

Clinical Healing Process and Symptoms of Two Cases of Chronic Periapical Lesions Treated with Er,Cr:YSGG Laser

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Purpose: To document a clinical and radiographical follow-up after root canal treatment of teeth with periapical lesions using an Er,Cr:YSGG hydrokinetic system laser (Waterlase).

Materials and methods: YSGG laser applied at 20 Hz, 5.0 to 1.0 W with 30% to 90% air-water spray was used for complete root canal therapy in 2 patients bearing 3 teeth with periapical lesions. Radiographs were taken and percussion was tested after the filling procedure, at the end of the first week, and 3 months later.

Results: According to the Cobb et al classification, 3 of the teeth were nonsymptomatic to percussion in both controls; radiography showed that lesions healed completely.

Conclusion: These results pointed out that YSGG laser can be used for complete root canal therapy both for incisors and molars, and healing fast and good.

Key words: Er,Cr:YSGG, laser, Waterlase, periapical lesion, hydrokinetic system, root canal treatment, Cobb et al classification.

J Oral Laser Applications 2004; 4: 211-215.

The clinical success of root canal treatments is based on good shaping, cleaning, disinfection, and filling of the canals.^{6,7} Just like in every dental treatment, there is always a risk of failure in root canal treatments. As reported before, with ideal conditions for root canal therapy, the success rate is 90%, but for teeth with periapical radiolucency, it is only about 80%.⁵ In order to raise these rates, the treatment periods should be decreased, root canal systems should be free of smear layer, and techniques and materials for disinfection and filling should be improved.^{2,5-7}

Research on lasers in dentistry started in the 1960s.^{2,4} Laser therapy for root canal treatment represented a new approach to more successful treatments. Various lasers can be used for disinfecting the canals. The Er,Cr:YSGG hydrokinetic system laser (YSGG) (Erbium, Chromium, Yttrium, Scandium, Gallium, Garnet) (Fig 1) with a wavelength of 2780 nm, frequency of 20



Fig 1 Waterlase (Biolase Technologies, San Clemente, CA, USA).



Fig 2 Pretreatment radiograph of teeth 31 and 41.



Fig 3 Radiograph of teeth 31 and 41 after filling procedure.



Fig 4 Radiograph of teeth 31 and 41 3 months post-operatively.



Fig 5 Pretreatment radiograph of tooth 46.

Hz, pulse energy in between 0 and 300 mJ, received the first FDA approval for complete root canal treatment. With the specific power and air-water mix mentioned above, complete root canal therapy can be done with a good disinfection and without smear layer or thermal side effects.^{1,3,8,9}

In this report, the YSGG laser (Waterlase, Biolase Technology, San Clemente, CA, USA) was used for access, debridement, and shaping of the canals of two patients. Postoperative clinical and radiological healing symptoms were evaluated.

CASE PRESENTATION

The first case is a 13-year-old male patient with severe tooth pain in his mandibular first incisors (31, 41). The patient had a history of old fillings on his incisors and the teeth were symptomatic to percussion. The radiograph revealed radiolucency (Fig 2). Based on clinical

and radiologic evaluations, root canal therapy with YSGG laser was selected for teeth numbers 31 and 41 with irreversible pulpitis and periapical lesions.

The second case is a 17-year-old male with severe nocturnal pain in his right mandibular first molar (46). The patient had a history of broken fillings in this tooth and secondary caries due to missing parts of the filling. The tooth was symptomatic to percussion, and radiological evaluation showed an increase in periodontal ligament space (Fig 5). Based on these data, root canal therapy with YSGG laser was chosen for the tooth number 46.

MATERIALS AND METHODS

In both cases, with settings of 3.0 to 5.0 W and 35% to 90% air and water, access was obtained with sapphire tips 600 μ m in diameter under local anesthesia on teeth 31 and 41, and mandibular anesthesia for

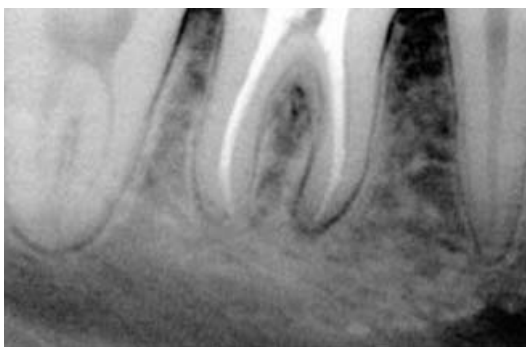


Fig 6 Radiograph of tooth 46 after filling procedure.



Fig 7 Radiograph of tooth 46 3 months postoperatively.

