

A Case of Advanced Wear

A. Gary Goodman, DDS

Editor's note: This case is the first in a series we are introducing to share the outcomes of everyday dentistry as it is being practiced by members of our network. The purpose is to articulate the thought processes behind the treatment of common but challenging cases, explained within the framework of the treating clinician's general dental philosophy. We thank Dr Goodman for helping us establish the model for this new feature and invite others in the network to contact us about cases they might like to share.

Philosophy and Background

I graduated from the University of Maryland School of Dentistry in 1975 and then continued my education in a hospital-based general practice residency with the US Public Health Service. Since then, continuing my dental education has remained a priority. Among the highlights of my training are four continuums at the LD Pankey Institute, two mini-residencies in implant prosthodontics, and surgical implant training at the Zimmer Institute.

When I started my private practice in 1981, my focus was on recruiting and building an exceptional, career-oriented team. Our office is a learning environment, and personal and professional growth is one of our core values. Seven years ago, I had the privilege of welcoming my son into my practice. I see myself as his mentor; we always discuss our cases together and learn from each other, to the benefit of our patients. In addition to having a full-time private practice, I am also a part-time clinical instructor in the Advanced Education in General Dentistry residency at the University of Maryland School of Dentistry.

As I have matured in dentistry, I have realized that the most important thing I can give my patients is an accurate, well thought-out diagnosis. If I can figure out where the teeth belong in space, I can reverse-engineer a plan to arrive there, "beginning with the end

in mind." The necessary treatment usually involves several dental specialties, and while I have become proficient in many modalities, it is often necessary to assemble a team of specialists. I then become the quarterback, calling the plays and directing the treatment sequence.

I have been a member of the Triple Crown Study Club (an SSC affiliate, directed by Dr David Mugford) since its inception. I believe that my ability to diagnose and treatment plan comprehensive cases has been taken to another level because of it. Of particular help with the case I am presenting here was (1) a seminar given by Dr William Robbins on "Global Diagnosis," and (2) the use of a diagnostic/consultation PowerPoint template developed by Dr Woody Wooddell. Of course, nothing happens until the patient says yes, and this PowerPoint template is also a valuable educational tool to help patients understand and take ownership of their problems. Accurate communication with specialists and laboratories is essential, and this tool is a great way to make that happen.

The case presented here is an advanced wear case. As we go through the diagnostic findings and records, my goal is to develop a treatment plan that restores the patient to excellent function and esthetics with the least amount of treatment.



Dr Gary Goodman is a full-time restorative dentist who maintains a private practice in Annapolis, Maryland. He graduated from the University of Maryland School of Dentistry and completed a hospital-based general practice residency with the US Public Health Service. He has been a member of the Triple Crown Study Club since its inception.

Clinical Treatment Planning

Treating Clinicians: Drs A. Gary Goodman and Mairead O'Reilly, and Jim Boyd, CDT

Initial Presentation: January 2015 | Age at Initial Presentation: 71 | Diagnostic Records: September 2015

Treatment Plan Presentation: November 2015 | Active Treatment Initiated: December 2015

Active Treatment Completed: January 2017

Introduction

The patient presented initially for a complete exam and prophylaxis. He did not express any concerns with his teeth, although he did state that occasionally he had “pain in his jaw joints” and that his jaw would sometimes lock closed. I expressed my concern with the advanced wear of his anterior teeth and told him that his restrictive bite was the cause of the wear and probably contributed to his temporomandibular joint symptoms.

I did not overwhelm him at this time with a lot more information or treatment options. I simply told him that dentistry had a solution to his problem and, when he was

ready to address this issue, we would need to gather diagnostic records. My experience has taught me that there has to be a relationship and trust before a patient will accept comprehensive dentistry, and this was only our first meeting.

When he came back 6 months later, he was ready to accept diagnostic records to explore his problem. In addition to the initial panoramic and bitewing radiographs and charting, we obtained intraoral and extraoral photographs, diagnostic models, and a facebow transfer.

Medical History

- Noncontributory.
- No allergies reported.
- Medications: Vitamin D, probiotics, fish oil, aspirin (81 mg), Flomax (tamsulosin), and Nasonex (mometasone).

