Diagnosis & Treatment Planning

Restoring the Worn Dentition Before It Becomes Worse

by Andrew C. Cobb, DDS

Occlusal disease is the most common destructive dental disorder, leading to a myriad of potentially worsening problems.[1] The solutions to these problems only become more complicated as the destructive nature of occlusal disease progresses.[1] For the dental practitioner, this poses a diagnostic and treatment planning challenge. If our treatment goal is to correct all of the functional problems of our patients, satisfy their esthetic concerns, and do so with the least amount of dentistry, then knowing when and how to treat is of utmost importance. Early intervention can prevent the worsening of preventable problems and allow for more conservative treatment. The comprehensive examination and identification of signs of instability is paramount to this process.[2] The following case illustrates this dilemma.

Initial Examination

A 35-year-old man was seen for a comprehensive evaluation (Figure 1 View Figure). His medical history was non-contributory. Past dental treatment was mostly routine. The mandibular third molars and maxillary left third molar were missing. The maxillary right third molar was in place and erupted. The maxillary left first molar had a porcelain-fused-to-gold crown in place. Several amalgam restorations were in place on the molars. In addition, the mandibular right central incisor had a composite restoration replacing the incisal edge, which had fractured off several times and was again missing (Figure 2 View Figure and Figure 3 View Figure). The patient also reported frequent headaches in the temporal area most notably in the morning, a bilateral click in the temporomandibular joint (TMJ), and a bruxing habit.

A comprehensive evaluation was performed including an occlusal analysis with facebow-articulated, centric relation (CR)-mounted study models and a photographic examination.[3]

Chief Complaint

The patient's chief complaint was loss of anterior tooth structure, unhappiness with his smile, and a desire to correct his dental problems so that he could maintain his dentition throughout his lifetime. He also stated a desire to have the treatment completed as soon as possible because he would be relocating from the area.

Diagnostic Findings

Clinically, all hard and soft tissues were within normal limits. Muscle examination revealed tenderness to palpation in the anterior belly of the left temporalis muscle, right and left belly of the masseter muscle, and the left and right medial pterygoid muscles. The patient reported occasional headaches mostly in the temporal area.[4] Both left and right TMJs were able to be load-tested without tension or tenderness. Doppler auscultation revealed slight crepitus in translation, and a click in translation in both joints at a 30-mm opening. No crepitus or click was apparent in rotation. The range of motion was normal.

The patient had a class II, division II relationship with an overjet of 3 mm and an overbite of 1 mm. A CR/maximum intercuspation (MI) discrepancy with an initial CR contact of the maxillary right third molar with the mandibular right second molar was followed by a 2-mm anterior slide into MI. Proper anterior guidance was not present. The posterior teeth were in contact during eccentric and protrusive movements. Fremitus was present on the maxillary first and second bicuspids.

Radiographic examination revealed no decay or apical pathology and the bony support was normal. Periodontal probings were all 3 mm or less. Gingival recession with exposed root surface was present on the maxillary left cuspid, maxillary left first molar, mandibular left and right bicuspids, as well as mandibular left and right cuspids.

The mandibular and maxillary anterior teeth had moderate wear with exposed dentin. Wear facets were present on the right second molars. No decay was noted and existing restorations, although not esthetically pleasing to the patient, were adequate.

Esthetically, the upper lip was asymmetrical.[5] The wear pattern on the anterior teeth resulted in the vertical and horizontal edge position discrepancy of the maxillary central incisors. The gingival architecture was disproportionate. The golden proportion, width/length ratio, and positioning of the maxillary anterior teeth were all insufficient. The buccal corridors were also slightly deficient.[6]

Diagnosis

The TMJs revealed a progressive lateral pole derangement.[7] Occlusal disease causing premature and rapid wear of the anterior teeth with exposed dentin, muscle hyperactivity with tenderness, and fremitus of the maxillary bicuspids was evident. Gingival recession was also present. The patient's smile was not esthetically pleasing, with a number of ideal smile-design principles being violated.[8]

Concerns and Discussion

This case illustrates the potential destructive nature of a patient with a CR/MI discrepancy accelerated by parafunctional habits. A 2-mm anterior slide from CR to MI had caused early attritional wear. This process resulted in exposed dentin on the anterior teeth and shows the correlation between function and esthetics. The lack of an esthetically pleasing smile is often more noticeable to a patient than functional problems are, but successful treatment requires the correction of both functional and esthetic concerns.[9]

A systematic process to evaluate the data obtained in a comprehensive examination—such as appropriate records, a full set of radiographs, CR-mounted diagnostic models with a facebow on a semi-adjustable articulator, and a series of digital photographs—is key to developing a treatment plan. The process of evaluating models and photographs is made simpler by following a programmed approach to treatment planning. The treatment options are further simplified if four possible treatment options are followed: reshape, restore, reposition, or surgery. This process helps to ensure that the functional problems are corrected and the esthetic goals of the patient are achieved as simply as possible.[10] Photographic imaging also may prove helpful in the visualization process of smile

design for the clinician as well as the patient.

