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A Case Report on Management of Hand Burns in a Leprosy Patient

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Abstract

Leprosy, or Hansen's disease, is a chronic infectious condition caused by *Mycobacterium leprae*, characterized by skin and peripheral nerve involvement. Theanaesthetic nature of leprosy lesions predisposes patients to unnoticed injuries, complicating the management of burns and chronic wounds. Burn injuries in leprosy patients are challenging due to delayed presentation, impaired healing, and increased susceptibility to infections. Advanced wound care modalities, including Autologous Platelet-Rich Plasma (APRP) and Low-Level Laser Therapy (LLLT), have emerged as promising solutions to address these challenges.APRP, rich in growth factors like PDGF, VEGF, and TGF-β, enhances angiogenesis, reduces inflammation, accelerates epithelialization, and promotes tissue regeneration, thereby improving wound healing. LLLT utilizes specific wavelengths of light to stimulate cellular activity, enhance microcirculation, boost collagen synthesis, and facilitate faster wound closure. When incorporated into a comprehensive management strategy, these techniques can significantly improve outcomes for burn wounds in leprosy patients.

This article highlights the unique challenges of burn management in leprosy and emphasizes the role of advanced therapies such as APRP and LLLT in optimizing wound healing and reducing complications. A multidisciplinary approach combining these modalities with conventional wound care, infection control, rehabilitation, and patient education is essential for achieving favorable outcomes.

Keywords: Leprosy, Burns, Hansen's disease, Autologous Platelet Rich Plasma, Low Level Laser Therapy, Adult burns.

INTRODUCTION

Hansen disease, or leprosy, is a chronic granulomatous bacterial infection that primarily affects the peripheral nerves and skin. Although not fatal, leprosy remains one of the leading causes of non-traumatic peripheral neuropathy globally. The clinical presentation and histopathologic changes depend on the patient's immune status at

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the time of infection and over the natural course of the disease.Burns injury is one of the important factors contributing to mortality in a developing country like India. Burns injury management in a patient with preexisting leprosy involves proper management of both conditions. In recent years skin regenerative techniques such as APRP and LLLT have been found to give better results in wound management as they reduce inflammation and aid in the healing process.

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. The subject was a 32yr/M with postburn raw area over right hand with Hansen's disease (*Fig. 1*). He had a sudden seizure episode and his hand fell into a flame and sustained 2nd degree thermal burns over right hand. He had a past history of diagnosis of Hansen's disease and was a defaulter.

Fig. 1: Thermal burn wound over right hand

He was admitted in tertiary burn care unit and initial resuscitation with intravenous fluids, analgesics and prophylactic antibiotics started. Nerve biopsy from superficial radial nerve of right hand was taken showed absent nerve fascicles and nerve PCR positive for Myco. leprae and hence started on MB-MDT. Serial debridement,regular low level laser therapy and autologous platelet rich plasma therapy was given (*fig. 2, 5, 6*). Regulated oxygen enriched cyclical negative pressure wound therapy was provided (*fig. 3*). Once the wound bed was deemed healthy, split skin grafting (*fig. 4*) was done over the wound surface to cover the defect. APRP and LLLT were applied to the SSG site. Topical collagen based antibiotic cream was applied over the affected area.

Fig. 2: Right hand after multiple debridement

Fig. 3: Application of cyclical NPWT

Fig. 4: Split skin grafting done over wound surface to cover the defect

Fig. 5: APRP application over SSG site

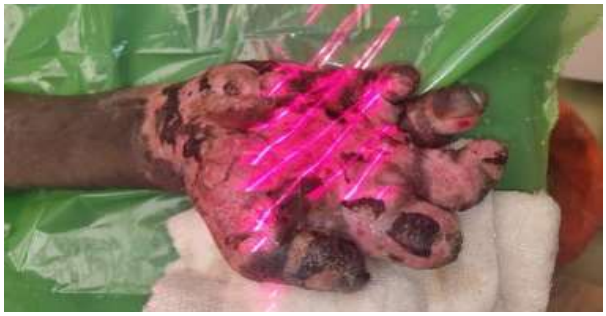

Fig. 6: LLLT application over SSG site

Fig. 7: Healed wound

RESULTS

Intraoperative and post-operative periods were uneventful for the patient. All second-degree superficial burn wounds healed completely. Graft take noticed over deeper areas. Wound healed well. (*fig. 7*) No complications and side effects were noted during entire procedure.

DISCUSSION

Mycobacterium leprae is an acid-alcohol-fast, gram-positive obligate intracellular bacillus with a distinct affinity for cells of the reticuloendothelial and peripheral nervous systems, particularly Schwann cells. It is commonly transmitted through two primary routes: the skin and nasal mucosa. The incubation period of *M. leprae* varies widely, ranging from a few weeks to as long as 30 years, with an average duration of 3 to 10 years. The bacillus preferentially infects macrophages, forming intracellular[1] clusters known as globi. Schwann cells, a key target of *M. leprae* infection, are critically affected, resulting in nerve damage, demyelination, and associated disabilities. The interaction between *M. leprae* and Schwann cells disrupts axonal conductance, exacerbating nerve injury and functional impairment[2,3].

