



CASE STUDY

TREATMENT OF BONE RESORPTION AROUND DENTAL IMPLANTS WITH INFRARED LASER WITH λ 904 NM

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ABSTRACT

The objective of this study is to present our experience with the use of infrared laser with (λ) 904 nm, for treatment of bone resorption in dental implants in process of osseointegration.

Material and methods: we present a clinical case of treatment of bone resorption around the apex of an implant in process of osseointegration. Low-level laser therapy (LLL) in the infrared specter with (λ) 904 nm was used for the treatment. Six procedures were performed, every other day, with a dose of 3-4 J/ cm².

Results: The radiography performed about three months after the treatment showed recovery of the bone resorption.

Conclusion: The use of laser in the infrared specter with (λ) 904 nm, for treatment of bone resorption in dental implants in process of osseointegration, following a protocol of six sessions every other day with dose of 3-4 J/ cm² per session, leads to recovery of the bone structure.

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INTRODUCTION

The laser technologies quickly advance into and find wide application in the modern medicine. A number of the specific effects of the laser energy are also used in the dental implantology. The placing of dental implants is associated with different in length regeneration period of the tissues. It is experimentally proven, that LLLT reduces the pain and the inflammatory process. With the soft tissues there is established faster healing of the wounds, increase of the mitotic activity, the number of the fibroblasts and the collagen synthesis. With hard tissues it improves the bone remodeling, as it activates the osteoblasts, reduces the osteoclast activity and improves the vascularization and the number of the trabeculae in fractures (Dortbudak, 2000; Lalabonova, 2010; Pretel, 2007 and Pugliese, 2003). Many researchers believe, that LLLT creates a number of conditions, which accelerate the healing of peri-implant bone defects. Dortbudak *et al.* (Dortbudak, 2002). study the effect of low-power laser irradiation on osteocytes and bone resorption in bone implants. Their results show that that the bone tissues of the irradiated areas are more vital, compared to the non-irradiated, and that it could be expected that the peri-implant healing would be accelerated.

In their study Nicolau *et al.* (2003), come to the conclusion, that LLLT increases the activity of the bone cells (resorption and forming) around the recovery site, without changing the bone structure.

Objective

The objective of this study is to present the possibilities of the infrared laser with (λ) 904 for treatment of bone resorption of dental implants in process of osseointegration.

Clinical case

Clinical history: The patient M.L, a 35-year-old female, visited the dental practice complaining from loss of tooth 11, due to past trauma, and established periapical lesion with advanced root resorption and grade II mobility. The patient wanted her lost tooth to be recovered with dental implant.

Status: Defect of the tooth line in the area of tooth 11. Pink mucosa without changes. The alveolar bone in the area of the vestibular plate is hollow, as a result of past periapical inflammatory process. The rest of the dentition is intact. The patient reports arterial hypertension. No other diseases.

Treatment: We decided to place dental implant in the place of tooth 11. Due to the lack of sufficient alveolar bone, and

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advanced resorption of the vestibular plate, to be performed augmentation by placing lyophilized bovine bone Bio Oss Geistlich. Anesthesia according to the general status (Daskalov, 2015). The planned intervention was performed. The healing period was without complications.

