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CASE REPORT: Restoring a Fixed-bridge Abutment with Advanced Endo/Perio Bone Destruction using TwinLight® Periodontal and PIPS® Endodontic Treatment

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I. INTRODUCTION

When treating periodontitis, mechanical debridement, i.e., scaling and root planning, has been found to be lacking since it does not result in complete healing, especially in severe periodontitis patients. For this reason, and also because of their better access to deep pockets, furcations, and grooves, dental lasers have been introduced for periodontal therapy. Among the different types of lasers that have been studied, the highly absorbed Er:YAG laser wavelength [1-7] and the deeply penetrating Nd:YAG laser wavelength [8-12] are of highest interest due to their unique wavelength penetration characteristics and extensive published research.

Following the published positive effects of laser therapies using either the Nd:YAG or Er:YAG lasers individually, the next step has been to develop a combined "Twinlight" Er:YAG and Nd:YAG laser periodontal treatment [13 -21].

The TwinLight® periodontal treatment, which was developed uniquely for the LightWalker® combined Er:YAG/Nd:YAG laser system (manufactured by Fotona d.o.o.), consists of three steps described elsewhere [21]. The first step consists of de-epithelialization and decontamination with the Nd:YAG laser. During the second step, calculus removal (debriding refinishing) is performed adjunct to mechanical scaling using the Er:YAG laser. And during the third step, clot formation is achieved using the Nd:YAG laser.

Periodontal tissue regeneration has been demonstrated to be promoted either when the Nd:YAG laser or Er:YAG laser is being used individually as an adjunct to mechanical therapy [11, 22-26]. The same or presumably even better result is expected when both laser therapies are performed in combination using the TwinLight® protocol. My clinical experience confirms this conclusion: bone regeneration is observed as one of the positive outcomes of the TwinLight® treatment. This is in agreement with a recently published 5 year prospective study report [21].

In this paper I report on one of my more difficult cases in which the periodontal TwinLight® laser treatment was additionally combined in tandem with the endodontic PIPS® laser treatment [27], both exclusively available with the LightWalker dental laser. Radiographs taken before and 3-years post-op demonstrate significant bone regeneration.

II. CASE

The laser device used in this case was an Er:YAG/Nd:YAG dental laser LightWalker® (manufactured by Fotona d.o.o.).

A 72-year-old male in otherwise good health presented with an endo/perio lesion of the mandibular left second molar (Fig. 1). The tooth was the distal abutment of a four-unit fixed partial denture. The patient's chief complaint was soreness to chewing pressure and a chronic dull ache on the left side of his jaw. He had recently seen his family dentist and an endodontist, both of whom had advised him the tooth was hopeless.

Fig. 1: Radiograph of the tooth before the treatment.

Surprisingly, the tooth and fixed bridge exhibited no mobility, a fact that is of paramount importance in restoring teeth of questionable periodontal status.

After explaining the potential for failure to the patient, the following course of action was followed:

1. After accessing the pulp chamber, a Tulsa Dental orifice opener was used very gently with EDTA as a lubricant due to the potential for creating mobility in the abutment. Only 4-5 mm was opened into three canals.

2. Once the canals were opened, EDTA was used once more using the LightWalker with the PIPS® protocol for 30 seconds to open the narrow canal as much as possible to the apex.

3. Canal lengths were determined with #8 and #10 Safesider files.

4. Still using EDTA as a lubricant, shaping/ debridement was started with a Dentsply/Tulsa Dental S-1 rotary instrument, and then proceeded with S-2 and F-1 instruments in the series. Note: in most cases, NaOCl would have been used with these instruments, but in this case with a high risk for creating mobility due to the weakened periodontium, EDTA was considered to be the better lubricant.

5. Once rotary instrumentation was finished through the F-1 file, the standard PIPS protocol was completed, that is NaOCl PIPS-ed for 30 sec, three times (each time allowed to stay in the canal for an additional 30 seconds before removal with a microvacuum tube). After NaOCl, EDTA was PIPS-ed one additional time, followed by 30 seconds of sterile H_2O PIPS-ed for 30 sec.

6. At this point attempts to dry the mesial canals with paper points were unsuccessful. It was assumed this was due to the periodontal pocket, so rather than continue attempts to complete the endodontic treatment, the attention was turned to the perio defect.

7. Following the prescribed LightWalker TwinLight® periodontal protocol [21], the Nd:YAG laser was first used to strip the diseased epithelium, followed by Er:YAG, ultrasonic scaler, and perforation of the bone at the base of the defect to create bleeding. Due to the width of the defect, it was decided to condense some freeze-dried demineralized bone into the intra-bony pocket in hopes of creating a matrix for new bone growth. Once the demineralized bone was placed, the Nd:YAG laser was used once more to create a fibrin clot and the gingival crevasse was sealed with Periacryl. Note: Since a graft material was placed into the bony defect the Nd:YAG fiber was not inserted to the depth of the defect. Rather than chancing damage to the graft, the fiber was placed only 3-4 mm into the pocket.

8. After the periodontal treatment was completed, the endodontic treatment portion of the case was addressed again. This time it was possible to dry the canals.

9. Obturation was accomplished by painting the canal walls with Brassler BC Sealer and injecting warmed gutta-percha, which was then condensed with a Dovgan condenser. No master cone was used.

10. Bio-stimulation was performed with the Nd:YAG laser for 45 sec. on buccal and lingual.

The radiographs below are immediate post-op and from the 3-year recall exam.

Fig. 2: The radiographs from immediate post-op (above) and from the 3-year recall exam (below). Bone regeneration can be clearly seen.

III. CONCLUSIONS

It is the author's contention that the success of this case can be attributed largely to the gentle nature of the TwinLight® and PIPS® treatments available in tandem with the Fotona LightWalker® laser. Traditional root-canal treatments and periodontal surgery both create a great deal of mechanical stress on the periodontium as endodontic instruments engage dentin within the canals, and scalers and ultrasonic instruments debride and root plane the diseased cementum. Laser energy

does not create mechanical stress, and its bactericidal nature as it works within the canals and on the perio defect is an additional bonus.

Finally, the radiographs taken before and 3-years post-op demonstrate significant bone regeneration following the combined TwinLight® laser periodontal treatment.

ABOUT THE AUTHOR. Dr. Steven Abernathy practices in Jonesboro, Arkansas. He graduated from the University of Tennessee College of Dentistry in 1979. He serves on the board of directors for the Horizon Dental Institute, and has been using various lasers in his dental practices since the mid-1990s.

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