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Er:YAG laser-assisted comprehensive periodontal pocket therapy (Er-LCPT) under microscope in a severe periodontitis with type 2 diabetes mellitus patient: A case report

Periodontitis is mainly caused by dental plaque biofilm, resulting in periodontal deep pocket and bone destruction, while diabetes mellitus (DM) is a major worldwide health burden and individuals with uncontrolled DM are more susceptible to periodontal destruction and basically are not suitable for periodontal surgery therapy.¹ Recently, the application of Er:YAG lasers has increased in periodontal therapy.^{2,3} Especially, a novel pocket therapy using Er:YAG laser in combination with conventional mechanical scaling and root planing treatment [the so called Er:YAG laser-assisted comprehensive periodontal pocket therapy (Er-LCPT)], was developed by Aoki^{4,5} et al.). In this case report, we evaluated the safety and effectiveness of the Er-LCPT in a type II diabetes mellitus patient with severe periodontitis teeth.

A 51-year-old female with a type II diabetes mellitus complained of uncomfortable and mobility at tooth 12, and she was referred from a local dental clinic. The patient had already received conventional scaling and root planing at the local dental clinic 3 months ago, and the previous doctor suggested extract the teeth and then perform dental implant surgery because it is very difficult to save the tooth. However, the patient rejected extraction of the teeth, and she was very scared at the conventional open flap surgery, thus the patient came to our hospital and asked other flapless treatment for this severe periodontitis tooth. After discussion, we decided to perform Er:YAG laser-assisted comprehensive periodontal pocket therapy (Er-LCPT) under microscope and the informed consent was obtained. Before Er-LCPT treatment, the upper right lateral incisor showed residual periodontal pocket (PD) 9 mm [clinical attachment level (CAL), 12 mm] with bleeding on probing (BOP)

(Fig. 1A), the periodontal pocket of the tooth was treated by Er:YAG laser (Litetouch™, Light Instruments Ltd, Yokneam Illite, Israel), a straight sapphire tip with a 400 μm diameter was inserted into the periodontal pocket to remove the inflamed connective tissue on the inner gingival surface and the bone surface under water spray, then thoroughly debrided by mini curette and laser under microscope (Fig. 1B). Then, the outer epithelium was removed and coagulation of the blood clot in the pocket entrance were additionally performed by Er:YAG laser (Fig. 1C). After Er-LCPT treatment, the patient did not take any pain killer at all. After 6 months, the soft tissue remained stable and the PD significantly reduced to 2 mm without BOP, and CAL reduced to 7 mm (Fig. 1D). After 1 year, the regenerated bone was confirmed, and then connective tissue was grafted on the buccal side to perform root coverage (Fig. 1E and F). After 1.5 years, the PD of the tooth remained 2 mm with no mobility and BOP, and veneer restoration by composite resin was performed for better esthetic outcome (Fig. 1G). Finally, 7 mm PD reduction and 5 mm CAL gain was achieved. Before Er-LCPT, the dental radiographic shows severe bone destruction (Fig. 1H), at 6-month and at 1-year follow-up, improved bone tissue was observed (Fig. 1I and J). After 1.5-year follow-up, the bone tissue appeared more stable without any adverse side effects and lamina dura could be observed around the root (Fig. 1K).

The result of this case report indicates that Er-LCPT therapy is useful and safe as well as effective for the treatment of severe periodontal pockets as a minimally invasive flapless surgery, and this may be considered as the best solution for those patient who are very scared or not suitable for conventional open flap surgery.

