Dermatophytid—a Misdiagnosed Entity?

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A mycological and immunological survey was performed in 26 patients with clinical signs of dermatophytid. Only 10 patitents fulfilled the main criteria of dermatophytid reactions, i.e. positive delayed skin test to trichophytin and dermatophyte isolated by culture. *Trichophyton mentagrophytes*—especially the zoophilic variant—was found in 9 patients of 10. In the majority of cases, inflammatory tinea pedis caused the dermatophytid reaction which appeared as vesicles localized to the palms. Relying on clinical appearance only implies an obvious risk of erroneously including pyoderma and various eczemas, e.g. pompholyx and contact dermatitis, as dermatophytids. Mycological culture and skin test with a reliable trichophytin antigen preparation ought to be applied in order to avoid misdiagnosis. *Key words: Dermatophytid; Dermatophytosis; Trichophytin.* (Received November 3, 1982.)

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Dermatophyte infections can be complicated by secondary, distant, aseptic skin lesions which in analogy to tuberculides were named trichophytids. They are nowadays better known as dermatophytids. In 1918, Jadassohn (4) recognized the causal connection between a generalized cutaneous eruption and a kerion infection. The classical reaction pattern of a dermatophytid, formerly considered as the most common one, consists of a symmetrical, generalized, often papular eruption on the trunk. This variant is principally connected with a scalp ringworm infection, usually at the height of the infection.

In 1926, Williams (14) put forward the hypothesis that eczematous eruptions on the hands might be dermatophytids secondary to fungus infections of the skin and the nails. Jadassohn & Peck reported that many dermatophytids on the hands are the sequel of infections of the feet (5). Beside these two main types of id lesions, various forms of dermatophytids have been described, often as isolated case reports (13). They include, e.g., erysipelas-like dermatitis, erythema nodosum, erythema annulare centrifugum, exfoliative dermatitis, and urticaria.

Peck (10) has moreover classified dermatophytids according to their histological and clinical characteristics. The classical criteria for the diagnosis of dermatophytid were also given by Peck (10): primary focus of proven dermatophyte infection, delayed positive intracutaneous reaction to trichophytin, fungus-free distant eruption and spontaneous disappearance of this eruption following successful treatment of the primary dermatophytosis.

The purpose of this study was to investigate patients with signs of dermatophytosis and distant rections corresponding to clinical dermatophytids and correlate these findings to the main dermatophytid criteria, i.e. dermatophytosis verified by culture and positive delayed skin reactivity to trichophytin.

MATERIAL AND METHODS

The subjects were 26 patients, 20 men and 6 women. They had primary lesions with clinical signs of dermatophytosis followed by secondary, distant skin eruptions. The patients were investigated at the

Department of Dermatology, Södersjukhuset during the period 1976–81. All were examined by one of us.

The patients were skin tested intracutaneously with purified trichophytin processed according to the ethylene glycol method (7). The immediate reaction was read after 20 min and considered positive when a distinct wheal of at least 11 mm diameter with surrounding flare—or else a wheal with distinct pseudopodia—appeared. The delayed reaction was read after 48 hours. It was considered positive when a distinct palpable erythematous skin lesion appeared, with a mean diameter of at least 4 mm.

Specimens for mycological investigations including cultures and KOH preparations were taken from the focus of the suspected dermatophytosis of all patients. The dermatophytes were identified according to standard criteria, based on the colonial morphology and the microscopic appearance of the fungus. Moreover, pigment production was studied on corn meal dextrose agar and, together with in vitro perforation of hair, was used to distinguish *Trichophyton rubrum* from *Trichophyton mentagrophytes* (11). The zoophilic form of *T. mentagrophytes* with a buff powdery surface of the colony was distinguished from the anthropophilic form of *T. mentagrophyes* by its flat, densely downy thallus and a lesser number of microconidia.

Bacterial cultures from the skin lesions were set up from 16 patients.

Total serum IgE levels were determined with radioimmunosorbent test (PRIST) in 17 cases.

Ten of the patients were patch-tested for allergic contact sensitivity. The finn chamber test method according to Pirilä was used with the ICDRG standard series.

RESULTS

The suspected dermatophytosis was localized to the feet in 24 patients, with the clinical id reaction localized to the hands in 20 cases and in 4 cases to the trunk or the extremities.

