

Advanced Therapies in the Comprehensive Recovery of Pediatric Burn Patients: Case Report

Luis Felipe Ramos Flores¹, Daniel Herrera Hernández², Jimena Celeste Treviño Flores³, Estefany Marlen Barragán Jiménez⁴, Ricardo Burciaga Castañeda⁵, Pablo Patricio Flores García⁶, Ivan Yahir Paternina Gonzalez⁷, Ulises Álvarez ocegueda⁸, Homar Arnoldo Tanori Saavedra⁹, María Guadalupe Nieblas Serrano¹⁰

¹Unidad de Medicina Familiar N. 2 IMSS Puebla / <https://orcid.org/0009-0001-4764-4239>.

²Hospital General Regional No. 1 Instituto Mexicano del Seguro Social, Tijuana, Baja California/
<https://orcid.org/0009-0003-7875-4179>.

³Hospital Universitario Dr José Eleuterio Gonzalez, Monterrey, Nuevo León, MX/
<https://orcid.org/0009-0004-8179-2034>.

⁴Hospital General de Zona no. 3 IMSS, Aguascalientes / <https://orcid.org/0009-0005-5736-2867>.

⁵C.H. ISSSTE Gómez Palacio / <https://orcid.org/0009-0000-3003-1885>.

⁶Hospital Universitario Dr José Eleuterio González, Monterrey, Nuevo León, MX/ <https://orcid.org/0000-0003-4891-0604>.

⁷Hospital Español de México / <https://orcid.org/0009-0002-1218-2596>.

⁸Hospital General de zona No. 3 IMSS, Aguascalientes / <https://orcid.org/0009-0008-4027-8310>.

⁹IMSS- UMAE, Hospital de Especialidades No.25/ <https://orcid.org/0009-0006-9520-7283>.

¹⁰Hospital General Regional No.1, Ciudad Obregón, Sonora.

ABSTRACT

ABSTRACT: Burns in pediatric patients represent one of the most complex and challenging injuries in the medical field, due to their short- and long-term physical, psychological, and social implications. Comprehensive recovery requires a multidisciplinary approach that incorporates both conventional and advanced therapies. This report presents the case of a pediatric patient with second- and third-degree burns on the extremities, trunk, and face, who was managed through an integrated care protocol that included surgical debridement, application of Epifast as a biotechnological covering to promote skin regeneration, early physical rehabilitation, and specialized psychological support. The role of advanced therapies in improving healing, reducing pain, preventing functional and aesthetic sequelae, and reintegrating the patient into society is emphasized. This case highlights the importance of specialized and individualized care to optimize clinical and functional outcomes in pediatric patients with severe burns.

KEYWORDS: Pediatric burns, Epifast®, advanced therapies, comprehensive recovery, skin regeneration, early rehabilitation, facial burns.

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INTRODUCTION

Burns are among the most severe traumatic injuries that can affect the pediatric population, not only because of the immediate physical damage but also due to the functional, aesthetic, and emotional sequelae that may develop in the short, medium, and long term. In children, burns are a major cause of morbidity and, in severe cases, mortality, particularly in developing countries where therapeutic resources may be limited. According to the World Health

Organization (WHO), more than 180,000 deaths annually worldwide are attributed to burns, with children under five years being one of the most vulnerable groups.¹

The treatment of pediatric burns has evolved considerably over the past few decades, transitioning from a focus solely on survival to a broader view that also aims for functional, aesthetic, and psychosocial recovery.² This evolution has been made possible by advances in the understanding of the pathophysiology of burns, surgical techniques, and the

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development of new biotechnological therapies aimed at skin regeneration. In this context, the management of burned pediatric patients requires the involvement of a multidisciplinary team composed of surgeons, intensivists, specialized nurses, physiotherapists, nutritionists, psychologists, and other healthcare professionals.³

Among the advanced therapies that have proven effective in skin recovery is Epifast, a biotechnological dressing composed of cultured allogeneic keratinocytes, which promotes accelerated epithelialization of partial-thickness wounds. Its use has been reported in the literature as an effective alternative in the treatment of burns by reducing healing time, decreasing pain, minimizing infection risk, and improving aesthetic outcomes. Additionally, as a ready-to-use product, Epifast optimizes hospital resources and facilitates the treatment of extensive injuries without the need for additional autologous grafts, which is particularly advantageous in pediatric patients with limited donor areas.⁴ This report describes the case of a pediatric patient with second- and third-degree burns on the extremities, trunk, and face, successfully treated through an integrated approach that included the use of Epifast as part of the therapeutic strategy. The clinical interventions performed, patient evolution, and

outcomes are analyzed with the goal of highlighting the importance of advanced therapies in the modern management of pediatric burns.⁵

CASE PRESENTATION

A 1-year-and-4-month-old male patient, previously healthy, presented to the emergency department after a domestic accident involving scalding with boiling water. Upon initial physical examination, second- and third-degree burns were identified, affecting approximately 30% of the total body surface area (TBSA) (**Figure 1**), located on the upper and lower extremities, anterior trunk, and face. The patient showed signs of upper airway compromise, including stridor, dysphonia, use of accessory muscles, and circumferential facial burns with soot in the nasal cavities and oral cavity. Given the suspicion of inhalation injury, prophylactic endotracheal intubation was performed in the emergency room, followed by adequate ventilatory response. The patient was transferred to the pediatric intensive care unit for comprehensive management.



