Decision Process in Treatment of Reduced Periodontium: A Case Report

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The relationship between attachment loss and occlusal trauma has been debated for many years. When a patient presents with advanced periodontal disease, a decision has to be made on whether the teeth can be saved or extracted. In this treatment example, the decision process in therapeutic planning for a patient with stage IV periodontal disease is discussed. The main dilemma is whether the patient should receive a prosthodontic reconstruction supported by osseointegrated implants or by periodontally compromised natural teeth. It is assumed that implants do better than teeth over the long term based on firm documentation in the literature, but this article describes why a periodontal prosthesis is still a viable treatment option. Int J Periodontics Restorative Dent 2020;40:e197–e204. doi: 10.11607/prd.4585

Periodontal health is defined by the World Health Organization as a state free from inflammatory periodontal disease that allows an individual to function normally and avoid consequences (mental or physical) due to current or past disease. A practical definition of periodontal health is a state free from inflammatory periodontal disease. This, in turn, means that absence of inflammation associated with gingivitis or periodontitis is assessed clinically as a prerequisite for defining periodontal health.1 Labial flaring, extrusion, rotation, spacing, mobility, bone loss, exposed root surfaces, and drifting of the teeth are all related to periodontal support.2 These changes happen as the periodontal ligament is unable to stabilize the teeth against external forces placed upon them.3

According to the American Academy of Periodontology glossary of terms, primary occlusal trauma is defined as an injury resulting in tissue changes from excessive occlusal forces applied to a tooth or teeth with normal osseous and soft tissue support; secondary occlusal trauma is defined as an injury resulting in tissue changes from normal or excessive occlusal forces applied to a tooth or teeth with reduced support. Chronic trauma from occlusion is seen more frequently than acute trauma. This progresses from ongoing changes in occlusion produced

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by tooth wear, drifting movement, and extrusion of teeth, combined with parafunctional habits such as bruxism and clenching.\(^4\)

The relationship between attachment loss and occlusal trauma has been debated for many years. It has been understood that trauma by itself does not cause attachment loss. However, trauma in conjunction with biofilm-induced inflammatory disease does seem to play a role in attachment loss. In the past, occlusion has been described as a co-destructive local factor.\(^5\) It has been discussed that occlusal stresses can evoke a biochemical response that initiates a cascade of biologic and pharmacologic events that contribute to attachment loss.\(^6,7\)

In order to treat these patients effectively, both the periodontal disease and the occlusion need to be treated. Periodontal prostheses are defined as those restorative and prosthetic endeavors that are absolutely essential in the treatment of advanced periodontal disease.\(^8\)

When a patient presents with secondary occlusal trauma associated with migration of teeth, a decision has to be made whether the teeth can be saved or extracted. Two main treatment options can be presented to a patient with stage IV, grade B periodontitis: treatment with an implant-supported prosthesis or a restoration utilizing only the teeth. In this case report, a patient is shown with a reduced periodontium and a diagnosis of stage IV, grade B periodontitis, and the decision-making process on how to treat this patient with advanced periodontal disease is demonstrated.

### Patient Therapy Report

A 55-year-old man presented (Fig 1a) with a chief complaint of needing to “get [his] teeth fixed” and regular dislocation of temporary restorations. The patient’s medical history was positive for arthritis, and he had no drug allergies. His initial dental examination revealed 6- to 7-mm probing depths in the maxillary right sextant, and probing depths ranging from 3 to 5 mm in the maxillary anterior and left posterior sextants. The attachment loss was 4 to 9 mm, 2 to 5 mm, and 4 to 8 mm in the maxillary right, anterior, and left sextants, respectively. The patient appeared to have Grade II furcation on tooth 17 (FDI system) and Grade I furcation on teeth 16 and 26. The patient presented with Grade II mobility on teeth 14, 15, 24, and 25, and Grade I mobility on all other maxillary teeth. The mandibular segment was more stable, with probing depths ranging from 3 to 5 mm and isolated Grade I mobility. The patient had a history of orthodontic treatment as an adolescent. The patient presented with a Class III molar relation and fremitus on teeth 11 to 13 and 21 to 23 in maximum intercuspation; there was also fremitus on tooth 15 in the right lateral excursion. When checked with a shim stock occlusion foil (Henry Schein), the patient only had occlusion on the right side, and the shim stock could be pulled out on the left side without any resistance. The initial thought was that the anterior provisional restorations might have heavier contacts, preventing posterior tooth contact. However, there was no contact on the left side, even without the anterior provisional restorations.

