

Care of oedematous skin in a resource-poor environment: A commentary of practice strategies to address a global community need

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ABSTRACT

The emphasis of this paper is to discuss low-cost, self-help interventions for oedematous skin which can be utilised in low-resource communities or settings. In particular, the emerging understanding of the role of epidermal cytokines in repair, as a source of stimulating dermal oedema will be overviewed. Venous overload, due to gravitational effects, is a common contributor to lower limb oedema. A combination of epidermal cytokine activity and chronic ambulatory venous hypertension can overload a failing lymphatic system which, in the absence of overload, may not develop lymphoedema. The epidermis may switch off cytokine production when transepidermal water loss is reduced by appropriate washing and emollient application. Venous overload is helped by elevation and ankle movements, whilst breathing aids both lymphatic and venous drainage. These are low-cost self-help interventions which have been found to be helpful in resource-poor countries and can be recommended and promoted in the management of lymphoedema in a wide range of health care settings and environments.

COMMENTARY INTRODUCTION

It has long been known that oedema delays healing¹, but it has only recently been identified and emphasised that oedematous skin is not only unhealthy, but the epidermis is itself contributing to the oedema²⁻⁴. The major causes of oedema include cardiac failure, malignancy, venous hypertension or parasitic blockage of the blood or lymphatic vascular systems, and local inflammation. However, it is the response of the epidermis to oedema that partially explains lymphoedema and accounts for the benefits of meticulous skin care. The epidermis, when it is in good health, is an effective barrier, has sweat glands that contribute to thermoregulation, its sensory function is finely tuned without itch or pain and, by looking good, contributes to feeling

good. When healthy, the skin has almost no 'switching on' of innate repair mechanisms, with only occasional mitotic activity. Most of the upper (outer) half of the epidermis, is anaerobic and the cells are tightly knit without nuclei.

In contrast, an unhealthy epidermis, such as in oedematous skin, is very different in both appearance and functionality. Oedematous skin initiates repair requirements with a 'switched on' repair mode including many mitotic figures and the dividing cells jostling for position which eventually exfoliate. The demand for oxygen will extend through most of the epidermis and often additional white cells will infiltrate further, increasing demands for oxygen. An active neutrophil can demand 50 times as much oxygen as any other skin cell. Importantly, the repair mode includes switching on the production of a range of inflammatory cytokines, many of which migrate into the dermis, where they greatly increase the permeability of the upper dermal capillary bed and stimulate the arrival of white cells².

The majority of persons following a mastectomy, or infection from the mosquito-borne filariasis, do not develop lymphoedema until something else happens to overload the failing lymphatic system, including local trauma, bee sting or a bacterial cellulitis causing an inflammatory response. Appropriate management of fissures and interdigital crevasses has long received attention in the care of lymphoedema^{6,7} (Figure 1).

Venous overload is another factor that contributes to lymphoedema, with gravity playing a role in overfilling the veins. Ambulatory venous hypertension is an underestimated inducer of lymphatic overload when the system is partially non-functioning and examination for dilated veins should always be conducted with the person in the upright position. Lymphoedema of the legs characteristically manifests as tissue fluid containing protein and other macromolecules, such as lipid, as part of its composition⁸. Upper limb post-mastectomy oedema has a venous component⁹ and, together with gravity-associated venous failure, disease and heart failure, causes a transudate; however, the tissue fluid does not contain high levels of protein and lipid¹⁰.

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MANAGEMENT OF OEDEMA

Oedema management encompasses management of known causes such as heart failure, cancer, filariasis, venous disease and local inflammation, especially when triggered by bacteria. It also includes care of the epidermis. Heart failure is obvious if the patient is breathless and has raised neck veins. Diuretics are prescribed for oedema but are not appropriate or effective for lymphatic failure alone. Oedema of the upper limb may have a contribution from compression of the large veins in the axilla, once buffering adipose tissue has been removed with lymph glands, and this may be slightly responsive to diuretics. In the elderly, heart failure is often an additional factor in swelling of the lower leg and diuretics are indicated. The role of the epidermal repair response has only recently been strongly emphasised, and much has been learned from studies of skin conditions, such as atopic eczema and psoriasis, in which switching off the inflammatory repair mode has been focused upon. Much too has been learned from managing elderly skin, the failure of which has become so prevalent due to age longevity. Oedema of the legs in the over sixties is much more common than in young persons¹¹.

SIGNS OF A 'SWITCHED ON' EPIDERMAL REPAIR MODE

The earliest sign of a switched on epidermal repair mode, whilst not visible, can be diagnosed by instruments that detect increased transepidermal water loss. Loss of barrier function is a very early sign of skin failure, but it is quickly followed by desiccation and exfoliation. The stimulus of the dermis by cytokines causes redness, but dilated blood vessels will be less obvious if obscured by oedema and fibrosis, as in lymphoedema. In the field of wound healing I regard the presence of dry, scaly, red, oedematous skin surrounding an ulcer is almost in as much need of care as the ulcer itself. This inflamed skin will be an indication of greater demand for oxygen by all the skin and, if ignored, may well be robbing the oxygen needed for healing the ulcer. These skin characteristics should not be ignored due to a positive response to moisturisation. Such care can reduce both oedema and oxygen utilisation by the non-ulcerated skin.

