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Case Report

Full-mouth Rehabilitation of Patients with Moderate to Severe Dental Wear: Clinical Case Report

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Abstract

Treatment of adult patients with the history of dental caries, chemical erosion, mechanical abrasion, or traumatic occlusal attrition promoted by parafunction, can be unpredictable and disappointing to both patient and the restorative team. However, an evidence-based approach with emphasis on conservation of the remaining hard and soft tissues will result in esthetic and functional rehabilitation and compete patient's satisfaction.

Introduction

One of the challenges of dental rehabilitation of patients with moderate to severe worn down dentition is to conserve the remaining tooth structure despite years of destruction. A detailed diagnostic workflow and documentation is of paramount importance to visualize the final form and function before attempting any restorative procedure such as tooth preparation, endodontic treatment, or extraction [1,2]. Although coronal migration of worn down teeth, to compensate for the space created by the loss of tooth structure, has been documented, this phenomenon is not inevitable [3,4]. Factors such as rate of wear, functional and parafunctional habits, ankyloses of teeth, or other biologic or mechanical factors can impede their eruption to some degree. An uncompensated tooth wear, in any direction, may result in adequate restorative space without the need for excessive tooth preparation [5]. When the remaining tooth structure is preserved during caries control procedures and tooth preparation, the need for prophylactic endodontic treatment for fabrication of post and core, hence establishing the retention and resistance form for the full coverage crowns, will be minimized as well. The purpose of this clinical case report is to highlight some of the steps for rehabilitation of a patient with advanced tooth wear and compromised dentition which could have resulted in partial or complete edentulism.

Case Presentation

A 57-year-old female patient presented to the dental clinics with the chief complaint of pain upon chewing food and an unattractive smile. (Figures 1-3) Her medical history was non-contributory.

Radiographic and clinical findings

1. Extraoral findings: No abnormality was evident in the neck and face region. There was a horizontal cant in the anterior teeth with a reverse curve which had affected her smile attractiveness. (see Figure-1)
2. Intraoral findings: (Figures 4-5)

Maxillary arch- Both third molars were missing, large defective silver amalgam restorations and/or recurrent caries were present on all posterior teeth except for the left first molar which had a metal-

Figure 1: Preoperative smile. Frontal view

Figure 2: Preoperative right profile view

Figure 3: Preoperative left profile view

Figure 4: Preoperative anterior retracted view

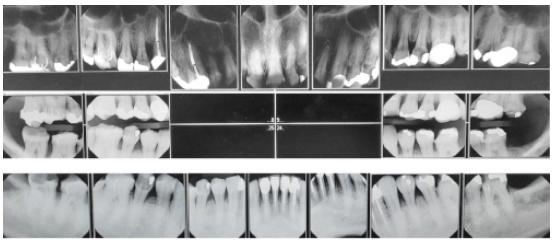

Figure 5: Preoperative full-mouth radiographs.

Figure 6: Maxillary arch preoperative occlusal view

Figure 7: Mandibular arch preoperative occlusal view

Figure 8: Mock-up maxillary anterior teeth

Figure 9: Provisional restorations

Figure 10: Maxillary final impression

Figure 11: Mandibular final impression

ceramic full coverage crown with defective margin. Moderate to severe wear (erosion and attrition) was present on all anterior teeth except for right canine which had been endodontically treated and restored with a prefabricated post and a metal-ceramic crown with poor margins. (Figure 6) Moderate to severe cervical abrasion was evident throughout the arch.

Mandibular arch- Both third molars as well as the left second molar were missing. Similar to the maxillary teeth, all mandibular remaining posterior teeth had history of failing or failed restorations except for the first premolars. All incisors were endodontically treated and restored with a prefabricated post and a metal-ceramic crown with poor margins. Moderate to severe cervical abrasion was evident throughout the arch. (Figure 7).

1. Periodontal findings: Despite the defective restorations and carious lesions, there was only a mild gingival inflammation. There was an isolated pocket depth of 4-5 mm on the distal of maxillary right second molar.
2. Parafunction: Patient expressed that she grinds her teeth at night.

Diagnosis

- Moderate to severe tooth wear with space available for restoration (Type I according to Turner's classification) (6).
- Stage II, Grade A periodontitis.
- Dental caries and failing restorations.