Diagnostic Findings: Extraoral/Facial

- Middle 1/3 of face height = lower 1/3 of face height.
- Normal profile.
- Age-appropriate incisal display.
- Tooth discoloration.
- Coincident dental and facial midlines.

Diagnostic Findings: TMJ/Muscle

- Popping of right temporomandibular joint (TMJ) on opening.
- No deviation on opening.
- Normal range of motion.
- Muscles of mastication exhibit no tenderness to palpation.

Diagnostic Findings: Intraoral/Dental

- Advanced attrition teeth nos. 8, 9, 22–27.
- Moderate attrition teeth nos. 6, 7, 10, and 11.
- Nonfunctional teeth nos. 1, 16, 17, and 32
- Lingually tipped teeth nos. 8 and 9.
- Acceptable posterior restorations.
- No caries.

Diagnostic Findings: Soft Tissue/Periodontal

- Soft tissue exam findings were within normal limits.
- Healthy periodontal tissues.
- AAP Type II with minimal bone loss.
- Probing all 2–3 mm.
- Adequate zone of attached gingiva.
- Disparate gingival levels in anterior teeth.

Periodontal Charting

[illegible]



Pretreatment frontal view.



Pretreatment maxillary occlusal view.



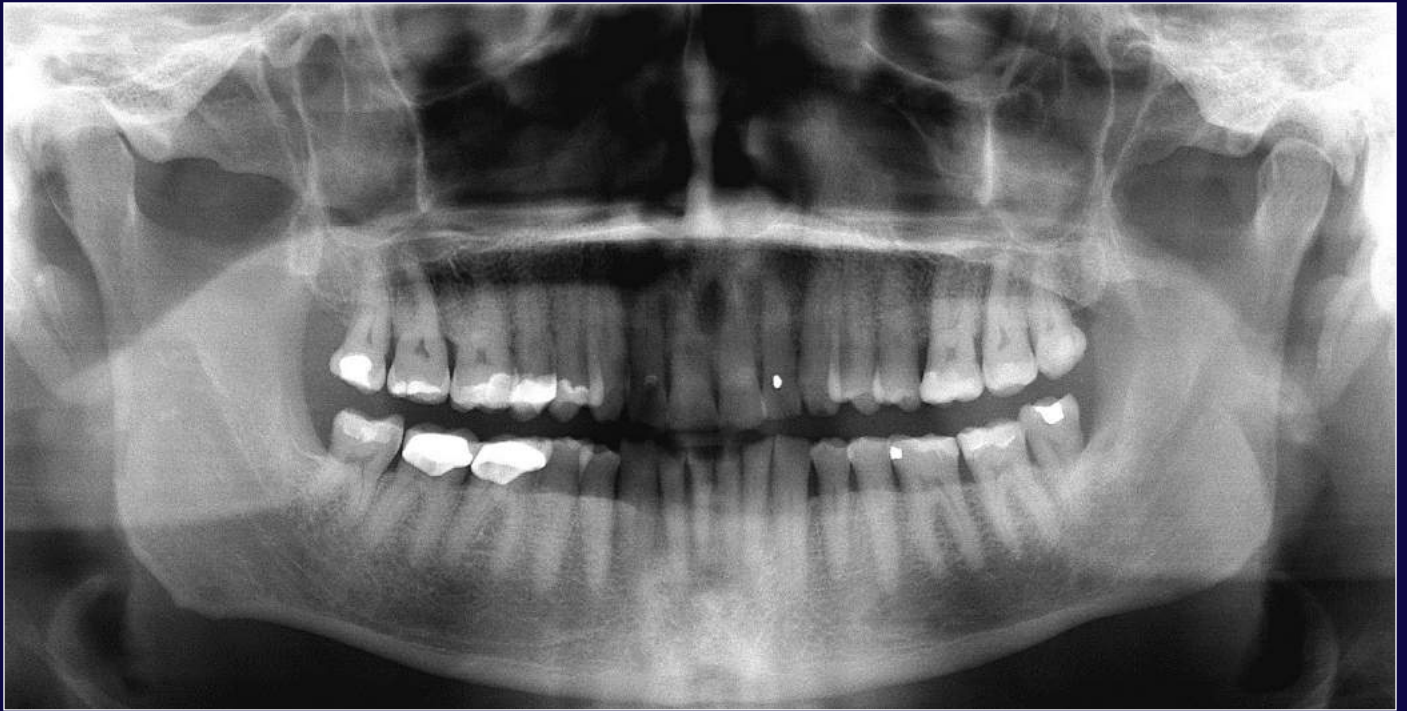
Pretreatment smile.



