

Role of Low Level Laser Therapy in Management of Pediatric Thermal Burn

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Abstract

Low level laser therapy (LLLT) has a role in wound bed preparation, wound healing process, joint stiffness, nerve regeneration, antimicrobial action and prevention of postburn scarring. Superficial burns are usually managed by healing by secondary intention. Deeper burns need early excision or debridement followed by cover by either skin graft or flap. Regenerative technology like low level laser therapy (LLLT) helps in healing of superficial burns. Further, Low Level Laser Therapy (LLLT) helps in controlling infection & promoting healthy granulation so that burn wound could be covered with skin graft or flap. After wound healing LLLT helps in prevention of hypertrophic or abnormal scarring. In this study, we studied the role of LLLT in management of pediatric thermal burns.

Keywords: Low level laser therapy; Pediatric; Thermal burns.

INTRODUCTION

Thermal burns are the most common modality seen in the pediatric group, mostly due to accidental fall of hot water (scald injury). Post thermal burn injury patient may develop a post burn scar or contracture if there is a delay in treatment.

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Low level laser therapy (LLLT) has a role in wound bed preparation, wound healing process, joint stiffness, nerve regeneration, antimicrobial action and prevention of postburn scarring. Superficial burns are usually managed by healing by secondary intention. Deeper burns need early excision or debridement followed by cover by either skin graft or flap. Regenerative technology like low level laser therapy (LLLT) helps in healing of superficial burns. Further, Low Level Laser Therapy (LLLT) helps in controlling infection & promoting healthy granulation so that burn wound could be covered with skin graft or flap. After wound healing LLLT helps in prevention of hypertrophic or abnormal scarring.¹ Limited clinical studies are available on role of LLLT in the management of pediatric thermal burns. In this study, we studied the role of LLLT in management of pediatric thermal burn wounds.

METHODS AND MATERIALS

This study was conducted in the plastic surgery department in JIPMER tertiary care center. Informed written consent was taken from the patient. The study was done on a one year old boy with no known comorbidities, sustaining 20% second degree mixed burns (superficial and deep) injuries over the right upper limb, hand, trunk due to accidental fall in hot water, while playing (Fig. 1). After resuscitation and acute management, for burns wounds plan was to manage superficial burns with medical management including dressing & adjuvant LLLT (Fig. 2). For deeper burns, plan

was to do early tangential excision & skin grafting (Fig. 3). We used Gallium Arsenide (Ga As) diode red laser of wave length 650 nm, frequency 10 kHz and output power 100 mW. It was a continuous beam laser with an energy density of 4 J/cm². The machine delivers laser in scanning mode (non-contact delivery) with a 60 cm distance between the laser source and wound. Superficial burn wounds were given low level laser therapy for duration of 125 seconds every time. Two sessions were given every 3rd day. Results were evaluated by noting total time taken in healing of superficial and deeper burns.



Fig. 1: 20% mixed (superficial & deep second degree) scald thermal burns over chest, abdomen and right arm.



Fig. 2: Application of low level laser therapy for superficial scald burns



Fig. 3: Skin grafting done for deeper burns



Fig. 4: Status after complete wound healing

RESULTS

Superficial burns healed in 7 days. deeper burns healed in 10 days. Donor site of skin graft healed in two weeks (Fig. 4). Post-operative period was uneventful. No complications were noted related LLLT or surgery. patient was discharged after rehabilitation in 3 rd week.

DISCUSSION

The acronym LASER can be abbreviated as "light amplification by stimulated emission of radiation". Low level lasers are defined by a power density at less than 500 mW/cm². It is defined as low level laser as the energy used is much less than that is

used for cutting, ablation therapy. Low-level laser therapy (LLLT) has been used as an adjuvant to conventional therapy with promising results, especially in patients with acute and bloody ulcers.¹ LLLT is a form of phototherapy that employs electromagnetic radiation capable of generating enough energy to interact with living tissues. It produces photochemical and photophysical effects without generating heat, with the intention of re-establishing cell homeostasis. Essentially, light energy is delivered topically in a controlled, safe manner and it is absorbed by photo absorbers (chromophores) that transform it into chemical energy. Positive effects include acceleration of tissue repair, increased formation of granulation tissue, wound contraction, inflammation, modulation, and pain reduction.² According to the literature, low-energy photoemissions given at a wavelength range of 600 nm to 900 nm accelerates cell proliferation and wound healing processes.^{3,4,5}

Laser therapy is a painless, cost effective procedure which induces faster granulation, wound contraction and re-epithelialization. It thus accelerates complete wound healing, avoiding the need for secondary procedures like split skin grafting. Control of infection is also better in patients whom low-level laser therapy was given.⁶ In addition to reducing the lesion area and accelerating the healing process, laser therapy has the advantage of being easily administered. These benefits assist in promoting patient quality of life and minimizing possible complications.⁶

In our study we used LLLT for healing superficial burns as an adjuvant regenerative technology & was found to be useful. Limitation of our study

is that it's a single patient based study with no control done in a single Centre. Large randomized controlled multicentric studies are required to substantiate result of our study.

CONCLUSION

Low Level Laser Therapy (LLLT) is an adjuvant regenerative technology helps in the healing of superficial burns.

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