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RESEARCH ARTICLE

ORAL LEUKOPLAKIA – EARLY RESULTS AFTER Er-YAG LASER TREATMENT

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ABSTRACT

Introduction: Wound sections resulting from high-energy laser treatment of premalignant oral lesions have a specific healing process.
Objectives: Aim of this study is to follow up the dynamics of wound healing in patients with oral leukoplakia submitted to Er-YAG laser treatment.
Materials: Observed in this study were 36 wounds resulting from surgical treatment of patients that were histologically proven with oral leukoplakia, without presence of cell displasia.
Methodology: Laser ablation technique was applied using vapolarization. The rate of wound healing was taken each 1, 3, 7 postoperative days. Indications were followed up for pain, infection and appearance of healing in the treated area.
Results: The wound healing processes run smoothly. There was no presence of pain and sensory disturbance. Feeding and comfort of the patients were recovered immediately after the procedure.
Conclusion: Wounds resulting from Er-YAG laser treatment of oral leukoplakia are healing without pain and without complications. This method gives excellent comfort to patients combined with good quality healing outcomes.

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INTRODUCTION

Cases of cancer in humans tend to become more frequent, while reasons for this are referred to a number of exogenous and endogenous factors. Genetic damage in the epithelium accumulates during the process of carcinogenesis and leads to the loss of cell cycle regulation and the emergence of uncontrolled reproduction. (Chiesa *et al*., 2005) Oral preneoplasia is damage in the epithelium, progress of which continues for months or for years and in some cases it turns into cancer. (Banoczmy and Siba, 1972) Leukoplakia is the most common preneoplastic oral lesion that has a potential risk of malignancy. (Bokor-Bratic, 2000) The etiology and pathogenesis of oral leukoplakia are not fully known, there are no specific histological findings. (Novakovic *et al*., 2011; Vander Waal, 2009; Vivek *et al*.) There are risk factors involved in the disease progress. They are most commonly related to tobacco use, consumption of alcohol and the HPV infection. (Novakovic *et al*., 2011; Vander Waal, 2009) Diagnosis of oral leukoplakia is mainly carried out through a direct visual inspection, vital dye staining is also used as well as stomatoscopy and spectroscopy, exfoliative cytodiagnosis. The histological examination of biobsy material, combined with the modern means of immuno-histochemistry may allow early registration of changes in the tissues, before the clinical expression of the ongoing changes at a cellular level. (Roed-Peterson *et al*., 1972) Approach in the treatment of oral leukoplakia involves removal of risk factors, impact on the lesion and follow-up of the diseased. Depending on the clinical and histological features, local or topical medication is being administered, surgical and electrosurgical excision procedures followed by plastics, cryotherapy, low or high-energy lasers. (Chiesa *et al*., 2005; Gillenwater *et al*., 2006; Kademani and Dierks, 2007; Roed-Peterson *et al*., 1972) High-energy lasers are used as an alternative to surgical treatment. (Chiesa *et al*., 2005; Ishii *et al*., 2003) Carbon dioxide (CO_2) laser has a wavelength of 10 600 nm, it is well absorbed by intra and extracellular fluids; it quickly heats up and evaporates the target tissues and the surrounding area, afflicted by thermal necrosis. It is used with a focused wave for excision of the lesions, and a defocused one for evaporating. (Kademani and Dierks, 2007; Roed-Peterson *et al*., 1972) Diod lasers are used with a different operational mode for excision of the lesions. The Nd-YAG laser was introduced to medicine a long time ago

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(1973), it has great energy and penetrates deep into the tissues. It is used for ablation of oral leukoplakia with very good subsequent results. More pronounced thermal effect and pain that requires anesthesia during treatment should be considered as negative effects of treatment with this type of laser. (Vivek *et al*.) The Er-YAG laser is a new generation system with specific features and integrated water cooling. The precise targeting and dosage of the laser waves allow the performing of ablations of lesions, without any observed coagulation effects in the surrounding tissues. On top of these advantages, these laser devices are characterized by their small size and ease of usage in outpatient conditions. (VanderWaal, 2009; Warnakulasuriya *et al*., 2007)

Purpose

The purpose of this prospective, randomized study is to trace the dynamics of healing of wounds, received after treatment with an Er-YAG laser in patients with oral leukoplakia.

