

'Skin failure' - a real entity: discussion paper**C Irvine** MB BS MRCP *South East Thames Regional Health Authority**Keywords:* skin failure; toxic epidermal necrolysis (TEN); erythroderma**Introduction**

Skin failure is a concept unfamiliar to most physicians who are taught to identify and treat failure in other organs from early student years. Most doctors are well equipped to deal with heart, renal, liver and respiratory failure but not with skin failure. However, the skin is a large, vital organ so early recognition and good management of skin failure are important if patients are to survive this life threatening state.

Physiology

The main functions of normal skin are regulation of heat loss from the body, prevention of penetration by foreign materials including bacteria, retention of body fluids and protein, resistance to mechanical damage and mediation of cutaneous sensation (Table 1).

Definition of skin failure

Skin failure could be defined as a loss of normal temperature control with inability to maintain the core temperature, failure to prevent percutaneous loss of fluid, electrolytes and protein with resulting imbalance and failure of the mechanical barrier to penetration by foreign materials.

Aetiology

There are many causes of skin failure, the most obvious and well known being thermal burns. Here the severity of the condition and the need for specialist care are well accepted and patients' lives depend on the skilful nursing and medical expertise of burns units¹. Skin failure may complicate a number of dermatological disorders (Table 2), one of the rarest

Table 1. Functions of normal skin

Temperature regulation
Physical barrier to foreign materials/trauma
Protection from UV radiation
Sensation
Fluid retention
Immune response (Langerhans cells)
Vitamin D synthesis
Excretion of toxins

Table 2. Medical causes of 'skin failure'

Erythroderma
Toxic epidermal necrolysis
Stevens-Johnson syndrome
Pustular psoriasis
Pemphigus
Graft versus host disease
Epidermolysis bullosa (childhood)

Table 3. Causes of erythroderma

Commoner	Eczema
	Psoriasis
	Drugs
	Lymphoma/leukaemia
Rarer	Toxic shock
	Other dermatoses such as:
	Pityriasis rubra pilaris
	Lichen planus
	Ichthyosiform erythroderma
Idiopathic	

and most dramatic diagnoses being Lyell's disease, toxic epidermal necrolysis (TEN).

In Lyell's disease, the epidermis peels off in sheets leaving large painful, raw, denuded areas. The aetiology in adults may be drugs (sulphonamides, pyrazolones, barbiturates, anti-epileptics) and perhaps most frequently idiopathic. It carries an appreciable mortality of 20-50%². In children most cases are due to the toxin from overt or occult staphylococcal infection and the name staphylococcal scalded skin syndrome (SSSS) is used. In childhood SSSS the prognosis is excellent as the epidermis splits off at a more superficial level and heals very quickly, within 5-10 days.

Common skin disorders may also result in skin failure. The term erythroderma describes extensive and severe inflammation of the skin with more than 90% of the body surface involved. It is only a clinical description with many possible causes including eczema, psoriasis, drugs, lymphoma and toxic shock syndrome, to name only a few (Table 3).

Eczema is a very common dermatosis and usually runs a more or less predictable course with flares and remissions. Occasionally a severe generalized eczema may develop, either spontaneously or triggered by some factor such as a drug, infection or intercurrent illness and the patient becomes erythrodermic.

Psoriasis too is very common and occurs in many clinical forms. Most patients have psoriasis which is chronic, stable and although unsightly, not life threatening. Rarely a severe generalized form, either erythrodermic psoriasis or generalized pustular psoriasis may be precipitated by factors such as drugs, the withdrawal of potent corticosteroids, infection, topical irritants or hypocalcaemia, or it may occur spontaneously.

In pemphigus, a rare autoimmune skin condition, an intraepidermal split causes the superficial epidermis to slough off, leaving raw areas which may be extensive in severe disease. Healing is slow and before systemic corticosteroids were available, the condition carried a high mortality.

Management of skin failure

Patients with large areas of inflamed, peeling or denuded skin will inevitably have some degree of skin failure and a dermatological opinion should be sought. The principle hazards are dehydration, and hypothermia and patients are best admitted to a specialist unit. Because of the resemblance to thermal burns, some authors have proposed that toxic epidermal necrolysis should be managed in a burns unit^{3,4}. Treatment may be divided into general and specific measures; general measures apply to skin failure of any cause and include control of body temperature, fluid and electrolyte balance, heart failure, infection and nutrition.

