

Resolving Periodontal Disease Through Photodisinfection Therapy: A Case Report

By Mabel Lo, RDH

Introduction

Traditional periodontal disease treatment has consisted of scaling and root planing (SRP) procedure, supplemented by local or systemic antibiotics. Mechanical debridement is able to lower the bacterial load subgingivally.

Although antibiotic therapy appears to target some subgingival species of bacteria found in diseased pockets, total elimination of these pathogenic bacteria is rarely achieved. The lowered number of pathogens still provides a significant risk for disease occurrence, with infrequent home care also contributing to disease progression¹.

Photodisinfection is a novel therapy that combines a photosensitizing solution (dye) with a specific wavelength of 670 nm in the presence of oxygen to kill gram-negative pathogenic bacteria subgingivally. Photodisinfection presents a viable adjunctive therapy to scaling and root planing as it kills a broad range of micro-organisms such as bacteria, fungi, viruses and protozoa with no danger of building antibiotic resistance.

Furthermore, photodisinfection has been shown to be effective in eradicating pathogenic bacteria such as *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* without creating a bacterial imbalance, as gram-positive bacteria are less susceptible². Supplementing SRP with antibiotic or photodisinfection therapies could be an effective way to treat chronic periodontal disease by targeting periodontal infections and eradicating pathogenic bacteria subgingivally.

Case Report

A 49-year old Caucasian female was referred to the dentist via an Internet search on adjunctive therapies for periodontal disease. She was in good health and a non-smoker with no known allergies. Her main concern was mobility in her maxillary left second molar (27) and 32B suppuration. She was very motivated to try and keep her natural teeth intact.

Clinical evaluation consisted of a radiographic examination, full-mouth periodontal probing and microbiological risk assessment. Heavy tissue hemorrhage was noted during probing, and all maxillary teeth had slight mobility. The maxillary left second molar had a definite class 1 mobility with probing depths of 7-10 mm.

Additionally, bleeding on probing (BOP) was noted from all six points. The mandibular left lateral incisor (32) also had class 1 mobility, and the gingival tissue showed edema and erythema with suppuration. Periodontal assessment revealed all posterior pocket depths ranged from 5-10 mm with BOP, and no furcation involvements were noted. Stain and calculus were present throughout the dentition. Microbiological risk assessment revealed a high count of white blood cells, indicating the presence of a severe infection. Additionally, organized

spirochetes too numerous to count were observed, indicating the likely presence of Aa (*Actinobacillus actinomycetemcomitans*). A few amoebae were found, also indicating the presence of a severe infection.



Emerging technology: The Periowave™ Photodynamic Disinfection technology combines a cold diode laser with advanced photosensitizers to destroy bacteria and inactivate virulence factors.



Fig 1.1: Tooth #32B reduced to 2 mm pocket depth at six weeks post SRP and first PW tx.

Recommended initial treatment consisted of SRP with local anaesthetic in conjunction with photodisinfection treatment using the Periowave system, as well as systemic antibiotic therapy. Immediately following the complete examination, ultrasonic and hand scaling were performed on the mandibular teeth, followed by photodisinfection using the Periowave system.

Due to the presence of protozoans and very high counts of organized spirochetes, one course of Clindamycin was prescribed for 10 days in order to protect the patient's systemic health. The patient returned the following day to have SRP completed on the maxillary teeth, followed by a photodisinfection treatment with the Periowave system. Pre-examination revealed that the severe infection around 32B was visibly reduced after one day. Oral hygiene instruction (OHI) was performed, and the patient was instructed in the Modified Bass brushing technique and recommended the use of dental floss and a stimulator for daily subgingival cleanings.

Six weeks later the patient returned for periodontal reassessment. Full-mouth probing was performed, which detected no mobility on 27, and pocket depths had reduced significantly from 7-10 mm to 4-5 mm. No mobility was found on the rest of the maxillary teeth. 32B had reduced from 8 mm with BOP to 2 mm with no BOP. All pocket depths previously over 5 mm had improved by 1-5 mm with no BOP present.

Microbiological risk assessment was performed and showed that no spirochetes or

amoebae were present. However, since stain and calculus were present on the lingual mandibular anteriors in addition to interproximal gingival soft and granular deposits on all posteriors, ultrasonic and hand scaling were performed. This was followed with a photodisinfection retreatment on all remaining areas with pocket depths greater than 4 mm. OHI was reviewed with the patient.

At the next six-week reassessment, the patient was given a full-mouth periodontal charting. Overall, pocket depths seemed to have stabilized, with no pocket depths higher than 5 mm found. Bacterial reassessment showed no presence of spirochetes or amoebae. Ultrasonic and hand scaler debridement were performed, as interproximal soft and granular deposits were present. Photodisinfection treatment was then administered to all 5 mm pockets. OHI was reinforced, and patient was put on a three-month recall.

Discussion

Although the outcomes of the periodontal therapeutic protocol were successful, the patient wasn't compliant with the recommended home care. Tooth brushing had improved but interproximal and subgingival cleaning was still not acceptable, even when OHI was reinforced at each reassessment appointment.

Because each patient's immune system and home care compliance are different, it is difficult to predict how many recurring sessions of photodisinfection each patient will need. Therefore, each reassessment appointment should include a microbiological risk assessment and periodontal probing to determine if photodisinfection treatment is needed at that time.

In this particular case one course of systemic antibiotics was initially prescribed due to the severity of the infection, as was indicated by very high counts of spirochetes and presence of protozoans. The adjunctive use of photodisinfection appears to have been instrumental in reducing and stabilizing pocket depths with each treatment. In patients not exhibiting severe infections, use of the Periowave system following SRP should be sufficient to achieve resolution.

Finally, it is also important that the patient maintain good oral home care between treatments in order to optimize health outcomes. RPN

References

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- 2 Konopka K., Goslinski T. Photodynamic Therapy in Dentistry. *J Dent Res*; 86(8):694-707, 2007.

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