Role of Low Level Laser Therapy in Full Thickness Skingraft Donor Site

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ABSTRACT

Low level laser therapy (LLLT) has been used in different fields, including healing of chronic ulcers like diabetic and pressure ulcers. Here we are using this method to look for role in FTSG donor site. Full thickness skin grafts include full thickness of the epidermis and dermis whereas split thickness skin grafts (STSG) include the entire epidermis and only partial dermis. LLLT improves tissue perfusion and fibroblast proliferation, with increases in collagen synthesis accelerating wound healing. The purpose of this case report is introducing LLLT as a therapeutic method for accelerating healing of FTSG donor site.

Keywords: Low level laser therapy; Full thickness skin graft; Donor site.

INTRODUCTION

Full thickness skin grafts are most common procedure done in plastic surgery for the skin defects. Full thickness skin graft sites are closed usually by suturing of the wound. Low level laser therapy helps in accelerating the wound healing process by stimulating microcirculation and collagen deposition in the wound.[1] In this case report we assess the role of low level laser therapy in full thickness skin graft donor site for better and faster healing.

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MATERIALS AND METHODS

The study was conducted in a tertiary care hospital in south India. Informed consent obtained from the patient. This is non-randomized prospective study conducted in department of plastic surgery. The patient was a 21 years male with alleged thermal burns at 2 years of age over left hand. Post burn contracture release followed by full thickness graft taken from left groin. (Fig. 1)

Donor site management with Low level laser therapy (LLLT) done over the donor site for 10 min after the wound closure. (Fig. 2)

Low level laser used was Gallium Arsenide (GaAs) diode red laser of wavelength 650 nm, output power 100 mW, frequency 10 kHz, continuous beam, scanning mode, non-contact delivery (60 cm distance between laser source and scar) with area of delivery adjustable according to the size of scar. Laser therapy was given for duration of 10 minutes. Therapy is given post-operatively immediately after suturing. LLLT was

given to the wound on day one, with all laser safety precautions in dedicated laser room.