Further evaluating the patient’s clinical findings, he presented with moderate to severe attachment loss in the maxilla and mild to moderate attachment loss in the mandible. He also experienced inadequate posterior support, infrabony defects in the maxilla, recession, and fremitus associated with secondary occlusal trauma. The patient had shortened roots subsequent to orthodontic treatment as well as bone loss, giving him a reduced periodontium. Thus, he was given the diagnosis of stage IV, grade B periodontitis. The full-mouth radiographs are shown in Fig 1b.

When treating a patient with advanced periodontal disease, a decision should be made on whether the treatment will involve only teeth, a combination of teeth and implants, or just implants. In the present situation, the authors believed that the mobility was present due to inadequate posterior support. Thus, it was the clinical impression that once the patient received posterior support, the mobility would be reduced.

Diagnostic impressions were made and articulated. A diagnostic wax-up of the maxillary arch was based on the decided incisal edge position. A full-arch provisional shell was created using Jet Tooth Shade acrylic (Lang Dental Manufacturing). The maxillary teeth were prepared for complete-coverage crowns. Caries were found in the mesial furcations of teeth 16 and 26. A mesiobuccal root resection was required for tooth 16. On tooth 26,
Barreling of the mesial furcation was performed, which eradicated the horizontal component of the furcation as well as the caries. After initial tooth preparation was completed, the one-piece provisional shell was relined using Jet Tooth Shade. Once the patient received the provisional restoration, he was referred to the periodontal department. Scaling and root planing were performed, followed by resective osseous surgery for the purpose of pocket reduction. The patient received the provisionals prior to periodontal treatment to enhance the smile and control mobility. Teeth 12 and 14 were extracted as they were nonrestorable.

The patient wore the splinted provisional restorations for approximately 1 year, which included 6 months postperiodontal surgery. It was anticipated that the anterior mobility would be reduced because the patient received posterior support, and that the patient would receive two three-unit fixed partial denture prostheses (FPDPs) while the remaining teeth would receive single crowns. However, there was no improvement in the mobility, despite the patient appearing to be periodontally and occlusally stable. At this point, the decision had to be made whether to extract the teeth with Grade II mobility and replace them with implants, or to construct a periodontal prosthesis. It was decided that the patient would benefit from maintaining the remaining teeth and bone, and it was decided to restore them with a periodontal prosthesis.

Final tooth preparations were performed, establishing a single path of draw (Fig 2a). A double cord technique was used, and the final impression was made using heavy- and light-body Impregum impression material (3M ESPE) in a custom tray. Two separate impressions were made for the left and right sides (Fig 2b). The impressions were poured with ResinRock die stone (Whip Mix) and were articulated on a semi-adjustable articulator (Model 2240, Whip Mix). The lab created individual castings (Fig 2c), which were tried in the patient’s mouth, confirming the individual fit using Fit Checker (GC America). The metal copings were then joined together using...
Pattern Resin (GC America) and immediately invested for soldering. The metal frame (Fig 2d) was tried in the patient’s mouth. The vertical dimension was maintained throughout the process, as determined by the provisional restorations. The framework was then picked up with heavy-body Impregum in a custom tray (Fig 2e). A master stone model was constructed and articulated. Porcelain was applied to the frame, and a bisque try-in was done, which included adjusting the occlusion and checking the distal contacts.

Figs 2a to 2f  (a) Tooth preparations. (b) Impressions of the right and left sides, respectively, made with polyether. (c) Try-in of the castings. (d) Metal framework. (e) Pick-up impression. (f) Bisque try-in.
(Fig 2f). Once the occlusion and contacts were confirmed, the prosthesis received ceramic characterization and glazing (Fig 2g).

The prosthesis was delivered for 1 week without any cement with the hypothesis that micromovements of the abutment teeth would induce more accurate seating. The prosthesis was then delivered with Temp-Bond (Kerr) and Vaseline for 4 weeks. No cement washout was observed, so the prosthesis was then delivered with Zinc Phosphate Cement (Henry Schein; Fig 2h). Postdelivery radiographs confirmed both the fit and cement removal (Fig 2i). The patient received a hard occlusal guard with canine guidance to protect the restoration. It must be noted that in the long term, problems like recurrent caries, endodontic issues, and fractured porcelain can sometimes occur. If telescopic copings are used, a less-permanent cement can be used, which will aid in longer maintenance of the maintaining the prosthesis.

The patient was seen every 3 months for periodontal maintenance, and the clinical and radiographic views at the 2-year follow-up are shown in Fig 3. The bone levels appear to remain stable, and the patient is happy with the restoration.

