Treatment of a Patient with Severely Worn Dentition: A Clinical Report

Sudsukh Thongthammachat-Thavornthanasarn DDS, MSD

This clinical report documents the prosthodontic treatment of a Prosthodontic Diagnotstic Index Class IV 63-year-old white male, referred to the prosthodontic clinic by his general dentist for evaluation and treatment. The patient was concerned about the severe wear on his teeth and understood the need for comprehensive (full-mouth) rehabilitation to restore his dental condition. The clinical findings, diagnosis, treatment plan, and sequence of treatment are presented.

J Prosthodont 2007;16:219-225. Copyright © 2007 by The American College of Prosthodontists.

INDEX WORDS: oral rehabilitation, severely worn dentition, PDI Class IV patient

THE AMERICAN COLLEGE OF Prosthodontists' Classification System for Partial Edentulism[1] allows the diagnosis of patients based on the oral condition at the time they initially present to the practitioner. The Classification System has recently been renamed the Prosthodontic Diagnostic Index (PDI), and allows patients to be classified based on the severity of their pretreatment dental condition. This clinical report documents the treatment of a 63-year-old white male referred to the prosthodontic clinic by his general dentist. The patient was classified as PDI Class IV—characterized by severely compromised location and extent of edentulous areas with guarded prognosis, abutments requiring extensive therapy, occlusion characteristics requiring reestablishment of the occlusion with a change in the occlusal vertical dimension, and residual ridge conditions.[1]

History

Chief Complaint

The patient's chief complaint was "I am aware of wearing problems of my teeth and a loose crown. My dentist recommended I have a full-mouth rehabilitation."

Medical History

A review of the patient's medical history revealed he was in excellent health, with no signs of systemic disease. His blood pressure was 135/85 and within normal limits for his age. The patient had a history of prostate cancer. He was given postradiation treatment by means of interstitial prostate seed implant placement. Two years postoperatively he was in complete remission and had routine follow up with PSA values within normal limits.

Past Dental History

The patient's dental history indicated periodic dental examinations, oral prophylaxis, restoration of carious lesions, and prosthodontic and endodontic treatment. Tooth #32 was extracted approximately 6 months prior to his visit to the prosthodontic clinic. A full mouth series of radiographs were taken (panoramic view, Fig 1). The patient denied any symptoms of temporomandibular joint disorder or myofacial pain dysfunction, but he admitted grinding his teeth. He stated that he had never worn any type of occlusal splint. The patient's oral hygiene regimen consisted of brushing twice a day.

Clinical Findings

Extra-oral Findings

There was no cervical lymphadenopathy. The patient had no muscle tenderness, or facial

Faculty of Dentistry, Department of Conservative Dentistry and Prosthodontics, Srinakharinwirot University, Bangkok.

Accepted January 5, 2006.

Correspondence to: Sudsukh Thongthammachat-Thavornthanasarn, DDS, MSD, Sukhumvit 23, Klong-teay Wattana Bangkok 10110, Thailand. E-mail: sudsukh@swu.ac.th

1059-941X/07

doi: 10.1111/j.1532-849X.2007.00175.x

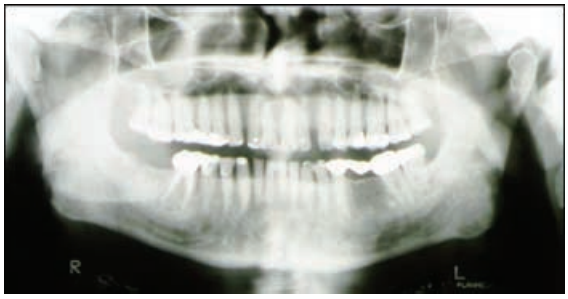

Figure 1. Panoramic radiograph, pre-treatment.

Figure 2. Teeth in maximum intercuspation, pre-treatment, frontal view.

Figure 3. Teeth in maximum intercuspation, pre-treatment, right lateral view.

asymmetry. Mandibular range of motion was within normal limits. The temporomandibular joints, the muscles of mastication, and facial expression were asymptomatic.

Intra-oral Findings

Figures 2 through 4 show the patient pretreatment. The maxillary arch was fully dentate (Fig 5).

Figure 4. Teeth in maximum intercuspation, pre-treatment, left lateral view.

Figure 5. Maxillary arch, pre-treatment, occlusal view.

Figure 6. Mandibular arch, pre-treatment, occlusal view.

