The American Board of Prosthodontics
Certifying Examination

Part 3:

Fixed Prosthodontic Treatment

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HISTORY & CHIEF COMPLAINT

SLIDE 2. Pre-Treatment, frontal view

Chief Complaint:

This patient is a 45 years old Caucasian female who was referred to the graduate prosthodontics clinic at UMDNJ for comprehensive dental care. Her chief complaint was " I want to cap my worn-down teeth, my teeth are short and I want to fix up my mouth".

Medical History:

A review of the patient's medical history revealed that patient has bipolar disease since 2007 and she is taking Prozac(40mg/2x daily, antidepressent) and Lithium(20 mg/2x daily, mood stabiliazer). Patient is under the physician care and last physical exam was 5 months ago. Her blood pressure and pulse were within normal limits 118/78,69 respectively. The patient had no medical contraindications to prosthodontic treatment.

Slide 3:full face lateral view

Dental History:

The patient stated that she did not received dental care for the last 2 years except emergency extraction of teeth #3 &30, and recent pain on area of tooth #14. She had a crowns on teeth #19,28,& 29 which had been placed 7 years ago. Crowns on tooth#29& 28 loosened two weeks ago. She went to a private general dentist for recementation and was referred to the postgraduate prosthodontics clinic at UMDNJ. Patient admitted to past history of soda swishing in her mouth and admits having 3 cocktails per day. The Patient is not aware of any parafunctional oral habits. Patient's oral hygiene regimen consists of brushing once a day without flossing.

CLINICAL FINDINGS

Extraoral findings:

The patient had no muscle tenderness, or palpable nodes. Mandibular range of motion was within normal limits and the temporomandibular joints were asymptomatic. The muscles of mastication and facial expression were also asymptomatic.

Slide 4: pretreatment smile

Slide 5: pretreatment frontal view of MIP

Intraoral findings:

Slide6: Maxillary occlusal view

soft tissue of the lips, cheeks, tongue, oral mucosa, and pharyngeal tissues were within normal limits. The saliva was thin and serous.
An examination of the maxillary hard tissue revealed: tooth # 3 missing due to extensive caries; worn teeth # 4,5,6,7,8,9,10,11,12,13,14&15, carious teeth #4,5,6,7,10,11,13. There were a labial composite resin on teeth# 8&9,occlusal composite resin on tooth# 12 and amalgam restorations on teeth # 14.

Slide 7:Mandibular occlusal view

Bilateral mandibular tori; tooth # 30 missing due to extensive caries; Worn teeth # 20,21,22,23,24,25,26,27, and caries in teeth #20,21,22,26,27; occlusal Composite restorations on teeth # 18&31; defective crown restoration on tooth #19, temporary crown with a post on tooth#28 and uncrown of prepared tooth#29.
There are abnormal respond of teeth # 6,7,10,13&14 to the electric pulp tester and thermal test.

Slide 8: left lateral MIP

Undetectable canine relationship on right and left with an angel class I molar relation was noted on the left side.

Slide 9: right lateral MIP

Examination of the patient's occlusion found that centric occlusion was not coincident with the maximum intercuspation; approximately of 1 mm horizontal slide was noted after chaiside deprogramming of the patient musculature and there was an initial tooth contact between tooth #2 with #31. 1mm of vertical and horizontal overlap was noted at MIP

Slide 10 (Protrusion – front)

Protrusive movement was guided by teeth #s (8 with 25) & (#9 with #23)

Slide 11 (Protrusion — right lateral)

There was no contact on the right protrusion movement.

Slide 12 (Protrusion — left lateral)

There was no contact on the left protrusion movement

Slide 13: Right laterotrusion view

Right lateral movement was guided by teeth # (5&6 with 28),(#2 with #31)

Slide 14: left mediotrusion view

There was non-working contact on the left balancing side.

Slide 15: left laterotrusion view

Left lateral movement was guided by teeth # (13,14 with #19), (15 with #18)

Slide 16: Right mediotrusion view

There was tooth contact on the right non-working side of tooth# 2 with #31

Slide 17: pretreatment frontal view of MIP

Gingival examination:

The color, size, texture, and contour of the maxillary and mandibular gingiva were within normal limits. General probing depths were between 1-3 mm with localized bleeding upon probing.

The patient had 3-6 mm of attached gingival in the maxilla and 2-5mm in the mandible except tooth#18 had no attached gingival in the buccal and distal area. No teeth demonstrated clinically detectable pathologic mobility or furcation involvement.

