



STUDYING THE POSSIBILITIES OF THE INFRARED LASER WITH (λ)904 FOR TREATMENT OF BONE RESORPTION OF DENTAL IMPLANTS IN PROCESS OF OSSEOINTEGRATION

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SUMMARY

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

Material and methods: The osseointegration process of 167 implants was radiologically evaluated between the first and the second surgical stage. In nine was established bone resorption reaching the implant screw. For the treatment was used infrared laser with (λ) 904 nm. Six procedures were performed, every other day, with a dose of 3-4 J/ cm².

Results: The x-ray tests done about three months after the treatment showed restoration of the bone resorption.

Conclusion: In diagnosed bone resorption of implants in process of osseointegration, the application of infrared laser therapy with (λ) 904 nm, with protocol of six sessions every other day, with dose 3-4 J/ cm² per session, recovers the bone structure.

Key words: dental implants, osseointegration, bone resorption, treatment, LLLT

INTRODUCTION

Nowadays, the lasers are widely used in medicine. It is experimentally proven that the low-level laser therapy (LLLT) reduces the pain and the inflammatory process. 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.

Many researchers believe that LLLT creates a number of conditions, which accelerate the healing of the peri-implant bone defects. Dörtbudak et al. [1] study the effect of the low-power laser irradiation of osteocytes and bone resorption of bone implants. Their results show that the bone tissues of the irradiated areas are more vital compared with the non-irradiated, and that it could be expected to have accelerated peri-implant bone healing. In their study Nicolau et al. [2] reach the conclusion that LLLT increases

the activity of the bone cells (resorption and formation) in the area of the recovery, without changing the bone structure.

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

MATERIAL AND METHODS

Subject of the study are 167 implants, which were radiologically evaluated for osseointegration process between the first and the second surgical stage. The evaluation is done through sectional and panoramic radiography. Nine of the implants showed bone resorption reaching the screw of the implant. We treated the complication with infrared laser therapy. We used distant irradiation with focused beam with conical shaped light guide under angle with ø3mm. The irradiated area is 0.5 cm² and includes 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 applied six procedures, every other day, with the following parameters:

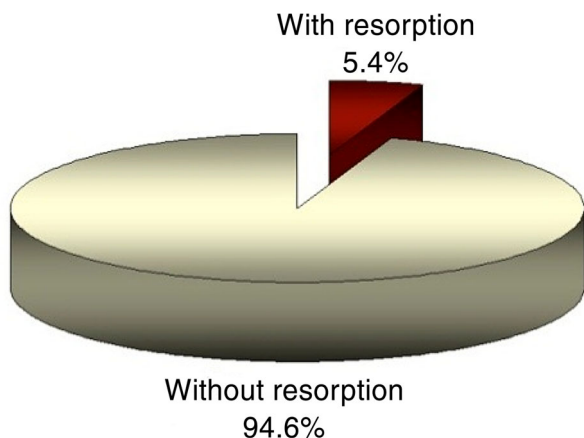
Power	P – 200 W
Frequency	F – 1000 Hz
Overmodulation	10 Hz
Time	2 min (through 3 fields); 1/1.5 min (through 6 fields)
Dose	E – 3-4 J/ cm²

RESULTS

The formation of the bone-implant interface was monitored every day with sectional or panoramic radiography. We registered bone loss exceeding the admissible. Probing could be used as clinical method for establishing the inflammatory process. The pain during pressure on the implant is a signal for development of periimplantitis.

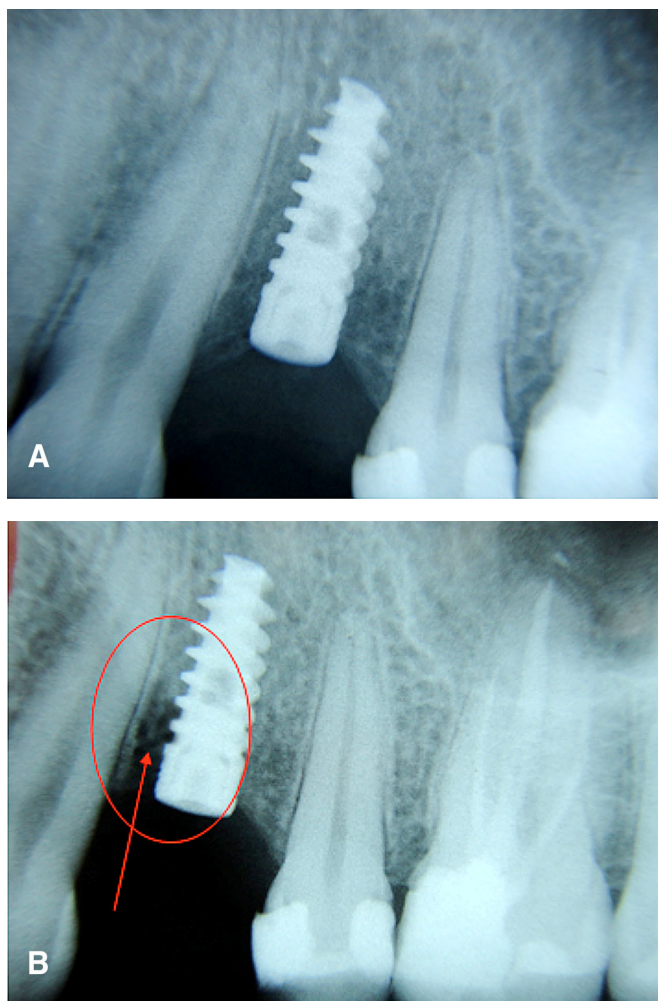
Of 167 studied implants, in nine (5.4%) was observed bone resorption reaching the implant screw between the 2nd and the 3rd month after implantation (Diagram 1).

Diagram 1 . Bone resorption.



In four cases the implanting was open, and in five of the cases closed. Other signs of inflammatory process - pain, reddening or swelling - were not observed. The mucosa above the implants was pale pink in color, calm, undistinguished from the adjacent mucosa. The registered discrepancy between the clinical symptoms and the radiological finding was a sign for absence of inflammatory component of the condition (Fig.1).

Fig. 1. a) implanting; b) 2 months later



In these cases was used laser therapy with (λ) 904 nm in the described methodology. The radiological changes in the bone were visualized in demineralization over 30%. The radiological follow-up, 2-3 months after the therapy, showed restoration of the bone design in all of the 9 cases (Fig. 2).

Fig. 2. 3 months after therapy



DISCUSSION

The registered bone resorption around the implant in process of osseointegration is significant for impaired process, which can compromise the final result.

The loss of bone could be a result from different factors. Some of them are associated with defects and shortcomings 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 [3, 4].

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 [5]. According to Pugliese et al. [6] the 4 J cm⁻² energy density provided more significant results than the 8 J cm⁻². Other studies maintain that the multiple doses, and not the irradiation intensity, are more effective for the bone formation and the implant – tissue interaction [7, 8], while Pretel et al. [9] 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 alveolar bone [10, 11].

We did six procedures, every other day, with dose of 3-4 J/ cm². The radiographies done three months after the therapy show recovery of the bone resorption.

CONCLUSION

In diagnosed bone resorption of implants in process of osseointegration, the application of infrared laser therapy with (λ) 904 nm, with protocol of six sessions every other day, with dose 3-4 J/ cm² per session, recovers the bone structure.

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