

CLINICAL EVALUATION OF THE HEALING PROCESS OF ORAL SOFT TISSUE SURGICAL WOUNDS STIMULATED BY LOW-LEVEL LASER THERAPY

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ABSTRACT

During the past decades laser therapy gained much popularity in clinical practice. Low-level lasers offer alternative solutions to numerous problems in oral surgery.

Purpose: The purpose of the present study is to evaluate clinically the healing process of soft tissue surgical wounds in the oral cavity stimulated by low-level laser therapy (LLLT).

Materials and methods: One hundred and twenty surgical wounds were assigned to three groups: **Group I** included 40 patients who underwent red spectrum LLLT with wavelength (λ) of 658 nm; **Group II** – 40 patients treated with infra-red LLLT with λ of 904 nm; **Group III (control group)** - 40 patients without LLLT. In **Group I** and **II** the LLLT procedures were applied 1 day before, in the day of and 1 day after the operation. Distant emission with a focused beam through an angled conical probe 3 mm in diameter (3mm) was used. The irradiated area is 0,5 cm². The area of impact is the surgical wound zone and the neighboring 0,5-1,0 cm of the adjacent oral mucosa.

Results and discussion: The evaluation of the healing process included the following criteria: pain, edema, hyperemia, time for wound closure, postoperative complications.

Conclusions: LLLT applied with the offered treatment modality accelerates the healing process of soft tissue surgical wounds in the oral cavity, reduces treatment time and restores patients' comfort

Key words: oral mucosa, LLLT, treatment, surgical wounds, oral surgery.

INTRODUCTION

In the past decades laser therapy gained much popularity in clinical practice.(10) Due to its high efficacy it is currently used in numerous medical fields.(1, 4, 7, 8)

The wide range of biologic effects of laser therapy makes it applicable in oral surgery. Low-level lasers offer alternative solutions to numerous problems met in the everyday practice.(2, 3, 5, 6, 9)

The goal of the present work was to assess clinically the healing of soft tissue operative wounds in the oral cavity stimulated by low power laser emission.

MATERIALS AND METHODS

The objectives of the study were 120 surgical wounds formed as part of the operative treatment of periapical lesions of the jaws and preprosthetic surgical corrections of the alveolar process preceding the functional reconstruction of the dentition. The wounds were distributed into 3 groups.:

Group I (test-group) included 40 patients in whom the healing process was stimulated with red spectrum LLLT applied by a developed by the authors method. The LLLT was conducted with diode laser "SIX LASER TS" with wavelength (λ) of 658 nm.

Group II (test-group) comprised of 40 patients who underwent stimulation of the healing process with infra-red LLLT. The latter was executed by a method developed by the authors using the "Prometeus" laser apparatus with λ 904 nm.

Group III (control) consisted of 40 patients with no LLLT.

In **Group I** и **II** the LLLT procedures were applied 1 day before, in the day of and 1 day after the operation. We used distant emission with a focused beam through an angulated conical probe 3 mm in diameter (3mm). The irradiated area is 0,5 cm². The area of impact is the surgical wound zone and the neighboring 0,5-1,0 cm of the adjacent oral mucosa. The parameters of laser emissions are as follows:

For (λ) 658 nm LLLT:

To obtain analgesic effect only:

- power P – 30 mW
- frequency f_1 – 5,8 Hz
 f_2 – 5,8 Hz
- time T – 1 min 22 sec
- dose E – 2 J/cm²

To obtain analgesic/antiflogistic effect:

- power P – 30 mW
- frequency f_1 – 5,8 Hz
 f_2 – CW
- time T – 1 min 14 sec
- dose E – 2 J/cm²

For (λ) 904 nm LLLT:

To obtain analgesic effect only:

- power P – 20W
- frequency f – 1000 Hz
- time T – 1 min
- dose E – 2 J/cm²

To obtain regenerative effect

- power P – 20W
- frequency f – 300 Hz
- time T – 3 min
- dose E – 1,5 J/cm²

The assessment of the healing process included the following criteria: pain, edema, hyperemia, time for wound closure, postoperative complications. The fore-mentioned indices were evaluated on the 1-st, 3-rd and the 5-th day after the operation.

The statistical analysis of the obtained data was made with SPSS v.17 и MS Office Excel 2003 package.

RESULTS AND DISCUSSION

The distribution of the patients by gender is 58,3% men, 41,7% women. The mean age is 45,83±1,35 years.

The obtained data from the followed-up parameters pain, edema, hyperemia, time for wound closure, postoperative complications are as follows:

Pain

Day 1: 32,5% of the patients in group I 32,5% suffered pain, the patients in group II are painless, and 75% of the patients in group III also suffered pain.

Day 3: all patients in groups I and II are painless, 10% of the patients from the group III had pain.

Day 5: the patients from all groups are painless.

Hyperemia

Day 1: the patients in group I who had wound hyperemia were 35%, in group II – 30% , and in group III – 50%.

Day 3: the patients with erythematous wounds in group II are 7,5%, in group III – 20%, and all patients in group I had no wound hyperemia.

Day 5: the patients in all groups had no wound hyperemia.

Edema

Day 1: 100% of the patients in group I and 47,5% of the patients in group II had insignificant edema; in group III 12,5% of the patients exhibited massive and 75,5% - insignificant edema.

Day 3: all patients in group I and II had no edema, 7, and 5% of the patients in group III had insignificant edema.

Day 5: the patients in all groups had no edema.

Postoperative complications

In groups I and II no postoperative complications were noted, while in group III the rate of postoperative complications was 5%.

Wound closure

In group I (λ 658 nm) the mean time for closure of the wound was 5,88±0,05 days, in group II (904 nm) – 5,43±0,10 days, and in the control group – 7,03±0,0 days.

From the results obtained it can be summarized that the healing process of soft tissue surgical wounds is stimulated by LLLT. Surgery is a stress-factor to the individual. General and local signs after the operative trauma have different character. Until healing is accomplished the changes in soft tissues pass through several stages and going from stage to stage is smooth and gradual. The biological stimulating effect of lasers applied in low power of mW/smI is manifested with acceleration of the process of rehabilitation and regeneration, antiflogistic and analgesic. (4, 5, 8, 10). The process of wound healing passes from alteration through proliferation to reach the phase of epitelization. In stimulating the healing processes certain role play the instigation and growth of the epithelium and the growth and formation of new blood vessels.

CONCLUSION

Low level laser therapy applied by the offered method of acceleration of the healing process of the soft tissue surgical wounds in the oral cavity is an effective, easily applicable and comfortable therapeutical option. It helps in reduction of the healing time and raises the quality of the results. The patients are offered a method of stimulation of the healing process and pain control without the use of drugs contributing to the rehabilitation and comfort in the postoperative period.

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