

# The Treatment of Periapical Lesions with Nd:YAG Laser: A Case Report

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**Abstract:** Sanitizing the periradicular infection and the surrounding tissue is our therapeutic aim. The restoration and conservation of teeth represents a challenge. With a combination of conventional surgery and laser technology, the treatment goal was achieved in the case described in the following report.

**Keywords:** periapical and interradicular infection, root resection, Nd:YAG Laser treatment.

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In this special case, a chronic periapical osteitis “granuloma” appeared as a granulomatous inflammation in the apical region, generated by microorganisms in the root canal. The root-canal flora showed a shift towards anaerobic bacteria, such as *Fusobacterium* (16%), *Peptostreptococcus* (15%), *Eubacterium* (11%), *Streptococcus* (9%), and *Enterococcus* (6%). Their proteolytic and fibrinolytic enzymes cause tissue dissolution, bone resorption, and degrading of plasma proteins. They produce toxic substances such as endotoxin and leucotoxin. The apical bone is compensated by granulomatous tissue rich in lymphocytes, leucocytes, and plasma cells. The radiograph shows a circumscribed apical opacity. Up to this point, patients often don’t feel any pain.

## THE LASER

The Nd:YAG laser (Denta Pulse 1000; Dentares, Woppenroth, Germany) has a wavelength of 1064 nm, and its operation mode is pulsed. In this case, we used the Nd:YAG intraoperatively directly at the apex and in the interradicular region. After conventional intraoperative

curettage, the idea was to clean the surface of the root, and remove the infected tissue to achieve sufficient bacterial reduction so that tissue regeneration could occur. Furthermore, clinical studies showed that the Nd:YAG is able to generate cell proliferation and causes osteoblast stimulation. At a setting of 1W and 20 pps, the Nd:YAG stimulates the biosyntheses of proteins.

I have used this Nd:YAG (inpulse) laser in my office since 1994. The spectrum of the possibilities is really convincing: sterilization of periodontal pockets and root canals, and all soft-tissue surgery.

## CASE REPORT

The patient was a 21-year-old male, who had no painful symptoms. The radiograph showed tooth 46 with a granuloma and an osteolytic process in the interradicular region (Figs 1 and 2). We explained all therapy steps to the patient, who then gave his consent. It seemed possible to avoid extracting the tooth.

First, a trepanation was performed and the root canal was prepared up to file size ISO 40.



**Fig 1** Pretreatment OPTG.



**Fig 2** Status at first examination.



**Fig 3** After resection.



**Fig 4** One month after resection combined with laser treatment.



**Fig 5** After nearly 2 months, the radiograph shows the regeneration of bone.

Then we applied the Nd:YAG laser with a power setting of 15 Hz/ 100 mJ. The effect of using laser in endodontics is the sterilization of the root canal and the surrounding dentin, the cleaning of the canal wall, the sealing of the dentin tubules, and the drying effect. The following week, we began the surgical part of treatment. After mandibular anesthesia, the apices were exposed, which proved to be quite simple be-

cause of the dimensions of the granuloma. The defect of the bone had the size of a small peanut and reached up to the bifurcation (Fig 3).

After resection, instrumental cleaning, and curettage, the roots were lasered for a second time using the same setting (15 Hz/ 100 mJ). Now the surface of the roots up to the bifurcation were treated with laser. This time, the setting was 20 Hz/100 mJ.



**Fig 6** Five months after resection and laser treatment.

The laser fiber was moved quickly in noncontact mode at a very short distance from the surface of the roots. Later, healing proceeded uneventfully, with the exception of an edema which lasted for three days. The patient felt no pain, and the subsequent radiographs showed the regeneration of the surrounding bone (Figs 4 and 5).

In particular, the interradicular defect disappeared very soon. Only 4 months later, the radiograph only shows the defect caused by the surgery (Fig 6).

## CONCLUSION

The treatment of periapical lesions with Nd:YAG was very successful, as previous experience has shown. However, this case highlighted the potential for success when laser is used in conjunction with conventional surgical treatment, because in this way, it was possible to access the regions which should be irradiated. It is my conviction that the use of Nd:YAG is indicated, and I will continue to treat patients with Nd:YAG laser.

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