Impact of Home and Professional Care on Laser-Assisted Management of Peri-implant Complications: A Case Report

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This case report emphasizes how home and professional care can impact clinical outcomes following nonsurgical mechanical therapy with the adjunctive use of a diode laser to treat failing implants. Localized severe peri-implant disease was diagnosed in a patient who was susceptible to periodontal disease, not compliant, and did not accept the surgical approach. A cause-related, diode laser–assisted, nonsurgical treatment was therefore implemented, according to a dedicated protocol, in four closely scheduled appointments. The patient’s oral hygiene skills became extremely effective. She then adhered to a bimonthly maintenance protocol in the first follow-up year and quarterly in the subsequent year. Bone remineralization was detected on comparative periapical radiographs 2 years after the diagnosis of peri-implantitis. At the 2-year observation, the patient’s high standard of home care and dedicated maintenance arrested the progression of peri-implantitis and yielded clinical and radiographic improvements following nonsurgical mechanical therapy with adjunctive repeated application of a diode laser. Int J Periodontics Restorative Dent 2021;41:819–825. doi: 10.11607/prd.5009

The nonsurgical treatment of peri-implantitis complications has proven to be quite successful in cases of mucositis. Cases of progressive and irreversible bone loss should receive this treatment as a first therapeutic phase. Peri-implant disease can be complicated by concomitant systemic pathologies, economic difficulties, and/or other problems, making a nonsurgical approach the only possible one. This case report offers insight on how proper home and professional care can affect clinical outcomes, especially for patients who are physically and mentally incapable of enduring conventional surgical therapy.

Current evidence shows that laser therapy provides a minimal benefit in the treatment of peri-implant diseases. Histologic evaluation and human histology supports evidence that limited regeneration can be achieved with the laser-assisted new attachment procedure (LANAP) surgical protocol in periodontally compromised conditions. No evidence is available on the efficacy of treating peri-implant disease with the conventional LANAP technique and the diode laser, initially employed in the surgical mode, as it has not been tested to manage peri-implant complications.

The main purpose of the present study is to assess how, in the same clinical case, the patient’s...
home performance and the adherence to a correct periodic recall program can affect both the inflammatory conditions and clinical stability to both worsen and recover. The present case report also analyzes the effectiveness of implant surface decontamination with diode-assisted treatment and evaluates the clinical outcomes of nonsurgical management of failing implants.

Case Report

Two implants were placed in 2008, replacing the maxillary left first and second molars in a 52-year-old woman, and the prosthesis finalization was provided by a prosthodontist (Fig 1). The patient was susceptible to inflammatory periodontal disease, and quarterly recall appointments were established. As long as the patient closely adhered to the tailored maintenance program, clinical and radiographic stability were maintained (Fig 1). Then, despite repeated phone reminders, the patient started to show a lack of compliance. Radiographic signs of peri-implant bone loss were noticed for the first time at the 10th year of follow-up (Fig 2). The patient failed to return for maintenance for a period of 1 year. Severe, localized peri-implantitis was diagnosed clinically (Fig 3a) and radiographically (Fig 3b) at the 11-year follow-up appointment. Compared to the radiograph taken at the 10-year follow-up, diffuse radiolucency (distally and mesially) at the implant replacing the first molar indicated a progressive loss of peri-implant bone support (Fig 3b). The adjacent second premolar was determined vital at pulpal test.

Therapeutic Option

A diagnosis of severe peri-implant disease was determined for the 63-year-old woman, who had a history of inflammatory periodontal disease, and supported surgical regeneration treatment following initial nonsurgical preparation. The patient rejected the surgical treatment plan, claiming psychologic...
motivations and surgical anxiety together with financial considerations, so the only option was the nonsurgical one. Periodontally compromised teeth had previously been well maintained with nonsurgical laser-assisted treatment, and she developed great confidence in such an approach. It was thoroughly explained to the patient that the therapeutic goal would be limited to simply prolonging the case survival. The patient accepted this premise.

The screw-retained implant-supported prosthesis (Fig 4) was removed, obtaining better access to mechanical and manual instrumentation. Every effort was made to decontaminate and detoxify the exposed implant threads.

