

Normalization in the Appearance of Severely Damaged Psoriatic Nails Using Soft x-rays. A Case Report

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SUMMARY The prevalence of nail psoriasis varies considerably among different studies, ranging from 10% to 55%. In psoriatic arthritis, its prevalence is as high as 85%. In spite of the high prevalence of the disease, considerable functional, psychical and cosmetic discomforts for the affected patients, and recent advances in the management of skin psoriasis, an efficacious and longlasting treatment for psoriatic nails remains elusive. A 51-year-old male patient with skin psoriasis and severe psoriatic lesions of all his finger nails and toe nails is presented. Some nail plates were up to 30 times thicker than normal. The patient received radiotherapy with soft x-rays in a total dose of 13.5 Gy administered in nine fractionated doses of 1.5 Gy (43 kV, 25 mA, 0.6 mm aluminum filter) at one-week and two-week intervals. Upon therapy completion, the appearance of nail plates gradually improved to normalize completely at 12 months of therapy. Almost three years of therapy completion, the patient is free from both disease relapse and radiotherapy sequels. Considering the high therapeutic efficacy and longlasting remission achieved, this type of radiotherapy should be used in the treatment of severe psoriatic nail lesions with massive nail plate thickening, to alleviate psychical and functional difficulties associated with the disease.

KEY WORDS: nail psoriasis, fractionated soft x-ray radiotherapy, therapy for nail psoriasis

INTRODUCTION

Nail involvement is recorded in some 50% of psoriasis patients, both adults and children. Nail psoriasis may develop isolated, i.e. without cutaneous lesions. Nail lesions are also quite frequently associated with arthropatic psoriasis (1-3). Psoriatic nail lesions entail many functional, cosmetic and psychical difficulties (4-7). Therapeutic results in nail psoriasis are rather modest; the more so, dermatologists generally pay little attention to

these lesions, and if they do treat nail psoriasis, it usually consists of topical or intralesional application of corticosteroids, with little and short-lived, mostly rather poor improvement.

The aim of this case report is to present our results in the management of severe psoriatic nail lesions that caused great functional, cosmetic and psychical difficulties to the patient.

CASE REPORT

A 51-year-old male, railroad worker, was admitted in October 2003 for psoriasis that had first occurred about a year before, whereas nail lesions developed 3 months after the disease onset. The nails showed rapid thickening and elongation, to eventually assume a hoof-like appearance. The patient was disturbed by the appearance of his nails, also being unable to perform fine movements with his fingers (taking food, buttoning, washing) and suffering pain on walking. The patient did not complain of arthralgia but had been treated for depression. He had received usual local therapy for his psoriatic skin changes but not for nail lesions. There was no psoriasis or congenital pachyonychia in his family history.

On admission, squamous plaques on the extremities and scalp covered about 10% of the patient's body. All finger nails (Fig. 1a) showed grayish-yellowish discoloration, were grossly thickened, hoof-like, crumbling, partially detached from the nail bed; the nail thickness, i.e. subungual hyperkeratosis, measured 16-18 mm across distal ends of the nails, at hyponychium (Fig. 1b). The distal end of the nail crossed the hyponychium by some 10 mm. All toe nails (Fig. 1c) showed similar features as finger nails, with subungual hyperkeratosis thickness of 13-22 mm.

All routine biochemistry findings were normal except for HLA typing, which yielded positive B13 and DR7 loci. The diagnosis of skin psoriasis was histologically verified. Biopsy specimens were not obtained from the nail bed. Onychomycosis was ruled out by direct microscopy and culture analysis. Association with psoriatic arthritis was excluded by laboratory testing and roentgenogram.

Therapeutic approach

Since only mild skin psoriasis was present, the patient was treated with phototherapy (UVB) in combination with topical corticosteroids and keratolytics. Fractionated radiotherapy with soft x-rays was administered for psoriatic nail lesions. The patient received a total of 13.5 Gy over 12 weeks in nine fractionated doses of 1.5 Gy upon distal phalanx of each finger/toe, 7 times at one-week intervals, and the last two at two-week intervals. The irradiated area included the nail, nail matrix, and periungual region of 5 mm in width. A tube of 30 mm in diameter was used for irradiated area restriction, while the rest of the finger/toe was protected by lead plates. Therapy was administered by use of a Siemens Dermopan 2 device, manu-

factured in 1978, properly maintained and calibrated to ensure precise radiation dosage. Instrument characteristics: voltage 43 kV, current 25 mA, 0.6 mm aluminum filter, and focus to skin distance 15 cm.