The clinical presentation of leprosy varies based on the patient's immune response. In cases at the tuberculoid pole, there is a strong, organized, and specific cellular immune response. Conversely, lepromatous leprosy is characterized by a lack of specific immune response. The lepromatous form primarily involves the skin and peripheral nerves, presenting with well-defined infiltrated plaques that are typically annular or ovoid. Sensory impairment differs across the spectrum: tuberculoid leprosy is marked by complete anesthesia over skin lesions, borderline tuberculoid (BT) and borderlineborderline (BB) lesions exhibit hypoesthesia (partial sensory loss), and lepromatous lesions generally show no sensory loss.

Managing burn injuries in patients with leprosy is particularly challenging due to the anesthetic nature of the lesions, which increases the risk of ulceration and non-healing wounds. To enhance outcomes, advanced wound management techniques such as autologous platelet-rich plasma (APRP) and low-level laser therapy (LLLT) are essential.

Low level laser therapy is generated from G-As (gallium-arsenide) laser. LLLT acts by photobiomodulation. It has effect on cell proliferation, metabolism, angiogenesis, apoptosis and inflammation. Effective LLLT utilizes wavelength of red to near infrared (600-1070 nm). LLLT acts on cytochrome c oxidase, promotes nuclear factor kappa b which promotes cell proliferation and anti-apoptotic action. It also upregulates VEGF which promotes angiogenesis. It

has a stimulatory effect on raw areas and wounds by improving granulation. It softens scars by reducing fibrous tissue formation, improves blood supply and promotes nerve regeneration. It has an anti-inflammatory action, the mechanism of which is not clearly elucidated.[4-6]

Autologous platelet rich plasma used in a chronic wound serves as a source of growth factors and thence has mitogenic, angiogenic and chemotactic properties. Autologous platelet rich plasma has also been shown to stimulate human dermal fibroblast proliferation and thus increasing the deposition of type I collagen, the above mechanism being proposed to its use in scar management. Application of activated Autologous platelet rich plasma also provides 5 to 10 times the normal concentration of growth factors that include PDGF, VEGF, TGF-β locally also accelerating wound healing.[7-9]

Regulated oxygen-enriched negative pressure therapy (RONPWT) acts similar to the negative pressure wound therapy but allows for intermittent oxygenation of the wound. In vitro studies have demonstrated that a regulated oxygen-enriched environment can reduce anaerobic infections, thereby promoting faster wound healing.[10]

CONCLUSION

Thermal burn injuries in a patient who affected with leprosy is challenging to manage due to immunocompromised status and presence of neuropathy. We have demonstrated an effective and successful method to manage such a challenging case. In addition to serial debridement and skin grafting using regenerative therapies like APRP, LLLT and RONPWT improved the wound healing, reduced hospital stay and early rehabilitation.

REFERENCES

1. Britton W.J., Lockwood D.N. Leprosy. The Lancet. 2004; 363:1209-19.
2. G. Weddell and E. Palmer, "The pathogenesis of leprosy. An experimental approach," Leprosy Review, vol. 34, pp. 57–61, 1963.
3. J.C. Pedley, "The nasal mucus in leprosy," Leprosy Review, vol. 44, no. 1, pp. 33–35, 1973.
4. Hopkins J.T., McLoda T.A., Seegmiller J.G., David Baxter G. Low level laser Therapy Facilitates superficial wound healing in humans: A triple-blind, sham-controlled study. J Athl Train. 2004; 39:223-229
5. Gaida K., Koller R., Isler C., Aytekin O., Al-Awami M., Meissl G., Frey M. Low level Laser Therapy – a conservative approach to the Burns. 2004; 30:362-367.
6. Widgerow A.D., Chait L.A., Stals R., Stals P.J. New innovations in scar manag.ement. Aesthetic Plast Surg. 2000; 24:227-234
7. Sudhanva H.K., Panday S., chittoria R.K., Mohapatra D.P., friji M.T., Dinesh K.S. Role of APRP in the successful uptake of Split Skin DONOR. Dermatology international Volume 1 number 2 July to December 2016
8. Elankumar S., Sudhanva H.K., Abhinav A, Chittoria R.K. APRP spray devices: a novel technique of applying APRP. Dermatology international Volume 2 number 2, July to December 2017
9. Weibrich G., Kleis W.K., Hafner G., Hitzler W.E,. Growth factor levels in platelet- rich plasma and correlation with donor age, sex and platelet count. Journal of cranio-maxillofacial surgery. 2002; 30(2): 97 -102.
10. Karr J.C., de Mola F.L., Pham T., Tooke L. Wound healing and cost-saving benefits of combining negative-pressure wound therapy with silver. Adv Skin Wound Care. 2013; 26(12):562-5.