

Case Presentation of a Minor Patient, Survivor of a Burn with ABSI Score - 12 Points (Probability of Survival Below 20%)

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ABSTRACT: According to the World Health Organization, burns represent a major global public health issue, causing approximately 180,000 deaths annually. The article presents the case of a 17-year-old patient with burns after electric shock (27,000 volts), with a burned area of approximately 72%, 3rd degree, segment IIB, with ABSI score=12, who was treated in a centre dedicated to paediatric burn patients. The use of treatment of paediatric burns not only enhances the quality of healthcare but also has the potential to reduce suffering and improve the chances of recovery for children who go through such traumatic experiences.

KEYWORDS: Burns, paediatric, body surface, treatment, survival.

Introduction

According to the World Health Organization, burns are a major global public health issue, causing approximately 180,000 deaths annually [1].

The low- and middle-income countries account for 90% of all reported burns, yet there is a lack of providers for burn care [2,3].

In many high-income countries, the mortality rate from burns has decreased, while the child mortality rate due to burns is now over 7 times higher in low- and middle-income countries, according to the World Health Organization [1].

The most vulnerable to burns are infants, as they cannot move away from heat sources, and they are at greater risk of burns [4].

Peritraumatic factors in children, such as anxiety and pain, parental post-traumatic reactions, and family functioning, have been identified as the most commonly associated factors with children's outcomes after burns.

A study by Bakker et al. (2013) showed that the severity of burns can indirectly influence the psychosocial post-burn outcomes of children [5].

The physical changes can serve as painful reminders of the incident, and others' reactions to their appearance can contribute to feelings of rejection, isolation, lowered self-esteem, and humiliation [6].

Their management and treatment require specialized expertise and proper training, as they

may involve long-term rehabilitation and careful monitoring [7].

Therefore, burn management remains a challenge worldwide, but it becomes even more acute in countries with limited resources and restricted access to advanced technology [3].

In the treatment of these burns, pain management plays a crucial role in ensuring the comfort and well-being of young patients [8].

Case report

A 17-year-old female patient, from an urban area, was hospitalized in the Plastic and Reconstructive Surgery Clinic of Craiova County Emergency University Hospital, for arc flash burns (high voltage wires-27,000 volts) 3rd degree, segment IIB, at the cephalic extremity, cervical, anterior trunk, right side, right upper limb (complete circular), left hand and forearm (complete circular), left lower limb (complete circular) (Figure 1).

In order to publish the article, we obtained all agreements regarding photography and participation in medical education and scientific research.

At the time of admission to the emergency room, the patient was in extremely serious general condition, conscious, hardly cooperative.

The patient was admitted directly to the operating room for evaluation and treatment, after which she was supervised in an intensive care unit, where hydroelectrolytic and acid-base rebalancing was performed.

From a surgical point of view, emergency decompression incisions were performed on the lower limbs on the external border.

After performing a rigorous mechanochemical dressing and hemostasis control, dressings with antiseptic solutions were applied.

Postoperative evaluation revealed burn injuries at the face, cervical, anterior trunk, right

side, thigh and upper third of the right leg, 2nd B and 3rd degree at the left thigh, external genital organs, infra-umbilical abdomen, right side, right arm and forearm, right anterior thigh, with a total body surface of about 72% and an ABSI score of 12, under 20% chance of survival.



Figure 1. Burn injuries, day 0. Source: The authors.

It was decided to transfer the patient to a specialized centre for minor burn patients, the transfer being carried out within the first 12 hours after the electrocution.

On admission to the specialized unit, the patient's general condition was still extremely serious, being in combustion shock, with hypotension, metabolic acidosis and marked hemoconcentration.

Surgical treatment was completed with decompression incisions in the right upper limb and proximal extension of the left lower limb incision and dressings with argentic sulfadiazine cream.

The systemic treatment consisted of antibiotic therapy, crystalloid solutions, analgesics, anti-

inflammatory drugs, proton pump inhibitors, amino acids, albumin, crystalloid plasma, erythrocyte concentrates, diuretics.

During the hospitalization the patient required the closure of the incisions of the lower limbs and excision of the 3rd degree eschar of the left thigh and iliac fossa (about 7% of the body surface).

The procedure was followed by coverage of the resulting integumentary defect with PTSG (partial thickness skin graft), reattached from the right calf and left side.

The excision of the right upper limb and right side (about 13% of the body surface area) was performed above the fascia, the resulting defect of the right upper limb was covered with free split skin, collected from the left upper limb.

The defect in the proximal third of the right arm and the right side were covered with free split skin collected from the left side and processed with the MEEK technique.

During hospitalisation, cultures were taken from the burnt wounds, one of which was positive for *Pseudomonas aeruginosa*, sensitive to Colistin.

It was decided to start targeted antibiotic therapy.

The local evolution was favourable, with 90% of the grafts from the right upper extremity integrated.

In the right side the grafts processed by the MEEK graft technique completely lysed, and in the left thigh they lysed in 50%.

After improvement of the patient's general condition, the excisional debridement of the remaining areas and the right-side reattachment with free split skin collected from the buttock and right thigh were continued.

The evolution was not unfavourable, the grafts in the right-side lysing 90%.