Prior to treatment, an informed consent in writing was obtained from the patient. During radio-



Figure 1a. Grayish-yellowish discoloration, crumbling, grossly thickened and irregularly shaped finger nails before radiotherapy.



Figure 1b. Before radiotherapy, subungual hyperkeratosis on the middle finger nail measured 18 mm.



Figure 1c. Yellowish, onychogryphotic toe nails before radiotherapy.



Figure 2a. Upon radiotherapy, the appearance of finger nail plates normalized in distal third, with marked deterioration of skin psoriasis on the dorsal aspect of the hands.

therapy, the patient did not complain of any unpleasant sensations or side effects. Upon completion of radiotherapy, however, deterioration of skin psoriasis on the dorsal aspect of the hands was observed.

Monitoring of therapeutic efficacy and evaluation of results

Photos of the nails were taken before, immediately after, and at 6 and 12 months of therapy completion. The thickness of subungual hyperkeratosis was measured by a ruler and expressed in mm. Upon completion of soft x-ray therapy (Figs. 2a and 2b), improvement was only recorded in the proximal third of the nails, with a discernible appearance of lunula unguis. At 6 months of therapy completion, nail plates of all fingers showed normal appearance in the proximal half, while the healthy nail plate growth ranged from 8 to 10 mm measuring from eponychium. The thickness of subungual hyperkeratosis decreased from the initial 16-18 mm to 6 mm. Therapeutic effect was not as good on toe nails, yet showing a healthy nail growth of 3-5 mm in the proximal part. At 6 months of therapy completion (Fig. 3), residual hyperkeratosis was mechanically removed by scraping and use of keratolytics. The patient was advised not to cut nails to prevent possible trauma and to ensure objective measurement. At 12 months of therapy completion, the nail plates of some fingers/toes assumed nearly normal appearance (Fig. 4a), while some still showed oily drops and onycholysis in the distal fifth of the nail (Fig. 4b). Almost three years of therapy completion the patient is



Figure 2b. Normalization in the appearance of finger nail plates in distal third upon radiotherapy – a detail.

free from relapse of nail psoriasis, his nails show normal thickness, however, discoloration and slow growth persisted in some nails.

DISCUSSION

It is currently a widely accepted opinion that epidermal hyperproliferation and incomplete cellular differentiation, both of them demonstrated in skin psoriasis, involve nail matrix and nail bed as well. Clinical appearance of nail psoriasis depends on the site of the disease activity (1-3). The most common manifestations of nail psoriasis are foveolae (pitting), discoloration (oily drops), subungual hyperkeratosis, subungual hemorrhage (splinter hemorrhages), and onycholysis. Involvement of the entire nail matrix results in crumbled, thickened and loose nails (2).



Figure 3. Six months of radiotherapy, excess hyperkeratosis was mechanically removed; normal appearance in the distal half of finger nail plates.



Figure 4a. At one year of radiotherapy, almost complete normalization and normal thickness of finger nail plates.

The origin and morphogenesis of nail plate have not yet been fully elucidated, however, the major part of the nail plate definitely derives from the nail matrix epithelium. The relative contribution of the nail bed to the formation of nail plate is still a matter of debate. It is considered that in healthy individuals, the nail bed keratinocytes account for 1/5 of the nail plate thickness (mass), whereas in psoriasis (nail psoriasis in particular) their contribution may be much greater, even exceeding 1/4 according to some authors (8).

It is well known that there is no efficient therapy for psoriasis, including nail psoriasis. Each type of psoriasis therapy (local preparations, phototherapy, any form of systemic therapy) has only a certain static effect on the disease. While systemic therapy (retinoids, cytostatics, immunosuppressants) frequently produces satisfactory results with prolonged remissions, because of a number of side effects it is not recommended when the disease is confined to nails alone or when nail lesions are more pronounced than skin changes. Although rarely useful, topical corticosteroids may in some cases be used in therapy of nail lesions, however, their prolonged application or use under occlusion may lead to skin atrophy (9). Intralesional application of corticosteroids (injections into the proximal end of the nail) has also been described (10), however, usually with only temporary improvement, while their application may frequently be associated with painful sensation, thus this mode of treatment is not in common use. Systemic therapy with oral retinoids, which have been introduced for severe forms of cutaneous psoriatic lesions, may frequently have beneficial effect on nail lesions (11), however, as discussed above, this mode of treat-



Figure 4b. Oily drops and onycholysis persisted in the distal fifth of finger nail plates.

