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# Atrophoderma of Pasini and Pierini

## *Clinical and histopathologic findings and antibodies to Borrelia burgdorferi in thirty-four patients*

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**Background:** Idiopathic atrophoderma of Pasini and Pierini (IAPP) is a distinctive form of dermal atrophy, usually appearing as one or more sharply demarcated depressed areas. Little is known about the clinical variants of IAPP, and limited data are available on antibiotic therapy for this condition.

**Objective:** Our purpose was to define the various types of IAPP clinically and histologically and to investigate a possible association with *Borrelia burgdorferi* infection.

**Methods:** The records of 34 patients with IAPP were reviewed. Skin biopsy specimens for routine histologic examination were obtained from 17 patients. Serum from 26 patients was analyzed for antibodies against *B. burgdorferi*.

**Results:** Of the 34 patients (21 female, 13 male, 7 to 66 years of age), 23 had well-circumscribed brown, depressed plaques. The back was most frequently involved (82%). Eleven patients had a superficial variant of IAPP, characterized by slightly atrophic brown macules forming large hyperpigmented patches with an irregular border. Secondary areas of induration developed in 7 of 34 patients. Ten of 26 patients (38%) had elevated serum antibodies to *B. burgdorferi*. Twenty of the 25 patients treated with oral antibiotics had clinical improvement with no evidence of new active lesions.

**Conclusion:** IAPP is an abortive, primarily atrophic variant of morphea. The clinical appearance of IAPP may be variable according to the stage of dermal atrophy and distribution of the lesions.

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Idiopathic progressive atrophoderma as described by Pasini<sup>1</sup> in 1923 and later by Pierini and Vivoli<sup>2</sup> in 1936 is characterized by single or multiple, sharply but often irregularly demarcated, gray or brown areas that are slightly depressed below the surrounding tissue. The lesions are usually asymptomatic and do not show inflammation. Rarely, mild erythema may be present in early lesions. The areas of atrophy are usually smooth and soft, although sclerodermatous changes are occasionally present. In 1958, Canizares et al.<sup>3</sup> proposed the term *idiopathic atrophoderma of Pasini and Pierini* (IAPP). Whether IAPP is a distinct entity or a variant of localized scleroderma has been disputed since its original description.<sup>4-18</sup> IAPP has been reported

under a variety of names, including atrophic scleroderma d'emblee, dyschromic and atrophic variation of scleroderma, morphea plana atrophica, and atypical lilac-colored and nonindurated scleroderma.<sup>14, 17, 19, 20</sup> Today IAPP is widely believed to be an atrophic nonindurated variant of localized scleroderma.<sup>21, 22</sup> Although the appearance of IAPP is usually sufficiently characteristic to permit clinical diagnosis, the individual lesions may be variable with respect to the severity of atrophy, color, size, and distribution. In this study, we describe the clinical findings of 34 patients with IAPP. The histopathologic features of 17 of patients were studied. In addition, a possible association with *Borrelia burgdorferi* infection and IAPP was investigated.