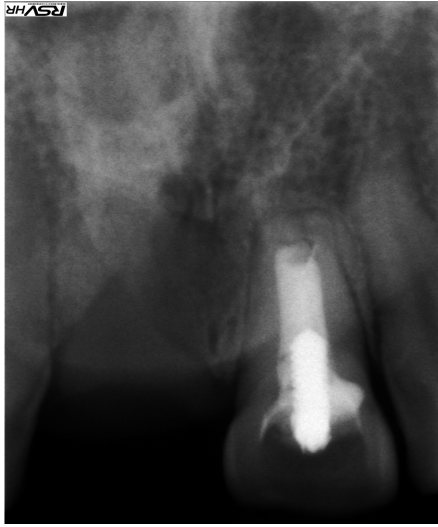


Fig. 1. Before implantation

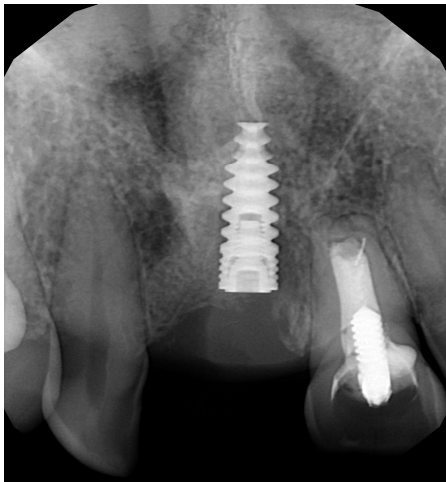


Fig. 2. After implantation

RESULTS

At the follow-up examination, one month later, the patient had no complaints. The x-rays showed no deviations from the normal. On the second month the patient reported slight discomfort in the area of the implant. The radiography showed resorption of the bone around the apex of the implant. The radiological changes of the bone are visualized at demineralization over 30%. For the treatment of the complication we used low-level laser therapy (LLL) in the infrared spectrum, under the following method: (Lalabonova, 9) We used distant irradiation with focused beam with conical shaped light guide under angle with diameter 3 mm (\varnothing 3mm). The irradiated area is 0.5 cm². The affected area was the mucosa in the implantation zone at a distance of 0.5 – 1 cm from it. We used diode laser Prometheus with (λ) 904 nm. We performed six procedures every other day, with the following parameters.

Power P – 200 W
Frequency F – 1000 Hz

Overmodulation 10 Hz

Time T – 2 min (in 3 fields); 1/1.5 min (in 6 fields)

Dose E – 3.4 J/cm²

At the follow-up examination, three months later, the patient had no complaints. The performed radiography showed complete osteointegration of the implant and densification of the bone trabeculae in the spongiosis.



Fig. 3. Bone resorption

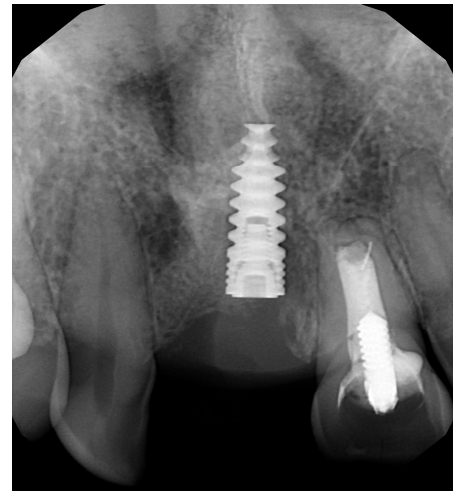


Fig. 4. Complete osteointegration

DISCUSSION

The registered bone resorption around the implant in process of osteointegration is significant for impaired process, which may compromise the end result. The loss of bone could be caused by different factors. Some of them may be related to errors and defects in the implant design. Since the conventional radiographies are non-isometric, for the establishing of the bone loss could be used the screw step, which is known for each implant (Lalabonova, 2014). According to the specialized literature, the irradiation with low-power laser in doses of 1.5 - 3 J cm² stimulates the number of the in-vitro fibroblast (Khadra, 2005). According to Pugliese *et al* (Pugliese, 2013), the 4 J cm² energy density provided more significant results than the 8 J cm². Other studies maintain that the multiple doses, and not the irradiation intensity, are more effective for the bone formation and the implant – tissue interaction (Coombe, 2001), while Pretel *et al*

(Pretel, 2007), come to the conclusion that the single dose is effective for accelerating the healing process. There are some studies, which prove the positive effect of LLLT on the regeneration of the soft tissues and the alveolar bone (Lalabonova, 2013; Lalabonova, 2014 and Lalabonova *et al.*, 2014).

Conclusion

The treatment with low-power laser irradiation in the infrared specter (λ) 904 nm, in case of diagnosed bone resorption of implants in process of osseointegration, following protocol of six sessions every other day, with dose 3-4 J/ cm² per session, recovers the bone structure from resorption and accelerates the osseointegration process.

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