Figure 1: Emergency Room Admission.

During the first days of hospitalization, a management protocol was implemented, including hemodynamic stabilization with intravenous fluids guided by the Parkland formula, continuous analgesia, antibiotic prophylaxis, and serial surgical debridement under general anesthesia. Due to the extent and location of the injuries, as well as the limited availability of donor areas, Epifast® was chosen as a biotechnological covering for the partial-thickness burn areas. The application was performed under sterile conditions in the operating room, ensuring proper contact of the dressing with the previously debrided wound bed.

As part of the comprehensive approach, passive physical rehabilitation was started on the second postoperative day,

along with individualized hypercaloric and hyperprotein nutritional support. Psychological care was also provided to both the patient (according to their neurological and emotional development) and the parents, aiming to reduce the traumatic impact of the event.

During the hospital course, the patient tolerated intubation well, with no secondary pulmonary complications, allowing for safe extubation on the fourth day. The areas treated with Epifast showed signs of progressive epithelialization, with no evidence of infection or rejection of the dressing (**Figure 2**). By the seventh day of hospitalization, a favorable clinical evolution was observed with adequate healing of the treated areas, without contractures or evident functional sequelae.

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The patient was discharged with outpatient follow-up for plastic surgery, rehabilitation, and psychology.



Figure 2: 7 Days After Admission.

DISCUSSION

Burns in the pediatric population represent a medical emergency of high complexity that requires immediate, structured, and multidisciplinary intervention to ensure survival and prevent functional, aesthetic, and psychological sequelae. The care of these patients presents a significant challenge due to the anatomical and physiological fragility of the pediatric patient, as well as the differences in immune, metabolic, and scarring responses compared to adults. The presence of facial burns and the suspicion of inhalation injury, as in the case presented, further elevate the severity of the clinical picture and require rapid and effective interventions, such as prophylactic endotracheal intubation to protect the airway.^{6,7}

This case emphasizes the crucial role of multidisciplinary treatment, which included intensive initial management, hemodynamic support, pain control, timely surgery, specialized nutritional support, early physical therapy, and psychological support. This collaborative and coordinated approach is essential to reduce complications and promote the comprehensive recovery of the burned patient.⁸

A key factor in the favorable outcome of this patient was the use of Epifast®, a biotechnological dressing composed of cultured allogeneic keratinocytes on a polyester membrane. Epifast acts as a temporary covering that promotes accelerated epithelialization of superficial and deep dermal non-infected wounds. The keratinocytes in the dressing release cytokines, growth factors, and bioactive mediators that stimulate the migration, proliferation, and differentiation

of the patient's own cells, thereby promoting skin regeneration without the need for additional autologous grafts.⁸

Among the advantages of Epifast are its easy application, significant reduction in pain in the treated area, decreased infection risk, and improved aesthetic outcomes for scars. In pediatric patients, where donor areas are limited and surgical trauma must be minimized, Epifast represents an effective and safe alternative for the treatment of partial-thickness burns. In the case presented, its use allowed for complete epithelialization within a short period (seven days) without the need for additional surgical procedures or infectious complications.^{9,10}

In addition to its biological benefits, Epifast facilitates hospital management by reducing the frequency of dressings and the need for repeated anesthesia, which is particularly valuable in pediatric patients. Its compatibility with early physical rehabilitation, as implemented in this case, also helps prevent joint contractures and maintain functionality in the affected extremities.^{11,12}

From a psychosocial perspective, early intervention by the psychology team was essential to address the emotional impact of the traumatic event, both for the child and their caregivers. Facial burns can generate high levels of anxiety due to the risk of disfigurement, making effective communication from the medical team and emotional support key components of comprehensive care.^{11,12}

CONCLUSION

The treatment of severe pediatric burns not only involves the restoration of the anatomical and functional integrity of the injured skin but also the preservation of the child's physical, emotional, and social development. In this regard, timely, specialized, and patient-centered care is crucial to prevent complications that could impact their long-term quality of life. The experience gained from this clinical case underscores the need for dynamic protocols that integrate technological innovation with a humanistic approach to care.^{13,14}

The implementation of biotechnological therapies like Epifast should be evaluated not only for their clinical efficacy but also for their ability to reduce hospitalization days, facilitate treatment adherence, and decrease the emotional impact of repetitive or painful surgical procedures. In this case, the rapid recovery of the patient within seven days allowed for the avoidance of chronic wounds and prolonged separation from the family environment, which is key to the child's emotional stability.^{13,14}

Furthermore, effective coordination between specialties should not be considered a secondary support measure but a central component of the treatment. Experience shows that rehabilitation and psychological support should not be delayed to later stages but incorporated from the outset as part of a proactive strategy to promote the functional and social reintegration of the child.¹⁵

Lastly, this case highlights the importance of having hospital units equipped not only with physical resources but also with trained personnel capable of evaluating, deciding, and applying advanced techniques with individualized judgment. Continuous training of the healthcare team, as well as the incorporation of updated scientific evidence, are fundamental pillars in providing excellent care.¹⁵

Ultimately, this case reaffirms that high-complexity pediatric medicine requires a balanced approach between technology, clinical judgment, and human sensitivity. Investing in advanced therapies, solid multidisciplinary teams, and comprehensive support is not a luxury but a necessity to ensure true comprehensive recovery for children who have suffered devastating injuries such as severe burns.

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