### PATIENTS AND METHODS

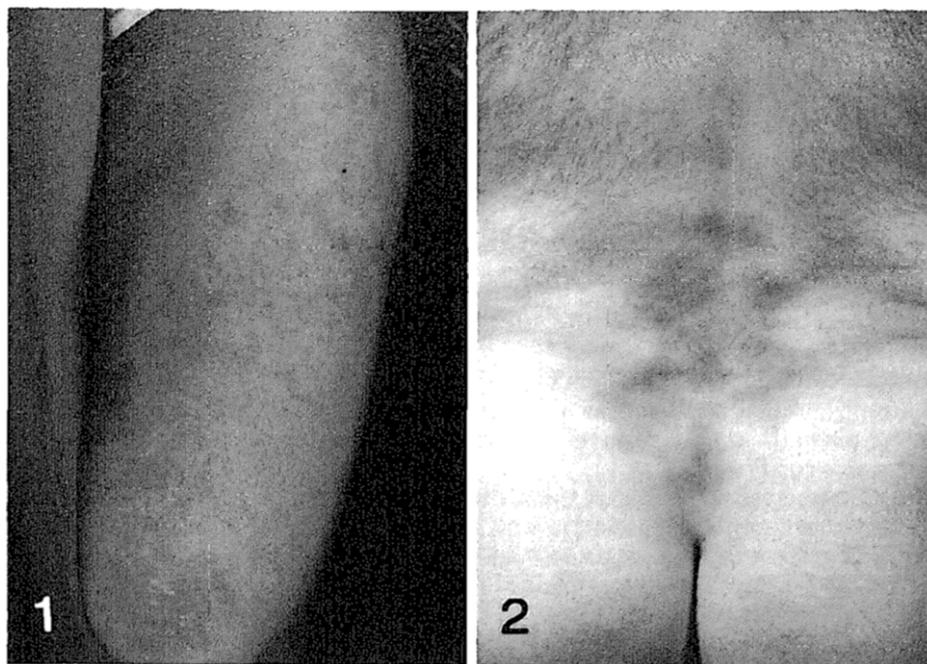
The records of 34 patients with the clinical diagnosis of IAPP were reviewed. Clinical data such as age, sex, date of initial diagnosis, site and clinical description of skin lesions were recorded. Most patients were seen regularly by one or more of the authors. Skin biopsy specimens for routine histopathologic studies were obtained from 17

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**Fig. 1.** Case 1. Slightly depressed, hyperpigmented macules in linear distribution on the left thigh.

**Fig. 2.** Atrophoderma of Pasini and Pierini. Well-demarcated depressed brown patches on lumbosacral area.

patients. All specimens were stained with hematoxylin and eosin, as well as with van Gieson and orcein for elastic tissue. Serum from 26 patients was analyzed for antibodies against *B. burgdorferi* spirochete with the indirect immunofluorescence (IIF) method. A titer greater than 1:128 was considered reactive. Forty-three healthy volunteers with no history or symptoms of *Borrelia* infection served as control subjects.