The mandibular arch was partially dentate with teeth #19, 31, and 32 missing (Fig 6). Overall, soft tissue of the lips, cheeks, tongue, oral mucosa, and pharyngeal tissue were within normal limits. The saliva was thin and serous. There was generalized severely worn dentition throughout, except on teeth #11-15, which all demonstrated

moderate wear. Cervical wear was noted on #2, 3, 5, 12, 13, and 15. Amalgam restorations in teeth #1-5, 13-15, 17, and 29 demonstrated marginal breakdown and severe wear. Marginal breakdown and leakage of composite restorations in teeth #6, 7, 10, 12, and 22 were noted. A complete gold-fixed partial denture (FPD) #18-21 had open margins and severe wear. Tooth #30 had a complete gold crown with occlusal endodontic access, which was restored with a provisional restoration. Occlusal caries was found on #16. Diastemas were present in both maxillary and mandibular anterior regions. The patient exhibited generalized mild gingivitis, generalized 1-3 mm probing depths, and minimal bleeding on probing.

Occlusal Findings

The patient presented with a bilateral class II molar and canine relationship. The patient demonstrated a slide from centric relation to maximum intercuspation for 1 mm with deflective occlusal contacts occurring between teeth #12, 20 and 13, 21. He had anterior guidance in protrusive and group function in lateral mandibular movement. Nonworking interferences were noted between teeth #12, 20 and #15, 18. The patient was a Turner's category No.1 with excessive wear and loss of occlusal vertical dimension.[2]

Radiographic Findings (Fig 1)

The trabecular pattern was generally normal. A widened PDL space was found at apical area #30, which had received recent endodontic treatment. The crown-to-root ratio ranged from 1:1.5 to 1:2.

Diagnosis

1. The patient presented as ACP PDI Partially Edentulous Classification IV.[1]
2. The patient was in excellent health and had no medical contraindications to prosthodontic treatment.
3. The patient had generalized mild gingivitis with fair oral hygiene.
4. Endodontic consultation confirmed tooth #30 had successful endodontic treatment.
5. Defective amalgam restorations with marginal breakdown were present in teeth #1-5, 13-15, 17, and 29, and defective composite restorations with marginal leakage were present in teeth #6, 7, 10, 12, and 22. Tooth #16 had occlusal caries.
6. The patient had a severely worn complete coverage all-gold FPD #18-21 with open margins. Tooth #30 had a complete gold crown with occlusal endodontic access restored with a provisional restoration and open margins.
7. The patient exhibited generalized severely worn dentition, except for teeth #11-15, which all had moderate wear.
8. Cervical abfraction was present on teeth #2, 3, 5, 12, 13, and 15.
9. Diastemas were present between all maxillary and mandibular anterior regions.
10. The patient was considered to be an "exacting patient" in terms of House's philosophical classifications.[3]

Treatment Plan

The following treatment plan was based upon clinical findings, articulated casts, diagnostic waxup, radiographic examination, and periodontic and endodontic consultations.

1. An oral and written presentation of the treatment plan was made to the patient, including risks, alternatives, and benefits of treatment. Alternative treatments were discussed, including oral rehabilitation with fixed prostheses and oral rehabilitation with overlay removable dentures. The patient selected oral rehabilitation with fixed prostheses. His approval was obtained.
2. Oral hygiene instruction and oral prophylaxis.
3. Extraction of teeth #1, 16, 17.
4. Occlusal vertical dimension (OVD) splint to be worn for 10 weeks to evaluate patient's tolerance of 3 mm increase in OVD (measured at the incisal pin).
5. Crown lengthening of teeth #2-5, 18, 20, 21, and 28-30.
6. Radiographic stent, surgical guide, and implant placement on tooth #31.
7. Restoration replacement in teeth # 2-7, 10, 12-15, 22, and 29.
8. Fixed prosthodontic restorations:

a. Remove defective restoration #18-20 to evaluate substructures and replace if necessary.
b. Maxillary arch:
i. Complete veneer gold crowns: #2, 3, 14, 15.
ii. Metal ceramic crowns: #4-13.
c. Mandibular arch:
i. Complex cast post and core and complete gold crown: #30.
ii. Metal ceramic crowns: #21-29.
iii. Fixed partial denture #18-20 (#20 metal ceramic crown abutment, #19 all gold pontic, #18 complete veneer gold crown abutment).
iv. Implant-supported full veneer gold crown, screw retained: #31.

