Conservative dentistry achieved through a multi-disciplinary approach

Combining orthodontics and CAD/CAM technology to achieve conservatism for a rehabilitation case

By Dr. Thomas Colina, DMD

C omplex treatment needs can necessitate oral rehabilitation of patients. Often these patients will require a multi-disciplinary approach to correct problems. When patients have significant concerns, such as severe malocclusions or destruction of dental tissue, oral rehabilitation can entail extensive treatment that may involve reconstructions.

To return the patient to optimal function, regain normal form and address possible concerns such as esthetics, an integrated approach that involves various disciplines needs to be taken. The challenge posed to a particular treatment plan may involve the treatment of many teeth and possibly the need to prepare a significant number of teeth and corresponding dental tissue. Another challenge in reconstruction cases is the cost associated with the restoration of numerous teeth. Cost may be a factor for patients. There are often many options and approaches that can lead to the same successful treatment outcome. The variety of options can be at different ends of the spectrum. Diagnostic tools, including tomograms and the use of CAD/CAM systems, are useful in achieving complex treatment goals. This paper presents a treatment option that is an alternative to the reconstruction approach through the innovative application of multiple disciplines and current technology.

Case presentation
A 31-year-old male patient presented with the chief complaint of his upper front teeth restorations breaking off a few months after being placed. He has had the front teeth restored numerous times with the same outcome. A comprehensive examination and record revealed the following findings.

Medical history and functional concerns
There is a history of arthritis in the family. The patient experiences transient pain from his back, neck and shoulders. He has noted he clenches and grinds his teeth day and night. He was involved in a motor vehicle accident and sustained head trauma 12 years before his presentation to our office. Along with routine examination protocols, the temporomandibular joint (TMJ) was examined using a TMJ health questionnaire, range of motion examination, muscle palpation and TMJ imaging. TMJ findings and symptoms were: normal maximum opening to 53 mm; no limitation in excursion; at opening, there is a 2 mm deviation to the left. There is a posterior slide from centric relation to maximum intercuspation. The patient noted cracking noises from the TMJ at opening and closing, and there has been occasional locking of the TMJ through the years. He has slight hearing loss and tinnitus.

As a routine for patients exhibiting TMJ dysfunction, a TMJ tomogram series was taken. Tomographic series was achieved by use of a CranexTome (Soredex, Tuusula, Finland). The CranexTome has a unique spiral tomography for cross-sectional images. Interpretation of hard tissue imaging study would include the evaluation of condylar and temporal component morphology and integrity of the bony articulating surfaces. The TMJ is assessed for signs of remodeling, degenerative joint disease or morphological variations affecting the TMJ, jaw and skull.

Condylar position in maximum intercuspation is evaluated. The diagnostic tools are used not only for initial assessment to attain a working and definitive diagnosis, but during and after treatment to assess attainment of the treatment objectives. The corrected lateral TMJ view taken at maximum intercuspation reveals a posteriorly displaced condyle and morphological bending of the condyles (Fig. 1). The joint vibration analysis (JVA Bioresearch International, Milwaukee, Wis.) is used to assess TMJ health for patients and yielded normal vibrations of the TMJ.

Skeletal pattern
Based on a cephalometric analysis, the patient presented with a Class I skeletal pattern with a slight retrognathic mandible.

Occlusion
A visual examination and cast analysis revealed a Class II dental pattern with a deep overbite and tight overjet, fractured upper incisor restorations, slight crowding of the upper and lower arches, and severe worn dentition (especially the anterior teeth). The upper incisors were retruded, and the upper and lower incisors had severe wear (Fig. 2).

There was generalized moderate wear on the posterior teeth. The patient presented with a posterior shift of 2 mm from centric relation to maximum intercuspation.