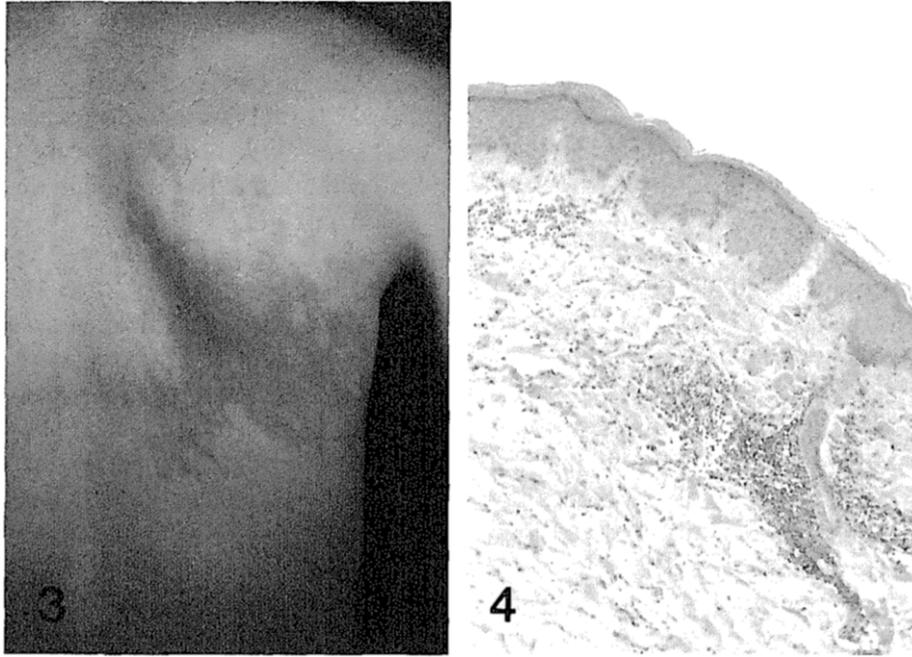
#### CASE REPORT

A 29-year-old woman had a 7-year history of several brown asymptomatic areas. She denied a preceding tick bite. Examination revealed large, brown, irregularly shaped, and slightly depressed areas on the inner aspects of her upper extremities, the right breast, abdomen, and the anterior left thigh (Fig. 1). Several small macules were present at the periphery of large lesions. The lesions extended from the right arm to the right breast in a zosteriform pattern. Large and small coalescing plaques were also present in a bandlike distribution on the abdomen and the left thigh. The lesions measured several centimeters in diameter and were slowly progressive, with new lesions developed at the periphery of plaques and enlarged variably. There was no evidence of sclerosis or inflammation. A complete blood cell count, chemistry profile, and serum immunoelectrophoresis were within normal limits. *B. burgdorferi* antibodies were absent. The

patient refused treatment. For almost 1 year, there has been little change in her disease.

#### RESULTS

Of the 34 patients, 21 were female and 13 were male. The ages of the patients at the time of diagnosis ranged from 7 to 66 years (mean 30.4 years). The mean age was higher for women (33.1 years, range 17 to 66 years) than for men (26.0 years, range 7 to 59 years). The duration of the disease varied from 6 months to 30 years. Two forms of IAPP were distinguished on the basis of clinical appearance. In 23 of 34 patients the lesions consisted of round and oval well-circumscribed blue-brown or brown depressed areas (Fig. 2). Usually, the border exhibited an abrupt transition from normal to diseased skin. Five patients had a single or a few lesions, whereas multiple disseminated areas were observed in 18 patients. Size of the lesions ranged from 2 to 15 cm in diameter. Some lesions became confluent, forming large, irregularly shaped areas. The predominant site affected was the back (82%), followed in frequency by the chest (39%), arms (30%), abdomen (30%), legs, hips, thighs, and groin. The lumbosacral region was involved in 10 of 19 patients with le-



**Fig. 3.** Superficial variant of atrophoderma. Irregularly shaped brown macules exhibit zosteriform pattern on the back.

**Fig. 4.** Atrophoderma of Pasini and Pierini. There is some homogenization and clumping of collagen bundles and an inflammatory infiltrate in reticular dermis. (Hematoxylin-eosin stain;  $\times 32$ .)

sions on the back. The affected areas were bilateral in 16 patients.

In 11 of 34 patients a superficial variant of IAPP was observed. The lesions were characterized by slightly atrophic brown macules that coalesced to form large hyperpigmented areas. Groups of isolated and occasionally confluent satellite macules, ranging from 0.5 to 1.5 cm in diameter, were present at the periphery of the large patches. The lesions were demarcated by highly irregular borders. Seven patients had solitary lesions and the other four had multiple disseminated patches. The most common site for localized lesions was the upper back and the lumbosacral region. Bandlike linear lesions were seen on the lower back in one patient, whereas two patients had a zosteriform pattern on the lateral back (Fig. 3). Four patients had multiple widespread pigmented lesions on the trunk, arm and leg in one patient, on the chest, arms, and thigh in one patient, and on the abdomen, forearms, dorsum of both hands, and thigh in another one. In one patient extensive confluent lesions were present on the trunk and extremities. In 7 of 34 patients areas of induration developed within the atrophic lesions.

#### HISTOPATHOLOGIC FINDINGS

Light microscopic studies showed a similar pattern for all 17 specimens. The epidermis was normal in 11, and a slight atrophy of the epidermis was observed in six cases. An increased pigmentation of the basal cell layer was noted in 16 specimens. All specimens showed various grades of a perivascular and interstitial inflammatory infiltrate consisting mainly of lymphocytes and histiocytes. Large numbers of plasma cells were found in the biopsy specimens of two patients. In 15 cases, the infiltrate predominantly involved the papillary and mid dermis, and in specimens from two patients infiltrates were present in the papillary and reticular dermis. In all specimens the lesional skin showed varying degrees of homogenization and clumping of collagen bundles in the reticular dermis but not in the papillary dermis (Fig. 4). Biopsy specimens from two patients with indurated areas within the patches of atrophy revealed some sclerosis of collagen in the reticular dermis. The elastic tissue stain showed no abnormality. Eccrine sweat glands, hair follicles, and sebaceous glands were intact in specimens from 15 patients and appeared slightly atrophic in two others.

