Routine laboratory examinations showed an increased white blood cell count of 17,600/mm³ (neutrophils: 74%, lymphocytes: 16%, monocytes: 8%, eosinophils: 2%, basophils: 1%) and elevated C-reactive protein of 5.9 mg/dl (normal range, 0–0.39). Liver and renal function tests were normal. Serum IgE was increased (830 IU; normal range, 0–400). A speckled pattern of antinuclear antibody was detected at 1:2,560 (normal range <1:40) without antibodies to ssDNA, dsDNA, Sm, SS-A/Ro or SS-B/La. The plasma zinc levels were normal. There were no symptoms suggestive of collagen diseases. Bacterial cultures from the pustules isolated only a small number of colonies of *Staphylococcus epidermidis* on several occasions, indicating a secondary colonization.

**Fig. 1.** Clinical features. **a** Multiple pustules with coalescence arising on the erythematous skin and forming large crusted plaques in the scalp. **b** Enlarged lymph node in the postauricular region (arrows).
Skin biopsy from the scalp showed an intense dermal infiltration of neutrophils and lymphocytes around the vessels as well as hair follicles and eccrine ducts, extending to the epidermis. There was a dense neutrophilic infiltration in the epidermis forming a subcorneal spongiform pustule without liquefaction degeneration of the basal layer (fig. 2). In the dermis, these cellular infiltrations were associated with nuclear dust scattered between collagen fibers. On direct immunofluorescence, there was no deposition of IgG, IgA, IgM or complements.

He was treated with oral prednisone, 20 mg daily, and topical clobetasol propionate 0.05% ointment for 4 weeks. The patient’s response was variable, with improvement seen on some visits but worsening noted on others. Then, instead of corticosteroids, we administered roxithromycin 300 mg daily for 8 weeks, which has immunomodulatory properties due to its inhibitory effect on neutrophil infiltration [4, 5]. However, it failed to alleviate his eruptions. He did not request any further treatment, turning down our suggestion to try dapsone or cyclosporine because of fear of their side effects. A follow-up made 3 months later demonstrated no special change in the clinical appearance of the scalp pustules.

**Discussion**

APF is a rare clinical entity. The clinical features are relapsing, aseptic, pustular eruptions, mainly affecting the scalp and cutaneous folds. Typical histological features are intraepidermal spongiform pustules with a neutrophilic infiltrate in the dermis. The etiology of amicrobial pustulosis is unclear. However, it is noteworthy that almost all the previously reported cases with amicrobial pustulosis were found in females showing various autoantibodies. Despite their immunological abnormalities most of them did not necessarily meet the diagnostic criteria for particular autoimmune diseases. Among them, SLE that was noted in 3 cases [6] was the most frequently observed disorder. The female predominance

**Fig. 2.** Histopathological features. **a** Biopsied specimen of pustule from the scalp showed massive neutrophil infiltration in the epidermis and dermis. Original magnification ×40. **b** A subcorneal spongiform abscess was observed. Original magnification ×100. **c** Neutrophils infiltrated around the blood vessels as well as the hair follicles and eccrine ducts. Hematoxylin-eosin stain. Original magnification ×100.
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may be explained by the underlying immunological disorders, such as SLE, which show a similar female prevalence.

APF is characterized by neutrophilic infiltration that usually constitutes the first-line defense against external insults. Its pathologic condition can be classified as autoinflammation disease in contrast to SLE that is considered as a typical example of autoimmune disease, which are characterized by specific T cells or pathogenic antibodies. However, SLE is sometimes reported in association with aseptic neutrophilic dermatoses such as Sweet's disease, subcorneal pustulosis or pemphigus foliaceus [7]. Furthermore, the neutrophilic infiltration can become predominant in some variants of LE, for example bullous LE or urticarial vasculitis. The association of LE with APF and other neutrophilic dermatoses seems to indicate that the pathogenesis of LE includes not only autoimmune but also autoinflammatory pathways. Based on this, Lipsker and Saurat [8] recently proposed the new concept of 'neutrophilic cutaneous lupus erythematosus'. In these conditions, it has been suggested that immune complexes activate complement in the skin to generate chemotactic factors that induce neutrophilic infiltration. However, direct immunofluorescence did not demonstrate any deposition of immune complexes in the skin in our case or in others [3, 6, 9, 10]. Thus, the relationship between the neutrophilic infiltration and the underlying autoimmune disease remained poorly understood.

APF is characterized by the aseptic pustules localized to major skin folds and the scalp. Recently Marzano et al. [2, 6] summarized 21 previous cases which showed that lesions were present in at least one of the major skin folds, such as axillae or groins, or in one of the minor skin folds, such as retroauricular folds or external canals in all cases. Furthermore, the anogenital area was always involved in addition to the scalp affected in 20 of 22 cases. Based on the analysis, they proposed diagnostic criteria for APF which include pustulosis distributed to the major fold, minor folds and anogenital area as an obligate requirement. From such a clinical viewpoint our present case is unique in that pustules were localized only to the scalp and retroauricular folds but spared the major skin folds or anogenital region, which did not satisfy the above-mentioned criteria. We cannot exclude the possibility that our case was not consistent with APF. Multiple pustules in the scalp may develop in several diseases (table 1), but our case did not match those noted in them. Although our case may represent a new pattern among these neutrophilic dermatoses, we rather consider that the incomplete presence of APF features may be related to the fact that it was observed in a young male. The occurrence in males may further explain the fact that there has not been any accompanying autoimmune disease in this case despite the presence of antinuclear antibody that showed a speckled pattern. Since some cases were reported to develop autoimmune diseases after the onset of APF, he should be carefully followed up for the development of collagen diseases in the future.

The therapy for amicrobial pustulosis is not well standardized. Systemic corticosteroids have been employed with good results [1, 3, 10, 11] but are not always effective [12]. Potent topical corticosteroids may occasionally be helpful [1, 13]. In addition, chloroquine [11], dapsone [10], cyclosporine [10], colchicines [9], cimetidine [2] and zinc [12] have been used for its therapy. Although the symptoms were not severe in our case, he did not respond satisfactorily to any of the above therapeutic modalities. Recently, Marzano et al. [6] reported that a combination of cimetidine and ascorbic acid was applied to induce clinical remission.

Table 1. Differential diagnosis of pustulosis on the scalp

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<tr>
<th>Disease</th>
<th>Synonyms</th>
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<td>Amicrobial pustulosis of the folds</td>
<td>Pustular psoriasis</td>
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References


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