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The Value of Occlusion in Dentistry: A Clinical Report Showing the Correction of an Anterior Reverse Articulation with Selective Occlusal Adjustment

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Abstract

The subject of occlusion has been deemphasized by academia over the last 30 years. This marginalization in turn has negatively impacted recent graduates who are largely unfamiliar with the use of occlusal adjustment by selective reshaping as a treatment modality. Use of proper occlusal therapy enables clinicians to more effectively help patients recover from parafunctional wear of the anterior and posterior teeth. In addition, familiarity with this field enhances the correction of progressive posterior and anterior reverse articulations. This article aims to highlight the importance of occlusal principles in treatment planning. In addition, we illustrate the benefits of occlusal adjustment by using a conservative technique, selective reshaping, as an option to correct anterior reverse articulation in a 20-year-old patient. The knowledge of occlusal principles enhances diagnosis of malocclusion in the development of a treatment plan. When properly employed, the technique of occlusal adjustment by selective reshaping may be used to correct an adaptive anterior reverse articulation with a high degree of predictability for select patients.

Over the past 30 years, and in sharp contrast to all other fields of dentistry, there has been a significant decrease in the number of articles published in the prosthodontic literature about the subject of occlusion. In addition, there has been a reduction in the number of hours devoted to the education of this discipline, the study of which has been absorbed superficially into other fields of dentistry.[1-4]

Occlusion remains a controversial subject in dentistry due to the quality of the low-level evidence-based research to prove many of its principles. Many occlusal therapies are based on assumptions, clinical experience, anecdotes, conjectures, and even mythology.[5,6] Clinical practice should incorporate this broad base of experience and knowledge, as well as the patient's desires and preferences.

As an example, the fundamental occlusal principles of mandibular movements and jaw positions are important for restorative dentistry and also improve the clinician's ability to diagnose and treat the various malocclusions, such as adaptive anterior reverse articulation,[7] lack of intraocclusal distance for restoring anterior tooth wear by erosion and bruxism,[8-10] to posterior[11] and anterior reverse articulations.

Central to the subject of occlusion is mastery of the centric relation (CR) position.[5] Some authors conceptualize CR according to the condylar position in the glenoid fossae.[7] In clinical practice, during the manipulation of the patient's chin for diagnostic purposes, the relationship of the mandibular condyle to the base of the skull cannot be proven; it is theoretical. While the real relationship of the CR is a controversial concept, the CR is a craniomandibular position that is almost unchanging, reproducible, and critical for diagnosis and treatment of malocclusions.

Effective jaw manipulation technique is an essential component in making the CR. In connection with the foregoing, two manipulation techniques stand out: the bimanual and bilateral jaw approaches. Each approach is equally effective, and the selection should be made according to the clinician's expertise. Some authors indicate the use of an anterior deprogramming device (i.e., JIG *de Lucia*) as an auxiliary device to record the CR position. The use of the device is effective because it does not require the assistance of a third person or the patient to make an accurate CR interocclusal record. The device separates the teeth and alters the neuromuscular response during the fabrication and trial placement check before the selective

Figure 1 Pretreatment frontal view in MIP.

Figure 2 Frontal view of the anterior reverse articulation. Note absence of contact, but edge-to-edge position of the maxillary (#7) and mandibular (#26) right lateral incisors.

occlusal adjustment phase commences. It also maintains the interocclusal distance necessary for the restorative material.

The CR jaw manipulation technique allows the clinician to identify whether the cause of the malocclusion is a functional or skeletal problem. If a premature contact is detected in the centric occlusion (CO) position, it will promote jaw deviation movement from CO to the maximal intercuspal position (MIP), which may generate an adaptive anterior or posterior reverse articulation. In these patients, the malocclusion may be corrected by selective occlusal adjustment. The clinical report presented illustrates the application of occlusal adjustment by selective reshaping as an option to conservatively correct an adapted anterior reverse articulation.

Clinical report

A 20-year-old male patient presented to the Dental Clinic of the Federal University of Santa Catarina (CEPID-UFSC; Florianópolis, Brazil) for restorative dental work. The initial clinical exam revealed that he had all his teeth, including third molars. His chief complaint was an unesthetic smile, which was associated with an anterior reverse articulation (Figs 1 and 2). The right mandibular central incisor (#25) was positioned partially to the facial in MIP. The right maxillary central

Figure 3 Frontal view of patient in CO.

Figure 4 Inferior view of anterior open occlusal relationship in CO.

incisor (#8) presented an incisal edge wear inconsistent with the patient's age. Bimanual manipulation technique was employed to reach the CR temporomandibular joint (TMJ) position (Figs 3 and 4) to perform a differential diagnosis between a skeletal and/or a dental reverse articulation. A CO contact in the right second molars (#2 and #31) generated an anterior opening greater than 3 mm, leading to the diagnosis of an adapted dental reverse articulation. The patient showed a minimally compromised dental condition and occlusal scheme, identified as class I according to the Prosthodontic Diagnostic Index Classification for the completely dentate patient.[6] The patient was presented with a treatment plan that included the use of orthodontic treatment. He rejected that optimal treatment option.

Treatment

Impression making

Impressions were made with alginate (Hydrogum; Zhermack, BadiaPolesine, Italy) to fabricate the diagnostic casts for occlusal analysis and treatment planning.

