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CASE PRESENTATION

Effectiveness of physiotherapy in the rehabilitation of burn injuries: presentation of a clinical case

Efectividad de la fisioterapia en la rehabilitación de secuelas por quemaduras: presentación de un caso clínico

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ABSTRACT

Introduction: Burns represent one of the most severe forms of physical trauma, with consequences that affect both functionality and the quality of life of patients. Despite the decrease in mortality, sequelae such as hypertrophic scars and joint limitations persist, requiring multidisciplinary approaches for rehabilitation. Physical therapy emerges as an essential component in this

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process, although its application must be adapted to the individual needs of each patient.

Objective: To evaluate the effectiveness of a comprehensive physical therapy protocol in the rehabilitation of a patient with severe burn sequelae, focusing on functional and aesthetic recovery.

Case presentation: This report describes the case of a 37-year-old man with severe burns to the head and upper limbs, who presented with joint limitations and hypertrophic scars. Treatment included therapeutic laser, physical therapy, pressure therapy, and occupational therapy for four months. The results showed significant improvement in joint arches, upper limb functionality, and the aesthetic appearance of the scars, allowing the patient to return to work.

Conclusions: The physiotherapy protocol applied proved effective in the rehabilitation of burn injuries, improving motor function, scar aesthetics, and patient quality of life. This case underscores the importance of a multidisciplinary and personalized approach to burn treatment, as well as the need to continue researching safe and effective therapeutic alternatives.

Keywords: Physiotherapy; Burns; Hypertrophic Scars; Rehabilitation; Therapeutic Laser

RESUMEN

Introducción: las quemaduras representan una de las formas más graves de trauma físico, con consecuencias que afectan tanto la funcionalidad como la calidad de vida de los pacientes. A pesar de la disminución en la mortalidad, las secuelas como cicatrices hipertróficas y limitaciones articulares persisten, requiriendo abordajes multidisciplinarios para su rehabilitación. La fisioterapia emerge como un componente esencial en este proceso, aunque su aplicación debe adaptarse a las necesidades individuales de cada paciente.

Objetivo: evaluar la efectividad de un protocolo integral de fisioterapia en la rehabilitación de un paciente con secuelas graves por quemaduras, centrándose en la recuperación funcional y estética.

Presentación del caso: se describe el caso de un hombre de 37 años con quemaduras graves en cabeza y miembros superiores, que presentaba limitaciones articulares y cicatrices hipertróficas. El tratamiento incluyó láser terapéutico, kinesioterapia, presoterapia y terapia ocupacional durante cuatro

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meses. Los resultados mostraron una mejora significativa en los arcos articulares, la funcionalidad de los miembros superiores y el aspecto estético de las cicatrices, permitiendo la reintegración laboral del paciente.

Conclusiones: el protocolo de fisioterapia aplicado demostró ser efectivo en la rehabilitación de secuelas por quemaduras, mejorando la función motora, la estética de las cicatrices y la calidad de vida del paciente. Este caso subraya la importancia de un enfoque multidisciplinario y personalizado en el tratamiento de quemaduras, así como la necesidad de continuar investigando alternativas terapéuticas seguras y eficaces.

Palabras clave: Fisioterapia; Quemaduras; Cicatrices Hipertróficas; Rehabilitación; Láser Terapéutico

INTRODUCTION

Burns constitute one of the most devastating forms of physical trauma, with implications that transcend the merely somatic to profoundly affect patients' quality of life. Historically, their management has evolved from ancestral practices—such as the use of honey and rituals in 1600 BC—to current multidisciplinary protocols that integrate reconstructive surgery and specialized rehabilitation. [1] In the contemporary epidemiological context, they represent the fourth most common type of trauma globally, with an annual incidence of approximately 9 million cases and more than 120 000 deaths. [2]

The functional and aesthetic sequelae of burns present significant therapeutic challenges. Hypertrophic scars, which affect 32–94 % of survivors, are associated with joint limitation, chronic pain, and profound psychosocial repercussions. [3]

Joint contractures are particularly problematic, persisting in 20 % of cases even 5 years after the trauma, compromising return to work in up to 50 % of patients. [4]

In this complex clinical scenario, physical therapy emerges as a cornerstone of the rehabilitation process. Current evidence supports interventions such as therapeutic laser—which improves scar elasticity through selective photothermia—and early mobilization protocols that reduce the incidence of contractures from 73 % to 6 % when applied intensively. However, gaps persist in the standardization of these approaches and in the objective evaluation of their long-term outcomes. [5-6]

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This study aims to evaluate the effectiveness of a comprehensive physical therapy protocol in the rehabilitation of a patient with severe burn injuries, focusing on functional and aesthetic recovery.

