A Case Report of Isolated Pigmentosus Atrophic Lichen Planus on the Supramaxillary Area: A New Variant

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Case report

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Abstract

Background: Lichen planus pigmentosus (LPP) and atrophic lichen planus (ALP) are two rare subtypes of Lichen Planus（LP）, the former is characterized by epidermal atrophy and the latter by over pigmentation. LP with both of the above manifestations has few reports and there is a lack of treatment experience.

Case presentation: We herein reported a 22-year old girl with a complaint of a sharply edged brown plaque on the supramaxillary area with pain and itchy for 6 months. The skin biopsy sample from the forehead revealed thinning of epidermal ridges, liquefaction degeneration of basal cells, loss of cuticular process, lichenoid lymphocytic infiltration and incontinence of pigment as well as numerous melanophages. It was diagnosed as atrophic Lichen planus pigmentosus (ALPP), and the plaque was completely cleared after 10 months of Alternating topical corticosteroids or calcineurin inhibitors.

Discussion and Conclusions: ALPP might be an independent variant of LP or LPP that causes significant epidermal atrophy in the degenerative phase. This case revealed the special type of LP and provided a clinical reference for the treatment.

Background

Lichen planus (LP) is a chronic inflammatory and self-limiting skin condition with phenotypic heterogeneity. Lichen planus pigmentosus (LPP) and atrophic lichen planus (ALP) are two different subtypes of LP, the former is characterized by epidermal atrophy and the latter by over pigmentation. In addition, some cases with LPP have mild epidermal atrophy, and some ALP have slight pigmentation. We report a special case with the characteristics of both subtypes significantly which was diagnose as atrophic Lichen planus pigmentosus (ALPP) and successfully treated with topical glucocorticoids and calcineurin inhibitors.

Case Presentation

A 22-year-old girl with a history of brown plaque on her face and occasional pain and itching for 6 months presented to our hospital. The brown plaque has been slowly progressed to a 2 cm × 1 cm black-brown atrophic patch. She denied any history of preceding rash, fevers, chills, trauma,medical application and long time exposure to sunlight. There was no relevant past medical, family, drug or allergy history. On examination the lesion appeared as black-brown with middle atrophy and sharply raised border, and was presented on the right supramaxillary area of the girl (Fig. 1A). Laboratory tests were negative for hepatitis B, syphilis, hepatitis C and HIV.

The patient was initially diagnoses as LP and differential diagnosis showed drug eruption and granuloma annulare. Interestingly, pathological section of the lesion showed a mixture of LPP and ALP, which are characterized by epidermal basket - like keratinization, hyperkeratosis, wedge-shaped hypergranulosis, thinning of epidermal ridges, liquefaction degeneration of basal cells, loss of cuticular process, lichenoid lymphocytic infiltration and incontinence of pigment as well as numerous melanophages within the papillary and superficial and middle of the dermis. (Figure.2)

The patient was given 1% pimecrolimus cream for topical application for 1 month at the beginning, and her itching was relieved, but the skin lesions showed no significant improvement. So, she was switched to 0.03% tacrolimus ointment for 1 month and the skin lesions became lighter in color and slightly reduced in area by 10%, and successively switched to 1% mometasone furfurate cream, desonide cream, chlorobetasol ointment, halometasone cream, triamcinolone acetonide and econazole nitrate cream every 2 weeks for 6 months, than changing to mucopolysaccharide polysulfonate cream, and calcitriol ointment for topical application 2 months. During this period, pigmentation and epidermal atrophy showed continuous improvement (Fig. 1B, C), and the patient's skin lesions were completely resolved after follow-up at 10 months (Fig. 1D).

Discussion And Conclusions

This case challenges our diagnosis and treatment because ALP and plaque-type LPP have similarities. According to our literature review, pigmentation is seen in nearly half of the ALP cases, while mild epidermal atrophy is seen in LPP cases. There are also significant differences between the two: the plaque boundary of LPP is unclear, while that of ALP plaque is depressed in the middle, elevated around and the boundary is clear; in LPP, more melanophages or pigment cells can be present, and the degree of

epidermal atrophy remains mild; ALP has significant epidermal process disappearance, while pigment incontinence is mild. Both epidermal atrophy and pigmentary incontinence were evident in this patient, and so it was diagnosed as ALPP, which might be an independent variant of LP or LPP with significant epidermal atrophy in the degenerative phase.

