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Tolerability and efficacy of hydrocolloid dressings in the treatment of venous leg ulcers under tropical conditions: an open prospective study

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ABSTRACT

In the Western world, hydrocolloid dressings are widely used in wound treatment. However, little is known about their tolerability and efficacy under tropical conditions. The purpose of this study was to assess the tolerability and efficacy of a hydrocolloid dressing in combination with short stretch compressive bandages under tropical conditions. Seventeen patients with venous leg ulcers attending an outpatient clinic in Surinam were enrolled in the study for a period of 6 weeks. Swabs for bacterial cultures were taken at the beginning and end of the study. All ulcers showed a good healing tendency. Percentage of granulation tissue in the ulcers improved from mean 27% at start to 92% at the end. Mean circumference at start was 9.9 cm, at the end 4.9 cm. Exudation diminished from moderate in six and severe in eight ulcers, to moderate in 10 and almost none in two ulcers. In general, the dressing was very well accepted, pain was never reported. Leakage was noticed 39 times in the 164 dressing changes. This study revealed no differences in the rate of bacterial infections or colonization of wounds compared with studies performed in temperate regions. Our data indicate that hydrocolloid dressings can be used under tropical conditions.

Key words: hydrocolloid dressing, tropical climate, venous leg ulcers

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Introduction

Several studies have shown that a moist environment favours wound healing.^{1,2} For this reason, many (semi)occlusive dressings have been developed. One of these dressings is the hydrocolloid dressing.^{3–8} These opaque, absorbent dressings consist of hydrocolloid granules embedded in an adhesive matrix covered by a polyurethane foam. In the Western world, these dressings are now widely used in the management of (leg) ulcers. However, little is known about their use under tropical conditions. Alleged increases in the frequency of wound infection may be an important reason that hydrocolloids are not used regularly under these conditions.^{9–11} One study performed in a south Indian hospital described good results in treating chronic ulcers mostly secondary to leprosy; however, no bacterial studies were performed.¹²

We studied the tolerability and efficacy of a hydrocolloid dressing for venous leg ulcers under humid tropical conditions.

Patients and methods

The study was performed in Paramaribo, which is the capital city of Surinam. It has a tropical climate with annual temperatures between 22.8 °C and 32.2 °C and more than 2032 mm of rainfall per year. The study was carried out during the rainy season with a humidity fluctuating at about 95%.

All patients received written and spoken information, and written informed consent was obtained. The study was approved by the local Ethics Committee.

Patients with a venous leg ulcer attending the outpatient clinic at the Department of Dermatology of the Academic Hospital Paramaribo in Surinam were included; the ulcers were less than 6 cm length and less than 4 cm wide and diagnosis was based on clinical signs for venous insufficiency, other diagnostic procedures were not available. Specific exclusion criteria were diabetes mellitus, congestive heart failure, malignancy or ankle/brachial index less than 0.75.

All ulcers were treated with a hydrocolloid dressing (Comfeel Plus Transparant[®] and Comfeel Plus Ulcer[®], Coloplast, Humlebaek, Denmark) for a period of 6 weeks. Dressing and bandages (Elko[®], Lohmann, Neuwied, Germany) were normally changed twice weekly, but more often when necessary. Short stretch bandages were applied. The bandages remained on day and night. All patients were mobile.

Evaluations were recorded at every visit until the end of the study or until the ulcer showed 100% granulation or complete re-epithelialization. Ulcer outline was traced on a transparent pouch and pictures were taken. The ulcer area was measured from the transparent pouch using a computer image analysis system. Clinical improvement was recorded by means of percentage of granulation tissue on a scale of 0%, 25%, 50% or 100%. The amount of exudate was defined as almost none, moderate or strong. The skin around the ulcer was inspected and maceration and redness were recorded; user friendliness of the dressing (defined as easy or difficult to apply) and patient comfort (painful, not painful) were documented. Clinical signs of infection of the ulcer (redness, warmth, pain) were recorded. Scoring was performed by one observer.

Swabs were taken for bacterial cultures at the beginning and at the end of the study. The swabs were immediately placed in 400 mL 8% glycerol/Pepton in a sterile screw-cap container. The containers, containing specimens were placed in a freezer at -20°C . Also, smears were taken for Gram staining.

Specimens were transported to the diagnostic laboratory of microbiology in the Netherlands on dry ice and stored at -70°C until further processing. Specimens were defrosted and subsequently inoculated and incubated according to standard procedures on selective and non-selective agars in air, 7% CO_2 and anaerobic conditions. When necessary additional media and/or incubation conditions were applied depending on the Gram stain used.

