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'Clues' for the Histological Diagnosis of Tinea: How Reliable Are They?

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Dear Editor:

Dermatophyte infections of the skin surface (tinea corporis and tinea faciei) mostly present as erythematous scaly papules that gradually progress to annular or nummular red patches or plaques, frequently with central clearing and peripheral scales[1]. Although less common, pustules, vesicles, or large blisters may be clinical features. Many histological 'clues' for the diagnosis of dermatophyte infection have been proposed, including neutrophils in the stratum corneum, compact orthokeratosis, papillary dermal edema, and the presence of fungal hyphae between 2 zones of cornified cells (called the 'sandwich' sign)[1,2]. This study was performed to evaluate the reliability and clinical value of the 'clues' for the histological diagnosis of tinea corporis and tinea faciei.

Eighteen skin biopsy samples were retrieved from histologically confirmed cases of tinea on the body and face of patients treated between September 2010 and March 2012 in the Department of Dermatology at the SMG-SNU Boramae Medical Center. The hematoxylin-eosin (H&E)-stained slides of the 18 periodic acid-Schiff stain (PAS)-positive biopsy specimens were reviewed by 2 dermatologists. The checklist included the presence or absence of hyphae, the sandwich sign, papillary dermal edema, eosinophils in the dermis, neutrophils in the stratum corneum and stratum malpighii, and other pathological characteristics of the specimens observed after H&E staining.

The initial clinical differential diagnoses for these 18 cases were broad, and 15 cases (83%) were clinically suspected to be a tinea infection, either as the primary impression or in the differential consideration. Allergic contact dermatitis, psoriasis, and cellulitis were the initial clinical diagnoses in 3 cases. The results of the histopathological examinations and reviews are summarized in Table 1. The

Table 1. Histopathologic features of periodic acid-Schiff-positive tinea cases

Variable	Value
Variable host inflammatory response	18 (100)
Parakeratosis	13 (72)
Basket weave keratin layer	12 (67)
Neutrophils in stratum malpighii	10 (56)
Spongiotic changes	8 (44)
Papillary dermal edema	6 (33)
Hyphae on H&E	6 (33)
Neutrophils in stratum corneum	5 (28)
Eosinophils in dermis	5 (28)
Compact orthokeratosis	4 (22)
Sandwich sign	4 (22)
Subcorneal pustules	4 (22)
Folliculitis and/or folliculocentric inflammation	4 (22)
Hemorrhage	4 (22)
Interface and/or lichenoid changes	3 (17)
Dermal fibrosis	3 (17)
Psoriasiform changes	2 (11)

Values are presented as number (%).

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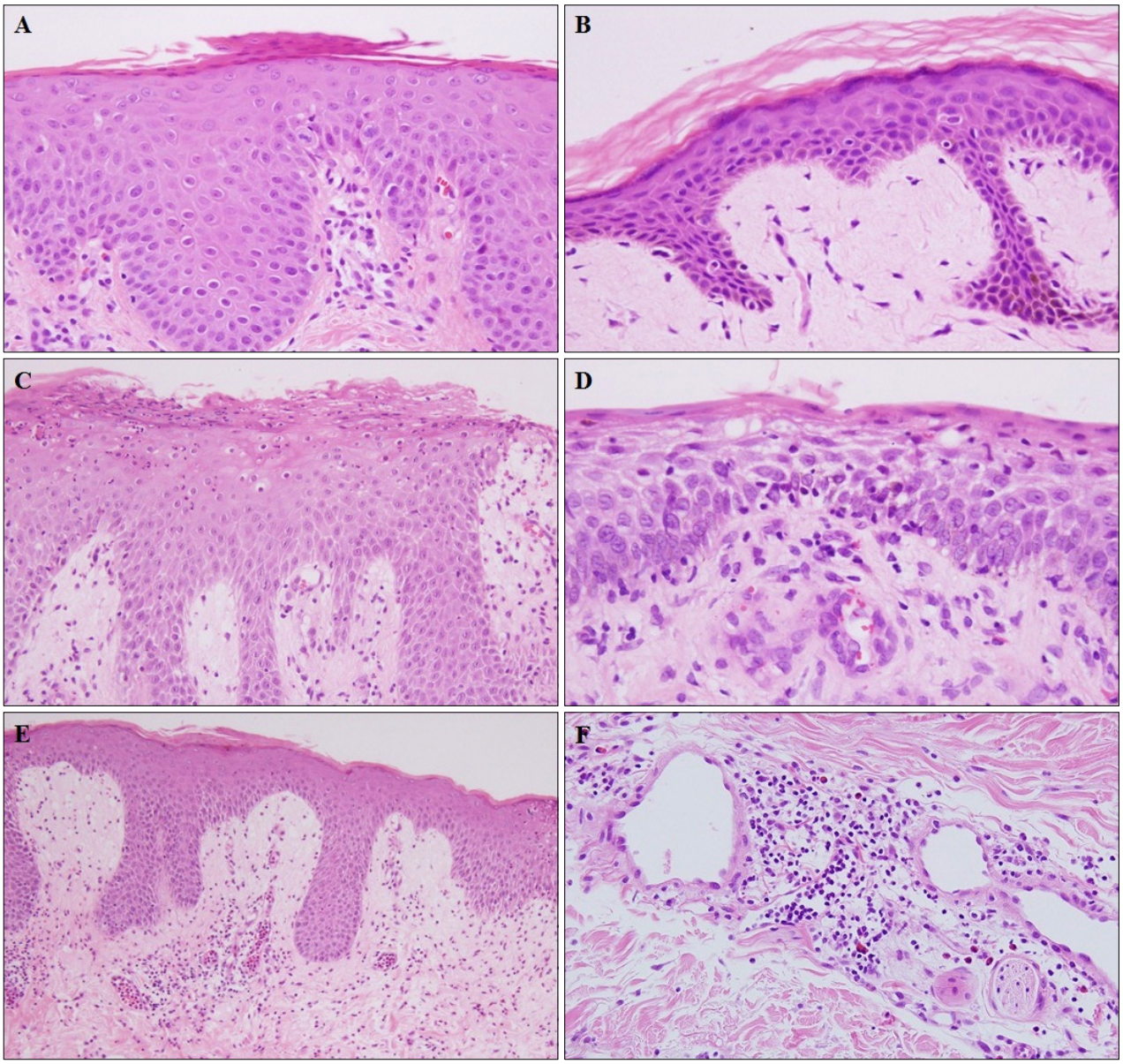