Pretreatment mandibular occlusal view.



Pretreatment retracted view.



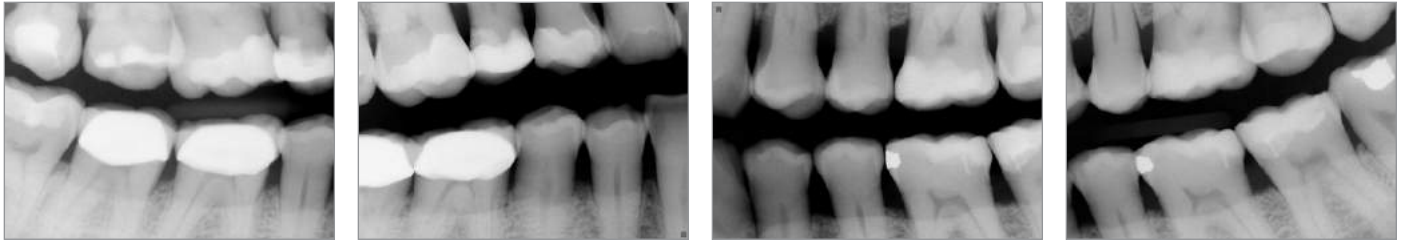
Pretreatment panoramic radiograph.



Pretreatment lateral and anterior views.



Pretreatment cephalometric views.



Pretreatment bitewing radiographs.

Occlusal Notes

- No CR-CO discrepancy.
- Anterior guidance is group function, right and left.
- No nonworking interferences.
- No protrusive interferences.
- Retroclined teeth nos. 8 and 9.
- Deep overbite.
- Advanced attrition teeth nos. 8, 9, 22–27.
- Moderate attrition teeth nos. 6, 7, 10, and 11.
- Supraerupted teeth nos. 8, 9, 22–27.

Radiographic Review

- Generalized excellent bone levels.
- Normal periodontal ligament spaces.
- No periapical pathology.

Diagnosis and Prognosis

- Diagnosis: Advanced anterior attrition and dentoalveolar extrusion.
- Prognosis: Excellent.

Summary of Concerns

- How can we create normal anatomy of the anterior teeth and periodontal tissues?
- How can we alleviate patient's TMJ symptoms?
- How can we educate patient so that he will choose the proper treatment?

Proposed Treatment Plan

Phase I: Diagnostic Evaluation/Consultation

The following records were obtained:

- Soft tissue exam.
- Tooth charting.
- Periodontal charting.
- TMJ/occlusal exam.
- Panoramic and bitewing radiographs.
- Intraoral and extraoral digital photographs.
- Diagnostic casts, facebow transfer.

All of the findings will be reviewed with the patient and the proposed treatment plan presented. He will also be referred to the orthodontist for a consultation.

Phase II: Orthodontics

- Extract third molars.
- Orthodontic therapy to intrude teeth nos. 8, 9, 22–27, as well as to procline teeth nos. 8 and 9.

Phase III: Restorative Treatment

- Provisional restorations.
- Definitive restorations.
- Orthodontic retention.

Active Clinical Treatment

Treating Clinicians: Drs A. Gary Goodman and Mairead O'Reilly, and Jim Boyd, CDT

Phase I: Diagnostic Evaluation/ Consultation

The goal of treatment was to move the teeth back into their original position. The maxillary anterior teeth needed to be proclined, and the worn, extruded teeth needed to be intruded. The gingival marginal levels of the anterior teeth were used as a guide to the amount of intrusion needed. The restrictive envelope of function would be opened up, and the anterior teeth could then be restored to normal anatomy.

