

Candida albicans Infections in Leg Ulcers and Surrounding Skin after the Use of Ointment Impregnated Stockings

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Six elderly women treated with double elastic bandages for chronic venous leg ulcers presented a clinical picture beneath these bandages as seen in intertriginous candidiasis. Painful, bright red, glistening skin lesions with pustules, denuded skin and scales were seen. Cultures on Sabouraud's agar from skin erosions and toe webs confirmed the suspicion of *Candida albicans* infection. Treatment with topically applied clotrimazole cream resulted in relief of pain and healing of skin lesions. There is a possibility of the *Candida albicans* having been transmitted from the toe webs by the bandages, and that the bandages creates a microenvironment suitable for growth of the yeast. *Key words: Candidiasis; Wound infection; Bandages; Varicose ulcer.* (Received March 5, 1985.)

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Candida albicans infections are common in mucous membranes and in intertriginous areas. The clinical picture in intertriginous candidiasis commonly presents as pruritic, erythematous macules with maceration, fissuring, pustules and easily detachable flakes. The skin is left denuded and intensely erythematous. *Candida albicans* is seldom found in normal skin, but the incidence is increased in the elderly and especially in women, above the age of 60 (1). To get a clinical infection the microenvironment has to be warm and humid, which usually is the case in intertriginous areas. During the last few years we have used double bandages with ACO Medicated Stocking as an inside protective coating for leg ulcers. This has been a well functioning compressive treatment with the bandages being changed only once or twice a week. The medicated stocking contains no preservatives. It is easy to put on. The bandage is not totally occlusive enabling wound secretion to be discharged through the bandage. Lately an unusual cutaneous problem appeared under these bandages in some of our patients.

MATERIAL AND METHODS

We have observed six cases, out of 97 patients treated with ACO Medicated Stockings, who presented a clinical picture beneath the bandages similar to that of cutaneous candidiasis. The median treatment time for the 97 patients without candidiasis was 2.1 months and their median age was 71 years (Table I). The six observed cases were all women with a median age of 80 years and a median treatment time of 12.2 months (Table II). They all had chronic recurrent leg ulcers due to venous insufficiency. None had diabetes mellitus or evidence of arterial insufficiency—the systolic toe and ankle pressures were normal. All the patients had been treated with mild topical corticosteroid on eczematous changes around the leg ulcers for shorter periods of time. Topically applied antibiotics were not used in any of the cases, but all the patients had received oral antibiotic treatment on one or several occasions.

The patients were treated in an out-patient clinic with double elastic bandages. The bandages were changed once or twice weekly. The inner protective layer, called the ACO Medicated Stocking (ACO Salvstrumpa), consisted of a knitted tube impregnated with an ointment. This ointment contained 20% zinc oxide, and soft and liquid paraffin. The outer adhesive bandage called Coban Self-Adherent Wrap (Medical Products Division/3M) gave the compressive effect.

Table I. Patients treated with ACO Medicated Stocking during 1983 and 1984 without *Candida albicans* infection

	Number of patients	Median age in years	Median treatment time with ACO medicated stockings in months
Men	36	66	1.5
Women	61	74	2.9
Total	97	71	2.1

The cultures for fungal infections were performed directly on Sabouraud's agar with cotton swabs. The treatment for the candida infections was made with an imidazole derivative—1% clotrimazole in cream—Canesten® cream (Bayer).

OBSERVATIONS

All six patients showed a similar clinical picture. There were red, glistening skin, superficial erosions, scales and small pustules. Denuded areas coalesced and outside these areas similar satellitic lesions in the form of macules with red skin and scales in the periphery could be observed. Lesions were only found from the knees to the feet. No lesion was found outside the bandage in any case. All the patients had changes in some toe webs with maceration and fissuring.

