

Role of Low Level Laser Therapy in Healing of Skin Graft Donor Site

Venkatesh A¹, Ravi Kumar Chittoria², Jacob Antony Chakiath³

How to cite this article:

Venkatesh A, Ravi Kumar Chittoria, Jacob Antony Chakiath/Role of Low Level Laser Therapy in Healing of Skin Graft Donor Site/RFP Journal of Plastic Surgery and Transplantation. 2023;4(2):99-101.

Abstract

Aim of this case report is to assess the role of low level laser therapy in management of skin graft donor site healing. Clinical examination of the donor site before and after the use of low level laser therapy was done. Low level laser therapy is effective in healing of donor site wound. LLLT may be used in donor site healing.

Keywords: Low Level Laser Therapy; LLLT; Skin Graft.

INTRODUCTION

Management of skin graft donor site wound poses a challenge regarding improving the general condition of the patient and adequate dressing of the wound. Usually the donor site is not opened after grafting till it heals. If it is opened due to some reasons like infection, one of the available methods of donor site wound care is low level laser

therapy which is believed to affect the function of connective tissue cells (fibroblasts), accelerate connective tissue repair, and act as an anti-inflammatory agent.¹ The aim of this case report is to assess the role of low level laser therapy (LLLT) (Fig. 1) in management of donor site healing.

MATERIALS AND METHODS

The study is done in a tertiary care hospital in South India. The subject is a 57 year old male, with no comorbidities, with alleged history of RTA and sustained injury to right lower limb (both bone fracture right leg). The patient underwent external fixation and bone debridement in orthopedic department. The patient was then referred to Plastic Surgery department for coverage of right lower limb raw area extending just below the knee joint to the ankle region with exposed tibia. SSG taken from the right thigh and it is used to cover the raw area over right lower limb. The donor site (Fig. 2) is treated with collagen scaffold dressing, LLLT, APRP and CNPWT. LLLT was given (Fig. 3).

Author Affiliation: ¹Junior Resident, Department of General Surgery, ²Professor, Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, ³Senior Resident, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor, Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

E-mail: drchittoria@yahoo.com

Received on: 28-03-2023

Accepted on: 23-04-2023



Fig. 1: Low Level Laser Therapy (LLLT) machine



Fig. 2: Skin graft donor site before LLLT



Fig. 3: LLLT applied over skin graft donor site

RESULTS

LLLT is useful in healing of donor site wound and fasten the wound healing in our patient. (Fig. 4)

DISCUSSION

Laser can be abbreviated as "Light Amplification



Fig. 4: Skin graft donor site healed after LLLT

by Stimulated Emission of Radiation." Low Level Lasers has a power density at less than 500 mW/cm².² It is defined as low level laser as the energy used is very much less than that is used for cutting, ablation therapy. Low Level Laser Therapy (LLLT) is used as an adjuvant to available therapy, especially in patients with acute and bloody ulcers.³ LLLT is a form of phototherapy that uses electromagnetic radiation capable of generating energy to interact with living tissues. It produces photochemical and photo physical effects and does not produce heat, with the intention of re-establishing cell homeostasis.⁴ Essentially, light energy is delivered topically in a controlled manner and is absorbed by photo absorbers (chromophores) that transform it into chemical energy.⁴

Positive energy includes acceleration of tissue repair, improved formation of granulation tissue, accelerated wound contraction, decreased inflammation, modulation, and pain reduction.⁵

According to the literature, low energy photo missions given at a wave length of 600 nm to 900 nm can accelerate cell proliferation and the wound healing processes.⁶ It is thought to: Stimulate respiratory chain components such as flavin and cytochromes which increase adenosine tri phosphate (ATP) synthesis, thus increasing the rate of mitoses and increasing fibroblast numbers, promote collagen and elastin production, leading to better re-epithelialisation, stimulates microcirculation and dilations of the capillaries and neovascularisation to increase tissue oxygenation, release mediator substances such as histamine, serotonin and bradykinin in to influence macrophages, rejuvenate lymphatic vessels.⁷

CONCLUSION

Low level laser therapy is found to be effective in improving wound healing in skin graft donor site.

REFERENCES

1. Avci P, Gupta A, Sadasivam M, Vecchio D, Pam Z, Pam N, Hamblin MR. Low level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring. *In Seminars in cutaneous medicine and surgery* 2013 Mar (Vol. 32, No. 1, p. 41).
2. Lubart R, Wollman Y, Friedmann H, Rochkind S, Laulicht I. Effects of visible and near infrared lasers on cell cultures. *J Photochem Photobiol B.* 1992;12(3):305-310.
3. Wu W, Naim JO, Lanzafame RJ. The effect of laser irradiation on the release of bFGF from 3T3 fibroblasts. *Photochem Photobiol.* 1994;59(2):167-170.
4. Vinck EM, Cagnie BJ, Cornelissen MJ, Declercq HA, Cambier DC. Increased fibroblast proliferation induced by light emitting diode and low power laser irradiation. *Lasers Med Sci.* 2003;18(2):95-99.
5. Frigo L, Fávero GM, Lima HJ, Maria DA, Bjordal JM, et al. Low level laser irradiation (In Ga AIP-660 nm) increases fibroblast cell proliferation and reduces cell death in a dose-dependent manner. *Photomed Laser Surg.* 2010;28 (Suppl 1):S151-S156.
6. Basso FG, Oliveira CF, Kurachi C, Hebling J, Costa CA. Biostimulatory effect of Low level laser therapy on keratinocytes in vitro. *Lasers Med Sci.* 2013;28(2):367-374.
7. Szymanska J, Goralczyk K, Klawe JJ, Lukowicz M, Michalska M, et al. Phototherapy with Low level laser influences the proliferation of endothelial cells and vascular endothelial growth factor and transforming growth factor-beta secretion. *J Physiol Pharmacol.* 2013;64(3):387-391.