Phase II: Orthodontics

The patient agreed to orthodontic therapy, and active treatment was initiated. As requested by the orthodontist, all four third molars were extracted under local anesthesia. After healing, Invisalign (Align Technology) therapy was initiated by the orthodontist, which was accelerated by the use of AcceleDent™. At 8 months into Invisalign therapy, the patient was referred back to me for my opinion on tooth position.

The tooth alignment was refined for an additional 2 months, and the patient was again referred for my evaluation. I undertook a quick composite mock-up of an intruded mandibular incisor to evaluate the height vs width of the incisor and anterior coupling. I was satisfied with the tooth position, and the gingival margin levels were now at the proper levels.

I removed the Invisalign attachments and made two sets of upper and lower alginate impressions. Essix-type retainers were fabricated for temporary retention as well as to serve as whitening trays. The patient whitened with Zoom NiteWhite ACP (Philips) and achieved a change from B-4 to A-1 in 2 weeks. One set of mounted models was sent to the laboratory for an ideal wax-up.

Phase III: Restorative Treatment

Local anesthetic (4% septocaine with 1:100,000 epinephrine) was administered by infiltration, and teeth nos. 8, 9, 22–27 were prepared for cingulum-sparing e.max ceramic crowns (Ivoclar Vivadent). The buccal margins were left supragingival to allow bonding to enamel. Avoiding preparation of the cingula maintains

maximum strength of the teeth. Because the teeth had advanced wear and were intruded, no incisal reduction was necessary. A custom silicone reduction guide was used to evaluate for proper reduction of tooth structure. Ultrapak size no. 1 cord (Ultradent) was used where necessary for retraction, and final impressions were made with Imprint 4 Super Quick (3M ESPE) regular and light polyvinyl siloxane impression material in custom trays. A bite registration was made with Blu-Mousse (Parkell). Luxatemp Automix Plus bisacryl was loaded into a silicone matrix made from the wax-ups for fabrication of “shrink-wrapped” provisionals. The occlusion was verified and the patient was instructed in the use of chlorhexidine 0.12% to prevent gingival inflammation around provisional crown margins.

Although there was incisal wear of the upper lateral incisors and canines, we chose not to treat those teeth because (1) we were able to achieve excellent anterior guidance without treating those teeth, and (2) esthetics were acceptable to the patient.

At a follow-up appointment, the patient reported that he was happy with the esthetics and phonetics of the provisionals, and my evaluation of the occlusion was positive: incisal coupling and canine guidance. A final shade was recorded (A-1), alginate impressions were made of the provisionals, and the laboratory was instructed to fabricate the final layered e.max crowns using the provisionals as a guide. At the insert appointment, local anesthesia was administered by infiltration (4% septocaine with 1:100,000 epinephrine). The provisionals were removed and the prepared teeth were cleaned. The teeth were etched with 40% phosphoric acid, and Adhese universal adhesive (Ivoclar Vivadent) was applied with a scrubbing motion for 20 seconds and then light-cured. The crowns were then bonded with Variolink Esthetic dual-cured bonding resin (Ivoclar Vivadent) and light-cured. Excess bonding resin was removed, post-op radiographs were taken, and the occlusion was verified. Oral hygiene was reviewed, and the patient was referred back to the orthodontist for the fabrication of retainers.



Restorative wax-up.



Digital tooth mold in desired position overlaid on existing teeth.



Pretreatment gingival levels.



Post-Invisalign treatment.



Post-treatment gingival levels.