CASE PRESENTATION

A 37-year-old male patient, a smoker with a medical history, suffered burns to his head and upper limbs due to an accident at the Matanzas Supertanker Base on August 5, 2022. The patient's progress was unfavorable, and he developed sepsis and deep vein thrombosis. The decision was made to transfer him to the Naval Hospital on November 11, 2022. He continued to follow up with the Caumatology specialty, who requested evaluation by the physical therapy service due to the patient's scar hypertrophy in his upper limbs. He began acute rehabilitation with psychological support, postural treatment, pressure therapy, laser treatment on upper limb scars, kinesitherapy, mechanotherapy, and occupational therapy. In February 2023, he was discharged from the Naval Hospital and referred to the physical therapy and rehabilitation service of the Matanzas Military Hospital to continue his physical therapy treatment.

Physical examination.

Integumentary and musculoskeletal evaluation:

Hypertrophic scars predominantly affecting the left side of the face were evident in the craniofacial region, with erythematous characteristics.

Upper limb changes:

Right upper limb: There was a linear hypertrophic scar involving the dorsal and medial aspect of the arm and forearm, with mild restriction of skin sliding but preservation of the full joint arches.

Left upper limb: There was a more extensive scarring pattern, affecting the dorsal and medial aspect from the proximal third of the arm to the dorsal region of the hand. Goniometry: Left elbow extension: 160° (20° limitation); left wrist extension: 65° (25° limitation); left wrist flexion: 70° (20° limitation). The remaining joints of the left upper limb showed no limitation.

Lower Extremities:

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Bilateral rectilinear scars were identified on the mid-thirds of the thighs, corresponding to skin graft donor sites, with no evidence of significant retraction or associated functional impairment.

Therapeutic Intervention Protocol:

1. Postural Treatment: Implementation of therapeutic positioning with static night splints (thermoplastic) for:
- Left upper extremity: Static wrist splint, with 20° of wrist extension.
- Right upper extremity: Static wrist splint in neutral position.

2. Compression Therapy:
- Custom-made compression sleeves for both upper extremities.
- Use protocol: 23 hours/day, removed exclusively for hygiene and physiotherapy treatment.

3. Laser Therapy: Equipment: LASS-Expert, PHYSIOMED, wavelength 808 nm.
- Parameters:
  - Dosimetry: 6 J/cm2 of energy density per impact area
  - Technique: Spot irradiation, 30 seconds/spot. Distance between spots: 2 cm.
  - Frequency: 5 sessions/week (daily, Monday through Friday)
  - Total sessions: 15
  - Areas treated: Hypertrophic scars located on the dorsal aspect of both forearms.

4. Adjuvant Pharmacological Management: HoneyDerm® (topical gel of medicalized honey + Centella asiatica)
Dosage: Cutaneous application, on areas of hypertrophic scars, with a thin local layer, every 12 hours.

5. Kinesitherapy (Exercise Therapy): Gentle assisted active mobilizations for the left wrist and elbow, and free active mobilizations for the left shoulder and right upper limb. Progressive stretching exercises for both upper limbs.

6. Occupational therapy: Activities to increase joint range in the left upper limb and maintain it in the right upper limb.

After two months of treatment, there was a decrease in scar volume, flexibility, and a change in color. The patient achieved full range of motion in the limited joints. The patient was able to return to work and drive.

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DISCUSSION

The case presented demonstrates the effectiveness of a comprehensive physical therapy protocol in the rehabilitation of burn injuries, which is consistent with current evidence. Recent studies [7-9] highlight that multimodal interventions, such as therapeutic laser (Nd:YAG 1064 nm) and physical therapy, significantly improve scar elasticity and joint mobility.

In the study conducted by Choi et al., [13] they reported that fractional laser therapy reduces scar volume by 30-50 % by modulating collagen synthesis and decreasing itching, results comparable to those observed in the patient presented. Furthermore, pressotherapy with compression sleeves (20-30 mmHg) has demonstrated efficacy in preventing scar hypertrophy, although its success depends on treatment adherence, as noted by Van Baar et al. [7] and Khatri et al. [14]

Regarding functional recovery, our findings are consistent with those of Hege et al. [10], who observed that protocols combining active-assisted mobilization and occupational therapy achieve improvements of 70–90 % in joint range of motion in upper limb burns. Return to work at 4 months in our case exceeds the average reported by Schneider et al., [6] where 60 % of patients with moderate burns return to work after intensive rehabilitation, highlighting the importance of early intervention.

In the authors' opinion, limitations persist. First, the absence of standardized validated scales (such as the Vancouver Scar Scale) in the baseline assessment makes it difficult to quantitatively compare our results with those reported in previous systematic reviews and meta-analyses. This limitation in the initial measurement could affect the accuracy of estimating the degree of improvement achieved. Furthermore, the contraindication of ultrasound for deep vein thrombosis (DVT) highlights the need for safe alternatives, such as the use of HoneyDerm®, whose effects on hypertrophic scars require further investigation.

Finally, the multidisciplinary approach implemented (physiatry, occupational therapy, psychology) is supported by Richard et al. [8], who demonstrated that integrated teams reduce psychosocial sequelae by 40 % and improve treatment adherence. These results underscore the importance of personalized protocols and extended follow-up to optimize long-term outcomes.

