

LOW ENERGY LASERS IN THE MANAGEMENT OF TRAUMATIC ULCERS IN ORAL MUCOSA – METHODS OF APPLICATION

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ABSTRACT

Introduction: Traumatic ulcers in the oral mucosa are extremely painful and can cause severe troubles in talking and eating. Their treatment can be quite prolonged. The present paper aimed at exploring the therapeutic potential of low energy laser irradiation (LELI) in treating oral mucosa traumatic ulcers and propose methods of stimulation of their healing using a laser with an appropriate wavelength and frequency of irradiation, appropriate dose and number of procedures.

Material and methods: Thirty patients were recruited in the study. They were allocated into three groups: group 1 (a study group) – these patients received red laser irradiation with a wavelength of 658 nm; group 2 (a study group) – these had infrared laser irradiation with a wavelength of 904 nm; group 3 (a control group) – these patients were treated with granofurin and solcoseryl.

With the technique we used the laser tip was placed at a distance from the irradiated area (0.5 cm²) with the fiber optic emitting in the red spectrum (658 nm) or the infra-red spectrum (904 nm). A diode laser was used in the study. We irradiated the area of the traumatic ulcer and the surrounding mucosa 0.5 to 1 cm in diameter. The applied dose was 1 – 2 J/cm². The treatment procedure was repeated once daily until the symptoms disappeared.

Results: We found that pain was rapidly managed with the treatment and epithelization of the ulcers was accelerated.

Conclusions: LELI is an effective and easy-to-use modality to treat traumatic ulcers that obviates the use of drugs.

Key words: traumatic ulcers, mucosa, low energy laser, therapy.

INTRODUCTION

It is quite common for people to lose some or all of their teeth for various reasons. Restoring them is then possible with movable or fixed prostheses.[10] These prostheses, if poorly fitted, are known very often to cause lesions in the oral mucosa which traditionally are referred to in dentistry as traumatic ulcers, or previously as decubitus ulcers.[1] These lesions are caused by very much the same mechanism that causes skin decubitus ulcers in various general disorders but here they develop in a different

environment. This accounts for the differences in the clinical picture and the methods they are treated with.[4]

Traumatic ulcers in the oral mucosa are extremely painful which sometimes makes it necessary for the prosthesis to be removed provisionally. This causes discomfort for patients in talking and eating. The respective treatment aims at alleviating the pain and achieving epithelization of the wound. However, treating oral mucosa lesions is complicated because topical drugs are difficult to apply there for a long time. That is why physical methods would be more appropriate to use here.[3, 8, 11, 12]

The aim of the present study was to explore the therapeutic potential of low energy laser irradiation (LELI) in treating oral mucosa traumatic ulcers and propose methods of stimulating their healing using a laser with an appropriate wavelength and frequency of irradiation, appropriate dose and number of treatment sessions.

MATERIAL AND METHODS

The methods were developed on the basis of monitoring the course of treatment of 30 patients with traumatic ulcers caused by poorly fitted movable prostheses which were designed to restore the masticatory function of dentition; LELI was used to treat these ulcers.

The ulcers in the patients were divided into three groups:

Group 1 (a study group) included 10 ulcers which were irradiated with a red laser (wavelength 658 nm) for stimulation of the healing process.

Group 2 (a study group) - 10 ulcers; healing of the ulcers was stimulated with LELI using an infra-red laser with a wavelength of 904 nm.

Group 3 (control group) included 10 ulcers treated conventionally with granofurin and solcoseryl.

Treatment sessions were conducted once daily for all three groups.

LELI for group 1 and 2 patients was conducted in a non-contact mode with a 3-mm conical optic fibre tip directed obliquely to the lesion area. The irradiated area was 0.5 cm². It included the area of traumatic ulcer with the adjacent erythematic mucosa in a diameter of 0.5 to 1 cm. The diode lasers used in the study were SIX LASER TS (Atlantis, $\lambda = 658$ nm,) and Prometheus ($\lambda = 904$ nm). The irradiation dosage was between 1 and 2 J/cm².

Fig. 1. Picture of methodology



Picture of methodology

The parameters of the laser therapy were as follows:
 $\lambda = 658 \text{ nm}$

Analgesic effect:

power	P	- 30 mW
frequency	f_1	- 5.8 Hz
	f_2	- 5.8 Hz
duration	T	- 1 min 22 sec
Dosage	E	- 2 J/cm²

Analgesic/anti-inflammatory effect:

power	P	- 30 mW
frequency	f_1	- 5.8 Hz
	f_2	- CW
duration	T	- 1 min 14 sec
Dosage	E	- 2 J/cm²

$\lambda = 904 \text{ nm}$

Analgesic effect:

power	P	- 20 W
frequency	f	- 600 Hz
duration	T	- 1 min 10 sec
Dosage	E	- 1.26 J/cm²

Analgesic/anti-inflammatory effect:

power	P	- 20 W
frequency	f	- 600 Hz
duration	T	- 1 min
Dosage	E	- 2 J/cm²

Regenerative effect:

power	P	- 20 W
frequency	f	- 300 Hz
duration	T	- 31 min
Dosage	E	- 1.5 J/cm²

The effect of treatment was assessed by the changes in the symptoms of pain, redness, and epithelization. They were assessed at baseline, and at days 1, 2 and 3 of treatment.

RESULTS AND DISCUSSION

The results for the pain, the erythema around the ulcer, and epithelization of the lesions were as follows:

Pain

The patients in groups 1 and 2 reported pain alleviation as soon as after the first procedure. Group 3 patients reported a reduction of the pain for a short time while the drugs was getting washed out by the saliva after which the pain returned to its initial intensity.

Erythema

The erythema around the ulcer was found to decrease after the first procedure in groups 1 and 2. In group 3 patients this reduction took longer to occur.

Epithelization of the wound was accelerated in group 1 and 2 patients.

These results suggests that LELI exerts a stimulating effect on the healing process of traumatic ulcers in oral mucosa.

Pain sharply decreased as early as on day 1 in the groups of patients receiving laser treatment regardless of what type of laser irradiation, red or infra-red, was used. The erythema around the traumatic ulcers significantly decreased in groups 1 and 2, clearly indicating that the inflammatory reaction abated.

The biostimulating effect of lasers accelerates the process of regeneration with predominating analgesic and anti-inflammatory effects.[2, 5, 7] A role in the process of healing stimulation is played by the stimulation of epithelial growth and the induced angiogenesis.[6, 9]

CONCLUSIONS

LELI applied for the treatment of traumatic ulcers in the oral mucosa is very efficient. The method is easy to use and does not burden the body with drugs.

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