## SEROLOGIC FINDINGS

Ten (38%) of the 26 patients tested for antibodies against *B. burgdorferi* had a significantly elevated IgG titer (1:128 or greater). None of the patients had an elevated IgM titer. Six (14%) of the 43 control subjects had a reactive IgG titer.

## TREATMENT AND FOLLOW-UP

Twenty-five patients were treated with oral antibiotics, and nine received no treatment. Fourteen patients were given oral penicillin, 2 million IU/day for 2 to 3 weeks. Seven patients were treated with oral tetracycline, 500 mg three times/day for 2 weeks. Four patients were treated with penicillin and tetracycline. All patients treated with antibiotics and six of the nine untreated patients were observed from 3 months to 8 years (mean 3.2 years). Twenty of the 25 patients treated with antibiotics showed clinical improvement and no evidence of new active lesions. Five patients experienced progression of their disease while receiving therapy. Of the six patients who did not receive antibiotic therapy, four had no evidence of progressive disease. The other two showed no improvement and continued to develop active lesions.

## DISCUSSION

Since the original description of IAPP by Pasini,<sup>1</sup> many cases have been reported, especially by Argentine dermatologists. Pierini et al.<sup>15</sup> classified the disorder into a primary idiopathic form of atrophy and an atrophoscleroderma, secondary to localized scleroderma. The controversy over whether IAPP represents a variant of scleroderma or is a separate entity has continued, and confusion and disagreement are reflected in different nosologic interpretations of the reported cases.<sup>4-13, 23-25</sup> Canizares et al.<sup>3</sup> concluded that IAPP lesions are different from true morphea and distinctive enough to justify their classification as a separate entity. However, the authors emphasized that these cases can be classified as scleroderma if IAPP is considered a part of the spectrum of connective tissue disorders. Arguments for IAPP as an idiopathic atrophy distinct from morphea include the absence of a lilac ring, evidence of a primary atrophic process, and a protracted course.<sup>1, 3, 17, 24</sup> On contrast, coexistent IAPP and morphea or lichen sclerosus et atrophicus have been reported.<sup>7, 13, 26, 27</sup> Quiroga and Woscoff<sup>12</sup> reported two cases of IAPP and reviewed the 22 cases

reported by Pierini and other South American dermatologists. Eleven had typical lesions of circumscribed scleroderma. The authors concluded that the clinical appearance and histopathologic changes reported in IAPP resemble the atypical lilac-colored and nonindurated scleroderma described by Gougerot.<sup>20</sup> Of the nine cases of IAPP studied by Jablonska and Szczepanski,<sup>13</sup> two had lesions of coexistent typical scleroderma and three developed indurated plaques within the atrophic lesions. They concluded that IAPP may be an abortive form of scleroderma. Subsequently, similar observations and opinions have been reported supporting this concept.<sup>8, 10, 14, 18</sup> Brunauer<sup>11</sup> proposed the term *atrophoscleroderma circumscripta of the Pasini-Pierini type*. Miller<sup>10</sup> stated that the atrophy that develops within the lesion of morphea cannot be distinguished clinically from IAPP and both may persist indefinitely. Although a benign course of IAPP is typical, a case of IAPP progressing to systemic scleroderma has been reported.<sup>28</sup> Our finding of a female predominance is in accordance with earlier reports.<sup>3, 14, 15</sup> Of the 40 cases collected from the literature 26 were women and 14 were men, giving a female/male ratio of 2:1.<sup>9, 10, 12, 13</sup> The mean age of our patients was 30 years, although patients have been as young as 7 years and as old as 66 years at initial presentation. IAPP is common in children. Eight of the 40 cases developed before the age of 13 years. As in previous studies,<sup>14, 17</sup> the back, especially the lumbosacral region, was most commonly involved. Frequently the lesions are localized and then slowly spread to other areas for months or years before stabilizing. Other sites frequently involved include the chest, abdomen, flanks, thighs, and upper extremities. Although a bilateral and symmetric distribution of lesions was frequent in our patients, unilateral involvement has been reported.<sup>29, 30</sup> The presence of sclerodermatous changes within preexisting areas of atrophy in some of our patients is in keeping with the findings of other investigators.<sup>3, 9, 13</sup> Of particular interest were the segmental zosteriform distribution and linear lesions in some of our patients. Because linear lesions are often a feature of localized scleroderma, it is not surprising that they can also be present in IAPP. These lesions could be confused with pigmented post-herpes zoster scars, especially on the back. Some pigmented unilateral lesions of IAPP involving the shoulder and side of the neck may clinically resemble nevus of Ito. IAPP may also

