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Laser Systems – A niche tool in management of oral lichen planus.

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Abstract

Laser systems as a treatment tool for soft tissue and potentially malignant lesions is gaining popularity in the present era. The potential advantages of these systems over surgical procedures in providing surface sterilization, dry surgical field, minimal invasion and increased patient acceptance makes it a state of the art tool for management of mucosal lesions. With a plethora of treatment modalities available for oral lichen planus definitive cure still remains obscure. This article explores the efficacy of lasers in the management of symptomatic oral lichen planus lesions refractory to conventional therapy.

Oral lichen planus (OLP) is a chronic mucocutaneous disease affecting 2 per cent of the population with a marked female predliction. It is characterized by erosive lesions, bullous, papular, reticular or white patches on oral mucous membranes. There are reports of association with lesions in the nails, scalp and other areas of mucosa such as on esophagus and vagina (1, 2).

The pathophysiology of OLP is an enigma with stress and oxidative damage as proposed etiopathological factors. Contemporary research demonstrates that it is a T-cell mediated autoimmune disease in which the cytotoxic CD8+ T cells trigger apoptosis of the basal cells of the oral epithelium. Several antigen-specific and nonspecific inflammatory mechanisms have been put forward to explain the accumulation and homing of CD8+ T cells subepithelial and the subsequent keratinocyte apoptosis. Treatment ranges across a broad spectrum from topical corticosteroids, vitamin A, anti-oxidants to laser ablation of the lesion (3).

Pharmacological agents employed in the palliation of symptoms and resolution of the lesion include use of corticosteroids (triamcinolone), cyclosporine and even anti-fungals and anti-protozoals (metronidazole) (1). In refractory cases systemic therapy is often required. Adverse reactions include mucosal atrophy, candidiasis, gastrointestinal upset, hypertension, hyperglycemia. However, symptoms in certain patients may not be alleviated, and the risk of relapse is high.

Lasers for lichen planus have shown promising results. We wish to shed light on their role in this auto-immune disease.

Lasers of different wave lengths are available and several have shown promising initial results. The efficacy of low-intensity and CO2 laser was tested in a study conducted by Agha-Hosseini et al; both lasers had a remarkable impact on pain, size of lesions and also clinical response (4).

The CO2 laser tissue effect is mainly generated by generating heat. This heat will result in temperature changes that will carbonize and vaporize the irradiated tissues. The operation on the tissue happens in two phases. Next, the optical energy of the molecules that absorb radiation is converted into vibrational energy. The energy becomes the conversion in a second step, which is followed by an increase in temperature and consequently its chemical decomposition. Laser wounds have a slight tissue healing contraction as opposed to scalpel-made wounds. This contraction occurs primarily in excisions, with considerable loss of tissue and its purpose is to approximate the edges of the wound. That can result in scarring. Also, hemostasis, reduced scar formation, and immediate sterilization of surgical wounds are other benefits of the CO2 laser (5).

The excimer laser was used in OLP biostimulation, with a photochemical reaction causing the lesion to regress (6). Maghales et al reported a case of A 46-year-old female and the use of the CO2 laser was found to be useful and effective to OLP (1).

Effective treatment like low-level laser therapy (LLLT) has been introduced for treating erosive OLP with minimal side effects. Several low-level lasers have been used to treat oral lichen planus, including ultraviolet (waves of below 350 nm length), Helium-Neon (632 nm), and more recently, diode (a spectrum of red to infrared wavelengths, 600 to 1100 nm) lasers. These lasers have been used with different wavelengths, intensities, powers, durations, number of sessions, and therapeutic approaches (with or without tissue absorbent) (7).

The principle of LLLT application is based on its bio stimulatory, anti-infective, and anti-ablation effects. Typically involves the intensification of electromagnetic fields excited by an external source of energy such as light that emits coherent, well-collimated, and monochromatic laser beam. This mechanism implies redox regulation that explains the clinical effects in the chronic inflammatory response (OLP) characterized by acidosis and tissue hypoxia that has the potential of tissue healing and tissue regeneration without systemic disturbances and undesirable effects on the healthy tissue (8).

Effects of LLLT on tissues include vasodilatation, enhanced blood flow, lymph drainage, neutrophils, fibroblast activation and pain stimulation threshold. Other effects are the aggregation of prostaglandins(PGE2), immunoglobulins and lymphokines, β –endorphins in tissues resulting in the reduction of inflammation, immune response and pain. Several LLLTs are used to treat OLP in the range of 600-1100nm, with various intensities, power, duration and number of sessions.

Suman et al showed successful reported three cases of EOLP treated via 980nm diode laser with complete remission of symptoms rapidly with no adverse effects

Mahdavi et al presented two cases of Erosive OLP treated via 630 nm low-level laser and found that there was decrease the pain and the soreness with no side effect (8). In another study by nahid et al Patients who were treated by LLLT with a wavelength of 970 nm reported acceptable results as well in a short follow-up study (9).

In the study by Kollner et al., 75 to 150 mJ/cm2 power of 308 nm excimer laser was emitted to OLP lesions three times a week, up to 32 sessions (10).

Jajarm et al showed in their study that 630 nm diode laser LLLT was as effective as topical corticosteroids with less side effects in the analysis. It was concluded that, LLLT may be a suitable alternative for treating erosive – atrophic OLP (11).

Soleiman et al. tested the efficacy of 980 nm diode laser in OLP care, no significant side effects were reported. And the approach was recommended as a viable solution for local and systemic addiction treatment (12).

Akram et al in their study, included five clinical researches. All included studies reporting clinical scores showed that LLLT was effective in the treatment of OLP in adult patients at follow-up. Three studies showed significantly higher improvements with topical use of corticosteroids compared to LLLT, while one study showed significant improvement with LLLT. One study showed comparable outcomes between LLLT and corticosteroid application (13).

To conclude, the treatment of symptomatic OLP, especially the erosive variant, represents a perplexing therapeutic

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challenge. Despite numerous existing remedies, there are many treatment failures. However, the efficacy of lasers in the management of symptomatic OLP lesions refractory to conventional therapy has not been studied extensively. Extensive clinical studies with a larger pool of patients and longer follow up are needed to approve this method before it may receive acceptance as a standard clinical treatment.

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