Papulonecrotic Tuberculid— a Rare Skin Manifestation in a Patient with Pulmonary Tuberculosis

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Abstract: Papulonecrotic tuberculid (PNT), a cutaneous manifestation of tuberculosis, is rare even in areas endemic for tuberculosis such as Taiwan. Concomitant pulmonary tuberculosis is uncommon in patients with PNT. We describe a patient with rare skin manifestations and simultaneous pulmonary tuberculosis. This 48-year-old woman had suffered from productive cough for 4 months, and pea-sized papules with central umbilication were noted over the extensor surface of her four extremities and lower abdomen 1 month prior to admission to our hospital. Chest roentgenography showed reticulonodular lesions with small cavitation over the lower right lung field, and sputum culture yielded *Mycobacterium tuberculosis* complex. PNT was diagnosed using the skin biopsy results and the papules healed with scar formation after antituberculous therapy.

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Key words:
papulonecrotic tuberculid
pulmonary tuberculosis

Papulonecrotic tuberculid (PNT), a form of cutaneous tuberculosis (TB), is uncommon even in countries with a high prevalence of TB [1]. In 1998, the Centers for Disease Control and Prevention reported that extrapulmonary sites were involved in 19.3% of all cases of TB reported in the USA, and cutaneous disease accounted for 1.1% of the extrapulmonary cases — or only 0.21% of all TB cases reported during that year [2]. In Hong Kong, cutaneous TB represented 0.066% of all new cutaneous disease cases seen during a 10-year period, and PNT accounted for 4% of cutaneous TB cases [1]. PNT is rare in Taiwan; our review of the reported cases indexed in MEDLINE since 1980 revealed only one case with simultaneous occurrence of PNT and erythema induratum, which was reported in 1997 [3]. Associated TB occurred in 38% [4] to 75% [5] of cases of PNT; the lymph nodes and the lung were the most common sites.

PNT presents as symmetric dusky red pea-sized papules distributed over the extensor aspects of the extremities, particularly the knees, elbows, buttocks, and lower trunk areas. The lesions may develop necrosis in the center; removal of the lesions results in crater-like ulcers. The hematogenous spread of mycobacterial antigens, which evoke a hypersensitivity reaction in patients with TB, may be a possible mechanism of PNT development [6]. The associated focus of the infection may not be prominent, and the diagnosis of PNT is important owing to the high likelihood of a good response to antituberculous therapy. We describe a patient with PNT on her four limbs with concomitant active pulmonary TB.

Case Report

A 48-year-old woman had suffered from productive cough for 4 months, which became exacerbated 1 month prior to admission. She visited our outpatient clinic and chest roentgenography showed reticulonodular infiltration with small cavitation in the right middle and lower lung field. The sputum smear results for acid-fast bacillus using Ziehl-Neelsen stain were strongly positive. Sputum culture revealed *Mycobacterium tuberculosis* complex.

Afternoon fever and hemoptysis had been noted intermittently for 1 week prior to admission. In addition, erythema and itching papules with central necrosis had developed

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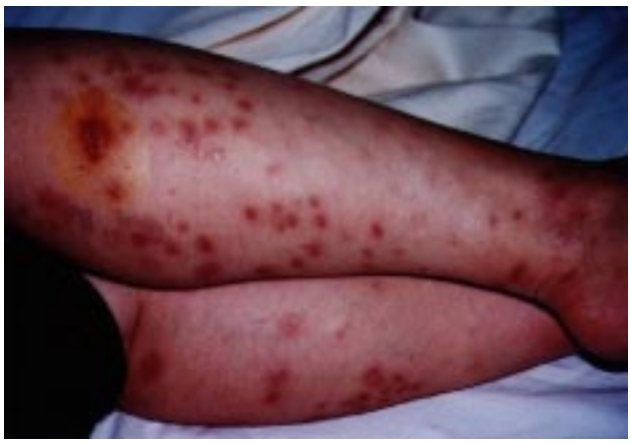

Fig. 1. *Erythematous papules with central umbilication over the lower legs.*

bilaterally over her legs and arms, predominantly on the extensor side, 1 month prior to admission (Fig. 1).

The immunology study results, including antinuclear antibody, rheumatoid factor, and immunoglobulin G, M, and A studies, were within reference ranges. Biopsy specimens from the papules on the right thigh disclosed areas of necrotic epidermis with fibrinoid necrosis accompanied by dense chronic inflammatory cell infiltration. Tubercle bacillus was not identified using the Ziehl-Neelsen stain (Fig. 2A). Vasculitis and granuloma with Langerhans' giant cells were also noted in the specimens (Fig. 2B). These findings are compatible with PNT.

After 2 months of antituberculous chemotherapy with isoniazid, rifampin, ethambutol, and pyrazinamide, the papules had healed with mild scar formation and the chest roentgenographic lesions resolved gradually. The entire 12-month course of antituberculous therapy was completed and no adverse reactions were noted.