This was followed by grafting of a part of the granulated left thigh graft (about 2% body surface area), with an integration rate of about 90%, right arm, right side, groin region (about 4% body surface area), with unexpanded free split skin collected from the right arm and right calf.

Postoperative outcome was favourable with complete graft integration (Figure 2).

During hospitalization, the patient complained of pain in the right eye, and the ophthalmologic consultation established the diagnosis of corneal ulceration and central abscess in the right eye.

Ophthalmologic treatment was started, with ophthalmic drops containing antibiotic, with a slowly favourable evolution, and the narrowing of the ulceration area.

The patient is discharged with an improved general condition, with the post-burn areas completely covered and epithelialized and is redirected to a recovery and kinesiotherapy centre.

The patient was hospitalized for approximately 70 days.



Figure 2. The postoperative aspect of burn injuries. Source: The authors.

At discharge the patient received a long-term therapeutic plan, including pressure therapy, massage, the use of silicone-based products,

psychotherapy, as well as a surgical plan for further surgery to cure possible retractile or unsightly scars.

Discussion

Burn injuries continue to be a major public health concern with significant implications for morbidity and mortality, regardless of a country's level of development [9].

Paediatric burns, in particular, represent a significant medical issue that can have long-term consequences on children's health and well-being [10].

Burns can cause intense pain, damage to the skin and underlying tissues, swelling, redness, and, in severe cases, can lead to shock or multiple organ failure.

Children may require immediate medical treatment, and the severity of burns can range from first-degree burns (affecting the top layer of skin) to third-degree burns (affecting deep layers of skin and underlying tissues).

As per the study by Bakker et al. (2013), unlike adults, children's facial skin contains a higher density of dermal appendages.

This can contribute to faster recovery and more effective wound healing, especially in the case of burns.

However, this strong regenerative capacity can have both beneficial and detrimental consequences.

In some children, cellular healing mechanisms can overcompensate, leading to the formation of hypertrophic scars and the development of severe contractures in those who have suffered severe facial burns [5].

Regarding burn hospitalization, the duration varies by country and is influenced by healthcare service payment programs.

However, recent trends show a decrease in the average length of hospital stay and an increase in the proportion of burns treated in specialized burn treatment centres in the studied countries [1].

Nevertheless, there is a global trend of declining injury rates, which is so significant that it can be generally stated that the world is becoming a safer place to live.

This development reflects advancements in public health, safety, and education, contributing to the reduction of risks and the severity of injuries [9].

Paediatric burns can result in permanent scars that may limit mobility, affect normal skin development, and cause discomfort or social stigma.

Scars can have a devastating impact on appearance and can be disfiguring as they are visible, stigmatizing, and serve as permanent reminders of the initial accident or surgery [11].

Innovative technologies can help accelerate the wound healing process. For example, 3D printing technologies can be used to create artificial tissues that facilitate more efficient wound healing.

The use of innovative technologies can contribute to reducing complications associated with burn treatment, such as infections.

Smart dressings or advanced diagnostic technologies can monitor wound conditions and alert the medical team to early signs of complications.

Children who suffer from burns may develop psychological trauma. Innovative technologies can be used to provide psychological therapy or support and help children cope with the emotional aspects of recovery.

As observed, virtual reality has gained recognition as a means to alleviate pain during medical procedures [12,13].

The field of virtual reality has significant potential in pain management as it acts as a potent non-pharmacological analgesic during daily burn care.

The lack of education and proper prevention can contribute to the increase in the number of paediatric burn cases.

If communities are not informed about risks and appropriate safety measures, this can lead to a rise in incidents.

In some cases, socio-economic factors, such as limited access to safe housing or medical assistance, can influence the risk of paediatric burns.

Children's skin is thinner and more sensitive than that of adults, making them more vulnerable to burns.

Additionally, their thermoregulation system is not as developed, which predisposes them to burns when exposed to excessive heat or other sources of burns, such as hot water or hot objects.

As a result, children constitute a significant proportion of burn cases globally and often present with extensive injuries requiring critical and surgical interventions.

However, the capacity for intensive care is limited in specialized centres, which should become a priority for the development of healthcare systems to prevent preventable deaths and disabilities [14].

Thus, burns can have a significant emotional and psychological impact on children [15].

Conclusion

In conclusion, burns are a serious public health issue with a significant impact on children and patients of all ages.

Proper management of these traumas involves both specialized treatment and significant efforts in burn prevention and public education about the risks.

The particularity of the case is the survival of a paediatric patient with a high mortality rate of over 80%.

This was made possible by the combination of an efficient treatment in the immediate emergency, carried out in the first hours post-injury, and in the subsequent management, both systemic and surgical.

This aspect reinforces the need to develop as many units exclusively dedicated to the treatment of paediatric burn patients, as well as the elaboration of updated and personalized treatment and recovery protocols according to the particularity of each case.

However, burn prevention is crucial for children.

Parents and caregivers need to be aware of risks such as hot surfaces, cooking appliances, hot water, and other burn hazards and take measures to minimize children's exposure to these dangers.

Additionally, educating children about burn risks and how to behave in risky situations is crucial.

Conflict of interests

None to declare.

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