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Treatment of leprosy wounds with adhesive zinc tape *

T SÖDERBERG,† G HALLMANS,‡ S STENSTRÖM,†
D LOBO,§ J PINTO,§ S MAROOF,‖ & CLAIRE VELLUT‖
From the Departments of Hand and Plastic Surgery† and Pathology‡, University of Umeå, Umeå, Sweden, Father Müller's Hospital, Mangalore§, India, and Hemerijyckx Leprosy Hospital, Polambakkam‖, India

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Summary In two hospitals in India 90 leprosy patients with a total of 128 ulcers on the soles of their feet were treated with local applications of zinc or gauze soaked in Eusol. The patients were selected on a random alternate basis. The average healing time was shorter for the tape-treated ulcers compared to the gauze-treated ulcers in both hospitals. The zinc tape was easy to apply, could be worn under shoes without causing pressure and was socially acceptable because no bandages were needed.

Introduction

For many years ordinary adhesive zinc tape has been used in the treatment of local wounds.[1–4] The tape has been applied to the wounds in many different ways and has proved valuable in the dissolution and removal of tissue necroses – particularly in the case of burns – and in cleansing infected wounds. Experimental studies in rats comparing the healing times of small excisional wounds treated with gauze sponges or zinc tape have shown that there is a shorter healing time when the tape is used.[5,6] It has been established that zinc plays a part in the wound healing process in man and that such healing is impaired in zinc-deficient animals and man.[7,8] Zinc from the zinc oxide in the tape is dissolved from the adhesive substance and absorbed into granulation tissue and serum.[4]

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Zinc deficiency is common among patients with burn wounds[9] as well as among patients suffering from leprosy.[10] The treatment method using zinc tape was introduced among leprosy patients for wound treatment in Ethiopia in 1970 by Dr Sten Stenström and in 1976 he reported very good results.[11] The present study was intended to compare the results of the tape treatment method with those of the widely used method of covering the wounds with gauze sponges soaked in Eusol.

Material and methods

Ulcers on the soles of the feet of patients in two leprosy hospitals in India, Father Müller's Hospital in Mangalore, Karnataka State (60 patients) and Hemerijyckx Hospital in Polambakkam, Tamil Nadu State (30 patients) were entered on a register. This was done using special forms which, apart from personal details, occupation, type of leprosy and disability grades (WHO classification), provided the following information about the ulcers:

A Date of formation of ulcer according to the patient.
B Type of ulcer:
  a Superficial: Whole ulcer is visible. No deep sinus. No signs of inflammation. No bone, tendon or capsule seen.
  b Deep: Deeper tissues involved.
  c Complicated: Deep sinus. Obvious clinical signs of infection. Joint, bone, tendon or capsule involved.
C Size of ulcer:
  a Small: Diameter less than 2 cm.
  b Large: Diameter 2 cm or more.
D Location of ulcer.

Two different groups of patients (with non-complicated ulcers) were selected. One group was treated with adhesive zinc tape and a control group was treated with ordinary gauze dressings soaked in different ointments as per the routine followed in the respective hospitals.

The non-porous adhesive zinc tape was made of a plastic web coated with an adhesive substance composed of gum, resin and zinc oxide. The zinc oxide concentration was approximately 30%. The tape was applied directly to the wound surface after soaking and drying the hands and the feet. The tape covered the ulcer and the surrounding skin. It was initially changed daily while the wound secretion was excessive, and less frequently as it decreased. No other bandage was used.

The gauze sponge was soaked with Eusol, applied directly to the wound surface, and kept in place with a bandage around the foot. New dressings were applied as in the case of zinc tape treatment.

The patients were selected on a random alternate basis without taking into consideration either the type or size of the ulcers. All the patients reported here are patients with non-complicated ulcers on their feet and they were all treated in the hospital. Of the 128 ulcers registered, 86 were in Mangalore and 42 in Polambakkam. Among the tape-treated patients in Mangalore, 23 were men and 10 were women, and among the gauze-treated patients in the same hospital 22 were men and 5 were women. All patients in Mangalore wore shoes. In Polambakkam all the tape-treated patients were men and among the gauze-treated patients there were 12 men and 3 women. Eighteen patients wore shoes and 12 did not. The starting date of the treatment (with either tape or gauze) and the date of healing were recorded on the form. The ulcer was accounted healed when complete epithelialization had occurred.

Statistics

The differences between group means for variables were tested using Student's *t*-test for unpaired observations. The test was modified if the variances were significantly different (*F*-test).

Results

The results have been tabulated separately for the two hospitals where the trials were conducted since they were completely independent of each other, though the same registration forms and principles were used. All patients had a disability grade of 1 or 2 (WHO classification) for the feet with ulcers. All ulcers were located on the plantar side of the feet or on the toes. Most of them were located under the head of the first metatarsal bone and on the big toe (Fig. 1).

The average healing time was shorter for the tape-treated wounds compared to the gauze-treated wounds in all groups of ulcers in both hospitals (Figs 2 and 3), although the differences were statistically significant in Polambakkam. No signs of skin sensitization were observed in either the tape-treated or the gauze-treated wounds.

Discussion

The healing time was shorter for tape-treated ulcers compared to similar gauze-treated ulcers. The zinc tape has the following advantages: 1, Shorter healing time. 2, Low cost. 3, Easy application. 4, More convenient for patients: (a) can be worn under shoes without causing pressure; (b) socially more acceptable, no bandages are needed. This is important for out-patients, especially since the bandages are often stigmata of leprosy.

