Case Report

Reestablishment of Occlusion with Prosthesis and Composite Resin Restorations

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Received 22 February, 2008/Accepted for publication 10 December, 2008

Abstract

Here, we present a case report on prosthetic reconstruction of posterior teeth and composite resin restoration of anterior teeth yielding considerable esthetic improvement, reestablishment of disocclusion guides and function.

Key words: Occlusion—Composite resin—Prosthesis

Case

The patient, O.D.R.P., was a man aged 55 years who attended the Discipline of Occlusion and Restorative Dentistry of Araçatuba Dental School, State of São Paulo–UNESP, with the chief complaint of deficient esthetics and function (Fig. 1A). Anamnesis revealed that the patient suffered from migraine characterized by mild occurrence of photophobia and needed medication consisting of a single dose of 50 mg sumatriptan (Sumax) 3 times a week. Pain intensity during crises was scored by the patient as moderate to severe (5 to 7) according to the Visual Analogue Scale (VAS).

During clinical examination, analysis of the VAS revealed that the patient was experiencing mild sensitivity in the bilateral temporal, masseter and lateral pterygoid muscles. Vertical dimension of occlusion was reduced to nearly 4 mm by grinding of anterior teeth and premolars associated with change in mandibular positioning; mouth opening was wide without pain and reached 48 mm as measured by the maxillary incisors and mandibular anterior teeth; excursive movements ranged from 7 to 9 mm as measured on the midline, and there was no deviation during mouth opening. The temporomandibular joint, mastication muscles, head posture and infrahyoid muscles were asymptomatic.

Periapical radiographic examination revealed horizontal bone loss at the right molars. The maxillary right and left first molars and mandibular right first molar were missing; the mandibular left first and second molars and mandibular right second molar had been endodontically treated. Conversely, the panoramic radiograph revealed that other structures, including the maxillary sinus and
mandibular condyles, presented clear and intact contours. The styloid and coronoid processes exhibited regular dimensions.

**Methods**

To restore dental occlusion, the vertical dimension of occlusion was initially reestablished with simultaneous achievement of mandibular balance. For that purpose, a bite plate was fabricated and placed in the maxillary arch. Such plates are characterized by a plane occlusal surface; lateral and anterior disocclusion guides, and occlusal contact on all mandibular teeth. Occlusal adjustment on such plates should be performed weekly, since use leads to relaxation of mandibular muscles and allows the mandible to return to a balanced position (Fig. 1B and 1C).

Accordingly, the bite plate was adjusted weekly, allowing the mandible to return to a balanced position. At each adjustment, mandibular spatial positioning was changed by the action of the mandibular muscles until stabilization was achieved by balancing of muscular forces, as evidenced by the coincidence of contact points adjusted the previous week. The bite plate was adjusted with the aid of Accufilm paper bilaterally, asking the patient to rapidly bite following arch closure in maximum intercuspation. The marks left on the bite plate were assessed and the most intensive were adjusted. The plate was not

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**Fig. 1** A: poor esthetics due to wear of anterior and posterior teeth. B: bite plate placed in mouth. C: occlusal contact points after achievement of mandibular balance. D: mounting of diagnostic cast with aid of bite plate. E: note extent of tooth structure that needed to be replaced to reestablish mandibular balance. F: guide employed for fabrication of provisional prostheses on posterior teeth. Next, guide was used to reconstruct left first premolar and canines bilaterally with composite resin restorations. G, H and I: diagnostic waxing and records on type of treatment to be performed.
polished in follow-up sessions after the first adjustment to allow the examination of contacts on the plate in the following session.

Diagnostic casts were obtained after achievement of mandibular balance. The maxillary cast was mounted with aid of a facial bow; the mandibular cast was mounted using the bite plate as a record. After achievement of mandibular balance, four small portions of clear Duralay resin were placed on the plate: two on the first premolars and two on the last molars. Next, the patient was asked to occlude on the plate and the resin was allowed to cure. This small portion of resin provided indents that allowed maintenance of dental cast position during fixation to the lower portion of the articulator (Fig. 1D). After mounting, the plate was removed and diagnostic waxing was performed to determine therapeutic needs (Fig. 1E).

After removal of the plate, which was employed as an interocclusal record, an orientation guide was fabricated on the diagnostic casts fixed to the articulator to reconstruct the posterior teeth with provisional prostheses and accomplish light-cured composite resin restorations (Fig. 1F).

Next, diagnostic waxing was performed on duplicated diagnostic casts mounted in an articulator to simulate the therapeutic needs of occlusion of the patient (Fig. 1G, 1H and 1I). After reconstruction of the posterior teeth with provisional prostheses, the guide was removed for reconstruction of the anterior teeth with microhybrid light-cured resin (Heraeus Kulzer GmbH & Co. KG, D-63450 Hanau, Germany), shades A2 opaque, A2, A3 and A3.5. The teeth were individually reconstructed with placement of a rubber dam. After reconstruction of the maxillary and mandibular teeth, both lateral guidances by the canines and anterior guidance were provided (Fig. 2) in order to allow disocclusion of posterior teeth during eccentric movement. After that, the restorations were protected by fabrication of a heat-cured acrylic resin plate, which was used for nighttime protection, especially in periods of greater stress.