LPP is a rare LP variant that is more commonly seen in the sun-exposed areas such as face, neck, and arms and can also be seen in flexed sites. The disease mainly affects the patients with skin types III to IV, and is more commonly seen in India, Latin America, Asia, and Africa, and is rare in Caucasians. It is caused by hepatitis C virus, endocrine diseases and autoimmune diseases, cosmetics and environmental pollution stimuli. LPP is characterized by symmetrically distributed dark brown to gray or grayish blue-gray color round and oval spots with irregular and ill-defined borders that eventually enlarges and coalesces, asymptomatic or mildly pruritic, and have a chronic course of 6 months to 3 years. According to pigmentation findings, it can be divided into diffuse, reticular, blotchy, and perifollicular patterns [1-3]. The main characteristic pathological findings of LPP are basal cell liquefaction and lichenoid infiltration. Moreover, perivascular lymphocytic infiltrate and pigment incontinence in the superficial dermis also could be seen in some cases. Epidermal hyperkeratosis and mild epidermal atrophy are also seen in some cases [4]. The infiltration pattern of LPP changes over time, with new lesions showing zonal infiltration and old lesions are characterized by perivascular infiltration [5].

Compared with LPP, ALP is even rarer, with few reports, unclear prevalence and unclear etiology [6]. It might be an independent subtype of LP or a regressive end stage of other LP types, and is seen to coexist with other types of LP damage [7]. Relevant literature was searched in the "Chinese Journal Full-text Database" and PubMed using the term "atrophic lichen planus," and analyzed 12 cases with definite diagnosis and complete clinical information, with regard to age, gender, lesion site, lesion manifestation（Table 1）, and histopathological characteristics (Table 2). Of the 12 ALP patients, there were 5 males and 7 females, with age range from 22 to 69 years, and an average of 57.45 ± 19.26 years. Of these, 66.67% of the patients were middle-aged, and the disease duration ranged from 2 months to 15 years, with an average of 41.81 ± 45.55 months. The course of the disease is chronic and protracted. The phenotype of this disease is significantly heterogeneous and there might be multiple clinical subtypes. The skin lesions remained good on the trunk, extremities, face, feet, neck, prepuce and vulva. Most of the patients showed brown, red, purple, white, blue, yellow spots, papules and atrophic depressions on the epidermis in the center of the plaques, and only 5 cases reported Wickham's wrinkles. Histopathological features were reported in 7 cases and presented as hyperkeratosis, granulocytopenia, epidermal effacement, liquefaction degeneration of basal cells, and lichenoid infiltration. Four cases presented pigment incontinence and varying degrees of pigmented cells.

The mechanism of LP pathogenesis is related to immune dysregulation. Cytotoxic T cells, mainly CD8+ cells, promote Th1 cells to secrete cytokines with the aid of CD4 + T cells and initiate the attack on basal keratinocytes, resulting in epidermal basal layer destruction. At the same time, more CD8+ T cells are recruited to the basal layer, resulting in persistent damage and leading to the chronic course of LP. The generation and differentiation of dendritic cells, regulatory T cells, and multifunctional T cells triggered by toll-like receptors-related innate immune responses are also involved. Upregulation of interleukin (IL)-1a, IL-6, IL-8, TNF-α, TGF-β, intercellular adhesion molecule 1 (ICAM-1), and vascular endothelial growth factor might increase microvessel density at the dermal-epidermal junction by recruiting the lymphocytes [18].

Basal cell degeneration, pigment incontinence and epidermal atrophy appear simultaneously in both LPP and ALP, and so we speculated that there is an association between the three in the pathogenesis. Epidermal atrophy mainly occurs due to retraction of epidermal processes and reduced resistance of the epidermis to shear forces, leading to reduced nutrient supply to the epidermis and might inhibit the proliferation of keratinocytes. Decreased epidermal thickness and loss of cuticular process might be related to abnormal melanocyte function, affecting the proliferation and differentiation functioning of the keratinocytes. It has been shown that senescent melanocytes induce telomere dysfunction in a paracrine manner and limit the proliferation of surrounding cells by activating mitochondrial oxidative stress. A 3D model was used to culture melanocytes with keratinocytes *in vitro*, in which senescent melanocytes impair the proliferation of basal keratinocytes, leading to epidermal atrophy *in vitro*. Studies have shown that the expression of p16, which negatively regulates cell proliferation, is significantly increased in melanocytes present in the epidermis of the elderly. A highly significant correlation between the increase of telomere-associated foci (TAF) in melanocytes and flattening of the epidermal-dermal junction is observed [19].

The patient was a young woman who denied other chronic diseases and did not use cosmetics or had no long-term sun exposure before disease onset. Starting from the pathogenesis of LPP and ALP, this case might be triggered by unknown external stimuli T lymphocyte-mediated immunity, resulting in interface inflammation, keratinocyte death triggered pigment incontinence, melanin granules and increased pigmented cells in the superficial dermis, and gradual appearance of epidermal atrophy with disease progression and keratinocytes were destroyed and increased.