**Treatment Protocol**

The patient’s standard of home care skills were assessed. Oral hygiene reinstruction was always reinforced, emphasizing the importance of closely adhering to the personalized maintenance program at each appointment.

Cause-related, laser-assisted, nonsurgical treatment was therefore implemented, using a diode laser before and after conventional periodontal instrumentation. This was accomplished in four appointments (the first appointment took 90 minutes, the following two appointments took ~20 minutes, and the fourth appointment took 1 hour). Such treatment protocol follows the diagnosis of mucositis or peri-implantitis. The second appointment was planned for the day after the first appointment but it could be arranged within 7 days of the first appointment. The third appointment was scheduled 1 month after the second, and the fourth appointment was scheduled 3 months later (4 months after the diagnosis of peri-implantitis). Considering the severity of the complications, a bimonthly recall appointment frequency was maintained for the following year.

**Materials and Methods**

In the first visit, the surgical treatment was performed without elevating a surgical flap after removal of the implant-supported screw-retained prosthesis (Fig 4). Local anesthesia was administered. Three different modes were used for the diode laser, in the following order: surgical, nonsurgical, and biostimulation.

The laser was initially employed in the surgical mode (940-µm diode laser; Epic, Biolase), aiming at widening the peri-implant pocket. Prior to surgical use, the diode insert must be photo-activated using a dark-colored card. This burns the polyamide coating of the optic fiber, so the diode laser can cut the gingival tissue, as a surgical blade (Fig 5).

The thin, pre-initiated optic fiber (E3-9, 300 µm, for Epic diode
laser) was inserted subgingivally, moving with a sweeping L motion to remove the diseased inner pocket epithelium and the diseased granulation tissue from the gingival margin to the base of the pocket, then moved laterally and apically (gingivectomy settings: 1.0 W, Peak Power 5.0 W, Mode* CP0, on for 10 microseconds, off for 40 microseconds) (Fig 5). This obtained better access to the next phase of decontamination and detoxification. Subsequently, the same diode laser was used in the nonsurgical mode (settings: 940 nm, 0.8 W, 500 Hz, 10 microseconds) with a different, non-initiated (300 µm) optical fiber (E3-9, thick) and applied three times for 30 seconds (total of 90 seconds per appointment) before and after nonsurgical periodontal instrumentation to enhance decontamination/detoxification of exposed implant threads.

The implant surfaces were then debrided using titanium-coated stainless steel curettes (Universal Curette, Ena Oral Care, Micerium) and ultrasonic devices with implant cleaning tips (IC1, Combi, Mectron). The laser decontamination procedure occurred by systematically moving the laser tip along the subgingival implant surface in a vertical and horizontal scanning way. Peri-implant pockets were rinsed with a hydrogen peroxide solution (3% BP, 10 vols) and antiseptic gel solution before and after using the laser (Hobagel, Hobama). Blood clot formation was enhanced by applying pressure for 6 minutes using gauze soaked in a volume of 3%/10 volume hydrogen peroxide (Fig 6).

Finally, the diode laser was also used in the photo-biostimulation mode, utilizing the handpiece without disposable tips (Fig 7) and with different parameters (0.5 W, 10 J/cm², CW, for 2 minutes).

The entire treatment procedure, including mechanical debridement, was performed at days 0 (baseline), 1, and 30 and at 4 months. No adjunctive antiseptics or systemic antibiotics were prescribed. The patient was given the following postoperative instructions: to only brush the coronal tooth surfaces for the first 2 weeks, to protect against dislodging the fibrin clot and the 0.12% chlorhexidine–soaked gauze (Digital Brush, Ena Oral Care, Micerium), and to brush using a rolling movement twice a day. The patient adhered to a bimonthly maintenance schedule in the first follow-up year and quarterly in the subsequent year. Delicate probing was performed (Fig 8) for the first 9 months. Reevaluation periodontal charting was recorded at 1 and 2 years posttreatment, combined with radiographic examination. Laser-assisted periodontal instrumentation was repeated once a year during the follow-up period. At each recall appointment, the diode laser was used for antimicrobial...
photo-biostimulation with proper parameters for a total of 3 minutes (Fig 7). The defocused beam, at low power, is absorbed by the tissue (Fig 7), stimulating metabolic and healing processes due to the photochemical effects of the laser. Additional home care reinforcement was provided at each visit.