ment is not used in case of primary nail lesions. Some authors report on the use methotrexate as the most efficacious therapy for severe psoriatic nail lesions (12), yet its prolonged application may lead to permanent nail dystrophy, which should be borne in mind. Recently, reports on the favorable effects of low dose cyclosporine have appeared in the literature (13-15). Phototherapy using topical or oral methoxalen and UVA, with or without retinoids, has been described as a potentially efficient therapy for nail psoriasis (16). Like some other authors (2), we believe that phototherapy is of low efficacy in this entity. Local therapy may include cytostatics, e.g., 5-fluorouracil, 1.0% solution, with or without a nail penetration-enhancing vehicle (17,18), cyclosporine (19), calcipotriol ointment (20), tazarotene 0.1% gel (21) and anthralin (22), however, with modest and short-lived or as yet inadequately investigated effects.

X-ray therapy for psoriasis is rarely used, i.e. only for refractory localized lesions. Nail psoriasis is one of the indications for x-ray therapy. Prior to psoriatic nail irradiation, nail thickness should be determined and x-ray transmission through normal and affected nail assessed (23). While grenz rays can be used for psoriatic nails of normal thickness, this type of x-rays has proved less efficacious in thickened psoriatic nails (24). Fast electron therapy penetrating nail bed, thus exerting a temporary therapeutic effect, has also been reported (25). However, x-rays are preferred for the treatment of nail psoriasis. Favorable results were observed in as many as 50% of patients treated with three doses of 1-1.5 Gy at week intervals (23). Finnerly was the first to describe three patients treated with 6 to 8 doses of 0.5-0.75 Gy in a total dose of

4-6 Gy, which led to complete remission of psoriatic lesions of all nails in several months. In two of these three patients, gradual improvement occurred within 14 months, and in one patient within only 4 months (26). Kouskousis *et al.* suggest the use of 1 Gy at week intervals up to a total dose of 4-5 Gy in cases where other therapies have failed (27). Mensing also recommends the use of radiotherapy, 4x1.5 Gy at 8- to 10-day intervals, for isolated nail psoriasis in adult patients (28). Yu and King report on definitive yet temporary effect of superficial radiotherapy in 3 fractionated doses of 1.5 Gy (90 kV, 5 mA, 1.00 mm aluminum filter) in three patients with nail psoriasis. The effect was observable at week 10 and 15 of therapy completion, with considerable reduction of nail thickness. The improvement was of transient nature because there was no statistically significant difference between the treated and untreated nails at week 20 of therapy completion (29).

Our patient underwent soft x-ray therapy with a lower penetration compared with other forms of x-ray therapy and superficial x-ray therapy. The depth of soft x-ray penetration at given device properties was 5 mm. It should be noted that we used a higher total dose and greater number of exposures than those reported from the studies mentioned above, which exceeded the dose of 3-12 Gy *per* irradiation field recommended by Panizon (23). Using this dose, we achieved a gradual but constant effect, which resulted in near normal appearance of the nail plates. A decrease in the linear nail growth was observed. In contrast to our expectation and the fact that finger nails generally grow completely in 6 months, a "normal nail plate" failed to grow even at 12 months of therapy completion. We also admit that the retarded nail growth due to the antimetabolic effect of radiotherapy may have been desirable for better onychocyte differentiation; modulation of the nail growth rate for therapeutic purpose has also been reported elsewhere (30).

CONCLUSIONS

Fractionated application of soft x-rays in a total dose of 13.5 Gy resulted in almost complete clinical normalization in the appearance of all finger nails and toe nails in a patient with the most severe form of nail psoriasis described to date. This therapeutic effect could also be considered as directly demonstrating the primary involvement of the nail matrix.

Because of the well known carcinogenic potential of even low-dose radiation (1-10 Gy) (31,32),

the management of benign dermatoses by radiotherapy has been on a steady decrease, even in conditions with indication for its application, such as severe and persistent forms of nail and scalp psoriasis (23). Upon thorough weighing the risk-to-benefit ratio of this therapy and side effects of systemic therapy with methotrexate and cyclosporin as alternative therapeutic options, among others, we found the favorable characteristics of radiotherapy to prevail. In this case, radiotherapy proved efficacious, leading to longterm remission. High therapeutic efficacy improved the patient's work ability and substantially upgraded his quality of life. While advocating individual approach in every patient, with due consideration of the disease severity and difficulties it causes to patients, we believe that radiotherapy has and should hold its place in the management of nail psoriasis in the elderly with severe psoriatic nail lesions and massive subungual hyperkeratoses.

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