9. Maxillary hard acrylic occlusal splint.

Treatment Sequence

1. Three sets of study casts were made using poly(vinyl siloxane) impression material (Examix: light body and medium body impression material, GC America, Alsip, IL) and improved dental stone (Silky Rock, Whip Mix, Louisville, KY) for records and treatment planning. A maxillary cast was articulated on a Whip Mix articulator model 8300 using an arbitrary face bow. The mandibular cast was articulated using a wax occlusal centric relation record. These articulated casts were used for initial diagnosis and treatment planning.
2. Patient received oral prophylaxis and oral hygiene instructions. Proper tooth brushing and flossing were re-emphasized.
3. Patient was referred to an oral surgeon to extract #1, 16, and 17.
4. The defective amalgam restorations in teeth #1-5, 13-15, 17, and 29, and defective composite restorations in teeth #6, 7, 10, 12, and 22 were replaced.
5. Quick analyzer analysis (Whip Mix) was performed to determine the patient's condylar guidance angles and immediate lateral translation. Right condylar guidance was 55° with immediate lateral translation of 0.5 mm. Left condylar guidance was 50° with 0 mm immediate lateral translation. The terminal hinge axis was located and transferred to the articulator using a kinematic face bow (Stuart, Whip Mix).
6. The maxillary casts were mounted on a Whip Mix articulator model 8300 using Stuart's face bow. The mandibular casts were mounted with centric relation occlusal records using a Lucia jig[4] and ZOE (Krex, Teledyne Dental, Los Angeles, CA) on modified panadent trays.
7. A maxillary occlusal vertical dimension splint was fabricated using heat-activated clear acrylic resin (Lucitone Clear Resin, Dentsply International, York, PA) to evaluate the patient's tolerance of a 3 mm increase in OVD. The patient was instructed to wear the splint all the time, except during teeth cleaning. The patient was compliant during a 10-week evaluation period. The patient tolerated increased OVD with no sign or symptoms of muscle soreness or TMJ pain.
8. The diagnostic tooth preparation and diagnostic wax patterns were completed on the mounted casts at increased OVD. A custom incisal guide table was made from GC pattern resin (GC America). The diagnostic patterns were used to determine necessary tooth reductions, adequacy of tooth preparation design, and the first set of acrylic provisionals.[5]
9. Patient underwent crown-lengthening procedures on #2-5, 18, 20, 21, and 28-30 by a periodontist.
10. A radiographic stent for implant #31 was fabricated (Lucitone Clear Resin), and tomographic radiographs were taken to check bone height and width and proper implant position. Using a surgical stent, the periodontist placed a single 5.0 × 10 mm endosteal dental implant (Sterioss Replace, Nobel Biocare, Yorba Linda, CA) in site #31. The implant was uncovered after 4 months and a healing abutment placed.
11. VITA Shade A1 was selected after discussion with the patient and his wife. Both were persistent about selecting a whiter shade for the patient.
12. Tooth preparations for metal ceramic crowns were completed on #6-12 and 22-27. Gingival tissues were retracted. Final impressions were made with polyvinyl siloxane impression material (Examix). Occlusal records were obtained using a Lucia jig and ZOE (Krex) on modified panadent trays at the splint-determined increased OVD.

Figure 7. Anterior teeth preparation, frontal view.

Provisional crowns were made from the diagnostic wax-up template and cemented with a provisional cement (Temp Bond, Kerr, Italia, SpA, Salerno, Italy). The maxillary OVD splint was modified by removing the anterior section.

13. The master casts, and dies number 1 and 2 were made with type IV stone (Prima Rock, Whip Mix) and coated with die hardener (Yeti, Engen, Germany). Die number 1 was removable and used to check margins. Die number 2 was used as a working die. The maxillary master cast was articulated on Whip Mix articulator model 8300 using Stuart's face bow. The mandibular master cast was articulated to maxillary cast by using the obtained occlusal registration record.

14. Metal ceramic crowns #6-12, and 22-27 were fabricated (WillCeram Y, Williams, Amherst, NY), tried in, and margins, proximal contact, and occlusion checked. The shape and contour of the anterior crowns were modified to the patient's satisfaction. Permanent cementation was done with Zinc phosphate cement (Mizzy, Inc., Cherry Hill, NJ). The patient continued to wear the modified maxillary OVD

Figure 8. Right lateral posterior teeth preparation.

Figure 9. Left lateral posterior teeth preparation.

Figure 10. Teeth in maximum intercuspation, post-treatment, frontal view.

Figure 11. Teeth in maximum intercuspation, post-treatment, right lateral view.

splint 24 hours a day to provide posterior support.