MATERIALS AND METHODS

The subject of this study are 36 wounds, received after surgical treatment with an Er-YAG laser in patients with oral leukoplakia. The participants in the study were randomly selected over a period of two years. Criterion for inclusion is the presence of a histologically proven oral leukoplasia, without presence of cellular dysplasia. (Fig. 1)

Fig. 1. Oral leukoplakia

Laser ablation was applied, by a vaporization technique. The anesthesia of the patients was accomplished through contact anesthesia with a 10% Lidocain spray. (Fig. 2)

Fig. 2. Treatment with an Er-YAG laser

The dynamic of the healing process of the wounds was registered on the 1st, 3rd, and 7th postsurgical days. The following indicators were traced: presence of pain, infection of the wound and epithelialization of the treated area. The intensity of the pain is registered from 0 to 10, under the VAS ten point scale. At 0 absence of pain is registered, weak pain between1and 3, moderate pain between 4 and 6, strong pain between 7 and 10.

RESULTS

The sex distribution of the study contingent is 64% women, 36% men. The median age of the participants is 56.38±0.97 years. The studied age range is 34 – 80 years.

Pain: When reporting the intensity of the painthe following data was obtained: (Fig. 3).

- During the first day after the manipulation a weak pain was reported in 88.88% of the studied lesions, while moderate pain was present in 11.12%.
- On the third day after the manipulation no pain was reported in 38.88% of the studied lesions, while 61.12% had weak pain.
- On the seventh day after the manipulation there was no pain in 88.88% of the lesions, while in 11.12% there was weak pain.

Infection

One of the possible complications during healing of the surgical wound is the occurrence of an infection. In order to establish it one mustobserve the local signs of inflammation of the wound (redness, exudation, swelling) during the healing process. The results of the tracing of this indicator are presented in Figure 4. The data analysis shows that in all lesions which were treated with laser ablation there was no recorded presence of infection during the observed period.

Epithelialization

Epithelialization of the wound is determined on the 7th postsurgical day. Epithelialization is recorded as partial, complete or lack thereof. The results are: 94.4% complete epithelialization and 5.6% partial epithelialization. (Fig. 5)

The result analysis shows that in patients with OL, treated with an Er-YAG laser, an accelerated healing of wounds is observed.

DISCUSSION

The results of the early postsurgical indicators in treatment of oral leukoplakia with an Er-YAG present the following: on the first day after treatment, a weak pain is present in 88.88% of lesions, with 11.12% having moderate pain. The change of the indicator on the third day is towards absence of pain in 38.88% of lesions, while on the seventh day 88.88% had no pain. The significantly lower intensity of pain is most likely owed to the non-traumatic nature of the procedure, the absence of additional damage to the surrounding tissues.