Esthetically, the creation of longer central incisors in this case would correct the flat appearance and allow the incisal line to follow the lip line. Length would be added at both the incisal edge and gingival areas to create a more pleasing width/length ratio. The golden proportion would be used as a guide for the central, lateral, and cuspid widths. Lengthening the centrals and grafting the left cuspid would improve the gingival plane. The mounted diagnostic casts would be used to help create the requirements for a stable occlusion.

Full-coverage restorations were planned for the maxillary six anterior teeth and the mandibular lateral and central incisors. Full coverage would allow for proper restoration of the wear, greater control over esthetic changes, creation of definitive centric stops, and establishment of anterior guidance. The maxillary first bicuspids were veneered to improve the esthetics and buccal corridor. Incisal edge composites were placed on the mandibular cuspids to restore slight incisal edge wear. Reductive equilibration established even CR stops on the posterior teeth. The overbite was increased 1.5 mm by lengthening the maxillary anterior teeth, which can be a cause for concern on a wear patient, especially if there is no CR/MI discrepancy. In this case, although the overbite was increased, repositioning the anterior teeth along with equilibration also increased overjet to allow for horizontal freedom. This was verified in the provisional restorations.

Treatment Plan

After a diagnostic wax-up was completed, including imaging, the treatment plan was discussed with the patient which took into consideration his wants and needs as well as his financial concerns (Figure 4 View Figure). The patient declined two of the treatment options presented. Full orthodontic treatment to better align the maxillary anterior teeth and gingiva was rejected because of cost and time constraints. The other option that the patient declined was periodontal grafting of the maxillary left cuspid.

Stage I Treatment

Initial periodontal treatment was performed and the patient was given home care instructions. A consultation with the periodontist was scheduled to discuss how to improve the gingival contours. It was decided that a closed technique could be used for lengthening the central incisors. Depending on the preferred technique of the periodontist, this can be accomplished utilizing a laser.[11] The teeth were whitened.

Stage II Treatment

Periodontal crown lengthening was accomplished using the diagnostic wax-up as a guide. The exact measurement from the incisal edge of the central incisors to the desired gingival margin was related to the periodontist. Minor orthodontic treatment was completed to better align the maxillary incisors and to allow for a more conservative tooth preparation. This was accomplished using Essex retainers and was completed in 6 weeks.[12]

Stage III Treatment

At one appointment, an occlusal equilibration was completed to eliminate the CR/MI discrepancy, and crown preparations were made for the maxillary cuspids, lateral and central incisors, and the mandibular lateral and central incisors.

Veneer preparations were completed on the maxillary first bicuspids, and the mandibular cuspids were restored with incisal composites. Preparations were completed using guide stents created from the diagnostic wax-up. Provisional restorations also were fabricated from diagnostic wax-up stents. Equilibration was completed along with final contouring of the provisional restorations. This allowed for the creation of stable anterior holding stops as well proper anterior guidance. Final impressions and records for the laboratory phase were taken.

Three days later occlusion was re-examined and verified, and the provisional restorations were confirmed to be in harmony with the envelope of function. The patient gave esthetic approval. Approved provisional models, photographs, and shade selection were obtained.

Three weeks later the restorations were tried-in, checked for proper occlusion and esthetics, verified by the patient, and delivered permanently. A full-coverage occlusal splint was fabricated for nighttime use.

Future Staged Treatment

Because of the patient's financial and time concerns, further treatment will be done as needed. This treatment will include periodontal grafting to correct recession on the posterior teeth. Older posterior restorations will be replaced on an as-needed basis.

Conclusion

The final result satisfied the patient's chief complaints, created a stable occlusion, and gave the patient the smile he wanted (Figure 5 View Figure and Figure 6 View Figure).[13] The process of identifying problems and finding treatment solutions to those problems is simplified when following a programmed approach.

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FIGURE 1 Full-face preoperative view of patient, who was unhappy with the esthetics of the anterior teeth.

FIGURE 2 Preoperative smile view shows the asymmetrical upper lip, wear, and malposed anterior teeth.

FIGURE 3 Retracted preoperative view shows asymmetrical gingival heights along with worn dentition.

FIGURE 4 The 4 X 4 problem list with the 4 possible treatment options, part of a programmed approach to treatment planning.

FIGURE 5 AND FIGURE 6 Postoperative views (smile and full face) show that the correction of the functional and esthetic problems results in an esthetically pleasing smile. Restorations by Shoji Suruga, CDT; at Bay View Dental Laboratory.

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