. Lucia VO. A technique for recording centric relations. *J Prosthet Dent* 1964; 14: 492-505.
13. Romeo G, Bresciano M. Diagnostic and technical approach to esthetic rehabilitations. *J Esthet Restor Dent* 2003; 15: 204-216.
14. Ghazal M, Yang B, Ludwig K, Kern M. Two-body wear of resin and ceramic denture teeth in comparison to human enamel. *Dent Mater* 2008; 24: 502-507.
15. Dawson PE. *Functional occlusion*. 1st ed. St Louis: CV Mosby; 2007.