CONCLUSIONS

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Burns remain a major cause of cosmetic, functional, and psychosocial sequelae in burn survivors. Patients suffering from burns will require intensive treatment for an extended period. The patient did well with physiatry treatment, achieved full joint arch completion, improved scar aesthetics, and improved psychological well-being, allowing him to return to work.

BIBLIOGRAPHIC REFERENCES

1- Wiechman SA, Patterson DR. ABC of burns: Psychosocial aspects of burn injuries. BMJ: British Medical Journal [Internet] 2020 [cited 01/01/2024]; 329(7462):391. Available in: https://pubmed.ncbi.nlm.nih.gov/15310609/

2- James SL, Lucchesi LR, Bisignano C, Castle CD, Dingels ZV, Fox JT, et al. Epidemiology of injuries from fire, heat and hot substances: global, regional and national morbidity and mortality estimates from the Global Burden of Disease 2019 study. Inj Prev. [Internet] 2020 [cited 01/01/2024]; 26(Supp 1):i36- i45. Available in: https://pubmed.ncbi.nlm.nih.gov/31857422/

3- Buhalog B, Moustafa F, Arkin L, Lee K, Siwy K, Donelan M, et al.b Ablative fractional laser treatment of hypertrophic burn and traumatic scars: a systematic review of the literature. Arch Dermatol Res. [Internet] 2021 [cited 01/01/2024]; 313(5):301-317. Available in: https://pubmed.ncbi.nlm.nih.gov/32926192/

4- Issler-Fisher AC, Waibel JS, Donelan MB. Laser Modulation ofHypertrophic Scars: Technique and Practice. Clin Plast Surg. [Internet] 2017 [cited 01/01/2024]; 44(4):757-766. Available in: 10.1016/j.cps.2017.05.007. https://pubmed.ncbi.nlm.nih.gov/28888301/

5- Soboleva AG, Sobolev VV, Karapetyan MM, et al. Laser Therapy Changes the Expression of Matrix Metalloproteinases in Bleomycin-Induced Skin Fibrosis. *Life (Basel)*. [Internet] 2023 [cited 01/01/2024]; 13(3):810. Available in: https://pubmed.ncbi.nlm.nih.gov/36983965/

6- Schneider JC, Mathews K, Ryan CM. Burn rehabilitation outcomes: lessons learned from the uniform data system for medical rehabilitation. J Burn Care Res. [Internet] 2020 [cited 01/01/2024]; 35(3):212-3. Available in: https://pubmed.ncbi.nlm.nih.gov/23799485/

7- Van Baar ME, Essink-Bot ML, Oen IM, Dokter J, Boxma H, van Beeck EF. Functional outcome after burns: a review. Burns. [Internet] 2019 [cited

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ISSN: 2789-7567 RNPS: 2524

01/01/2024]; 32(1):1-9. Available in: https://pubmed.ncbi.nlm.nih.gov/16376020/

8- Richard R, Baryza MJ, Carr JA, Dewey WS, Dougherty ME, Forbes-Duchart L, et al. Burn rehabilitation and research: proceedings of a consensus summit. J Burn Care Res. [Internet] 2019 [cited 01/01/2024]; 30(4):543-73. Available in: https://pubmed.ncbi.nlm.nih.gov/19506486/

9- Procter F. Rehabilitation of the burn patient. Indian J Plast Surg. [Internet] 2019 [cited 01/01/2024]; 43(Suppl):S101-13. Available in: https://pubmed.ncbi.nlm.nih.gov/21321643/

10- Hege AR, Choubisa CA, Kasatwar P. Physiotherapeutic Rehabilitation of a Patient Following an Electrical Burn: A Case Report. Cureus. [Internet] 2022 [cited 01/01/2024]; 14(9):e29702. Available in: https://pubmed.ncbi.nlm.nih.gov/36320961/

11- Okhovatian F, Zoubine N. A comparison between two burn rehabilitation protocols. Burns. [Internet] 2020 [cited 01/01/2024]; 33(4):429-34. Available in: https://pubmed.ncbi.nlm.nih.gov/17466461/

12- Raipure A, Patil S, Pathan H. Effectiveness of Early Physiotherapy Rehabilitation Approach for Split Skin Grafting Post-burn in a Pediatric Patient. Cureus. [Internet] 2023 [cited 01/01/2024]; 15(8):e44083. Available in: https://pubmed.ncbi.nlm.nih.gov/37750141/

13- Choi KJ, Williams EA, Pham CH, Collier ZJ, Dang J, Yenikomshian HA, et al. Fractional CO2 laser treatment for burn scar improvement: A systematic review and meta-analysis. Burns. [Internet] 2021 [cited 01/01/2024]; 47(2):259-269. Available in: https://pubmed.ncbi.nlm.nih.gov/33288326/

14- Khatri KA, Mahoney DL, McCartney MJ. Laser scar revision: A review. J CosmetLaserTher. [Internet] 2022 [cited 01/01/2024]; 13(2):54-62. Available in: https://pubmed.ncbi.nlm.nih.gov/21401378/

STATEMENT OF AUTHORSHIP

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CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest.

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