be misdiagnosed as a Becker nevus, especially the nonhypertrichotic variant. Coexisting Becker's nevus and localized scleroderma<sup>31</sup> as well as Becker's nevus and IAPP<sup>32</sup> have been reported.

Our light microscopic findings were similar to those described previously.<sup>3,9,13,14</sup> Histologically, IAPP may be impossible to diagnose unless full-thickness normal skin is available for comparison. In early lesions of IAPP, there is focal homogenization and minimal thickening of collagen bundles and mild perivascular inflammation. Immunophenotyping of the dermal infiltrate demonstrated that the perivascular inflammatory infiltrate was composed of CD3<sup>+</sup> T cells with a predominance of the CD4<sup>+</sup> helper/inducer T cell subset.<sup>33,34</sup> As the lesion ages, homogenization and swelling of the dermal collagen increases, and there may be a slight sclerosis of collagen in the reticular dermis. In agreement with Jablonska and Szczepanski<sup>14</sup> and others,<sup>11,16,33</sup> we found no changes of elastic tissue in our cases. However, some investigators have reported rarification and fragmentation of elastic fibers.<sup>6,10</sup> Jablonska and Szczepanski<sup>14</sup> stated that in the majority of cases histologic differentiation between IAPP and residual pigmented lesions after involution of morphea is not possible. Similarly, sclerodermatous lesions that appeared years after the onset of atrophy in some of our patients revealed varying degrees of collagen sclerosis resembling morphea. According to a recent classification of localized scleroderma,<sup>35</sup> IAPP should be considered a primary atrophic variant of morphea within the spectrum of sclerosing disorders.

Recent studies indicate that 20% to 50% of patients with morphea have antibodies to *B. burgdorferi*,<sup>36,37</sup> whereas others have failed to confirm these findings.<sup>38</sup> Buechner and Ruffli<sup>39</sup> reported that 53% of patients with IAPP had serum antibodies to *B. burgdorferi*. Aberer et al.<sup>40</sup> reported the cultivation of the organisms from lesions of morphea. In addition, spirochetes have been cultured from lesions of seronegative patients with IAPP.<sup>41,42</sup> The presence of serum antibodies against *B. burgdorferi* in 38% of our patients suggests that IAPP may be associated with *Borrelia* infection. Oral antibiotics have been recommended for the treatment of the early stages of morphea.<sup>21</sup> Penicillin has also been proposed as therapy for IAPP, but the results have been inconclusive.<sup>9,13,43,44</sup> The response to antibiotic treatment in a significant proportion of

patients with IAPP in the present study may further support the etiologic role of *B. burgdorferi* in some types of IAPP. Despite these results, the natural course of the disease is often self-healing and makes evaluation of therapy difficult. Nevertheless, antibiotic treatment should be considered for patients with an early stage of IAPP who have a positive *Borrelia* antibody titer.

