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Management of furcation-involved molar using Er:YAG laser-assisted bone regenerative therapy: A case report

Periodontitis is a multifactorial chronic disease. Furcation involvement (FI) is one of the most detrimental factors affecting tooth survival rate over time.¹ Recently, the dental application of Er:YAG lasers has increased,² especially in periodontal therapy.^{3,4} The Er:YAG laser effectively ablates soft and hard tissues and calculus on root and implant surfaces and effectively debrides bony defects in restricted areas, including furcation defects. Blood clots that form in the superficial areas of grafted bone when Er:YAG laser irradiation is used without water spray are convenient for bone regenerative procedures. Er:YAG laser-assisted bone regenerative therapy (Er-LBRT) is effective.⁵ This case report identified a potential method for degree III FI therapy for patients who refuse extraction.

A 52-year-old male complained of pain at tooth #36 during biting. The pocket depth was 12 mm buccally and lingually with degree III FI, bleeding on probing (BOP), and mobility I. The pocket depth was 3 mm at the mesial and distal sites buccally and lingually (Fig. 1A). Extraction was recommended due to the unfavorable prognosis of the tooth. As the patient desired to save the tooth, periodontal regenerative therapy was offered. Endodontic treatment and scaling and root planing (SRP) were initially performed, followed by a re-evaluation and surgery three months later. Local debridement at the furcation bone defect was achieved using Er:YAG laser (Erwin AdvErL™, J. Morita Mfg. Co., Osaka, Japan, Tip: PSM 600T) at 20 Hz and 50 mJ/pulse (Panel setting: 70 mJ/pulse) with water spray in near contact irradiation mode (Fig. 1B) and a mini curette. No

thermal damage was observed on the root surface. A 9-mm vertical bone defect was observed at the furcation area (Fig. 1C and D). Human freeze-dried bone allograft (FDBA, OraGRAFT®, LifeNet Health) and collected blood were mixed and grafted into the bony defect at the crest of the furcation (Fig. 1E), then the blood clot forming procedure was performed using Er:YAG laser irradiation without water spray in non-contact mode (Fig. 1F). The flaps were sutured (Fig. 1G). The soft tissue showed favorable wound healing after two weeks (Fig. 1H). Three years postoperatively, the soft tissue had healed favorably and the pocket depth was reduced to 4 mm at the buccal site and 3 mm at the lingual site without BOP or mobility (Fig. 1I). The periapical radiograph showed severe bone loss to the mesial root (Fig. 1J) preoperatively that was improved at three months (Fig. 1K). Dense, bone-like tissue was observed after the regenerative treatment. The original bone defects were successfully repaired, though some defects remained up to three years postoperatively (Fig. 1M, N, and O). The patient provided informed consent and the study was approved by the appropriate review board.

A molar with degree III FI is an advanced condition with an unfavorable prognosis. Er:YAG laser is a useful and effective treatment for granulation tissue and furcation root surface debridement within a restricted area. The Er-LBRT procedure simplifies the clinical procedure and can be used to treat molars with degree III FI if the interproximal bone level is acceptable for a trial of periodontal regenerative therapy.