Pouring casts

Four removable dies were prepared for the maxillary right and left premolar and molar regions of the upper cast. Fujirock dental stone (GC America, Alsip, IL) was used to cover approximately 2 mm of the cervical aspect of the crown indentations (Fig 5). Retentions were created in the anterior aspect of the cast while the stone was setting. After the stone set, petroleum jelly was applied with a brush over the region in which the dies

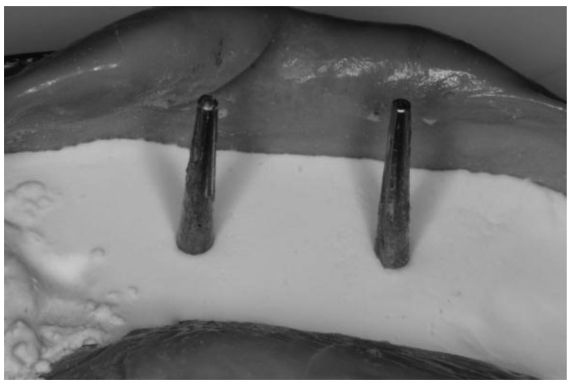

Figure 5 First layer of dental stone with dowel pins positioned.

Figure 6 Casts positioned with CR record for mounting in the articulator.

would be created. Next, a second layer of stone was poured. The lower model was fabricated in the conventional manner.

Mounting the casts

The anterior deprogramming device and CR wax interocclusal record were prepared. The casts were assembled in a semi-adjustable articulator. The maxillary cast was mounted to the upper member of the articulator with the aid of Camper's plane and a mounting table by means of special stone. Afterwards, the wax interocclusal registration was positioned over the maxillary cast to relate the lower cast (Fig 6). Next, the maxillary and mandibular casts were related by means of the CR interocclusal record. To maintain this relationship between the casts, three sites (frontal, lateral right, and lateral left) were fixed with matchsticks and beeswax. Finally, the mandibular cast was attached to the semi-adjustable articulator's lower member.

Mounted cast verifications

To certify that the casts were related correctly, the patient's anterior tooth relationships in CO and MIP were compared to the mounted casts.

Fabrication of removable stone dies

After the mounted casts were verified, they were sectioned with a saw (Fig 7). The maxillary cast was sectioned from the mesial of the first premolar to the distal of the second molar up to the first layer of stone, yielding four dies (two in the region of the premolars and two in the region of the molars). The anterior region of the cast remained fixed.

Figure 7 Removable stone die fabrication of the maxillary cast.

Figure 8 Casts with the molar dies removed. Procedure conducted during the occlusal adjustment of the casts.

Figure 9 Final position of the casts after occlusal adjustment. Note a more facial position of the maxillary anterior teeth in relation to the mandibular teeth.

Analysis and diagnosis for occlusal adjustment (ADOA)

After maxillary cast die fabrication, ADOA was conducted. Once a CO contact was detected, the indicated die was removed. Immediately after, the following dies corresponding to the additional CO contact sites were removed until all four dies were removed (Fig 8). After removal of all the dies, the casts showed contact only on the anterior teeth. At this point, it was confirmed that occlusal adjustment by selective reshaping would correct the patient's dental anterior reverse articulation (Fig 9).

Figure 10 Angled perspective view of the maxillary arch showing facial position of the maxillary right lateral incisor.

Figure 11 Right lateral view showing correction of the anterior reverse articulation after selective occlusal adjustment.

Occlusal adjustment by selective reshaping

Following ADOA, occlusal adjustment may commence by selective reshaping in the patient's oral cavity. Muller tweezers (Neumar Instrumentos Cirúrgicos, São Paulo, Brazil), occlusal film (AccuFilm® II Double-Sided S017 Red/Black; Parkell, Inc., Edgewood, NY), and a cone-shaped diamond bur (KG Sorensen FG 4138 and 3195; KG Sorensen, Cotia, Brazil) were used to accomplish the necessary adjustments to achieve correction of the anterior reverse articulation (Figs 10 and 11). The selective occlusal adjustment was performed while examining the casts.

Discussion

Occlusal adjustment is an important treatment option for some malocclusions. For many patients, orthodontics is recommended as the first course of treatment for occlusal correction but may not be selected due to prolonged treatment time and increased expenses for both patient and clinician. The use of occlusal adjustment principles and treatment can achieve favorable results in a shorter period of time with minimal costs when used with proper diagnosis.

Occlusal therapy is a means to control the load being applied through the teeth and periodontium to the TMJ. Two ways have been indicated to control these forces: (1) reducing the level of muscle activity; and (2) redistributing the occlusal forces to more or different teeth.[7]

Early treatment is a more effective strategy than no interceptive treatment (observation only) to treat malocclusions. According to Dr. Dupont's teachings,[8] an occlusal exam is indicated at the initial exam, in conjunction with evaluation of the TMJ, the teeth, and the periodontium to look for the causes of the sign and symptoms of the problem.

Clinical trials in patients with primary dentition presenting posterior reverse articulations comparing selective occlusal adjustment to no interceptive treatment concluded that early treatment is better than self-correction by waiting for eruption of the permanent dentition.[11] In a previous study, selective occlusal adjustment was used to treat functional posterior reverse articulation in children. Stability of the correction was observed after 12 months, while the control group (observation only) showed no self-correction of the malocclusion.[11]

In this clinical report, only two visits of 30 minutes to 1 hour each were needed to correct the patient's anterior reverse articulation. Before commencing any selective occlusal adjustment in the oral cavity, the patient's casts were prepared with die pins and mounted on a semi-adjustable articulator for study analysis without assistance of a facebow, because the error generated is negligible.

Conclusion

The knowledge of occlusal principles enhances the proper diagnosis of malocclusion in the development of a treatment plan. When properly employed, the technique of selective occlusal adjustment by reshaping of the teeth may be used to correct anterior reverse articulation with predictability.

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