Positive delayed skin reaction to trichopytin, in combination with dermatophytosis verified by culture, was found in 10 of the patients. Clinical data, size of delayed skin reaction and mycological findings of these patients are listed in Table I. Nine of the 10 patients suffered from tinea pedis. This infection was in all cases ascribed to *T. mentagrophytes*, appearing as the zoophilic variant in 7 cases. The primary infection of the feet showed in 6 of 9 cases a more deepseated vesicular appearance. The otherwise commoner low-grade inflammatory tinea pedis was only seen in 3 of 9 cases. The distant id reactions to *T. mentagrophytes* infections were all localized to the hands and in 7 of 9 cases with a

Table I. *Survey of patients with verified dermatophytosis and positive delayed skin reaction to trichophytin*

Tm a = *Trichophyton mentagrophytes*, anthropophilic variant,
Tm z = *Trichophyton mentagrophytes*, zoophilic variant,
Ef = *Epidermophyton floccosum*

Dermatophytosis		Dermatophytid		Delayed skin reaction (means of perpendicular diameters in mm at 48 h)
Localization	Culture	Localization	Reaction pattern	
1. Tinea pedis	Tm z	Hands	Vesicular	20.5
2. Tinea pedis	Tm z	Hands	Vesicular	15.5
3. Tinea pedis	Tm z	Hands	Vesicular	14.0
4. Tinea pedis	Tm z	Hands	Vesicular	13.5
5. Tinea pedis	Tm z	Hands	Vesicular	9.0
6. Tinea pedis	Tm a	Hands	Vesicular	6.5
7. Tinea pedis	Tm z	Hands	Erythema/scaling	13.5
8. Tinea pedis	Tm z	Hands/extremities	Erythema/scaling	11.5
9. Tinea pedis	Tm a	Hands/extremities	Vesicular	6.5
10. Tinea pedis	Ef	Trunk/extremities	Papular	5.5

Fig. 1. Dermatophytid. Palmar vesicles and bullae. Positive delayed intracutaneous test to trichophytin (*right*).

clear vesicular pattern (Fig. 1). One patient had an *Epidermophyton floccosum* infection of the groin with a papular id on the trunk.

Of the 26 patients, 16 did not satisfy the requirements of both positive delayed reaction to trichophytin and positive mycological culture. Laboratory findings and clinical data concerning this group of 16 patients are as follows. Bacteriological culture showed rich growth of *Staphylococcus aureus* and/or beta-hemolytic streptococci in 7 cases. Dermatophytes were isolated in 5 cases only, all *T. rubrum*. Skin test with trichophytin revealed positive delayed reactivity in 3 cases. Positive immediate skin reactions were registered in 4 patients. One of them was suffering from atopic disease and another had a *T. rubrum* infection of the groins. Two patients showed increased IgE values: 187 kU/l and 608 kU/l respectively (normal levels <120 kU/l). Both of them presented a positive immediate skin test. The clinical findings in this group of 16 patients were dominated by vesicles and bullae of the palms (9 cases). The remaining patients showed in most cases localized erythema and scaling, predominantly on the trunk and the extremities. Allergic contact dermatitis was found in 2 cases with positive patch test, to parabens and wool alcohols respectively. A single patient developed erythema multiforme.

DISCUSSION

Dermatophytid is a diagnosis often based solely on clinical grounds. Of our 26 patients with clinical signs of dermtophytid, only 10 fulfilled the following two major criteria: dermatophytosis verified by culture and positive delayed skin reaction to trichophytin.

It is obvious that the immunological properties of the antigen preparation used is of importance for the outcome of skin test and thus the number of cases classified as dermatophytid. Previously used unspecified antigen preparations may affect the diagnosis of ids by taking non-specific properties into account. In this investigation we used a trichophytin preparation purified according to the ethylene glycol method, standardized with respect to biological activity and considered specific and sensitive compared with commercial preparations (7).

The second criterion for id diagnosis was a positive mycological culture from the primary skin lesion. In 9 of 10 patients, *T. mentagrophytes* was found. This contrasts with the usual mycological findings in our clinic, where *T. rubrum* is by far the most dominant species (8).

The clinical picture of the id patients with foot infections also differed from ordinary tinea pedis and showed active inflammatory lesions. The id response was dominated by vesicles and bullae on the palms. The classical eruption on the trunk due to scalp ringworm was not seen. In a single patient *E. floccosum* was isolated. It appears as if an inflammatory dermatophyte such as *T. mentagrophytes* of the zoophilic variant is a prerequisite for the induction of a dermatophytid. *E. floccosum* may also be considered to give more inflammatory lesions than *T. rubrum* (8).