After accomplishment of anterior restoration with composite resin, impressions were taken of the posterior teeth for fabrication of resin-fused-to-metal fixed partial dentures cast in gold. The articulator was adjusted after achievement of mandibular balance and reconstruction of the anterior teeth with resin. The impressions were poured in plaster and the casts were mounted on the articulator with the aid of the face bow and wax records in centric, lateral and protrusive relationships. After obtaining wax and resin records, the condylar pathways and Bennett angles were adjusted for occlusal rehabilitation of the posterior teeth. After fitting, occlusal adjustment and finishing, prostheses were cemented on the prepared teeth (Figs. 3 and 4).

Impressions were then taken to obtain dental casts which were mounted in an articulator for fabrication of a new maxillary bite plate.
After one year of utilization of restorations, the patient was asymptomatic and presented satisfactory chewing efficiency.

**Discussion and Conclusion**

The goal of any treatment is to reestablish function and esthetics. Currently, achievement of these goals is attempted as conservatively as possible to avoid cervical wear and involvement of the junctional epithelium. Reestablishment of function requires preparation of the stomatognathic system so as the muscles, temporomandibular joint and teeth may function in harmony to achieve maximum mechanical work without overloading any structure. Mandibular positioning and orthopedic mandibular positioning are considered to be balanced when the condyles are positioned against the posterior slope of the temporal bone, with the articular disc interposed between these structures, and they are in harmony with the teeth and mandibular muscles.

This functional balance may be easily achieved by previous utilization of bite plates, whose weekly occlusal adjustment allows changes in the mandibular spatial positioning, which allows the mandible to return to a balanced position. Moreover, this interocclusal device indicates if the vertical dimension of occlusion reestablished is also adequate to allow balanced muscular function.

In the present case, a combination of composite resin restorations to maintain periodontal integrity and replacement of preexisting single prostheses was used to reestablish esthetics and function and allow maintenance of mandibular balance. However, many prosthodon-
tists prefer to restore worn anterior teeth with ceramometal prostheses or ceromers. Composite resin was selected in this case to allow a relatively conservative procedure with short working time, immediate outcomes, low cost, no biological involvement of tissues, easy repair if required, and the possibility of achieving favorable esthetics.

Most importantly, mandibular balance should be maintained to allow mastication and swallowing without damage to muscular physiology, periodontal structure or the biomechanics of the temporomandibular joint.

Bruxism is commonly observed and may also cause imbalance. This parafunction, also known as dental attrition, occurs during rapid eye movement (REM) sleep. Bruxism is an oral habit characterized by rhythmic activity of the masticatory muscles, which causes forced contact between tooth surfaces. In the present case, bruxism seemed to be associated with temporomandibular disorder, causing discomfort, dental and muscle sensitivity, premature loss of tooth structure due to excessive attrition, and headache. According to these observations, two basic groups of etiologic factors were considered, namely peripheral factors (occlusal) and central factors (pathophysiological and psychological). The role played by occlusion (occlusal discrepancies) as an important factor in triggering bruxism was noted by Lazic et al. in 2006.

An interocclusal plate was employed to reestablish the vertical dimension of occlusion. This plate was adjusted weekly, when the response of mandibular muscles to the increased vertical dimension of occlusion was observed. The patient was reevaluated weekly by anamnesis and palpation, followed by occlusal adjustment on the plate when required.

According to Steno (1977), reduction in vertical dimension, parafunctional habits such as tooth clenching, and occlusal alterations with large lateral protrusive sliding may cause proprioceptive and metabolic changes in the muscle, with accumulation of products that cause pain. When the mandible is returned to a balanced position, these undesirable factors are eliminated and pain intensity is reduced to mild (2 to 5 according to the VAS), and specifically headache in this case, which reduced the need of medication to once at each 15 days. This agrees with the reports of Szentpetery et al. (1987) and Chua et al. (1989), since reestablishment of the vertical dimension of occlusion allows muscle contraction, which favors the blood and lymph circulation and improves the oxygenation and elimination of metabolic products generated during muscle work. Another study by Schokker et al. (1990) indicated that evidence of reduction in the upper joint space is more frequent in patients with migraine compared to in patients with tension headache. Even though this was not observed in our patient, reestablishment of mandibular balance relieved the headache, improving the quality of life, as reported by Simon (2005).

Therefore, a mandibular balanced position should be reestablished in any patient in need of extensive occlusal treatment. This allows restorations to receive and transmit adequate forces along the tooth long axes and ultimately to the posterior slope of the articular eminence. Forces are then dissipated and neutralized on the skull base, maintaining the function and integrity of the involved structures of the stomatognathic system.

References

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