RADIOGRAPHIC FINDINGS

Slide 18: Pre-Treatment Panoramic Radiograph

A pre-treatment panoramic radiograph showed dense regular trabeculation. the bone level supporting the teeth was level with no infra-bony pockets. All the third molars and teeth#3&30 are missing.The maxillary sinuses and the mandibular condyle were within normal limits.

Slide 19: Pre-Treatment Full Mouth Radiographs

Full mouth radiographs showed periapical radiolucency on tooth #20. The maxillary and mandibular bone was dense and displayed heavy trabeculation, intact lamina dura, and periodontal ligament space of uniform dimension were present.Crown to root ratio was favorable throughout the dentition.

Slide 20: pretreatment smile

- The patient has straight soft tissue facial profile. The patient's esthetics, phonetics, occlusal plane and occlusal vertical dimension were evaluated. Interocclusal space was at her physiologic rest position was 6mm.The patient exhibited excessive amount of space between anterior teeth during S sound.
- The maxillary anterior teeth appeared short. Patient had an Average smile line; the upper central incisors not visible at rest; the incisal edge don't follow lower lip line and smile width up to second molar with Normal buccal corridor.

Slide 21 ; Diagnostic Wax-up

Two sets of diagnostic casts were made using irreversible hydrocolloid and a dental stone. *Patient's mandibular movements were traced with the Denar Cadiax®.* The maxillary cast was mounted in a D5A articulator with slidematic facebow. The mandibular cast was mounted using Lucia jig anteriorly and a Blu-mousse (PVS) posteriorly.

A maxillary occlusal splint was fabricated to deprogram the muscles to achieve a more accurate CR and, also used to determine the patient's ability to tolerate a 3 mm increase in the occlusal vertical dimension. During a 3 month period, the patient tolerated the increased OVD with no signs or symptoms of muscle soreness or TMJ pain. New centric relation record was made at increase of VDO to remount mandibular cast.

Diagnostic wax-up was then completely at the proposed occlusal vertical dimension. Appropriate occlusal plane and occlusal schemes were also reestablished based on clinical observations.

DIAGNOSIS

1. The patient presented with excellent health and had no medical contraindications for prosthodontic treatment.
2. The patient had generalized plaque-induced gingivitis. The patient's oral hygiene was poor and needed improvement.
3. Carious teeth # 4,5,6,7,8,9,10,11,12,13, 20,21,22 ,26,&27
4. A defective crown on tooth # 19
5. Chronic apical periodontitis on tooth #20
6. Partial edentulism
7. The patient exhibited moderate to severe wear exposing dentin on most of her teeth due to history of chemical erosion from soda switching.
8. Pantographic survey indicated that mandibular movements were reproducible and smooth. TMJs were normal. There was a slight immediate side shift.
9. Prosthodontic Diagnostic Index (PDI) Class IV partially edentulous patient
   - Edentulous areas were in both arches.
   - Abutments in three sextants had insufficient tooth structure and required adjunctive therapy, i.e., periodontal and/or endodontic procedures.

- Reestablishment of the entire occlusal scheme was required with change in occlusal vertical dimension

TREATMENT PLAN

The following treatment plan was based on clinical findings, evaluation of articulated diagnostics casts, radiographic examination, periodontal and endodontic consultations. Following a thorough explanation of treatment options, objectives and limitations, the patient consented to the following treatment plan:

Phase I:

- Oral hygiene instruction, scaling
- Caries control & fluoride application
- Appliance therapy to relax muscles,test vertical and to take a new Centric Relation at proposed VDO
- Full diagnostic wax-up at proposed VDO
- Provisionalization with fixed partial dentures

Phase II:

- Endodontic procedure: teeth # 4,6,7,10,11,12,13,14,19.
- dowel & core: teeth # 4,6,7,10,11,12,13,14,19.
- Extraction: teeth # 5,20,21,28
- Crown lengthening and split thickness graft in tooth#18
- Extraction and Socket preservation in area of teeth#20&21.
- Implant placement in area of# 3,5,20,21,28,30
- Uncovery of the implants

Phase III: Prosthodontic Treatment

a. Maxilla:
    - Ceramometal single crowns: teeth # 2,3,4,5,12,13,14,&15.
    - All ceramic single crowns; teeth #6,7,8,9,10,&11
    - Implant supported cement retained ceramometal single restorations #3,&5.