Treatment Sequence

1. Documentation

To mount the diagnostic casts in CR, preliminary impressions were obtained with irreversible hydrocolloid impression material (Jeltrate, Dentsply-Sirona). Vertical dimension at rest (VDR) was determined to aid in estimation of the interocclusal rest space (Freeway space) by subtracting from the vertical dimension of occlusion (VDO). It was found that the patient had in excess of 6 mm of interocclusal rest space, which could provide at least 3mm of restorative space without interfering with her physiologic functions. Interocclusal relationship was registered in centric relation using a 3-mm thick auto polymerizing acrylic resin anterior jig (GC Pattern Resin, GC Corp) to deprogram the muscles of mastication and provide enough space for the registration material (Blu-Mousse, Parkell, Inc).

Facebow registration and a series of extra- and intra-oral photographs were obtained, diagnostic casts were fabricated in Type III dental stone (Microstone, Whip Mix Corp), and mounted on a semi adjustable articulator (Denar Mark II, Whip Mix Corp.).

2. Mock-Up

Diagnostic wax-up was competed at an increased VDO which was maintained by the anterior jig. A silicon putty index was made of the diagnostic wax-up (Speedex Putty, Coltene). At the following appointment, the putty indexes were relined with a Bis-acryl composite material (Structure 2, Voco) and the esthetics as well as the phonics were evaluated intraorally (Figure 8).

3. Tooth preparation and Provisionalization

The mock up process was repeated in the following appointment, this time to prepare the teeth through the composite material by following the depth cuts through the Bis-acryl material. This ensures an adequate reduction without removing excessive tooth structure. Once the initial preparation is completed, the remaining mock-up material is removed and the preparations are finished following the standard protocol for all-ceramic full coverage crowns. There was no need to remove the existing posts from the endodontically treated teeth, as there was no periapical pathology and the posts and their build-up material were is an acceptable condition. Most importantly, there were no recurrent caries invasion near the posts. Patient had been informed of possible need for endodontic treatment for one or more teeth in advance. However, the only tooth which required endodontic treatment was mandibular right second molar, for which she was referred to an endodontist.

Provisional crowns which were fabricated with heat-polymerizing acrylic resin according to the diagnostic wax-up, were relined with auto-polymerizing acrylic resin. (Figure 9) Acceptable provisional restorations can be fabricated with Bis-acryl composite resin material intraorally, or milled with poly methyl Methacrylate (PMMA) blocks as well. The patient was instructed to follow a rigorous hygiene regimen, including the use of chlorhexidine gluconate 0.12% mouthwash twice a day for 2 weeks (Peridex, 3M). She was scheduled for follow up appointments as needed.

4. Final Impression

After a period of 2 months and after the completion of endodontic therapy and demonstration of proper oral hygiene, the provisional restorations were removed and teeth were inspected for any possible defect. A new set of periapical radiographs were taken to check for any pathology.

Retraction cords were packed (Ultrapack size 0 and 1, Ultradent) and impressions were made with addition-reaction polyvinyl siloxane impression material (Aquasil, Dentsply-Sirona). (Figs) It became necessary to remake the impression for the mandibular right quadrant and supplement it with the full-arch tray (Figures 10-12).

5. Occlusal Registration

Interocclusal records were made at the same VDO as in the provisional restorations by removing the posterior segments from both arches, leaving the anterior segments in place, and injecting the PVS registration material (Blu-Mousse) between the posterior segments while the patient was closing her teeth. After setting, the anterior provisional restorations were removed, patient was instructed to close on the previously polymerized registration material, and a fresh PVS material was injected between the anterior teeth, connecting it to the posterior segments. Once all three segments were unified, a light-body PVS material (Aquasil) reline was performed on both sides of the occlusal registration record (Figures 13 and 14).

Impressions of the provisional restorations were made in irreversible hydrocolloid and supplemental occlusal records were made to relate the maxillary and mandibular master casts to the cast of the provisional restorations, in addition to each other (cross-mounting). Finally, the case was sent to the dental laboratory for fabrication of single full coverage crowns and an endo crown for the mandibular right second molar. It was decided to fabricate all the posterior restorations with full-contoured (monolithic) zirconia material. For the anterior teeth, the material of choice was zirconia veneered with feldspathic porcelain, mainly for its superior optical properties such as translucency.