#### REFERENCES

1. Pasini A. Atrofodermia idiopathica progressiva. G Ital Dermatol 1923;58:785-809.
2. Pierini LE, Vivoli D. Atrofodermia idiopathica progressiva (Pasini). G Ital Dermatol 1936;77:403-9.
3. Canizares O, Sachs PM, Jaimovich L, et al. Idiopathic atrophoderma of Pasini and Pierini. Arch Dermatol 1958;77:42-60.
4. Barker LP. Idiopathic atrophoderma of Pasini-Pierini. Arch Dermatol 1960;82:465.
5. Brubaker M. Idiopathic atrophoderma of Pasini and Pierini. Arch Dermatol 1961;84:523-4.
6. Kogoj FR. Qu'est-ce que c'est que la maladie de Pasini-Pierini? Ann Dermatol 1961;88:247-56.
7. Rupec M. Ueber die Beziehungen der zirkumskripten Sklerodermie zum Morbus Pasini-Pierini. Z Haut Geschl Krkht 1962;33:114-6.
8. Flegel H, Reink H. Idiopathische Atrophodermie Pasini-Pierini. Z Haut Geschl. Krkht 1965;39:268-72.
9. Salomon T, Milicevic M. Ueber vier Faelle der idiopathischen Atrophodermie von Pasini und Pierini. Dermatologica 1968;136:479-88.
10. Miller RF. Idiopathic atrophoderma. Arch Dermatol 1965;92:653-60.
11. Brunauer SR. Zur Terminologie der sogenannten "idiopathischen progressiven Atrophodermie von Pasini und Pierini" sowie ueber die Stellung dieser Affektion im System der Dermatosen. Hautarzt 1964;15:108-12.
12. Quiroga MI, Woscoff A. L'atrophodermie idiopathique progressive (Pasini-Pierini) et la sclérodermie atypique lilacée non indurée (Gougerot). Ann Dermatol 1961;88:507-20.
13. Jablonska S, Szczepanski A. Atrophoderma Pasini-Pierini: Is it an entity? Dermatologica 1962;125:226-42.
14. Jablonska S, Szczepanski A. Atrophoderma Pasini-Pierini. In: Scleroderma and pseudoscleroderma. Warsaw: Polish Medical Publishers, 1975:521-36.
15. Pierini LE, Abulafia J, Mosto SJ. Atrophodermie idiopathique progressive et états voisins. Ann Dermatol Syphilol 1970;97:391-416.
16. Thiel W, Schaarschmidt H, Wätzig V. Kasuistischer Beitrag zum Krankheitsbild der Atrophodermia idiopathica progressiva Pierini-Pasini. Dermatol Monatsschr 1985;171:185-91.
17. Pullara TJ, Lober CW, Fenske NA. Idiopathic atrophoderma of Pasini and Pierini. Int J Dermatol 1984;23:643-5.
18. Murphy PK, Hymes SR, Fenske NA. Concomitant unilateral idiopathic atrophoderma of Pasini and Pierini (IAPP) and morphea. Int J Dermatol 1990;29:281-3.
19. Ehrmann S, Brunauer SR. Sclerodermie. In: Jadassohn J, ed. Handbuch der Haut und Geschlechtskrankheiten. Berlin: Springer, 1931:717.