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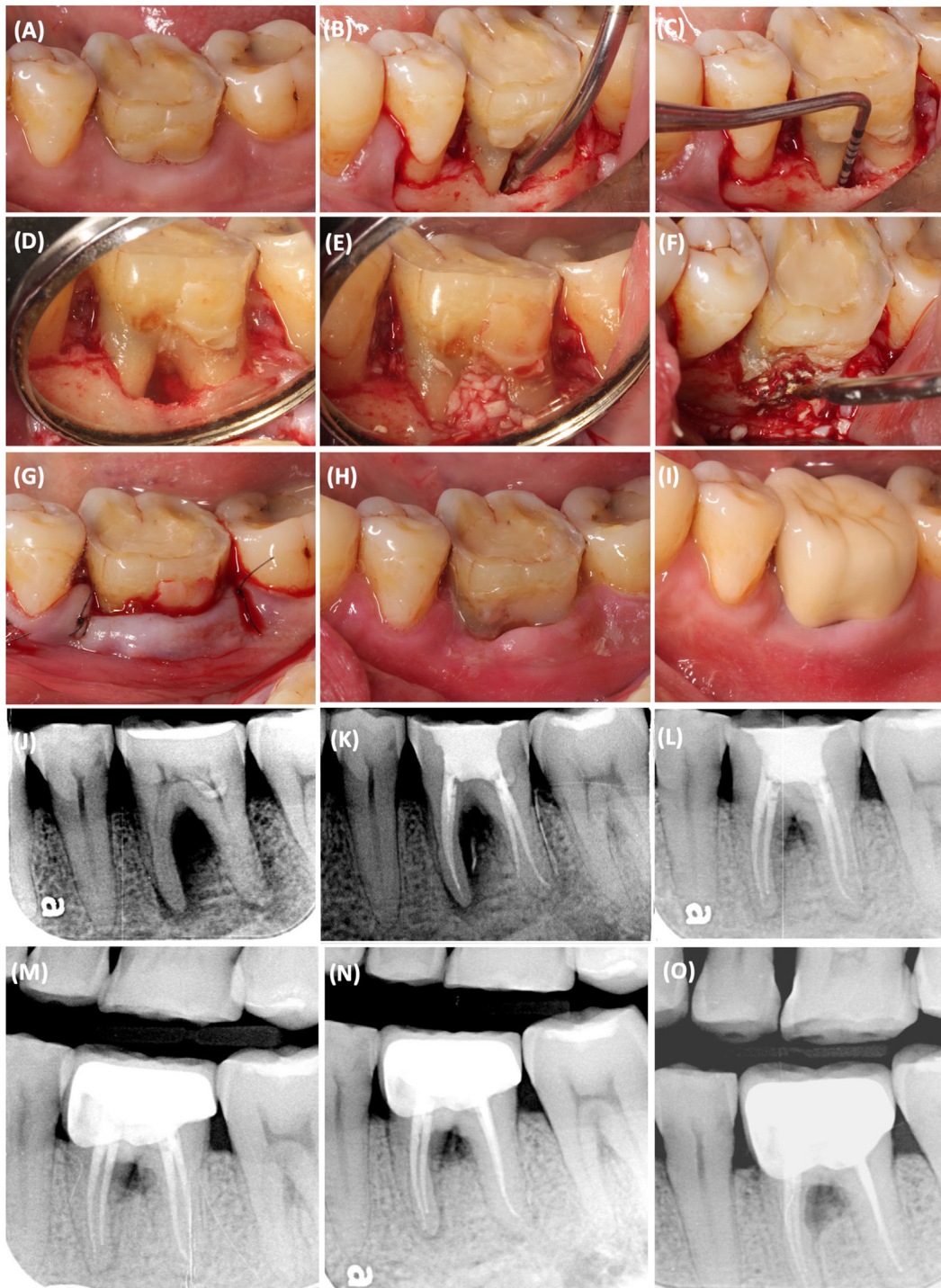


Figure 1 Degree III furcation defect treated with Er:YAG laser-assisted bone regenerative therapy. (A) Baseline measurements. (B) A full-thickness flap is raised at the furcation bone defect at tooth #36, and the granulation tissue is debrided using Er:YAG laser and a mini curette. (C, D) A furcation defect is observed. The vertical bony defect is 9 mm following endodontic treatment and SRP initial therapy. (E) After debridement, bone material is grafted into the bony defect to the crest. (F) A blood clot forming procedure was performed using Er:YAG laser irradiation without water spray under non-contact mode. (G) The flaps are sutured. (H) At two weeks postoperatively, the soft tissue healing is favorable. (I) At three years postoperatively, the results are favorable. (J) The periapical radiograph obtained before treatment is shown. (K) A periapical radiograph obtained three months after the endodontic treatment and SRP is shown. (L) A dense, bone-like tissue is observed at tooth #36 furcation bone defect after surgery. (M, N, O) Radiographs obtained one, two, and three years after surgery show that the original bone defect at tooth #36 is successfully repaired, though some defect remains.

Declaration of competing interest

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

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