SKIN CARE — EMPHASIS IN RESOURCE-POOR REGIONS

As chairman of a subcommittee of the International Society of Dermatology named *Skin Care for All: Community Dermatology* (www.skincareforall.org), and a mentor of a large programme for lymphatic filariasis in Kerala, South India¹²⁻¹⁴, I have learned from working in resource-poor regions, that care of the skin is of key benefit and it is not expensive.

SELF-HELP: ELEVATION AND MOVEMENT

I suggest that all who care for the skin: wound management clinicians, lymphoedema managers, dermatologists, podiatrists and tropical skin disease specialists; should



Figure 1: Fissures due to lack of moisturisation common in persons who do not wear shoes. They are entry points for soils irritants and bacteria.



Figure 2: 'Leg' clinic in which immobility, the effects of gravitational stasis, and rare taking of deep breaths are featured.



Figure 3: Some patients need many bandages, but have only simple cotton bandages worn out by washing. The effectiveness of their bandaging is questionable.

adopt a programme that seeks low-cost interventions which promote self-help. One strategy in treating the skin is through elevation, and both the venous blood vessels and lymphatics benefit by central core emptying in the thorax which is encouraged by breathing and body movements. The large veins in the thorax are emptied more completely by taking deep breaths. All the lymphatics drain there and therefore deep breathing is an important therapeutic manoeuvre. In India, yoga is culturally a very acceptable way of achieving this¹⁵⁻¹⁸.

All body movements promote emptying of veins and lymphatics. Lymphoedema sufferers move less and hardly ever take a deep breath. This is very obvious when patients waiting in a lymphoedema clinic are observed (Figure 2). If there is one movement best encouraged it is ankle movements. Fibrosed, stiff ankles must be gradually mobilised.

SKIN HYGIENE AND MOISTURISATION

As emphasised by Matts, by what I have called the Matts' Hypothesis⁵, washing the skin with 3% glycerine¹⁹ (or using any locally preferred emollient) reduces transepidermal water loss, providing a very effective way of reversing a major contributor to lymphoedema. The epidermis reacts to moisturisation by switching off the repair response, and preventing cytokine production that activates dermal vasculature. I always emphasise switching off the repair mode of the epidermis, sealing entry points for bacteria and soil irritants, and moisturising what is often a desiccated skin surface. It should be applied to all the skin, especially if it is scaly and erythematous. I do not discourage local traditional practices that include herbal washes, but I try to put a stop to scarification as it adds to local inflammation and infection. It should be remembered that the skin prefers to be acidic and that many soaps are very alkaline. A teaspoon of vinegar in a pint of water can be beneficial to overcome this.

Of course there are many other interventions for the treatment of oedema, but mostly they add cost. Some are essential, such as footwear in environments with irritant soil. In recent years the association between lymphoedema and obesity has been identified. This has led to further research and the finding that adipose tissue is stimulated by lymphoedema, and its removal by liposuction helps in control of lymphoedema²⁰. At the Institute of Applied Dermatology in Kerala, the Integrated medical system includes appropriate dieting.

BANDAGES AND HOSIERY

Bandages and hosiery are the basis of most biomedical therapy (Figure 3). Manual lymphatic drainage (MLD) by a skilled practitioner, and skilled bandaging using modern varieties of short-stretch bandages, are unquestionably best practice. However, in resource-poor countries, these are not easily applied nor affordable. Having spent many days teaching patients and their families such best practice, I am

invariably disappointed when, on visitation months later, I see how the bandages are applied: loose around the foot and constricting just below the knee. In resource-poor regions, I find bandaging skills so poor with the available material, that I do not insist on anything that is unaffordable. Notable is the fact that their lymphoedema, in spite of ineffective bandages, is improving. The reason for this is that the patients are moving more and are regularly taking care of their skin, including hygiene and moisture interventions. They are thus reducing lymphatic overload caused by inflammation and venous gravitational effects.

CONCLUSION

In the management of oedema and lymphoedema, biomedical practice has focused on MLD, bandages and hosiery. Low-cost, self-help interventions such as limb elevation, body movement, breathing, and weight control should be considered and promoted. Skin care strategies including hygiene and the application of emollients, can switch off the repair response, and prevent cytokine production that activates dermal vasculature, contributing to oedema formation. This discussion paper has highlighted simple but effective interventions which should be considered and implemented in a wide range of health care settings and environments including low-resource communities.

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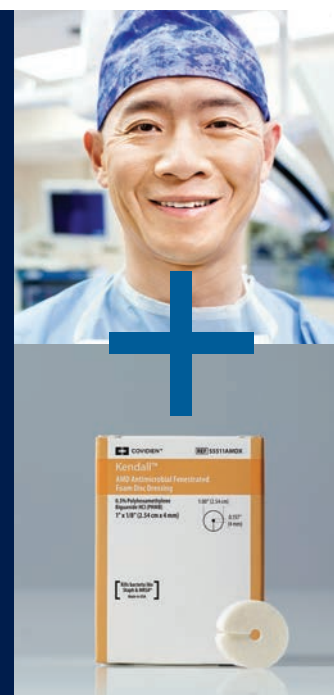
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