Among the patients deemed on solely clinical grounds to be, suffering from dermatophytid, we found a high frequency of pathogenic bacteria: rich growth of *Staphylococcus aureus* and/or beta-hemolytic streptococci from skin lesions. It appears as if these bacteria are in certain cases capable of mimicking dermatophytids. Since the treatment of these infections is entirely different from the treatment of dermatophytosis, it is important to identify at an early stage those cases caused by bacterial infection.

A review of the literature has revealed two epidemiological studies with varying reports on the frequency of dermatophytids: 8% and 0.2% of tinea infections respectively (1, 3). From the results of this investigation it is evident that dermatophytids are seldom seen in our clinic. Ten cases of dermatophytids according to the classical criteria were seen during 5 years. More than 300 cases of dermatophyte infections were diagnosed each year during the same time.

The nature of the dermatophytids is not known, but they are thought to be the result of sensitization to fungus antigens liberated from the focus of infection into the bloodstream or the lymphatics (2). The delayed skin reaction to trichophytin reflects the cell-mediated immunity. The immediate skin reaction to trichophytin may be transferred by serum (12), in that case indicating a circulating antibody reaction, and is closely correlated to chronic dermatophytosis (6, 8). It may also be non-specifically elicited in atopic patients (9). The relevance of the immediate skin reaction to trichophytin in dermatophytid is not known. Against the background of current knowledge in the field of immunology it is not unlikely that the immediate skin response is a sign of sensitization to fungus antigens. This is so if the reaction is mediated by antibodies. The immediate reaction to trichophytin might in that case constitute another complementary criterion in diagnosing dermatophytid. The nature of the immediate response needs further investigation before the significance of this reaction for the diagnosis of dermatophytid can be estimated.

In conclusion, if the classical criteria previously presented are considered valid, there is an obvious risk of misdiagnosing dermatophytid reactions when the diagnosis rests on

clinical grounds only. Some cases of bacterial infection and allergic contact dermatitis could easily be overlooked!

REFERENCES

1. Dostrovsky A, Kallner G, Raubitschek F, Sagher F. Tinea capitis. An epidemiologic, therapeutic and laboratory investigation of 6390 cases. J Invest Dermatol 1955; 24: 195.
2. Grappel SF, Bishop CT, Blank F. Immunology of dermatophytes and dermatophytosis. Bacteriol Rev 1974; 38: 222.
3. Hall FR. Cultures and findings in two hundred cases of dermatophytosis of the feet. Arch Dermatol 1956; 74: 306.
4. Jadassohn J. Über die Trichophytien. Berl Klin Wochenschr 1918; 21: 489.
5. Jadassohn W, Peck SM. Epidermophytie der Hände. Arch Dermatol Syphil 1929; 158: 16.
6. Jones HE. Reinhardt JH, Rinaldi MG. A clinical, mycological and immunological survey for dermatophytosis. Arch Dermatol 1973; 108: 61.
7. Kaaman T, von Stedingk LV, Wasserman J. An evaluation of delayed hypersensitivity in guinea pigs to various trichophytin preparations. Acta Derm Venereol (Stockh) 1976; 56: 283.
8. Kaaman T. Cell-mediated reactivity in dermatophytosis: differences in skin responses to purified trichophytin in tinea pedis and tinea cruris. Acta Derm Venereol (Stockh) 1981; 61: 119.
9. Marcussen PV. Relationship of the urticarial to the inflammatory reaction to trichophytin. Arch Dermatol Syphil 1937; 36: 494.
10. Peck SM. Fungus antigens and their importance as sensitizers in the general population. Ann NY Acad Sci 1950; 50: 1362.
11. Rebell G, Taplin D. Dermatophytes: Their recognition and identification. Coral Gables FL: Univ Miami Press, 1970.
12. Sulzberger MB, Kerr PS. Trichopytin hypersensitiveness of urticarial type, with circulating antibodies and passive transference. J Allergy 1930; 2: 11.
13. Sulzberger MB. Dermatologic allergy. Springield. Illinois: Charles C. Thomas Publisher, 1940.
14. Williams CM. Dermatophytid complicating dermatophytosis of the glabrous skin. Arch Dermatol Syphil 1926; 13: 661.