Low Level Energy Laser in Oral Mucositis: A Pilot Study

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INTRODUCTION / BACKGROUND:

Mucositis is the painful inflammation and ulceration of the mucous membranes lining the digestive tract, usually as an adverse effect of chemotherapy and radiation therapy.[1] Mucositis can occur anywhere along the gastrointestinal (GI) tract, but oral mucositis (OM), commonly referred to as “stomatitis” or “mouth sores”, refers to the particular involvement of the mouth. Oral mucositis is a common and often debilitating complication of cancer treatment.[2] OM affects many patients undergoing high-dose chemotherapy and hematopoietic cell transplantation. Support Care Cancer 2007; 15: 521-539. ISBN-10 1-85097-150-1

Sores or ulcerations can become infected by virus, bacteria or fungus. These may act as a site for local infection that may cause sepsis especially in immunosuppressed patients. Pain and loss of taste perception make it more difficult to eat, which leads to weight loss. Approximately 50% of all patients who receive chemotherapy develop some oral mucositis that results in oncology treatment planning delays, dose reduction or even discontinuation of treatment that may affect oncologic treatment response.[3]

MECHANISM OF ACTION:

The mechanism by which LLLT affects cells is not well understood but it seems to be based on bio-stimulation.[4] It is believed that low-level radiation is absorbed by intracellular photoreceptors in the membrane of the mitochondria. The effects include a reduction in pain due to increased endorphins, reduction in inflammation via downregulation of pro-inflammatory cytokines and tissue healing effects as a result of increased neovascularization and macrophage activity.[5]

The specific parameters of laser therapy that can affect biological response include: 1. Wavelength (μm), 2. Laser power (mW), 3. Amount of energy to be delivered to tissues per square area (J/cm²), and 4. Rate of energy or intensity (W/cm²).

RESULTS:

50 adults were treated with the LLEL. Some patients suffered from recurring lesions due to ongoing chemotherapy. During those episodes the patients suffered from different grades of lesions; 50% were diagnosed with grade 1-48%, grade 2 and with 2%-grade 3. At each new visit the scoring in pain and severity of lesion was recorded. Pain was often described as a burning sensation and the patient may experience trouble speaking, eating, or even opening the mouth. Patients tolerated the laser treatment without any adverse effects or reactions.

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PATIENTS AND METHODS:

Chemotherapy experienced patients diagnosed with cancer between the ages of 18 and 80 undergoing chemotherapy with symptoms of oral mucositis participated in this study. There were no ECOG performance status restrictions to this study. Patients were assessed for eligibility to the laser therapy based on the World Health Organization (WHO) Toxicity scoring system. The WHO scale is based on subjective, objective and functional outcomes. A single score that grades the extent of the condition from 0 (no observed toxicity) to 4 (swallowing not possible such that patient needs supplementary nutrition). The impact of laser therapy on pain control was evaluated using a visual analogue scale.

Patients, as part of the CTCA Patient Empowered Model of Care (P2C) model, met with various medical disciplines during their course of treatment and many were offered the following recommendations:

1. Medical Oncologist: deoxchemo, mauxil, ranitidine, carafate, benadryl, and/or lidocaine.
2. Naturopathic Physician: supplements including L-glutamine, probiotics, herbs and/or vitamins.
3. Registered Dietitian: plenty of liquid intake. Avoicil fruit, alcohol, protein, and foods that are hot are all known to aggravate mucositis.
4. Patient Education/Care Management/Wound Care Nurses: clean their mouth every four hours and at bedtime. Water-soluble jellies to lubricate the mouth and salt mouthwash to help soothe the pain and keep food particles clear so as to avoid infection.

Blood count cells of the platelets and absolute neutrophils were registered. The laser was to be applied every 48 hours, repeating the procedure at each visit until complete healing of the lesion occurred. Number of visits administered: 18-36 jouses per treatment session (approximately 3.5-7.0 min). For many patients a reported clear progress in healing was observed. All patients tolerated the laser treatment without any adverse effects or reactions.

DISCUSSION:

Prevention of ulceration can minimize pain, risk of infection, use of feeding tubes and length of stays in hospital. In immunocompromised patients, there is a risk of developing oral thrush which is a submucosal yeast to produce bacteremia or sepsis. No standard therapy is known for OM and if therapy exists it is mostly supportive; basic oral care, bland oral rinses, analgesics, cryotherapy, antibiotics, growth factors and cytokines, biologic mucosal protectants and anti-inflammatory agents.[6-8]

We had opportunities for study improvement. There were multiple providers delivering the therapy and who have contributed to inter-operator variability. Many of our patients were utilizers of complimentary medications and supplements and we did not control for this in the study. Taking pictures of the lesions would have made it easier to grade the mucositis and track more objective progress. It is not known whether patients received visits to dentist for routine odontologic treatment. There is some research to show benefit using the laser preventively and we did not utilize that in this study.

CONCLUSIONS:

The three main effects applicable to LLLT are: 1) analgesic effect, 2) anti-inflammatory and 3) a fast wound healing. These results were confirmed in this study along with other studies[9-11]. New guidelines could be developed regarding the use of LLLT in treating oropharyngeal pain. A more extended study is needed to further confirm this promising result.

FUTURE DIRECTION:

In a 2012 randomized controlled pilot study involving pediatric patients, topical application of honey was found to reduce recovery time in grade 2 and 3 chemotherapy-induced oral mucositis to a degree that was statistically significant. In grade 3 oral mucositis, honey was shown as effective as a mixture of honey, olive oil and propolis, while both treatments were found to reduce recovery time compared to the placebo group.

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