15. The defective FPD #18-20 was removed to evaluate substructures of abutment teeth. Caries was found in both abutments. Amalgam restorations were placed in both abutments after caries removal and evaluation of vitality. Preliminary preparations were made on #12-15, and 21. Provisional restorations were made and cemented (Temp Bond). The maxillary OVD splint was again modified, by removing the left occlusal section, and checked for comfort and stability.
16. Tooth preparations were finalized on #12-15, 18, 20, and 21. Gingival tissues were retracted. Final impressions were made with poly(vinyl siloxane) impression material (Examix) with sectional stock tray for dies number 1 and 2 (see above). Provisionals were made and cemented (Temp Bond).
17. Crown #30 was removed, along with caries, and preparation for custom cast metal posts and core began. Final post and core impression was made with polyvinyl siloxane impression material (Examix). Provisional was made and cemented (Temp Bond).
18. Custom cast metal cast posts and core #30 were fabricated (Harmony, Williams, Amherst, NY), tried-in, fit checked, and cemented with Zinc Phosphate cement (Mizzy, Inc.).
19. Preliminary preparations were made on teeth #2-5, 28, and 29. Provisionals were made and cemented with Temp Bond. Provisional screw-retained implant crown #31 was made and screwed onto the fixture.
20. Tooth preparations were finalized on #2-5 and 28-30 (Figs 7-9). Gingival tissues were retracted. Final impressions were made with polyvinyl siloxane impression material (Examix) with a sectional stock tray for dies number 1 and 2. Impression coping was attached to implant #31. Gingival tissue was retracted on teeth # 2-5, 12-15, 18, 20, 21, and 28-30. Full arch impressions were made for both maxilla and mandible. Occlusal registration records were made with ZOE (Krex) and modified panadent trays using maxillary and mandibular anterior contacts to maintain OVD. Provisionals were made and cemented (Temp Bond). Provisional implant crown #31 was screwed onto the fixture.
21. The master casts and dies number 1 and 2 were made with type IV stone (Prima Rock) and coated with die hardener (Yeti). The maxillary master cast was articulated on Whip Mix articulator model 8300 using an arbitary face bow (centric relation record taken at the new OVD established by the anterior teeth). The mandibular master cast was articulated to the maxillary master cast by using the obtained occlusal registration records.
22. Metal ceramic crowns #4, 5, 12, 13, 21, 28, and 29 (WillCeram Y, Williams), implant-supported all-gold retainer #31, FPD #18-20, and complete veneer gold crowns #2, 3, 14, 15, and 30 (Harmony, Williams) were fabricated. All units were tried-in and adjusted as needed for proximal contact and occlusion. All units were cemented with Zinc phosphate cement (Mizzy, Inc.). The implant-supported all-gold retainer #31 was screwed onto the fixture and the access opening filled with gutta percha. A functional analysis of the occlusion confirmed that the goal of a mutually protected occlusion had been achieved for this patient.
23. After one-week observation, there was no screw loosening of implant-supported all-gold retainer #31, and the access opening was filled with a cotton pellet, gutta percha, and composite.
24. Two sets of casts of the completed restorations were made from polyvinyl siloxane impressions (Examix) and improved dental stone (Silky Rock) for records and for fabrication of an acrylic resin occlusal splint. Arbitary face bow transfer and centric relation records were made. The occlusal splint was made with heat-activated clear acrylic resin (Lucitone Clear Resin; Dentsply International) and placed for the patient, with instruction for wear and maintenance.

Post-treatment view of the patient is shown in Figures 10-15.

Instructions to Patient

Oral hygiene instructions were reviewed, emphasizing cleaning of the restoration margins. Additional instruction was given on the use of floss threaders and superfloss under the FPD. The patient was also instructed to wear the occlusal splint at night.

Figure 12. Teeth in maximum intercuspation, post-treatment, left lateral view.

Figure 13. Maxillary arch, post-treatment, occlusal view.

Figure 14. Mandibular arch, post-treatment, occlusal view.

Figure 15. Periapical radiograph, post-treatment.

Post-treatment Therapy

The patient was seen at 1- and 2-week follow-up appointments. The patient stated that he was pleased with esthetics, function, and comfort of the prostheses. Oral hygiene was excellent. The patient was given instructions to seek 6-month prosthodontic and periodontic recall appointments.

Prognosis

The patient was very motivated and dedicated to restoring his oral health to optimal condition. His positive attitude and improved oral hygiene should help to ensure a favorable prognosis. Long-term prognosis will depend on consistent and continued good oral hygiene practice and wearing the occlusal splint.

References

1. McGarry TJ, Nimmo A, Skiba JF, et al: Classification system for partial edentulism. J Prosthodont 2002;11:181-193
2. Turner KA, Missirlian DM: Restoration of the extremely worn dentition. J Prosthet Dent 1984;52:467-474
3. Gamer S, Tuch R, Garcia LT: M.M. House mental classification revisited: intersection of particular patient types and particular dentist's needs. J Prosthet Dent 2003;89:297-302
4. Lucia VO: Modern Gnathological Concept-Updated. Chicago, Quintessence, 1983
5. Wise MD: Failure in Restored Dentition: Management and Treatment. Chicago, Quintessence, 1995