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The Importance of First Aid to Burned Patients: 30 Years of Experience at the Burns Centre in Pisa

Roberto Gianfaldoni[1], Serena Gianfaldoni[1*], Jacopo Lotti[2], Georgi Tchernev[3], Uwe Wollina[4], Torello Lotti[5]

[1]University G. Marconi of Rome, Dermatology and Venereology, Rome 00192, Italy; [2]G. Marconi University, Department of Nuclear Physics, Subnuclear and Radiation, Rome, Italy; [3]Medical Institute of the Ministry of Interior, Dermatology, Venereology and Dermatologic Surgery; Onkoderma, Private Clinic for Dermatologic Surgery, Dermatology and Surgery, Sofia 1407, Bulgaria; [4]Krankenhaus Dresden-Friedrichstadt, Department of Dermatology and Venereology, Dresden, Sachsen, Germany; [5]Universitario di Ruolo, Dipartimento di Scienze Dermatologiche, Università degli Studi di Firenze, Facoltà di Medicina e Chirurgia, Dermatology, Via Vittoria Colonna 11, Rome 00186, Italy

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***Correspondence:** Serena Gianfaldoni. University G. Marconi of Rome, Dermatology and Venereology, Rome 00192, Italy. E-mail: serena.gianfaldoni@gmail.com

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Abstract

The first aids to burned patients are fundamental for the evolution of the disease and the success of the next medical care in a Burns Center. In our 30-years experience, we can reassume that they must be provided to limit the cause of thermal damage, to evaluate and correct eventual respiratory or cardiovascular disorders, to find out the possible damage to different organs and the primary care on cutaneous lesions.

Introduction

Burn is a tissue damage caused by the action of the heat released by a body (e.g. hot metal or stoves) or a liquid (e.g. boiling water or frying oil), a caustic agent (e.g. muriatic acid, ammonia, caustic soda), radiations (e.g. surn-burns, radiotherapy) or by a direct sources of heat (e.g. flames), which overcomes the skin's natural protection.

The entity of the tissue damage is directly proportional to the intensity of the noxae pathogens, to their time of action and the extension of the affected skin. Burn is the paradigmatic example of orthodontic dermatitis as it may affect all kind of people, without differences such as in allergic dermatitis.

When the cutaneous involvement is important (for depth and extension of the injury), by a simple dermatological disease, burn become a complex systemic disease, which involves different organs and may be deadly. The burned patient care includes a series of different treatments which follow each other in step with the progression of the burn disease.

The first aid cares to this kind of patients are fundamental, because they influence irreversibly the evolution of the disease and the success of the medical care [1, 2]. They can be chronologically divided into different stages, which start from the time of the burning accident until the patient reaches to the hospital.

First aid to burned patients

Rescue vehicles

The choice of the better rescue vehicle is the first important step in the assistance of burn patients. In general, the possibilities of intervention in the area

of the accident can be carried out by helicopter or ambulance.

Choosing the most suitable transport vehicle should be based on consideration of certain factors such as availability of the vehicle and personnel, accessibility of the nearest hospital centre, costs and others.

Even if expensive, the helicopter is the quickest means of relief. It needs in addition to medical staff, flight crew and appropriate infrastructures (e.g. landing pads, unobstructed aeroplane areas).

The main risk associated with the use of a helicopter is the lack of landing areas near the accident site or the hospital, so it is necessary to complete the journey with an ambulance. In this case, both means must be available promptly and suitably equipped with medical personnel and instruments for the patient care.

Unlike a helicopter, the ambulance is certainly less rapid in transporting the patient, but it provides a better primary care and comfort to him. Finally, it does not need any particular infrastructure to reach the headquarters of the accident or the burn centre and involves the commitment of a singular team of qualified staff.

In any case, the medical and paramedical staff, involved in the first aid of the burns victims, must have a high professional training in the treatment of burning disease and demonstrated the ability to handle emergency situations such as urgent respiratory and cardiocirculatory assistance.

Measures to carry out immediately on the side of the accident

Whereas the severity of a burn is determined by the intensity of the stimulus and the duration of its action on the skin, it is fundamental to stop it [3]. In first aid, even rescuers must be careful to not to be involved with a burn.