Body temperature

Normal temperature control is lost in erythroderma and skin failure from other causes, the patient becoming poikilothermic and following the temperature of their surroundings. In a cool environment, the greatly increased dermal blood flow of erythroderma causes radiant heat loss and although the skin looks and feels hot, the core temperature of the patient falls. Conversely in a very hot environment the skin is unable to sweat because of intraepidermal blocking of sweat ducts and as vasodilatation is maximal, there can be no further response to a rise in external temperature, so hyperthermia may ensue. Ambient temperature should be around 30°C, which feels uncomfortably warm for the attendants.

Fluid

Fluid and electrolyte losses from raw skin surfaces are copious and need adequate replacement, with close monitoring of urine output which should be at least one litre per day to prevent prerenal uraemia. Indwelling intravenous lines should be kept to a minimum as they are a potential source of infection. Daily body weight using a weigh-bed may be a useful guide to fluid balance.

Infection

Infection needs to be regularly sought and promptly treated with appropriate antibiotics, which should be given systemically. This is preferable to the prophylactic use of broad spectrum antibiotics with the attendant problems of resistance. Topical anti-septic agents may be used but their application to patients with very sore skin can be uncomfortable. The skin in erythroderma is extremely sensitive and may be irritated by anything but the blandest of emollients.

Cardiovascular system

The greatly increased blood flow through the skin may lead to high output heart failure particularly when combined with anaemia and in the elderly.

Nutrition

Patients with skin failure are in a hypercatabolic state with excessive loss of protein from the skin and attention must be paid to nutrition with the greatly increased protein and calorie requirements.

Physical handling

Patients with skin failure, particularly those suffering from TEN and pemphigus may suffer considerable pain and discomfort and they need gentle, skilled handling, perhaps using a turning frame and ripple bed. Silk

sheets are more comfortable as they are less adherent to the denuded areas and some hospitals are still able to provide them. Topical agents can alleviate a great deal of the discomfort and application may be less painful for the patient if the cream is first spread over a sheet and then placed on the skin, rather than being 'rubbed in'. If there are raw, moist areas as in TEN, silver sulphadiazine cream (Flamazine) is a soothing antibacterial agent. For the inflamed scaly skin of psoriasis and eczema, bland emollients such as aqueous cream or white soft paraffin applied several times daily can be very effective. There may be profound psychological disturbance and anxiety requiring sympathetic psychiatric support³.

More specific measures depend on the aetiology of the skin failure, for example the use of active agents such as methotrexate in psoriasis, systemic steroids in pemphigus. These will not be discussed.

Complications

During the acute phase, there may be stress-induced gastrointestinal ulceration and haemorrhage requiring transfusion and cimetidine therapy⁵. Erythroderma may be associated with malabsorption due to 'dermogenic enteropathy'⁶. Venous thrombosis is a risk with the imposed bedrest and the circulatory embarrassment. Some conditions, notably TEN and pemphigus, may produce scarring of the cornea leading to blindness⁷ and of the urethra and vagina leading to stenosis⁸ but cutaneous scarring is fortunately uncommon. Hair loss, either at the time of the insult (this may be permanent), or some 3 months later with a temporary but sometimes profound loss due to telogen effluvium may occur after extensive skin involvement. Finger and toe nails may be shed acutely and damage may cause permanent loss or deformity.

Conclusion

In summary I would like to propose that skin failure is an entity just as mortal as failure of heart, lungs or kidney and like these other conditions, skin failure needs specialist treatment. The earlier it is recognized and treated, the more satisfactory is its outcome.

References

- 1 Feller I, *et al.* Improvements in burns care, 1965-1979. *JAMA* 1980;244:2074-8
- 2 Lyell A. Toxic epidermal necrolysis (the scalded skin syndrome), a reappraisal, *Br J Dermatol* 1979;100:69-81
- 3 Demling RH, Ellerbe S, Lowe NJ. Burn unit management of toxic epidermal necrolysis, *Arch Surg* 1978;113:758-9
- 4 Marvin JA, Heimbach DM, Engrav LH, Harnar TJ. Improved treatment of Stevens-Johnson syndrome. *Arch Surg* 1984;119:601-5
- 5 Rasmussen J. Toxic epidermal necrolysis. *Med Clin N Am* 1980;64:901-20
- 6 Shuster S, Marks J. *Systemic effects of skin disease*. London: Heinemann, 1970
- 7 Bennett TO, Sugar J, Shgal S. Ocular manifestations of toxic epidermal necrolysis associated with allopurinol use. *Arch Ophthalmol* 1978;95:1362-4
- 8 Kim PS, Goldfarb IW, Gaisford JC, Slater H. Stevens-Johnson syndrome and toxic epidermal necrolysis, a pathophysiologic review with recommendations for a treatment protocol. *J Burn Care Rehab* 1983;4:91-100