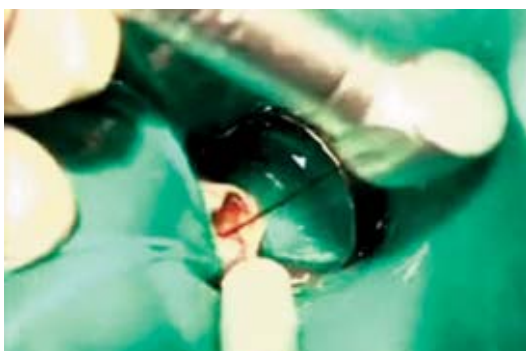


Fig 8 Shaping procedure with 200-µm endodontic fiberoptic tip.



Fig 9 Measuring and marking of working length on fiberoptic tip in accordance with laser-endoparameters.

tooth number 46. During the procedure of access preparation, no discomfort was felt in either case.

After the pulps were exposed, rubber-dam was placed and the energy level decreased to 1 W to extirpate the pulp with laser. With #10 K- handfiles, working length was measured using radiography. After determining the working length, a 200-µm endodontic fiberoptic tip at 1.5 W energy and 34% air and 24% water was used to remove pulpal and diseased dentinal tissues (Fig 8). 2 mm shorter than working length, which was determined on the radiograph as suggested by the manufacturer (Fig 9). The 200-µm tip was moved up and down 3 times, and in a circular movement 3 times for a duration of 8 s and a total of 48 s. The first part of cleaning and shaping was thus completed. Subsequently, a 300-µm tip was used 3 mm shorter and a 400 µm tip 4 mm shorter than the working length with the same settings. No additional irrigation solution was used during the cleaning and shaping procedure. In accord with FDA guidelines, the

dentist, patient, and hygienist wore special protective eyeglasses during the treatments.^{1,3,8,9}

After the cleaning and shaping procedures, absorbant paper points were used to dry the canals. The canals were packed with master gutta-percha cones size #30 for teeth 31 and 41, and size #25 for mesial and distal canals in tooth 46. Control radiographs were taken.

All the canals were filled with sealer and gutta-percha using the lateral condensation method, and final radiographs were taken (Figs 3 and 6).

The two anterior teeth were restored with anterior restoration composite filling (Z250, 3M, St Paul, MN, USA), and the molar was restored with a posterior hybrid composite material (Filtekflow P60, 3M).

At the first postoperative follow-up one day after treatment, pain status was recorded as spontaneous, no pain, slight, moderate, or severe. At follow-ups one week and 3 months after treatment, percussion symptoms were recorded and spontaneous pain charts were

Table 1 Pain chart

Time postoperatively	No pain	Slight	Moderate	Severe
1 day	3	0	0	0
1 week	3	0	0	0
3 months	3	0	0	0

Table 2 Radiographic chart

Duration	Good	Bad	No change
3rd month	3	0	0

drawn according to the method of Coba et al.⁴ In the third month, radiographs were again taken and the results evaluated according to Coba et al: if a lesion improved or completely healed, it was marked as “good”, if the lesion worsened or did not change, it was then marked as “bad”.

RESULTS

At the examination on the first postoperative day of both cases, no pain was recorded. Postoperative exams after 1 day, 1 month, and 3 months showed no percussion symptoms in either patient (Table 1). In the third month, the radiographic follow-up revealed that 3 of the teeth had healed completely (Table 2) (Figs 4 and 7).

DISCUSSION

In this case report, postoperative clinical and radiological symptoms were monitored in 2 patients bearing 3 teeth with periapical lesions which were completely treated with YSGG laser. According to the classification of Coba et al, the prognosis of the teeth was good following treatment.⁴ According to recent studies, lesions can be expected to shrink or heal totally in the third month as seen using radiography.⁴ In the two cases described here, the lesions healed totally during the observation time period (Table 2) (Figs 4 and 7).

Improvement of the treatment techniques will surely increase the success rate of root canal treatments. Although laser-assisted root canal therapy is expensive, the positive effects on outcome have been proven in previous studies.^{5,7} Nevertheless, all laser systems should be improved upon and more research needs to be conducted.⁵

CONCLUSION

As shown in the two cases described here, complete Er,Cr:YSGG laser root canal therapy can be successful in terms of the prognosis of teeth with periapical lesions.

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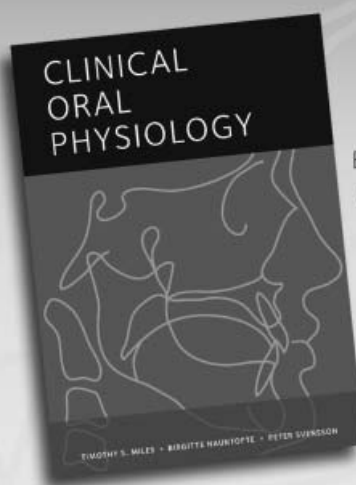
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