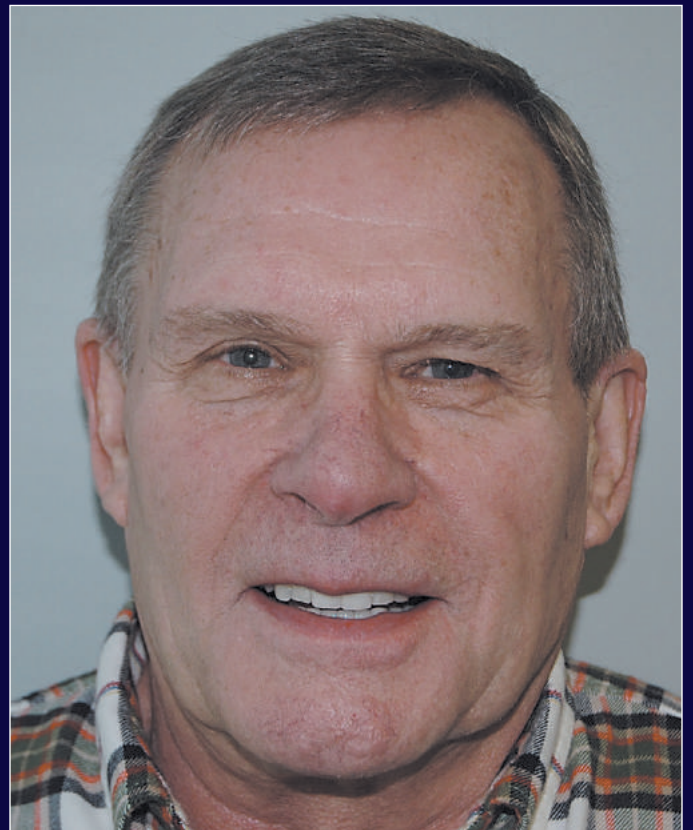
Post-treatment smile.



Panoramic radiograph, post-Invisalign treatment.



Cephalometric radiograph, post-Invisalign treatment.



Post-treatment frontal view.

Commentary

Advanced wear cases are commonly seen in a busy general dental practice. Very often the advanced wear is combined with dentoalveolar extrusion. These cases are challenging to treat because the teeth have moved into positions that make them very difficult to restore.

There are three options to treat these cases:

- Functional crown lengthening. This often leads to a compromised result because the crown margins must be on cementum rather than enamel, and the necessary incisal reduction may compromise the pulp.
- Increase the vertical dimension restoratively. This approach involves treating all of the teeth in one arch. While the extrusion is not treated, space is gained to restore the teeth.
- Orthodontic intrusion. This approach has the obvious and important benefit of “putting the teeth back where they belong.” The preparation of the intruded teeth can have margins on enamel, and no incisal reduction is required, sparing the pulp. In addition, no posterior teeth have to be treated.

In the past, many adult patients would refuse orthodontic treatment, thus compromising ideal treatment options and results. With the increasingly skillful use of Invisalign therapy in the appropriate situations, adult

patients are much more inclined to accept orthodontics, and the interdisciplinary team of an orthodontist and restorative dentist can achieve minimally invasive optimal results for their advanced wear patients.

Critical to this interdisciplinary approach is excellent communication between the restorative dentist, orthodontist, laboratory, and patient. To me, the IDEA™ PowerPoint template has become indispensable for this communication. By overlaying the outline of a tooth in the proper position over the patient's extruded tooth, they quickly understand the treatment goals. The same PowerPoint template is sent to the orthodontist and laboratory so that everyone knows where the teeth should be.

I am happy to report that we achieved an excellent result with this case. The correct diagnosis was made, the patient understood and was cooperative and motivated, and the final position of the teeth was predetermined and communicated to the interdisciplinary team, including the laboratory. At the 1-year follow-up, it was noted that there was some improvement in the right TMJ popping which I believe is a result of the increased freedom in the previously restricted envelope of function.

When the proper diagnosis is made and the end result is visualized by the team, the actual treatment becomes the easy part.

Dr Mairead O'Reilly is a full-time orthodontist who maintains a private practice in Annapolis, Maryland. She was born and raised in Ireland and received her initial college and dental training from Trinity College, University of Dublin. She was certified in orthodontics at Eastman Dental Center in Rochester, New York, and received an MS in oral biology from the University of Rochester's Graduate School of Medicine and Dentistry. She is a member of the Triple Crown Study Club and very much enjoys treating interdisciplinary cases.

With over 20 years at MicroDental, Mr Jim Boyd has gained expert insight on smile design and functional esthetics. He collaborates with doctors to provide in-depth case planning with photos, computer-design, and detailed communication to make the cosmetic restorative results predictable and natural-looking.