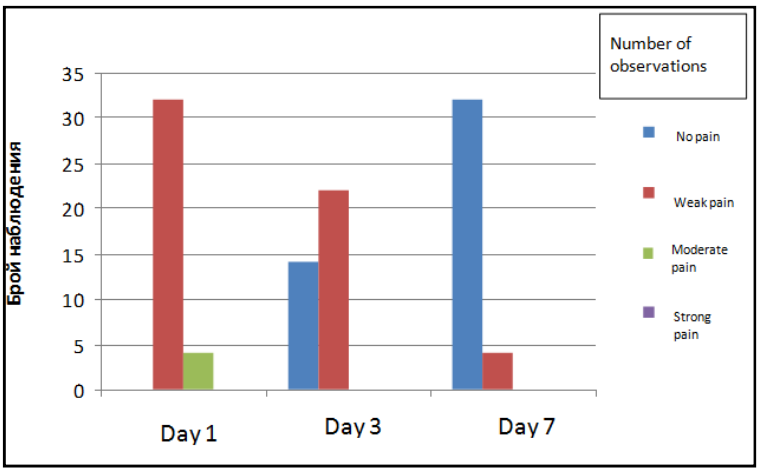


Fig. 3. Pain after ablation

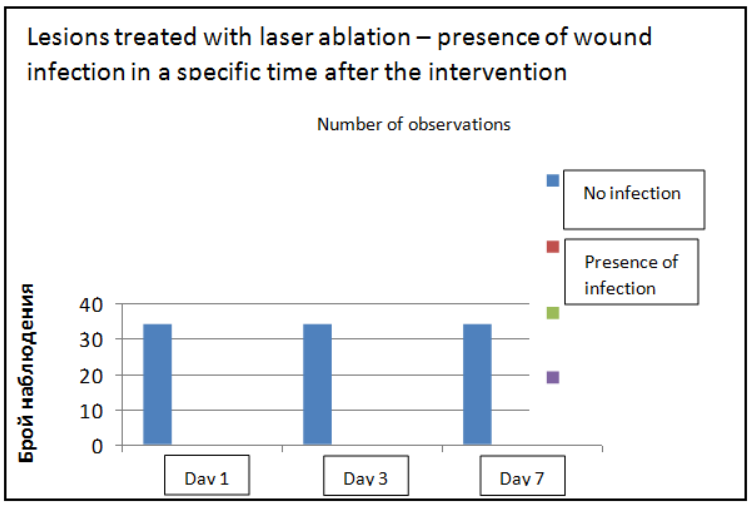
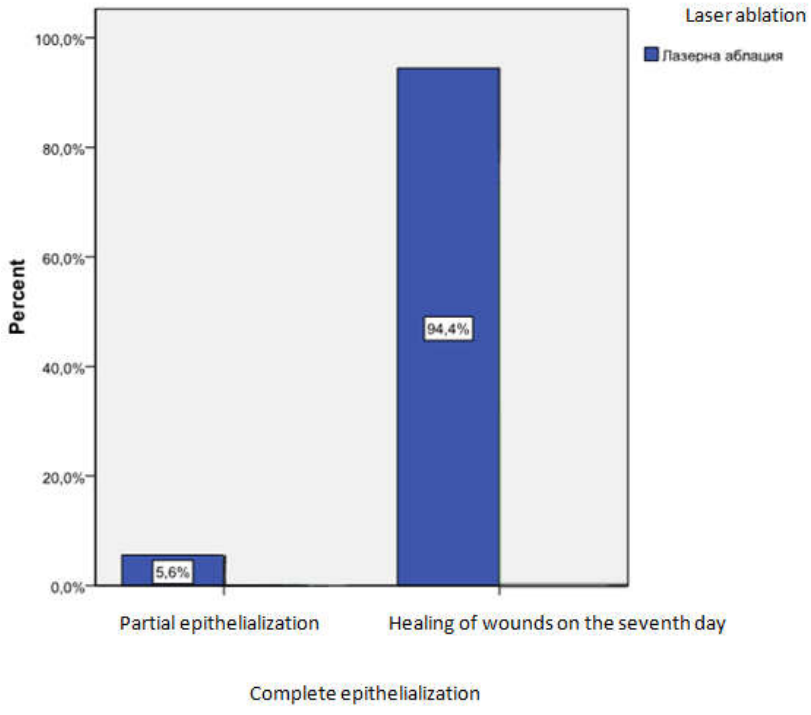


Fig. 4. Presence of an infection



The features of the Er-YAG laser show that during operation with it thermal destructions are not present in the surrounding tissues, as a result of which a surrounding area of thermal necrosis is absent.

(Ishii et al., 2003) Another author – Armenores (2010), has recorded similar low levels of pain after ablation of oral lesions with an Er-YAG laser. In regards to the inflammatory reaction it is stated, that in lesions, treated by laser ablation, not a single case has been established of wound infection during the entire postsurgical observation period. In regards to the healing of the wound, complete epithelialization is observed in 94.4% of cases on the seventh day. This is owed to the stimulating effect of the laser radiation on the surrounding tissues and to the absence of coagulation when using an Er-YAG laser, as other authors have also established. (Armenores *et al*., 2010; Ishii *et al*., 2003)

Conclusion

Based on the analysis of the results, received from the prospective study, we can conclude the following: the wounds received after treatment of oral leukoplakia with an Er-YAG laser heal painlessly and without complications. The method provides excellent comfort for the patients, combined with good treatment results.

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