Discussion

When treating a periodontally susceptible patient, the question arises as to whether the patient should be treated with dental implants or simply using the existing teeth for the periodontal and restorative treatment. In the United States, approximately 47% of the population suffers from periodontitis. When looking at peri-implant diseases, the literature varies, reporting that 28% to 56% of patients suffer from peri-implantitis. Derks et al found the incidence of peri-implantitis to be 45% over a 9-year period. This number is close to the number of patients suffering from periodontitis. Recent systematic reviews have shown that implants placed in periodontitis-susceptible patients have increased chances of biologic complications like peri-implantitis and have lower success and survival rates than those placed in periodontally healthy patients. Additionally, there is currently no strong evidence to suggest the most effective treatment for peri-
implantitis. Contrarily, a long-term report shows that implants are successful in periodontitis-susceptible patients, even after 32 years. However, that report is on an individual patient.

Extracting teeth and replacing them with implants is a very frequently performed procedure to manage periodontally compromised dentition. Dentists assume that implants will do better than the patient’s dentition, notwithstanding that the literature shows that periodontitis-susceptible patients are at an increased risk to develop peri-implantitis. When planning the treatment for a periodontally compromised patient, the main goal should focus on maintaining the teeth through periodontal treatment, thus delaying the placement of dental implants.

The extraction of periodontally compromised teeth does not eliminate the underlying host response nor the patient’s susceptibility to peri-implantitis. Even treated but still periodontally compromised teeth have survival rates of around 90% in well-maintained patients. In addition, cross-arch FDPDs on teeth with significantly reduced periodontal support seem to function equally as well as implant-supported reconstructions. It has been shown that utilizing teeth to support the prosthesis at an earlier age can be beneficial in predictably preserving bone for the patient, allowing implants to be utilized in the future, at a time when the patient’s teeth may not be salvageable.

The potential for technical complications is another aspect that needs to be considered. Two common FDPD complications are prosthesis fracture and loss of retention. These were found to be very rare occurrences with a periodontal prosthesis, as the periodontal disease patient presented with long clinical crowns for tooth preparation, providing adequate length for retention and resistance form. Similarly, because of the long crowns, there were adequate metal dimensions in the framework to provide good connector height, which in turn helps prevent flexure and fracture of the prosthesis. When comparing the incidence of technical complications, it was an incidence rate of 39% for implant-supported reconstructions as opposed to 16% for tooth-supported reconstructions after 5 years.

When considering the long-term outcomes of cross-arch sta-
bilibizing FPDPs, the literature has shown that the estimated survival rate is around 98% at 10 years.²¹ When looking at a systematic review of the same, the success rate was above 90%.²² Previously, root resection and hemisection were routinely used procedures. However, with the advent of implants, these procedures are seldom used today, owing to the fact that implant placement is considered a better option.²³ Root resection and hemisection procedures are done because the morphology of the defect provides an environment for bacterial growth and limits self-performed and professional plaque control.²⁴ A systematic review concluded that high survival rates are achieved with root resection and hemisection, making them a dependable option for treatment of furcated molars that often are considered for extraction and implant placement.²⁵

A question now arises: If a periodontal prosthesis and all its principles work well, why is it not considered the treatment of choice for the periodontally involved dentition? The answer is that it is assumed that implants would resolve the situation better than treating periodontally involved teeth. However, the literature shows that this is not true. Certainly, the periodontal prosthesis patients present a greater challenge, starting with diagnosis and treatment planning, tooth preparation, impressions, and the fitting of the fixed prosthesis, which requires a highly skilled clinician. These cases need a team of specialists who are trained to handle such cases. Also, the laboratory fee is very high because noble or high noble metals are often used, and it is difficult to find laboratories that know how to make the appropriate restoration. Lastly, the process is very time consuming, and patients want to receive their new, fixed teeth faster than previous decades, making hybrid restorations a popular treatment option compared to periodontal prostheses. In addition, the All-on-Four treatment protocol has shown a high success rate.²⁶ However, the major question remains: At what point in a patient’s life do we use up “end stage procedures”?

**Conclusions**

It must be kept in mind that implants are not better than teeth. When a patient has periodontally involved teeth, even though they may be extracted, the underlying host response is not eliminated. One consideration from the 2008 Scandinavian Consensus Conference is that “the survival rates of teeth in periodontal well-maintained patients are in general higher than that of implants.”²⁷ Because there are clinical centers with 30 or more years of long-term implant success with unpublished data, additional data-gathering in the future may reveal higher success rates with well-placed implants over periodontally compromised teeth. An economic consideration of patients with repetitive/revision treatment to transition from a periodontal prosthesis to an implant-supported prosthesis is also an important factor to consider for long-term treatment planning and continued long-term implant success.

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**References**