To avoid this, it is advisable to wear protective equipment such as gloves, masks, suits, eyeglasses, flame-retardants, etc. If the cause is an electrical current exposure, the material to be used must be insulating.

At this point, it is important to remove flaming clothing and those that are impregnated with toxic substances (e.g., Caustics). Removing jewels, belts and other accessories is also essential, as they may be overheated by the burning cause, is a further source of heat.

It is, therefore, appropriate to wipe the body of the victim with abundant sterile water, to cool the burnt area and remove any contaminants.

When the cause of burn is a caustic one, the use of a chemical antidote may be good if its application is timely. Otherwise, it may be dangerous because it may aggravate the cutaneous. Also, if there is a continuous skin solution, the late use of the chemical antidots only aggravates the burn as the substance penetrates and further damages the skin which is not primarily involved by the noxa pathogens.

In these cases, it is essential to irrigate the cutaneous lesion with sterile water to reduce the concentration of the chemical and the intensity of the burning stimulus [4].

The use of ice or a very cold source is not appropriate because, even if it inhibits the hyperthermic cause, it further damages, through ischemia, perilesional skin, which is essential for the successive repair of the wound [5].

Applying ointments or other topical remedies (potatoes, toothpaste, etc.) is not recommended as possible sources of infections.

Given the importance of an aseptic environment, it is recommended to cover the patient with sterilised blankets, particularly those that may contain the thermal dissipation of the patient's body, so as not to aggravate the hypovolemic shock condition that develops in the early stages of Burning disease. Finally, the use of blankets limits the exposure of burned areas to the environmental ventilation, thus reducing the stimulation of exposed nerve endings and the pain that characterises superficial burns.

Control of vital parameters and first medical treatments

Meanwhile, rescuers should quickly monitor the patient's vital parameters and assess any damage to the respiratory and cardiovascular systems [6].

Respiratory function evaluation is both clinical and instrumental (e.g. partial oxygen pressure assessment) (Table 1).

Table 1: Main causes of respiratory tract damage

Inhalation of irritating substances resulting in bronchospasm.
Bronchospasm due to an allergic hypersensitivity to inhaled fumes
Carbon monoxide poisoning
Damage to the respiratory centre from electrical burns
Oedema of the first airway in the case of facial and neck burns
Extensive thoracic burn that restricts its movement
Hypoxia for burns occurring in closed environments

Indirect indices of respiratory damage are evidence of burnt whiskers, burns around the mouth, pharyngeal oedema, and black-grey sputum.

Only in the hospital, the respiratory damage will be confirmed and quantified with more accurate instrumental examinations such as emogasalysis, RX chest, bronchoscopy or pulmonary scintigraphy.

The first aids to be carried out in the event of injury to the respiratory system are aimed at:

- Ensure the patent airways (possible tracheotomy).
- Guarantee an adequate expandability of the chest cage (possible escarectomy in the case of full thickness burns that restrict the mobility of the chest cage).
- Oxygen administration.
- Eventual administration of corticosteroids.

The cardiovascular function estimation is both clinical and instrumental. Fundamental is to evaluate the blood pressure and the pulse rate (Table 2).

Table 2: Main causes of cardiovascular failures

Cardiomyopathy by hypovolemic shock
Cardiomyopathy by neurogenic shock
Cardiac arrhythmias from electrical burns

Of primary importance is to place a venous access, preferably in non-burnt surfaces.

In the case of cardiac arrhythmias, resuscitation manoeuvres or electric cardioversion should also be performed, while a fluid therapy is necessary in the case of hypovolemia.

Last but not least, a neurological and orthopaedic evaluation should be allowed due to the risk of cervical and cranial traumas.

In the suspect of a rachid trauma, the application of a cervical collar is fundamental.

In conclusion, first aids to burned patients are a crucial moment to their management, because they drive the evolution of the disease and the success of the medical treatment at the Burns Center. In our 30-years experience, we can reassume that they must be provided to limit the cause of thermal damage, to evaluate and correct eventual respiratory or cardiovascular disorders, to find out the possible damage to different organs and the primary care on cutaneous lesions.

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