Research Article

Microscopic Examination of Nail Clippings from Patients with Palmoplantar Pustulosis

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Keywords

Nails · Onychodystrophy · Psoriasis · Palmoplantar pustulosis · Nail clipping · Microscopy

Abstract

This study describes the clinical characteristics and microscopic findings of nails from 25 patients with palmoplantar pustulosis. **Methods:** This is a cross-sectional study of adult patients with clear-cut palmoplantar pustulosis. Onychodystrophy severity was evaluated in finger-nails using the nail psoriasis severity index (NAPSI). A fragment of the most dystrophic finger-nail was collected from each patient and submitted to routine histotechnical processing. The following microscopic parameters were evaluated: nail plate and subungual region thickness, presence or absence of parakeratosis, number of layers of parakeratosis, and presence of neutrophils, serous lakes, bacteria, blood, and fungi. **Results:** Twenty-one patients (84%) presented onychodystrophy with a mean NAPSI score of 12.67. The most common nail change was pitting (76.19% of patients). On average, nail plate thickness and subungual region thickness measured 0.42 and 0.14 mm, respectively. Neutrophils and fungi were not observed, but serous lakes were found in 4.7%, bacteria in 28.57%, blood in 4.76%, and parakeratosis in 19.05% of the patients. **Conclusions:** although palmoplantar pustulosis is a disease with great amounts of neutrophils in the epidermis, those cells were not found in the nail clippings studied herein. Furthermore, when clinical aspects and microscopic findings of palmoplantar pustulosis are compared to those of similar studies in psoriasis vulgaris, they show different characteristics.

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Introduction

Palmoplantar pustulosis represents a localized form of psoriasis with an estimated prevalence of 0.01–0.05% [1–5]. The involvement of nails is frequent in patients with psoriasis and is found in approximately 56% of cases in psoriasis vulgar [6], the most common cutaneous manifestation, whereas in palmoplantar pustulosis it occurs in 30–76% of patients [7]. The main goal of the present study is to describe the microscopic findings and clinical characteristics of nails from patients with palmoplantar pustulosis. To the best of our knowledge, this is the first detailed study describing nail changes associated with this specific form of psoriasis in the literature.

Methods

This is a cross-sectional study of patients diagnosed with palmoplantar pustulosis [3] and followed up in a dermatology outpatient hospital in Brazil (Hospital Universitário Evangélico de Curitiba, Paraná).

Patients were selected between August 2016 and August 2017 (consecutive cases) and data such as age, sex, duration of disease, and presence or absence of arthritis were collected. Onychodystrophy severity was evaluated in fingernails using the nail psoriasis severity index (NAPSI) [8].

A fragment of the most dystrophic fingernail was collected from each patient. When nails were clinically normal, nail fragments were systematically collected from the second finger of the nondominant hand.

Nail clipping was performed by cutting the distal portion of the free edge of the nail plate, with a minimum size of 5 mm in length and 2 mm in width [9, 10]. The nail samples were technically processed for microscopic observation as previously described [11]. The following microscopic parameters were evaluated: nail plate and subungual region thickness (measured in millimeters using an appropriate ruler), presence or absence of parakeratosis (corneocyte nuclei at the subungual region), number of layers of parakeratosis, and presence of neutrophils, serous lakes, bacteria, blood, and fungi. Microscopic examination was performed blindly.

Categorical variables, with nominal or ordinal measurement scales, were analyzed using the χ^2 test, or Fisher's exact test when the χ^2 test could not be applied. Quantitative variables were analyzed using the Mann-Whitney test. When significant differences were observed, supplementary comparisons were performed using the least significant difference test. All tests were performed at $p \leq 0.05$.

Results

Twenty-five patients with palmoplantar pustulosis were included. Twenty-two were women and 3 were men, with ages varying between 18 and 74 years (46.24 ± 13.68 years). The duration of the disease ranged from 6 months to 19 years (6.6 ± 7.73 years). Arthritis was recorded in 16% of the patients.

Twenty-one patients (84%) presented onychodystrophy with NAPSI scores varying from 5 to 23 (12.67 ± 5.16). The most common nail changes were pitting (76.19%), leukonychia (38.1%), onycholysis (33.33%), crumbling and splinter hemorrhages (23.81%), Beau's lines (14.29%), oil drop discoloration, and red spots in the lunula (9.52%).

The microscopic thickness of the nail plate ranged from 0.2 to 0.8 mm (0.42 ± 0.17 mm), and that of the subungual region from 0 to 0.6 mm (0.14 ± 0.16 mm).

Fig. 1. Dystrophic nail from a patient with palmoplantar psoriasis showing a thick subungual region with blood. HE. Original magnification, $\times 20$.

Fig. 2. Dystrophic nail from a patient with palmoplantar psoriasis depicting prominent arching of the nail transition zone. HE. Original magnification, $\times 10$.

Neutrophils and fungi were not observed, but serous lakes were found in 4.7%, bacteria in 28.57%, blood in 4.76%, and parakeratosis in 19.05% of the patients (number of layers varying from 3 to 6, mean: 4.25). Prominent arching of the nail transition zone was observed in 9.52% of the patients with onychodystrophy. Some microscopic findings can be seen in Figures 1 and 2.