6. Insertion of Definitive Prostheses

At the insertion appointment, the provisional restorations were removed, the teeth were cleaned thoroughly, and isolated with cotton rolls. The final restorations were tried in, proximal contacts were evaluated with waxed dental floss and radiographs were taken. Once the fit was verified, the esthetics and the occlusion were examined and patient's approval was obtained. the intaglio surfaces of the prostheses were washed with water, cleaned with a cleaning paste (Ivoclean, Ivoclar- Vivadent) for 20 seconds, rinsed and dried. All the restorations were cemented with resin-modified glass ionomer cement (Fuji Plus, GC Corporation) except for the mandibular right second molar endo crown which was adhesively bonded. For this purpose, the tooth was etched with 35% phosphoric acid (Ultra-etch, Ultradent) for 20 seconds and rinsed for 15 seconds, a ceramic primer was applied to the intaglio of the endocrown (Monobond Plus, Ivoclar-Vivadent), waited for 60 seconds, applied a universal resin cement (RelyX Unicem2, 3M), cleaned the excess

Figure 12: Mandibular right quadrant repeated final impression

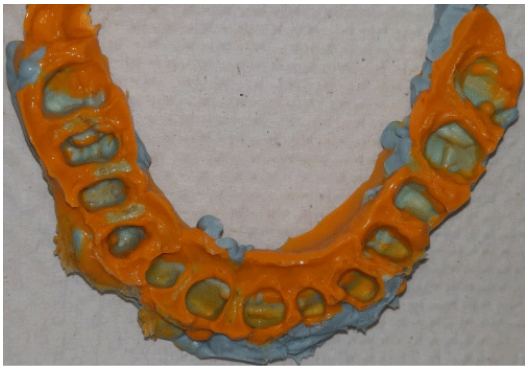

Figure 13: Interocclusal record maxillary side

Figure 14: Interocclusal record mandibular side

Figure 15: Postoperative smile

Figure 16: Postoperative retracted view in MIP

Figure 17: Postoperative retracted view in open position

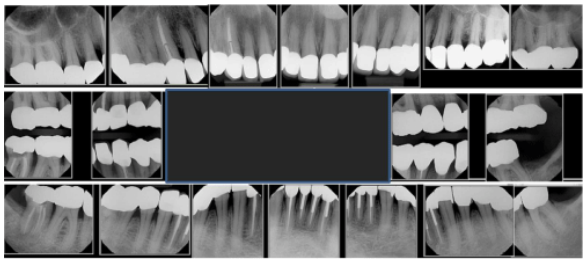

Figure 18: Postoperative full-mouth radiographs

cement after 30 seconds, and light cured it for 40 seconds. To verify the absence of any excess cement, additional radiographs were taken. (Figures 15-18).

Discussion

Glossary of Prosthodontic Terms defines centric relation as "a maxillomandibular relationship, independent of tooth contact, in which the condyles articulate in the anterior-superior position against the posterior slopes of the articular eminences; in this position, the mandible is restricted to a purely rotary movement; from this unstrained, physiologic, maxillomandibular relationship, the patient can make vertical, lateral or protrusive movements; it is a clinically useful, repeatable reference position" [7]. It is obvious that when the teeth are in their maximum intercuspal position (MIP), the registration material does not have adequate thickness and can be easily distorted. In addition, patients with worn down dentition may have developed occlusal interferences which could result in hit-and-slide type of intercuspation and hinder the correct maxillomandibular relationship [8].

Increasing the vertical dimension of occlusion to provide restorative space is a safe and predictable procedure [9,10]. However, any increase in the VDO must follow a complete extra- and intra-oral evaluations,

including assessment of the vertical dimension of rest (VDR) [11-13]. In the present case, the existence of more than 6 mm of interocclusal rest space was a clear demonstration of available space.

During the impression procedure, there was a need to remake the impression of the mandibular right posterior quadrant. This is completely acceptable and will not result in any complications, as the dental technician can pour the impressions, scan the segmental cast and merge it to the master cast digitally. This will avoid any "unreadable" finish lines and be much less time-consuming and annoying to the patient. Although intraoral scanners provide accurate images of the prepared teeth and are more comfortable for the patients, their efficiency for such full-mouth cases has not been proven [14].

It was decided to fabricate an endo-crown for the mandibular right second molar to take advantage of the pulp chamber for retention and resistance and to avoid more axial reduction and post and core fabrication. This type of restoration has shown a favorable short and long term success [15,16].

Conclusion

Loss of tooth structure can have several etiologic factors including dental caries, mechanical or chemical wear, and parafunction. Understanding the etiology before treatment planning is the key to successful short and long term rehabilitation. A clinical example was described with emphasis on maintenance of the remaining tooth structure.

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