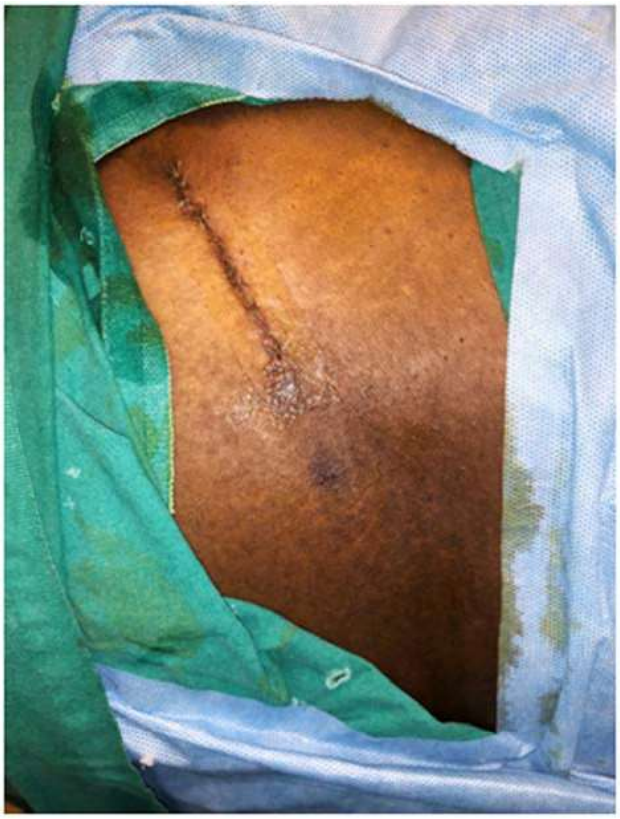

Fig. 1: Donor site wound after primary closure

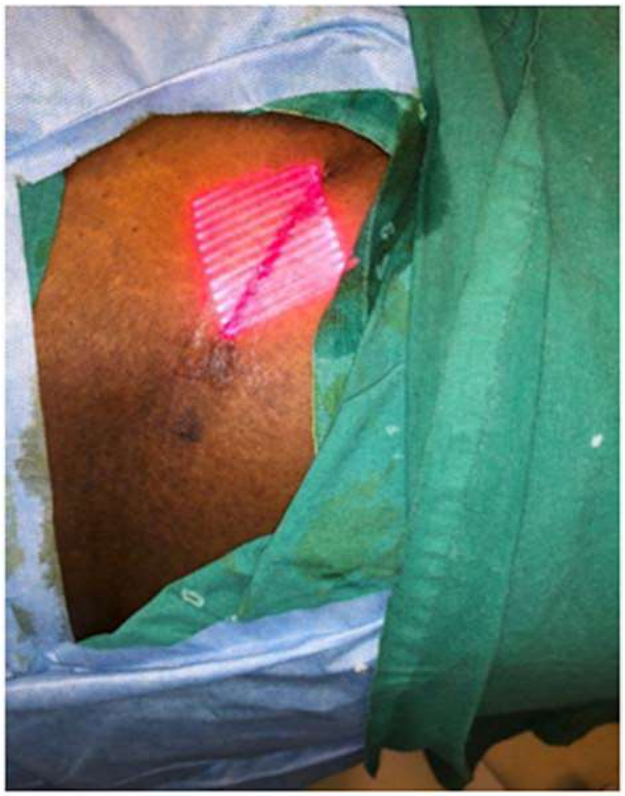

Fig. 2: LLLT application at donor site

Low level laser used was Gallium Arsenide (GaAs) diode red laser of wavelength 650 nm, output power 100 mW, frequency 10 kHz, continuous beam, scanning mode, non-contact delivery (60 cm distance between laser source and scar) with area of delivery adjustable according to the size of scar. Laser therapy was given for duration of 10 minutes. Therapy is given postoperatively immediately after suturing. LLLT was given to the wound on day one, with all laser safety precautions in dedicated laser room.

RESULTS

The application of LLLT over full thickness graft donor site aided in the healing of the wound. (Fig. 3) No complications noted post-operatively. Patient discharged successfully.

Fig. 3: Post-operative day 7 FTSG donor site

DISCUSSIONS

FTSG works well for reconstruction of burns contracture. LLLT helps in healing at FTSG donor site and thus decreases morbidity related to burn contracture. Contracture causes physical and aesthetics consequences and appropriate treatment

is very essential for day-to-day activities of victim post trauma. Proper site selection should be made to decrease donor site morbidity. LLLT has been found to be safe and beneficial in few case reports for uptake of FTSG post burn contracture but randomized controlled trials had yet to be done.

The acronym LASER abbreviated as "light amplification by stimulated emission of radiation", are defined by a power density at <l500 mW/ cm^2.[2,3] Energy used in LLLT is much less than the one used for cutting, and ablation therapy. LLLT is a form of phototherapy that employs electromagnetic radiation, that is capable of generating enough energy for interacting with living tissues. It produces photochemical and photophysical effects without generation of heat, with consideration of re-establishing cell homeostasis. Essentially, light energy is delivered topically in controlled way which is absorbed by photo absorbers (chromophores) that transform it into chemical energy.[4] Positive effects include increased formation of granulation tissue and acceleration of tissue repair, wound contraction, inflammation, modulation, and pain reduction.[4] As per literature, low energy photo emissions given at a wavelength range of 600nm to 900nm accelerate cell proliferation and promote wound healing.[5] Its action is thought to:

- Stimulate respiratory chain components promoting ATP synthesis, 6 and hence increase rate of mitoses and fibroblast numbers.[6]
- Stimulate collagen and elastin production.[7]
- Stimulate micro-circulation with dilatation of the capillaries and neovascularisation.[8]
- Liberate mediator of inflammation-histamine, serotonin and bradykinin and hence activate macrophages.
- Regenerate lymphatic vessels.

CONCLUSION

In our study we found that LLLT was useful in promoting wound healing at FTSG donor site and prevention of complications.

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