20. Gougerot H. Sclerodermies atypiques: la forme lilacée non induite en plaques ou en bandes. *Bull Soc Fr Dermatol Syphiligr* 1932;39:1667-9.
21. Jablonska S, Lovell CR. Localized scleroderma. In: Jayson MIV, Black CM, eds. *Systemic sclerosis: scleroderma*. New York: John Wiley & Sons, 1988:303-18.
22. Winkelmann RK. Localized cutaneous scleroderma. *Semin Dermatol* 1985;4:90-103.
23. Eshelman OM. Idiopathic atrophoderma of Pasini and Pierini. *Arch Dermatol* 1965;92:737-8.
24. Poche GW. Progressive idiopathic atrophoderma of Pasini and Pierini. *Cutis* 1980;25:503-6.
25. Weiner MA, Gant JQ. Idiopathic atrophoderma of Pasini and Pierini occurring in two brothers. *Arch Dermatol* 1959;80:195-7.
26. Kee CE, Brothers WS, New W. Idiopathic atrophoderma of Pasini and Pierini with coexistent morphea. *Arch Dermatol* 1960;82:154-7.
27. Borda JM, Abulafia J. Esclerodermia en gotas, atrofodermia "idiopathica" y liquen escleroso y atrofico coexistentes. Alopecia y estade vitiligoide, secuelas de esclerodermia. *Arch Argent Dermatol* 1956;6:98-102.
28. Bisaccia EP, Scarborough DA, Lowney ED. Atrophoderma of Pasini and Pierini and systemic scleroderma. *Arch Dermatol* 1982;118:1-2.
29. Iriundo M, Bloom RF, Neldner KH. Unilateral atrophoderma of Pasini and Pierini. *Cutis* 1987;39:69-70.
30. Wokalek H, Schmidt HG, Niedner R, et al. Atrophodermia idiopathica progressiva Pasini-Pierini mit Vorkommen von antinukleären Antikörpern. *Hautarzt* 1985;36:154-60.
31. Ruffi Th. Melanosis Becker mit lokalisierter Sklerodermie. *Dermatologica* 1972;145:222-9.
32. Smolle J. Becker'sche Melanose und oberflächliche zirkumskripte Sklerodermie. *Aktuel Dermatol* 1983;9:187-8.
33. Berman A, Berman GD, Winkelmann RK. Atrophoderma (Pasini-Pierini): findings on direct immunofluorescent, monoclonal antibody, and ultrastructural studies. *Int J Dermatol* 1988;27:487-90.
34. Kernohan NM, Stankler L, Sewell HF. Atrophoderma of Pasini and Pierini: an immunopathologic case study. *Am J Clin Pathol* 1992;97:63-8.
35. Altmeyer P, Adam B, Bacharach-Buhles M, et al. Zur Klassifikation der zirkumskripten Sklerodermie. *Hautarzt* 1990;41:16-21.
36. Aberer E, Neumann R, Stanek G. Is localized scleroderma a *Borrelia* infection? *Lancet* 1985;2:278.
37. Ruffi Th, Lehner S, Aeschlimann A, et al. Zum erweiterten Spektrum zeckenübertragener Spirochätosen. *Hautarzt* 1986;37:597-602.
38. Hoesly JM, Mertz LE, Winkelmann RK. Localized scleroderma (morphea) and antibody to *Borrelia burgdorferi*. *J AM ACAD DERMATOL* 1987;17:455-8.
39. Buechner SA, Ruffi Th. Progressive idiopathic atrophoderma of Pasini and Pierini: a *Borrelia* disease. In: Stanek G, Kristoferitsch W, Pleischette M, et al, eds. *Lyme Borreliosis II*. New York: Gustav Fischer, 1989:164-71.
40. Aberer E, Stanek G, Ertl M, et al. Evidence for spirochetal origin of circumscribed scleroderma (morphea). *Acta Derm Venereol (Stockh)* 1987;67:225-31.
41. Weber K, Praec-Mursic V, Reimers CD. Spirochetes isolated from two patients with morphea. *Infection* 1988;16:25-6.
42. Hoffmann H, Martin C, Praec-Mursic V. Atrophodermia Pierini et Pasini: seronegative *Borrelia burgdorferi* infection. Abstracts B. Fourth International Conference on Lyme Borreliosis, Stockholm, p 89.
43. Bureau Y, Barrière H, Litoux P, et al. Atrophodermie de Pierini-Pasini. *Bull Soc Fr Dermatol* 1966;73:427-9.
44. Lohrer R, Barran L, Kellnar St, et al. Atrophodermia idiopathica et progressiva Pasini et Pierini, eine wenig bekannte Form der zirkumskripten Sklerodermie im Kindesalter. *Monatsschr Kinderheilkd* 1986;134:878-80.