Discussion

Palmoplantar pustulosis shares many features with psoriasis vulgaris, and about one third of patients with palmoplantar pustulosis present typical psoriasis lesions elsewhere in the body (skin, nail, or joint changes). However, on a genetic level, one of the major allelic determinants of psoriasis susceptibility – the psoriasis susceptibility locus (PSORS) 1, which carries HLA-Cw*0602 – has not been found to be involved in the development of palmoplantar pustulosis [2–5]. Moreover, patients with palmoplantar pustulosis do not respond as

Table 1. Comparison of microscopic nail clipping findings in patients with psoriasis vulgaris and onychodystrophy and patients with palmoplantar pustulosis and onychodystrophy

	Psoriasis vulgaris (n = 50)	Palmoplantar pustulosis (n = 21)
Nail plate thickness, mm	0.44±0.14	0.42±0.17
Subungual thickness, mm	0.19±0.15	0.14±0.16
Layers of corneocytes, n	6.9±8.12	4.25±1.26
Neutrophils	12	0
Serous lakes	46	5 ^a
Blood	12	5 ^a
Bacteria	74	29 ^a

Data are presented as mean ± SD or percentage, as appropriate.

^a Percentages were rounded.

well to the therapies usually employed in psoriasis vulgaris, and differ by having a female predominance and a stronger association with smoking.

In the population analyzed in this study, we found a much higher incidence of the disease in women (88%), with an average age of 46 years, when compared to reports from the literature [12, 13]. On the other hand, the average duration of disease and arthritis rates are in agreement with previous reports [14, 15].

Nail changes were observed in 84% of our patients, which is a higher percentage than the 30% found in other studies for palmoplantar pustulosis [7, 16]. The reason for this elevated rate in the onychodystrophy index could not be determined. Some possible reasons are (a) the small number of studies that have examined patients with palmoplantar pustulosis, preventing the establishment of reliable statistics; (b) the focus of the study on nail changes in this particular population; and (c) since this is the first study to analyze palmoplantar pustulosis patients in Brazil, the results could indicate a characteristic genetic profile more prone to onychodystrophy in Southern Brazil.

Most patients with onychodystrophy due to palmoplantar pustulosis from previous studies presented alterations due to nail matrix involvement. Burden and Kemmett [16] observed onycholysis and pitting in almost 40% of patients with that disease, and another study [7] found that 42.9% of patients presented pitting and 50% presented onycholysis. We observed similar results, finding pitting and onycholysis in 76 and 33% of our patients, respectively.

The average NAPS index for patients with pustulosis palmoplantar is not mentioned in the literature, but in this research we found an average of 12.67. Published data of NAPS index values for psoriasis vulgaris are variable according to the study, with scores ranging from 26.6 to 30.6 [17, 18]. A comparison of these values between the two forms of psoriasis should be conducted very cautiously, though, because the methods chosen for evaluation vary among studies.

Some studies claim that severity in nail involvement is a predictor of psoriatic arthritis prevalence [19], although common nail and joint autoantigens were never identified [20, 21]. Coincidentally or not, we found a low prevalence of arthritis among our patients (16%) and a low NAPS index (12.67 on average). Other authors [13] report a prevalence of 13–64% of arthritis in pustulosis palmoplantar, and some studies have demonstrated a greater nail involvement (high NAPS index) in patients with psoriatic arthritis [19].

Few studies have reported microscopic observations of nail changes in nail inflammatory diseases [22–26]. Specific studies that have examined psoriasis are even rarer. Machler et al. [22] were the first to describe nail microscopic findings for psoriasis, reporting the presence of parakeratosis and neutrophils without other microscopic details. Werner et al. [23]

described detailed nail microscopic findings of dystrophic nails from patients with psoriasis. A comparison between the microscopic changes observed in patients with psoriasis vulgaris by Werner et al. [23] and in patients with palmoplantar pustulosis from the present study is presented in Table 1. In general, it appears that nails in palmoplantar pustulosis are microscopically less altered than those in psoriasis vulgaris. This could be an explanation for the low NAPS score found in this study.

Neutrophils are important cells in the physiopathology of palmoplantar pustulosis. The characteristic pustules of the disease consist of large intraepidermal collections of neutrophils. T-cell infiltrates in the dermis and epidermis play another important role, secreting several cytokines (IFN- γ , IL-6, IL-17, and TNF- α) that act as inflammation drivers in palmoplantar pustulosis [27]. Interestingly, whereas neutrophils were observed in nails of 12% of the patients with psoriasis vulgaris [23], they were never observed in nails from patients with palmoplantar pustulosis. This is likely a paradox, since palmoplantar pustulosis is the putative form of psoriasis presenting more neutrophils, and characteristically involves fingers and toes, close to the nail apparatus [22].

In conclusion, to the best of our knowledge, palmoplantar pustulosis presents less severe onychodystrophy and different microscopic characteristics when compared to psoriasis vulgaris. NAPS score seems to be lower in palmoplantar pustulosis and there is higher incidence of neutrophils, bacteria, and serous lakes, and more prominent parakeratosis in nails from patients with psoriasis vulgaris. Maybe our results add up to the differences between palmoplantar pustulosis and psoriasis vulgaris, as indicated by the already described distinct genotypic and phenotypic findings, and the low response to therapies regularly used in the treatment of the latter.

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Statement of Ethics

Subjects gave their written informed consent. The study was approved by the local Research Ethics Committee (Registration No. 1.601.733).

Disclosure Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Anber A. Tanaka and Betina Werner: substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data; and drafting and revising the work. Cassio Tornesny and Cassia Farris: substantial contributions to the acquisition, analysis, and interpretation of data, and drafting and revising the work.

All authors agreed to be accountable for all aspects of the work and approved the final version.

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