Various factors are responsible for the shorter healing-time achieved with

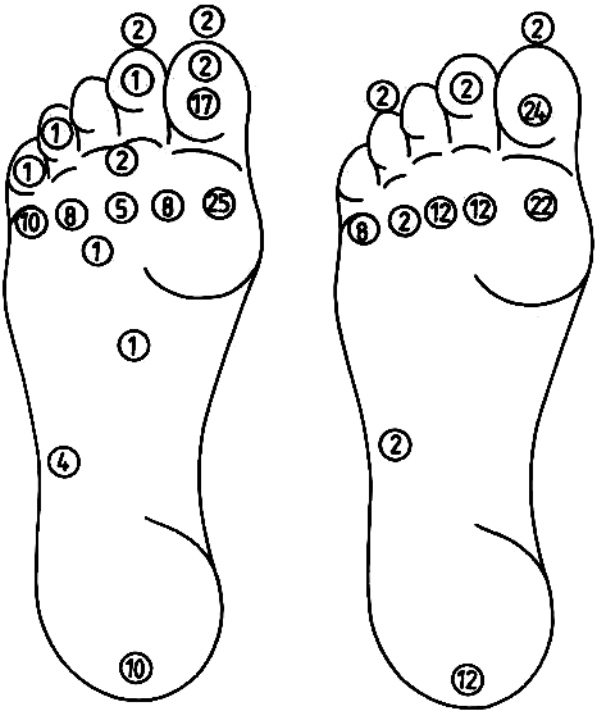

Figure 1. Location of the 86 plantar ulcers in Mangalore (left) and the 42 plantar ulcers in Polambakkam (right) expressed as a percentage of the total number of ulcers in each hospital.

adhesive zinc tape. Zinc tape by virtue of being non-porous and waterproof acts as an occlusive dressing thereby protecting the ulcer and preventing contamination from outside. Necrotic tissue whenever present is dissolved during treatment with zinc tape.[3,12] It has to be emphasized that the adhesive substance must be strongly adhesive to the surrounding skin, otherwise the zinc tape will quickly come away from the wounds. It is generally agreed that epithelialization is fast during occlusive treatment where the epithelium is migrating through an exudate. The risk of infection offered by the same exudate is probably lessened by the liberation of zinc from the zinc tape.[13] The epithelialization progressing in the wound is not damaged when the tape dressing is changed because the tape never sticks to the wound and there is no traumatization during redressing. This can rarely be avoided with other dressings like gauze. Although the gauze dressing may be almost occlusive, a state which is known to be favourable to epithelialization,[14] cotton gauze itself provides a poor environment for epidermal healing.[15] Similar results of differences in healing times between zinc-tape-treated wounds and gauze-treated wounds has previously been observed in rats.[5,6]

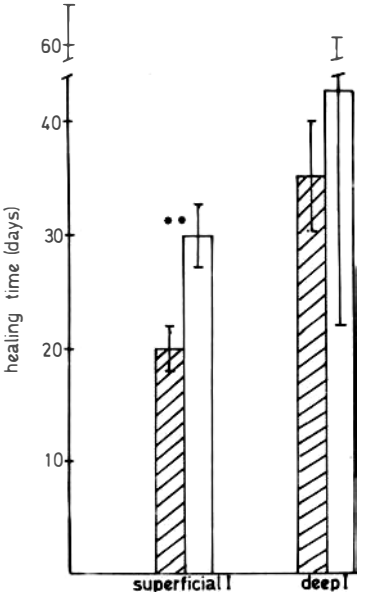

Fig. 2

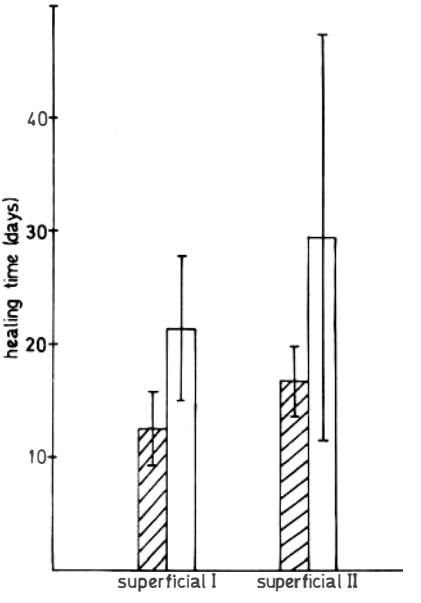

Fig. 3

Figure 2. Wound healing time in days of superficial and deep ulcers treated with zinc tape or gauze in Mangalore. I = Wound area less than 2 cm in diameter. ▨, tape treatment; □, gauze treatment.

Figure 3. Wound healing time in days of superficial ulcers treated with zinc tape or gauze in Polambakkam. I = Wound area less than 2 cm in diameter. II = Wound area more than 2 cm in diameter. ▨, tape treatment; □, gauze treatment.

Zinc from the zinc tape is absorbed into granulation tissue. This may be beneficial for the wound-healing process as zinc is needed for a normal wound-healing process during zinc deficiency.[8] Zinc-tape-treated wounds have been found to have a high collagen content compared with gauze-treated wounds in rats.[6] It was postulated that the high collagen concentration in tape-treated wounds was a result of a decreased liberation of collagenase by the macrophages. Macrophage activity is inhibited by high concentration of zinc.[16]

We have observed that very often the first reaction to the mention of adhesive zinc tape as a treatment for wounds is one of disbelief, lack of interest, or ridicule, or a combination of all three. The results presented here show that zinc tape is of value in the treatment of leprosy ulcers. We are convinced that the main advantage in treating leprosy wounds with zinc tape lies in using the method on out-patients where the benefits of the treatment are most obvious. Patients can be instructed on how to treat their own ulcers with the tape. They can be given pieces to use at home whenever needed. Through the early treatment of ulcers or injuries by the patient himself complications might be avoided, thus preventing mutilation.

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