

Beneficial Effects of Applying Low-Level Laser Therapy to Surgical Wounds After Bariatric Surgery

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Abstract

Background: Bariatric surgery is a successful method for weight loss in cases of morbid obesity; however, as an invasive procedure, surgical complications may occur. Low-level laser therapy (LLLT) has been increasingly used due to its effectiveness in controlling the inflammatory response, accelerating tissue repair, and reducing pain. The objective of this study was to investigate photobiomodulation effects after bariatric surgery and determine the laser actions during the inflammatory process, wound healing (clinical observation), and analgesia. **Methods:** This study was a randomized, placebo-controlled, clinical trial in which 85 patients underwent Roux en-Y gastric bypass (RYGB) by conventional techniques (i.e., open surgery). Patients were divided into two groups and were irradiated with LLLT at 10 different points through the surgical scar in three sessions of applications: the laser group (laser-on) consisted of 43 patients who received the CW diode laser (MMOptics), while the placebo group (laser-off) consisted of 42 patients who were treated by the same protocol but with a disabled laser. Temperature was measured by a digital thermometer in both groups, and pain was evaluated using the visual analogue scale for pain. Biochemical analysis and digital images were used to document and evaluate the inflammatory response as well as tissue repair process at the surgical wound site. **Results:** Patients in the laser group demonstrated diminished wound temperature as erythrocyte sedimentation rate (ESR) compared with the placebo group, indicating better inflammatory process control as well as improved wound healing and reduced pain. **Conclusions:** LLLT applied with the described protocol led to a decrease by biochemical markers and wound temperature compared with the placebo, which indicated that LLLT was able to control the inflammatory process; in addition, seroma and pain were reduced and cicatrization was improved by this preventive procedure.

Keywords: analgesic effect, cicatrization, low-level laser therapy (LLLT), morbid obesity, seroma

Introduction

OBESITY IS CONSIDERED one of the most relevant public health issues worldwide. The World Health Organization estimates that a quarter of the global population has become either overweight or obese.¹ Bariatric surgery is used as an adjuvant method for reducing the morbidity and mortality related to these conditions. Despite the benefits of the procedure, unexpected complications can potentially occur; thus, the more that is known about how to handle such events, the better patients will recover from bariatric surgery.

Low-level laser therapy (LLLT) acts through photo-physical and chemical responses that promote biomodulation

effects in the treated tissues and cells. This photobiomodulation can cause two types of effects, that is, biostimulation and/or bioinhibition responses.²

Electromagnetic radiation interactions occur mostly in unstable redox environments (typically in physiological stress situations); these interactions stimulate photo-acceptor molecules in the cellular membrane and in mitochondrial receptors, thereby aiding injured tissue to reach homeostasis.^{3,4}

LLLT has been clinically applied to reduce edema by modulating the inflammatory response; LLLT has been shown to increase phagocytosis and collagen synthesis, reduce pain, and promote tissue repair and re-epithelialization.^{5–7}

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