Fig. 1. Skin biopsy specimens diagnosed as tinea corporis and tinea faciei showed various histological findings on H&E stained sections, including (A) parakeratosis, (B) basket weave keratin layer, (C) neutrophils in the stratum malpighii, (D) spongosis, (E) papillary dermal edema, and (F) eosinophils in the dermis (A~D: ×200; E: ×100; F: ×400).

spectrum of pathological changes was parakeratosis in 13 cases (72%) and other diverse changes such as basket weave keratin layer in 10 cases (56%), neutrophils in the stratum malpighii in 9 cases (50%), spongiotic changes in 8 cases (44%), papillary dermal edema in 6 cases (33%), neutrophils in the stratum corneum in 5 cases (28%), dermal eosinophils in 5 cases (28%), compact orthokeratosis in 4 cases (22%), and sandwich sign and subcorneal pustules in 4 cases (22%) (Fig. 1). It is worth noting that hyphae on H&E-stained sections were observed in only 6 cases (33%). In the remaining 12 cases (67%), hyphae were not observed in H&E-stained sections, and could only be identified in sections stained with PAS.

Many cutaneous diseases have characteristic histological features that help physicians make the correct diagnosis[2]. However, as reported during the past years, dermatophytoses of the body and face commonly have unusual, nonspecific, or unnoticed histopathological findings. Veraldi et al.[3] reported a case of tinea infection with positive direct immunofluorescence findings of granular deposition of immunoglobulin G and C3 at the dermoepidermal junction. Moreover, Goldberg et al.[4] also reported a case

of bullous tinea corporis with positive direct immunofluorescence features that revealed spongiotic dermatitis on H&E-stained sections. Incidental acantholysis within the epidermis was also observed in another case of tinea corporis[5]. Because the histological features of dermatophytoses are often various, nonspecific, and unusual, several 'clues' for the histological diagnosis of dermatophytoses have been proposed in the literature, including neutrophils in the stratum corneum of the skin, compact orthokeratosis, and the presence of fungal hyphae between 2 zones of cornified cells (the so-called sandwich sign)[6].

Among the tinea cases of this study, only 4 cases (22%) showed the sandwich sign, which is known as the typical and specific histological finding of dermatophytosis. Neutrophils in the cornified layer were observed in only 5 cases (28%); 4 cases (22%) showed a compact orthokeratosis. Nonspecific findings that are commonly observed in other dermatoses, such as parakeratosis (72%), basket weave pattern keratin layer (56%), spongiosis (44%), and papillary dermal edema (33%), were observed much more frequently than relatively specific findings, the so-called 'clues' for the histological diagnosis of dermatophytoses. These findings imply that such histological 'clues' for making the diagnosis of superficial tinea infection are not very reliable or useful.

We expected the cases of this study to present with more typical histological findings than those described in previous studies because the proportion of cases with an initial clinical diagnosis of tinea infection was higher in the present series than in previous reports[2,7]. Although most of these cases have typical clinical presentation, several previously known 'clues' for the histological diagnosis of tinea cannot be solely relied on for a correct diagnosis. Moreover, fungal hyphae could be identified on the H&E-stained sections of only 6 cases (33%) despite the typical clinical manifestations. Therefore, we believe that performing PAS staining for biopsy specimens of all inflammatory lesions can improve the detection of hyphae that may be frequently missed on routine H&E staining, thus decreasing erroneous clinical and pathological diagnoses that delay appropriate treatment and cure.

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