Results

This case currently has an uneventful 2-year follow-up (Fig 9). A significant recession was present at 3 months (Fig 8). The peri-implant probing values decreased from 10 mm (Figs 3 and 4) to 4 mm (Fig 9a). The radiographic analysis indicates a marked increase in peri-implant bone mineralization (Fig 9b) compared to the radiograph taken at the time of peri-implant diagnosis (Fig 3b).

Discussion

The patient rejected the surgical treatment option indicated for a case of severe peri-implant disease. Thus, the only possible treatment method was the nonsurgical approach. Conventional nonsurgical treatment procedures of peri-implantitis, with or without adjunctive measures, yield limited clinical improvements and have showed uncertain predictability.

Laser therapy in combination with surgical/nonsurgical therapy provided minimal benefit in reducing probing depth, gaining clinical attachment level, decreasing the amount of recession, and reducing the Plaque Index in the treatment of peri-implant diseases. When this method is used as an adjunct to nonsurgical laser-assisted therapy, it might result in a greater reduction in bleeding on probing in the short term. However, current evidence allows for analysis of only Er:YAG, CO₂, and diode lasers, but in advanced cases, complete resolution of the disease is unlikely.

A cause-related, nonsurgical treatment protocol was implemented with the adjunctive use of a diode laser before and after conventional periodontal instrumentation in closely scheduled appointments. The diode laser has been used in three different modalities and in the following order: surgical, nonsurgical, and in biostimulation mode. The laser was initially employed in the surgical mode (Fig 5) to remove inflamed tissue from the inner wall of the peri-implant pocket and thus gain better access to nonsurgical instrumentation. The surgical laser mode is similar to the early stages of the LANAP technique, introduced for the first time in 1990, involving an Nd:YAG laser (1,064 nm) for the treatment of periodontally compromised teeth, as reported in a recent literature review.

The diode laser was subsequently used in the nonsurgical mode as an adjunctive tool, with the aim of improving the effectiveness of nonsurgical decontamination with conventional instruments. While the clinical science of managing peri-implant diseases is progressing, current evidence shows minimal benefit following laser-assisted surgical/nonsurgical therapy in the treatment...
of peri-implant diseases. However, following the LANAP surgical protocol, histologic evaluations and human histologies provide evidence that regeneration can be achieved in periodontally compromised conditions. No evidence is available regarding the use of the LANAP technique in the presence of peri-implant disease.

No articles have been released using a diode laser initially in the surgical mode, photo-activated, in order to remove the inner epithelium of the peri-implant pocket and to facilitate subgingival access (Fig 5). The same diode laser can then be used in a nonsurgical mode to assist the mechanical and chemical decontamination phase for its bactericidal and detoxifying action.

The current clinical result is satisfactory for the patient, who realized the importance of strictly adhering to the recommended follow-up schedule, bimonthly in the first follow-up year and quarterly thereafter.

Failure to comply with the recommended periodicity seems to have been a most significant factor in progressive loss of peri-implant support bone. In the present case, the acute episode was treated with an effective etiologic therapy combined with nonsurgical mechanical therapy and adjunctive repeated application of a diode laser, successfully arrested the progression of peri-implantitis and yielded significant clinical improvements and bone remineralization at the 2-year observation. The clinical outcomes of this case report might be relevant in managing patients who are physically and mentally incapable of enduring conventional surgical therapy. Proper oral hygiene, improved peri-implant tissues, and regular follow-ups were crucial factors for the 2-year stability of the treatment outcomes.

**Conclusions**

The patient’s high standard of home care and dedicated maintenance, combined with nonsurgical mechanical therapy and adjunctive repeated application of a diode laser, successfully arrested the progression of peri-implantitis and yielded significant clinical improvements and bone remineralization at the 2-year observation. The clinical outcomes of this case report might be relevant in managing patients who are physically and mentally incapable of enduring conventional surgical therapy. Proper oral hygiene, improved peri-implant tissues, and regular follow-ups were crucial factors for the 2-year stability of the treatment outcomes.

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**References**