Cases 1 and 2 had lesions that covered the larger part of both legs. Some areas on the legs below the knees had normal skin except for a few smaller satellitic lesions. Case 3 had most of the lesions on the distal part bilaterally on the medial and the lateral sides. On the rest of the legs there were scattered satellitic macules. Case 4 had erosions mostly around the middle portion of the right leg with satellites above and below this area. Case 5 had deep erosions on the larger part of the left leg with scattered pustules. This area was edged with more superficial erosions and there were red and scaly macules on the rest of the leg. Case 6 had deep erosions bilaterally on the distal and the middle portions around the legs and above these areas were a few satellitic lesions. Cases 5 and 6 differed from the others, because they had deeper and more painful lesions that bled easily. Besides these deep lesions, these two patients also had the more superficial lesions. The lesions started in a superficial manner, but before the time of the diagnosis of the *Candida albicans* infection the changes became deeper and more painful.

All six patients showed positive cultures on Sabouraud's agar from erosions and from toe webs. Patient 5 had perlèche in both oral commissures also with growth of *Candida albicans*.

The patients were treated with clotrimazole cream (Canesten). Cases 1 and 3 were treated twice weekly, case 2 three times a week, cases 4 and 6 daily, and case 5 twice daily. The superficial erosions were paler and less painful after the first treatments. Cases 1 and 3 were healed from all *Candida albicans* erosions after 6 weeks, case 2 after 4 weeks and case 4 after 8 weeks. Cases 5 and 6 were

Table II. Age and sex of patients and time of treatment with ACO Medicated Stocking to the diagnosis of the *Candida albicans* infection

Case	Age in years	Sex	Treatment time in months
1	85	Female	12.0
2	89	Female	15.9
3	75	Female	12.4
4	71	Female	17.9
5	69	Female	7.6
6	85	Female	6.7
Mean	79		12.1
Median	80		12.2



Fig. 1. Case 2 before treatment with clotrimazole.

much slower to heal, the superficial erosions were gone in about 4 weeks of time, but the deeper erosions had epithelialized to about half of the areas in 8 weeks of time. The treatment with clotrimazole has been stopped after 8 weeks and cultures and the clinical picture has been followed. No signs of *Candida albicans* growth were seen two months after discontinuing the treatment with the clotrimazole cream.

DISCUSSION

Double elastic bandage with ointment impregnated stockings as an inside protective coating is a very convenient treatment for many patients with chronic leg ulcers. The patients may stay in their homes living a normal life and coming to the clinic once or twice a week for the change of the bandages. In the reported six female patients a clinical picture similar to intertriginous *Candida albicans* infection was seen after the use of ointment impregnated stockings. The partially occlusive bandages used, could give rise to a microenvironment, that is suitable for the growth of *Candida albicans*. Maibach et al. (2) showed that occlusion is essential for developing *Candida albicans* lesions. Rebora et al. (3) made experiments with partial occlusion and showed, that even slightly occlusive materials enhanced the risk for infections with *Candida albicans*. Infection may be spread by contact with infected persons or their fomites (4). Usually an infection arises from the patient's own saprophytic colonisation, for example from the mouth, the vagina or the gastrointestinal tract. *Candida albicans* is seldom air-borne, but the risk is greater in a hospital environment (4, 5).

The ambition of the manufacturer to avoid allergens, in the form of preservatives, in the impregnated stockings, might however make it easier for a *Candida albicans* infection to develop. Preservatives might not only inhibit growth of microorganisms in the impregnated stockings, but also on the skin surface.

Old people are more prone to *Candida albicans* infection (1, 6) and it is essential to look for it beneath these types of bandages. The *Candida albicans* infection may give rise to large denuded areas of the skin of the legs and may possibly also inhibit the healing of the original ulcer. Several studies have shown *Candida albicans* in leg ulcers (7, 8, 9, 10), the full importance of which is not clear. The way of transmission of the *Candida albicans* infection in our patients is uncertain. This new kind of stocking is pulled from the foot up over the leg. In the presence of *Candida albicans* on the feet or around the toes—as was

the case in all of our patients—there is a possibility of spreading the yeast with the stockings. If this is the mechanism of spreading, one should closely observe all patients for any manifestations of *Candida albicans* on the feet or in the toe webs, and use plastic covers of the toes when the stocking is pulled over the legs.

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