Results

Seventeen patients (10 men and seven women) were included of whom 14 patients completed the study. Three patients dropped out because of non-compliance. The average age of the patients was 59 years (range 38–87). All patients had unilateral ulcers, 14 ulcers were localized on the medial and three on the lateral gaiter area of the leg. The mean duration of ulceration at the start of the study was 13 months (range 2 months to 10 years). The mean size of the ulcers was 9.9 cm^2 (range $5.5\text{--}18.7\text{ cm}^2$) at start and 4.9 cm^2 (range $0\text{--}10.5$) at the end of the study; two ulcers showed complete re-epithelialization during the study period (one at week 3 and one at week 4).

Percentage of granulation tissue formation improved from mean of 27% at start to 92% at the end of the study. Nine ulcers showed 100% granulation and three ulcers showed less than 90% granulation tissue at week 6 (Table 1).

Exudation of all ulcers was moderate in eight ulcers and

Table 1 Ulcer circumference and granulation tissue formation before and at the end of the study period

Patient no.	Circumference at start (cm^2)	Circumference at end (cm^2)	% Granulation tissue at start	% Granulation tissue at end
1	7.7	5.6	< 25	100
2	9.3	2.8	< 25	100
3	12.7	10.5	< 25	100
4	13.5	7.7	< 25	100
5	16.7	8.2	< 50	< 50
6	10.1	2.3	< 25	100
7	9.6	3.6	< 50	100
8	8.2	3.3	< 25	100
9	5.5	2.3	< 50	100
10	6.9	closed, week 3	0	closed, week 3
11	6.2	5.8	< 25	100
12	5.8	closed, week 4	0	closed, week 4
13	18.7	9.5	< 25	< 75
14	7.5	6.8	< 25	< 75

Table 2 Results of bacterial culture at start and termination of the study

Bacterial cultures	At inclusion ($n = 17$)	At termination ($n = 11$)
<i>S. aureus</i>	7 (41%)	6 (54%)
<i>S. pyogenes</i>	1 (6%)	0 (0%)
Haemolytic streptococci (non-group A)	3 (18%)	1 (9%)
Enterobacteriaceae	7 (41%)	5 (45%)
<i>Pseudomonas aeruginosa</i>	3 (18%)	3 (27%)

strong in nine ulcers at the start of the study. At the end all ulcers that had not yet closed showed moderate exudation in 10 ulcers and almost none in two ulcers. The dressings were easy to handle and could be removed without causing pain. Patients described the dressing as comfortable and pain was never reported. Leakage of the dressing was noticed only 39 times in the 164 dressing changes, while maceration was recorded only five times (3% of all dressing changes). Average wear-time of the dressing was 3.2 days.

No clinical signs of infection were recorded and no patients were treated with systemic antibiotics during the study. Micro-bacterial results of cultures taken before and at the end of the study are shown in Table 2. Seven of the 13 isolates of *Staphylococcus aureus* were resistant to tetracycline; no methicillin-resistant *S. aureus* was found. All haemolytic streptococci showed resistance to tetracycline. Five of the 12 isolates of Enterobacteriaceae were found to be resistant to gentamicin.

Discussion

In developing countries chronic leg ulcers present an important health problem. Ulcers caused by venous disease may play a

minor part and ulcers caused by infectious disease or sickle-cell anaemia may be more important.^{13,14} It is important to treat the cause of ulceration; if the underlying causes are not treated then even the best dressings are not effective.¹⁵

Because of financial problems hydrocolloid dressings are often not used in many developing countries. However, economic analyses show that the financial aspect of these dressings compared with classic dressings, such as cotton gauze, may be in favour of hydrocolloid dressings.^{16,17} Although the costs of hydrocolloid dressings are much higher than other dressings, hydrocolloid dressings can be changed every 2–5 days, sometimes even once a week. In this study, dressings were changed twice weekly because of hygienic considerations; in this hot and humid climate compressive dressings become easily wet and dirty.

This pilot study clearly shows that hydrocolloids are very well tolerated by patients in a tropical climate. There were no problems with the adhering capacity of the hydrocolloid used. All ulcers showed a very good healing tendency and apart from maceration in three patients no adverse events were noticed. It is important to note that during this study compression therapy was given, this may explain the quick wound closure seen with some patients.

In this study no infections were noted, which is consistent with the use of hydrocolloid dressings in moderate climates.¹¹ The microorganisms found are not much different from those found in studies performed in the Western world.^{18–20} Pathogenic microorganisms were not found more often, and the presence of bacteria do not appear to have interfered with wound healing.

The high rate of bacterial strains resistant to tetracycline and gentamicin may be explained by the extensive use of these antibiotics in ointments for wound care in Suriname. The use of antibiotic containing ointments is not recommended because of the possible development of bacterial resistance and the risk of causing contact allergic reactions.^{21,22} Moreover, in most chronic wounds use of antibiotics appears to be unnecessary.²³

Conclusions

This study indicates that hydrocolloid dressings may function well in the extreme humid conditions of a tropical climate. No infections were noted in the group studied. This study revealed no differences in the frequency of bacterial infection or colonization of the wound from those recorded in studies performed in temperate regions.

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