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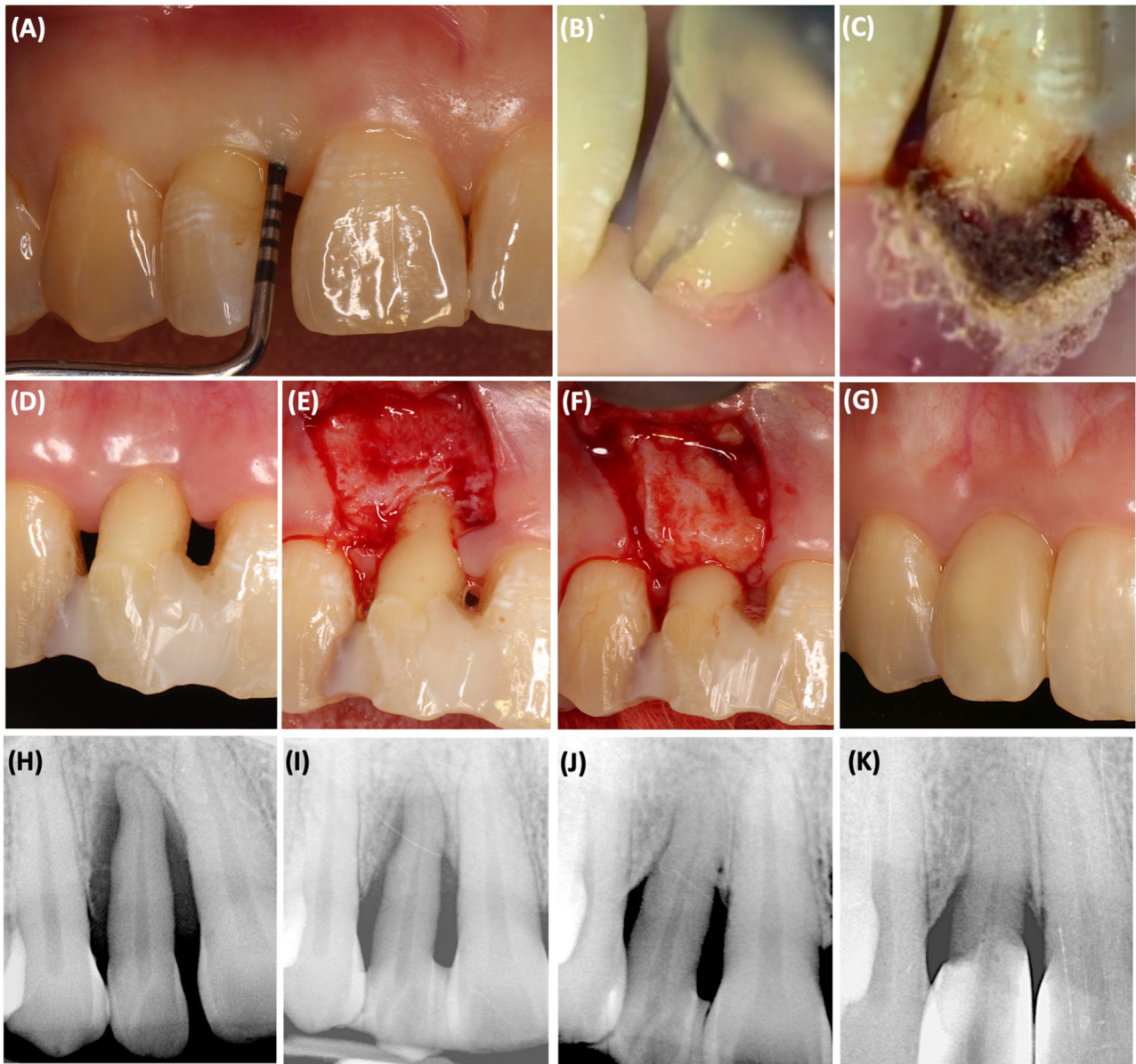


Figure 1 A severe periodontitis tooth treated by Er:YAG laser-assisted comprehensive periodontal pocket therapy (Er-LCPT) under microscope in a type II diabetes mellitus patient. (A) Before Er-LCPT treatment, the upper right lateral incisor showed residual periodontal pocket depth (PD) 9 mm [clinical attachment level (CAL), 12 mm] with bleeding on probing (BOP) and mobility grade II. (B) The periodontal pocket of the tooth was treated by Er:YAG laser irradiation with a straight sapphire tip with a 400 μm diameter to remove the inflamed connective tissue on the inner gingival surface and the bone surface in a sweeping motion mode at approximate 30 mJ/pulse (panel setting 40 mJ/pulse, energy density 23.9 J/cm²/pulse) and 20 Hz in contact mode under water spray, then thoroughly debrided by mini curette and laser under microscope. (C) Following total debridement of pocket inside, the outer epithelium was removed and coagulation of the blood clot in the pocket entrance were additionally performed by Er:YAG laser. After Er-LCPT treatment, the patient did not take any pain killer at all, although medication was prescribed. (D) After 6 months, the soft tissue revealed a stable appearance and the PD significantly reduced to 2 mm without BOP, and CAL reduced to 7 mm. (E, F) 1 year after Er-LCPT therapy, the regenerated bone was confirmed, and then connective tissue was grafted on the buccal side of the teeth to perform root coverage. (G) 1.5 years after Er-LCPT therapy, the soft tissue revealed a stable and favorable outcome and PD remained 2 mm, and veneer restoration by composite resin was performed (by Dr. Wei-Hsuan, Lee). (H) Before Er-LCPT, the dental radiographic shows severe bone destruction extend to almost 100% to the apex. (I) At 6-month follow-up, partially bone tissue regeneration was observed under dental radiographic examination. (J) At 1-year follow-up, considerably improved bone tissue was observed. (K) After 1.5-year follow-up, the bone tissue appeared more stable without any adverse side effects in the irradiated site, and the lamina dura can be observed around the root.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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