Introduction

Primary wound burn strategy depends on burn wound assessment. Deep second degree and third degree burns are candidates for surgery such as excision and grafting, while superficial burns can be treated using topical antimicrobials. In superficial burns, emergency management is based on cooling using water at a mild temperature. Burns are irrigated with water for a period of 5–10 min. Essentially, the aim of cooling is to remove pain. Antiseptics are applied to the wound, soaked with sterile water and dried using gauzes.

Blister Management

Blisters are encountered both in superficial and deep second degree burns. A blister is an obstacle for the assessment of burns and should be removed. The top of the blister is gently cut with a sharp scalpel, allowing the liquid to leak out and then the whole non-adherent epidermis is excised, while trying to prevent painful contact with the base of the wound (Fig. 2.1).

When to Operate

Assessment is determinant for strategy, but cannot be conclusive during the first examination. Surgical excision and grafting in deep second degree burn wounds will be decided after a period of 2–3 days, as the evolution of the burn wound can be positive. Diagnosis of burn depth is difficult during the first days. Thirty percent of burn experts cannot determine the exact wound depth when analyzing the burns at the first assessment. On the contrary, observation of a frank third degree burn will necessitate a surgical decision of immediate excision followed by a skin graft (Figs. 2.2–2.3).

Local Dressings

Silversulfadiazine cream is the most commonly used local treatment, worldwide. This drug is a combination of sulfamides and silver, with a low risk of resistance and allergy, proposed in various situations. The cream modifies the local ground and can be applied over a period of 3 weeks. The need for a persistent antimicrobial dressing during the whole evolution of superficial burns has to be revisited (Demling). Most of the authors propose the use of non-antimicrobial dressings as soon as the diagnosis of superficiality is complete. Dressings formed by hydrofiber, a texturized carboxymethylcellulose frame including and delivering silver have been successfully proposed in the local management of second degree burn wounds. Silicone coated dressings (safetac technology), aiming at reducing pain during dressing changes, are often used in superficial burns (Heymans).
Pain Management

Pain should be correctly managed during the first hours after accident, then regularly reassessed. Assessment tools for pain are numerous and should be selected depending on the condition of the patient. The visual assessment scale is the most common mode of quantifying pain when the patient can communicate. Other scales may be suggested when the patient is under general anaesthesia. Pain is more pronounced when the burns are superficial, granulation tissue is present, and repetitive dressings are done. Pain at dressing change is a specific issue, more easily managed when using adapted modern dressings.

Surgery

The aim of surgery is to remove potentially infected materials from the wound, cover the exposed tissues using skin grafting and reduce the length of stay in the hospital. This coverage can be done using either split-thickness skin graft, full-thickness skin graft or step by step reconstruction of the skin using bioengineered tissues like artificial dermis (Fig. 2.4).

Dermis and/or Skin Substitutes

Early excision and skin grafting is the most traditional method, where a skin graft is harvested on different possible areas (skull, thigh, legs, back, abdomen). Depending on the extent of surfaces to cover, the skin graft may be amplified using mesh grafts (×1.5, 2, 4, 6). The uniformity and regularity of the scar obtained with these methods mostly varies with the possibility to use unmeshed skin grafts. In moderate surfaces, the colour matching of the skin graft is also an issue and is better matched when harvested close to the recipient zone. When using a skin graft coming from further away, such
as thigh skin to resurface a cheek, the risk of having a bad colour match is higher, leading to a permanent hyperchromia of the transferred skin.

The use of dermal substitutes will be dealt with in Chap. 13.

Scar improvement was observed when using double layer dermal substitutes (Integra, Purdue, Heimbach, Renoskin, Hyalomatrix Pelnac), and more recently with single layer dermal substitutes (Matriderm™) being immediately covered using thin skin grafts (Van Zuijlen).

Cadaver skin can safely be used, especially to cover temporarily deep burns wound (Sheridan). The use of these materials is dependent on the availability, which is an issue linked to tissue banks which are necessary to store them under adapted freezing conditions. Allografts can be used as a sandwich technique when autograft donor sites are limited (extensive TBSA) or when the patient is in poor general health, thereby limiting the possibility of general anaesthesia. Autografts can be extensively meshed (×6) and covered using ×2 meshed allografts (Fig. 2.5). Keratinocyte Autologous Cell cultures provide hope for the future, if a functional dermis has been obtained (Rheinwald, Compton, Boyce).

The use of xenograft has also been proposed, either to replace dermal components or to secure skin grafts.

Early skin grafting may be contraindicated, due to various situations such as contraindications for surgery, exposure of joints, tendons or vascular bundles.

Flammacerium (silver sulfadiazine plus 2% cerium nitrate) was proposed in the 90s, and was mainly used over extensive surfaces of third degree burns where surgery cannot be performed on a single occasion. Flammacerium presents the unique possibility of combining with necrotic tissue, transforming it into a calcified tissue strongly adhering to the wound edges for a very long period of time. This powerful antimicrobial agent should be used only over limited surfaces (no more than 30% TBSA), the risk of inducing methemoglobinemia being a real and life-threatening complication (Fig. 2.6) (Wassermann).
Negative pressure therapy is not the treatment of choice for burns, but presents some interesting capacities to promote granulation tissue over noble exposed tissues like joints, tendons or vascular pedicles, after complete surgical excision of the burnt tissues. This technique has indications when doubts persist on the vitality of the exposed tissues before skin grafts.

**Conclusion**

Burns management is mainly based on excision and grafting techniques, in deep burns with the recent introduction of the use of dermal substitutes and on the use of antimicrobials in superficial burns, with the recent use of modern dressings.
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