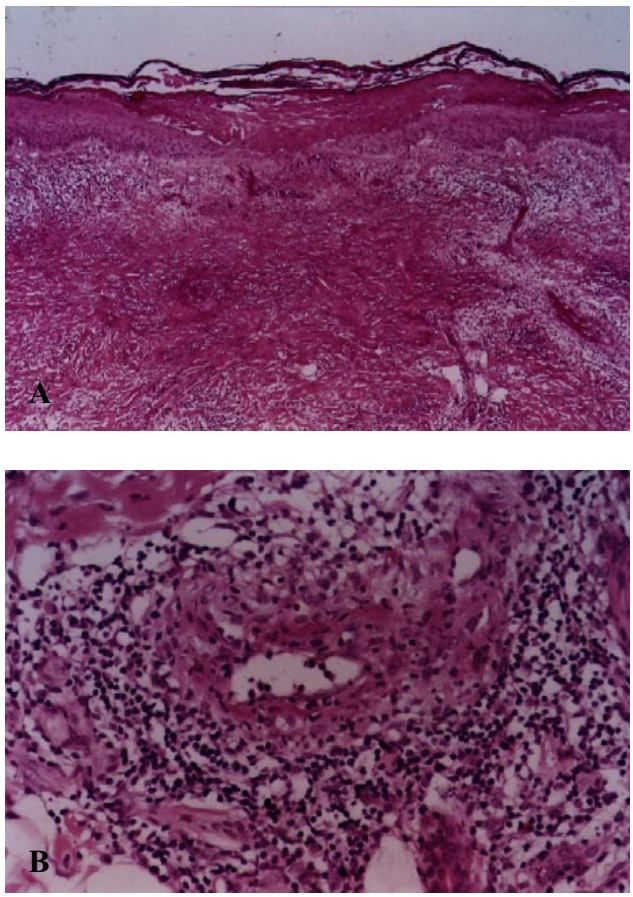

Fig. 2. *Photomicrographs of skin biopsy specimen. (A) Necrotic epidermis with fibrinoid necrosis accompanied by chronic inflammatory cell infiltration (hematoxylin & eosin, x 40). (B) Perivascular infiltration with lymphocytes and granuloma with epitheloid cells can be noted in the deep dermis (hematoxylin & eosin, x 200).*

Discussion

Cutaneous TB can be divided into two main groups: true TB and tuberculid. The concept of tuberculid was described by Darier in 1896 [7], and Pautrier firmly established PNT as a TB-associated condition [8]. Tuberculids include PNT, erythema induratum (EI), and lichen scrofulosorum. Because Morrison and Fourie observed that PNT lesions could evolve into lupus vulgaris, from which *M. tuberculosis* had been cultured [4], and tuberculid-like eruptions can develop after BCG vaccination [9], tuberculid is regarded as a cutaneous form of TB. Strong positive Mantoux reactions have been found in most patients with tuberculid [10].

Although associated TB was noted in 38% to 75% of PNT patients [4, 5], tubercle bacillus could not be demonstrated directly from the cutaneous lesions using light microscopy, culture, or guinea-pig inoculation. However, hypersensitivity reactions to mycobacterial antigens through hematogenous spread from a focus of infection are a possible mechanism of tuberculid development [1]. Arthus type reactions initiated by mycobacterial products may be responsible for the vascular damage. This explains why vasculitis is the fundamental change in PNT lesions. Delayed (type 4) hypersensitivity reaction follows the Arthus reaction [10].

The pathologic features of PNT include infarction-like lesions with coagulation necrosis, granulomatous reactions, and infiltration by macrophages, dendritic antigen presenting cells, and lymphocytes—predominantly T lymphocytes. In spite of the rarity of this condition, both PNT and EI may appear in the same patient [3, 11]. These conditions represent different levels of immune-complex-mediated vasculitis followed

by delayed hypersensitivity reaction. EI involves the larger, deeper subcutaneous vessels and PNT involves the smaller, more superficial vessels [12, 13].

PNT is more prevalent in women. The skin lesions distribute mostly on the extensor aspects of the limbs and trunk, and have a good response to antituberculous drugs, healing with scar formation. Recurrence is not common after the patient has received the correct medication.

The polymerase chain reaction (PCR) has been applied to identify mycobacterial DNA in clinical specimens. Using formalin-fixed specimens, Victor et al demonstrated the presence of the 123-bp DNA fragment specific for *M. tuberculosis* in 50% of adult patients with PNT [14]. Negative PCR results may be due to sampling error, loss of target DNA during DNA extraction, loss of sensitivity in formalin-fixed/paraffin-embedded tissue, rapid destruction of organisms, the presence of non-viable or opsonized organisms, or the presence of tissue inhibitors [10].

In summary, we have described a rare case of cutaneous manifestations associated with pulmonary TB. PNT has been shown to be a form of post-primary TB [15], although it was previously considered a hypersensitivity reaction [6]. It is important to promptly recognize PNT and to ensure that patients receive adequate antituberculous drugs to reduce its recurrence.

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