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Role of Low Level Laser Therapy in Post Burns Scar

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Abstract

The effectiveness of low level laser for post burns scar to reduce the size of the scar. Although low level laser therapy, its effectiveness and the process by which it reduces the size of the post burns scar are inadequate, in our study low level laser was performed on a subject with post burns scars on the trunk and evaluated the efficacy and mechanism of action of a non-invasive body contouring intervention approach using LLLT.

Keywords: Low Level Laser Therapy; Scar; Burns.

INTRODUCTION

The efficient healing of skin wounds is crucial for securing the vital barrier function of the skin, but pathological wound healing and scar formation are major medical problems causing both physiological and psychological challenges for patients. Burns remain a common injury after which many patients develop a severe form of scarring known as hypertrophic scarring. The formation of the hypertrophic scar arises from the excessive production of collagen during wound healing. Low level laser (light) therapy (LLLT) is a fast growing technology used to treat a multitude of conditions that require stimulation of healing, relief of pain and inflammation, and restoration of function. Therefore, we aim to establish the importance of using low level laser therapy in the treatment of post burn scarring.

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MATERIALS AND METHODS

This study was conducted in tertiary care centre in department of plastic surgery after getting the department ethical committee approval. Informed consent was obtained for examination and clinical photography. A 61-year-old male with no known comorbidities presented with an alleged history of electric burns causing him to sustain an island of 2nd degree burns over the right side of the chest and right side of the abdomen with entry wounds on bilateral hands and exit wounds over the left foot. The patient underwent wound debridement with skin grafting (Fig. 1) The patient was treated with LLLT (Fig. 2). The initial Vancouver scar scale was

calculated to be.[9] The scar was assessed with the Vancouver scar scale (VSS) and patient satisfaction. LLLT was given over 3 sittings, 3 weeks apart were given.

Fig. 1: Initial scar after skin grafting

Fig. 2: Low Level Laser Therapy applied on the scar

RESULTS

In our study, after application of LLLT the quality of post burns scar improved subjectively and the VSS was 3 at the end of the sessions (Fig. 3). No adverse local or systemic effect noted with the use of LLLT.

Fig. 3: Scar after treatment

DISCUSSION

The healing of a burn wound is accomplished either by restitution (complete regeneration) or substitution. Restitution is possible only if the skin is burnt as deep as the stratum papillare and all the specialised cells of the organ are preserved. The epithelial cells, in these cases, are derived from the epithelial appendages such as pilosebaceous units and sweat glands in the central portion and wound edges at the periphery. These appendages extend into the deeper dermis and may even penetrate into the subcutaneous fat and survive in partial thickness injuries. The sequence of cellular events that comprise epithelialisation includes cellular detachment, migration, proliferation and differentiation. If the skin is affected deeper in the zone of stratum reticulare, the defect is covered by substitutive unspecialised connective tissue. The final result is demonstrated by a lesser or more extensive formation of the cicatrix. With full thickness loss of skin, wound contraction and epithelialisation from the margins occur leading to contractures.[1]

Although the elucidation of the genetic component of scarring is in its infancy, DNA genotyping has been used to identify the variant genes associated with the severity of the hypertrophic scar. In a study of predominantly white males, a particular variant of the CUB and Sushi multiple domains 1 (CSMD1) gene was associated with less severe post-burn hypertrophic scarring. The role of the resultant protein in the hypertrophic scar is yet unknown; the protein produced by the CSMD1 gene is a putative tumour suppressor, the expression of which is elevated in cells isolated from head and neck cancers. The reduction in post-burn hypertrophic scar in the presence of the RE11136645 variant is postulated to be related to inflammation via complement activation, regeneration of neurons, or signalling via the TGF-β/SMAD1 pathway – a key pathway known to modulate post-burn hypertrophic scarring.[2]

Low-level lasers that affect biological systems without using heat include those made of Krypton, Argon, He, Ne, and ruby. When the tissue

chromophores are influenced by laser energy, the cytochromes in the mitochondria absorb the laser radiation and convert them into energy by the cell (ATP), and created energy induces protein synthesis and acceleration or stimulation of cell proliferation. The interaction of light with biological tissues is influenced by various factors, including wave length, laser dose, and the tissue's optical characteristics. The structure, water content, thermal conductivity, heat capacity, density, and capacity to absorb, disperse, or reflect the released energy are examples of tissue qualities.[3-4]

CONCLUSION

Low level laser isan effective, non-invasive therapy for the management of post burn scarring, but needs large scale randomised trail for application in large scale.

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