b. Mandible:
    - Ceramometal single crowns: teeth #s 18,19,29,31.
    - All ceramic single crowns; teeth #22,23,24,25,26,27
    - Implant supported cement retained ceramometal single restoration #20,21,28,&30

Phase IV:

- Post treatment therapy and post treatment instructions
- An occlusal appliance will be fabricated to protect the patient's reconstruction
- Periodic prophylaxis and prosthodontic examination

TREATMENT

1. Patient was informed of the treatment plan with its objectives and limitations. The selected restorations, restorative materials, esthetic requirements and possible complications were discussed.
2. Scaling and Oral hygiene instructions
3. Caries control & topical fluoride (1.1% Sodium fluoride) application
4. Construction of a heat-processed acrylic-resin occlusal device to be worn for a period of three
5. Full diagnostic wax-up at proposed VDO
6. Preparation of all teeth and provisionalization, providing the patient with a mutually protected occlusion.
7. Reevaluation of the restored vertical dimension of occlusion with the provisional restorations.
8. Endodontic treatment with a post and core on teeth # # 4,6,7,10,11,12,13,14,19.
9. Extraction and Socket preservation in area of tooth#20&21 with crown lengthening and split thickness graft on tooth#18
10. Implant placement in area of# 3,5,20,21,28,30& Uncovery of the implants
11. Restoration of all teeth with final crowns, providing the patient with a mutually protected occlusion.
12. Construction of a heat-processed acrylic-resin maxillary occlusal device for use during sleep and during the day as needed.

13. Post insertion and oral hygiene instructions.
14. Full mouth radiographic survey and a panoramic radiograph to serve as a baseline for future evaluations.
15. Placement in periodic recall and maintenance program.

5. Prognosis

Assuming the patient maintains good oral hygiene, wears her occlusal device as required, and keeps her appointments of the periodic recall and maintenance program, the prognosis is favorable.

6. Treatment

The treatment plan was reviewed and discussed with the patient. Possible complications and postoperative requirements such as oral hygiene maintenance and an occlusal device were discussed in depth with the patient, and the patient signed the consent form. Treatment was performed as per the treatment plan. The patient received oral hygiene instructions and topical fluoride.

A maxillary occlusal device was fabricated using heat-processed acrylic-resin and delivered to the patient. It increased her current occlusal vertical dimension by 3mm at the incisors, providing her with a mutually protected articulation. The patient wore the occlusal device for three months.

Slide-22 Provisional Restorations- Frontal View

Based on the diagnostic wax up,the teeth were prepared for ceramometal crowns in the posterior and all ceramic in the anterior. Heat-cured acrylic-resin provisional shells were fabricated, relined in the patient's mouth, and cemented with non-eugenol tempoary cement providing the patient with mutually protected articulation.

Provisional restorations were placed on all the prepared teeth. Patient adaptation to the proposed vertical dimension, esthetics and phonetics of the provisional restorations were evaluated. An

alginate impression of the corrected provisional were made and poured with type IV dental stone. The casts were mounted on the D5A articulator. Teeth # 4,6,7,10,11,12,13,14,19 was endodontically treated, and restored with a prefabricated metal-dowel and a composite-resin core on teeth # 4,6,10,11,14 and cast dowel& cores on teeth#4,7,12,13,19. Extractions of teeth#20&21 with ridge preservations and crown lenghrning of tooth#18 was performed at the same time. Implants placed in area#20&21 after a 4 month of a healing period.

Implant placement in area #3 with an extraction of tooth#5 & immediate implant placement was performed at the same time. Implant placement in area #30 with an extraction of tooth#28 & immediate implant placement was done at the same time.

Double Custom abutments were fabricated after all implants uncovery. One of each abutment was delivered and torque following manufacture instruction and the other one was kept for laboratory used. New provisional restorations were fabricated based on the mounted corrected provisional stone casts.

Slide-23 Provisional Restorations left lateral view

Left lateral view of the provisional restorations in centric occlusion.

Slide-24 Provisional Restorations right lateral view

Right lateral view of the provisional restorations in centric occlusion.

A facebow transfer record of the maxillary arch was made using the same third points of reference as the initial facebow transfer at the diagnostic phase of the treatment.

Irreversible hydrocolloid impressions were made of the provisional restorations to fabricate a custom anterior-guide table and to aid in the fabrication of the final restorations. A centric relation record was made between the maxillary provisional restorations and the lower prepared teeth at the restored occlusal vertical dimension, to allow cross mounting of the casts of the provisional restorations with those of the prepared teeth.