Treatment options
The following treatment options were presented to the patient:
• Reconstruction of the arches to achieve an artificial occlusion. This first option would entail splint therapy and eventual reconstruction to achieve a stabilized occlusion. This approach will provide a stable occlusion and would entail restoration of numerous teeth — both anterior and posterior — to support the anticipated change in vertical dimension. The disadvantage to the approach is the introduction of artificial material in the mouth and the need for maintenance of the restorations. Of course, this approach also entails significant dental tissue reduction to provide partial and full coverage restorations to support the occlusal scheme.

In addition, although the treatment can be provided in a fairly short amount of time, the cost for the restorations can be significant for most patients.

• Orthodontically to achieve the best possible occlusion and orthopedic alignment. This approach provides for the patient an option to conserve dental structure, minimize the need for extensive procedures to provide a stable and functional occlusion, and allows cost for the treatment to be more manageable. The disadvantage is the time required to achieve orthopedic and orthodontic correction.

Treatment plan details
Straight wire appliance treatment (SWA) was proposed to attain ideal inter- and intra-arch alignment augmented by a mandibular repositioning mechanism by way of posterior build-ups and elastics or a fixed orthotic or use of a Twin Force Appliance. This phase of treatment was anticipated to last 20 months. After the orthodontic treatment, restoration of the six anterior or maxillary teeth with porcelain restorations would follow. The lower incisors will be evaluated for the need of restorations. The need for an upper bruxing appliance would also be evaluated after the completion of the restorations.

Discussion of the treatment
The first phase of the treatment was the provision of orthodontic therapy using GAC Innovation C Self Ligating Bracket System. The Innovation C bracket system has a highly translucent porcelain structure and a rhodium coated clip, which provide superb esthetics as well as a high-torque component for the incisors of 17 degrees for the upper central and 10 degrees for the upper lateral incisors. One of the main goals for the treatment was the correction of the maxillary incisor torque. The retroclined upper incisors had contributed significantly to the posterior position of the anterior teeth and had resulted in an intercuspal position that produced a posteriorly displaced condyle. The correction of the incisor torque brought about a natural repositioning of the mandible, which was a treatment goal for the patient. The JVA, which has been proven effective in discriminating joint vibrations to assess TMJ2 conditions, was utilized to evaluate the TMJ during and after treatment. Anterior repositioning of the mandible has been described in the literature as a viable approach to the treatment of Class II malocclusions and TMJ dysfunction.
Woodside3 and McNamara4 describe a functional approach to the correction of the Class II malocclusion. Following repositioning therapy has had a history of more than 50 years. Gelb5 referred to his repositioning appliance in 1959 and described the Gelb 4/7 position, which is currently accepted in the literature and recognized by many practitioners treating TMJ dysfunction. To correlate with the physiologic position of the condyle in the fossa (Fig. 3). Several functional appliance designs and their efficacy of improving TMJ dysfunction through mandibular repositioning have been described in later literature.5, 6 Simmonds7 further describes the alleviation of symptoms after mandibular repositioning. As noted, there was a natural anterior repositioning of the mandible upon removal of the centric interference in this patient, and appliance therapy was unnecessary. Posterior resin build-ups with Class II elastic traction effectively bonded.8 The pressable lithium disilicate is indicated for inlays, onlays, thin veneers, partial crowns, three-unit anterior bridges, three-unit premolar bridges, telescope primary crowns and implant restoration while the machinable lithium disilicate is indicated for all the previous applications except bridges.9, 10

Summary

Reconstructive treatment usually entails significant correction of malocclusion and the maxillomandibular relationship. Many patients requiring reconstruction commonly present with varying functional concerns, including TMJ dysfunction and associated symptoms.11 Technology, such as tomograms and the use of IVA, could serve as standard equipment in the diagnosis and treatment of these patients as well as aid in objectively evaluating the TMJ condition during and after the treatment. The goal of any treatment is to provide the patient with good esthetics, comfort and long-term function. The innovative melding of disciplines and the use of current materials and technology can allow conservation of dental tissue that is irreversibly altered and removed using the traditional reconstructive approaches.

References


Contact Information

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