Slide-25 frontal view of the centric relation record

An anterior self-cured acrylics resin jig and posterior PVS records were used to record centric relation between the prepared teeth.

Slide-26 Teeth Preparations-frontal view

Slide-27 Teeth Preparations-left lateral view

Slide-28 Teeth Preparations-right lateral view

Slide-29 Maxillary Preparations- occlusal view

Slide-30 Mandibular Preparations- occlusal view

Slide-31 maxillary final impression

Slide-32 mandibular final impression

Maxillary and mandibular full arch impressions with GC copings for the custom abutments were made using an addition silicone impression material and acrylic-resin custom trays. Gingival retraction was obtained using plain braided cord soaked in hemodent solution (21.3% aluminum chloride, hemodent).

Each impression was poured twice-using type V dental stone. The first pour was used to fabricate sectioned dies. The second pour was used as a solid cast. The dies were sectioned and trimmed. The margins of posterior teeth dies were marked with a red-wax pencil and sealed with thinned cyanoacrylate-resin. A four layer of die spacer was applied over the dies. The articulator with mounted working casts, provisional restorations casts, and a detailed work authorization were sent to the dental laboratory.

Metal framework were waxed, invested and cast in a noble metal alloy and zirconia coping was fabricated.

The copings were tried on the teeth and adjusted for internal fit using silicone disclosing paste. OVD and centric relation were verified. The castings were returned to the lab for the porcelain application.

The restorations were returned to the mouth in the bisque-bake state and adjusted for the interproximal contacts, contour, and occlusion

6. Completed Restorations

Slide-33 Occlusal view of the completed maxillary restorations

The intaglio surfaces of the restorations were microetched with 40μ aluminum oxide, cleaned and luted with a resin cement (Relyx unicem). This is an occlusal view of the completed maxillary crowns.

Slide-34 Occlusal view of the completed mandibular Restorations

This is an occlusal view of the completed mandibular crowns.

Slide-35 Frontal View of the restored teeth in centric occlusion.

Slide-36 Right Lateral View of the restored teeth in centric occlusion.

Slide-37 Left Lateral View of the restored teeth in centric occlusion.

Slide-38 Right Lateral View of the restored teeth in right laterotrusion demonstrating the canine protected occlusion.

Slide-39 Left Lateral View of the restored teeth in left mediotrusion

Slide-40 Left Lateral View of the restored teeth in left laterotrusion demonstrating the canine protected occlusion.

Slide-41 Right Lateral View of the restored teeth in right mediotrusion.

Slide-42 Frontal View of the restored teeth in Protrusion demonstrating the anterior protected articulation.

Slide-43 Right Lateral View of the restored teeth in Protrusion.

Slide-44 Left Lateral View of the restored teeth in Protrusion.

Slide-45 Panoramic and Complete mouth Periapical Radiographs were taken serving as a baseline for future follow-up and to verify the complete removal of excess cement.

Post treatment therapy: The importance of the maintenance of a high standard of oral hygiene was stressed to the patient. Tooth brushing and dental flossing technique was reinforced. 1.1% neutral sodium **fluoride** brush-on gel (Prevident 5000 plus) prescribed to be used twice daily. 0.12% chlorohexidine mouth rinse was prescribed one time daily for 7 consecutive days a month for gingival enhancement.

Slide-46 Frontal view with Occlusal device.

The patient returned at 24 hrs for a minor occlusal adjustment. Irreversible hydrocolloid impressions were made. A heat-processed-clear acrylic-resin maxillary occlusal device providing a mutually protected articulation was given to the patient to wear during sleep hours and at daytime as needed for protecting the restoration. Instructions on the wear and care of the occlusal device were given to the patient. The patient returned at two and four weeks for an occlusal analysis, and for soft tissue evaluation, and was placed on 6 months periodic recall.

Slide-47 the patient presenting full natural smile

The patient reported complete satisfaction with the esthetics function and comfort of the prosthesis, and was very happy with her new smile. All of her complaints were satisfied.

SLIDE 48. Post-Treatment, frontal view

7. Prognosis

The prognosis was highly favorable. It was explained to the patient that the long-term prognosis of the restoration would depend on the maintenance of oral hygiene and the wearing of her occlusal device in order to protect the restorations.