The treatment of LP can be divided into three categories: oral drugs (acitretin, sulfapyridine, hydroxychloroquine, griseofulvin), topical creams (vitamin D analogues, corticosteroids), and phototherapy (narrow-band ultraviolet B) [20]. The classical therapeutic aim of LP is to accelerate the resolution while relieving from the pruritic symptoms. Moderate-to-high potency topical corticosteroids (TCS) are considered as the standard first-line treatment option for this. The mode of action of corticosteroid therapy is non-specific and exerted immunosuppressive and immunosuppressive effects by regulating the proinflammatory mediators at genetic, cytokine, and cellular levels. However, long-term topical corticosteroids might cause local pigmentation, epidermal atrophy, etc., while calcineurin inhibitors tacrolimus and pimecrolimus do not cause epidermal atrophy and pigmentation while inhibiting the inflammatory response [21].How to weigh the advantages and disadvantages and reasonable dressing change remains the key to successful treatment in this case.

This is the first report to date with marked pigmented and atrophic lichen planus, which we call this as pigmented atrophic lichen planus, the etiology and mechanism of it are unclear, and it might be an independent subtype of LP or catagen phase of LPP.

Declarations

Ethics approval and consent to participate:

Not applicable.

Consent for publication:

Written informed consent for publication was obtained from all participants.

Availability of data and materials:

Not applicable.

Competing interests:

The authors declare no competing financial interests.

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Authors' contributions:

The diagnosis and treatment of this case were completed by Dr. Zhang, and the collation of case data and summary of previous literature were completed by Dr. Liu, Dr. Zhao and Dr. Su.

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The patient is willing to share the case and has signed informed consent.

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Tables

Table 1
Case review of atrophic lichen planus

Author	Age/Gender	location	Color	Clinical form	Duration	Wickham	Atrophy	Else
Current patient	22/F	Supramaxillary area	Brown	Plaque	6 moths	+	+	
Li et al. 2014 [8]	69/F	Lateral of lower leg	Purple	Papule	15 years	+	+ central	
Zhuang et al. 2005 [9]	65/M	Prepuce	Red	Papule and ulcer	2 year	-	+	
Ai et al. 2012 [10]	16/M	Anterior cervical, chest v-zone, armpits, groin	Dark purple	Macule	13 years	+	+ central	Loss of finger-nail
Wei et al. 2002 [11]	69/M	Forehead chest v-zone back and lateral side of upper limbs	Blue and brown	Macule and patch	1 year	+	+	
Shao et al. 1992 [12]	32/F	Face and back of hand	Reddish brown	Patch	6 years	/	+ central	Family history
Rustin et al. 1986 [13]	54/F	Thigh upper arms neck trunk	Lemon-yellow	Annular lesions	8 months	/	+	Addisonian pernicious anaemia
Roxburgh 1946 [14]	57/M	Forearms, feet and ankles	Red	Shiny polygonal islands	1 year	/	+	
Davis 1938 [15]	55/F	Clavicle thigh	White	Spots	5 years	/	+	Needle-prick
Davis 1938 [15]	62/F	Vulva forearms thighs and anal	White	Spots	5 years	/	+	
Forman1933 [16]	27/M	Chest, trunk, proximal part of the limbs, face and scalp	Red then brown	Patch	2 months	+	+	Administration of arsenic and bismuth
A. Whitfiled 1911 [17]	63/F	Below the knee	Bluish-red	Network and the “ holes” were composed of pearly atrophy	4 years	+	+	

Table 2
Histopathology of atrophic lichn planus

Author	Hyperpigmen-tation	Melanophages	Pigmentary incontinence	Histopathology
Current patient	+	+	+	Keratinization, lichenoid lymphocytic infiltrate incontinence of pigment numerous of melanophages
Lin et al. 2014 [8]	+	+	+	Lichenoid infiltrate
Zhuang et al. 2005 [9]	-	-	-	Basal cell liquefaction degenration lichenoid infiltrate
Ai et al. 2012 [10]	+	+	+	Hyperkeratosis , follucylar plug,basal cell liquefaction degenration
Wei et al. 2002 [11]	+	+	+	Slightly hyperkeratosis epidermal ridges disappear basal cell liquefaction degenration Lichenoid infiltrate
Shao et al. 1992 [12]	-	-	-	Hyperkeratosis hypogranulosis lichenoid infiltrate
Rustin et al. 1986 [13]	-	-	-	Hypergranulosis and hyperkeratosis degeneration of the basal layer lichenoid infiltrate
Forman 1933 [16]	+	+	+	Well-marked granular layer and slight hyperkeratosis,lymphocytic infiltrate on basal layer, mainly leucocytic infiltration around the vessels

Figures

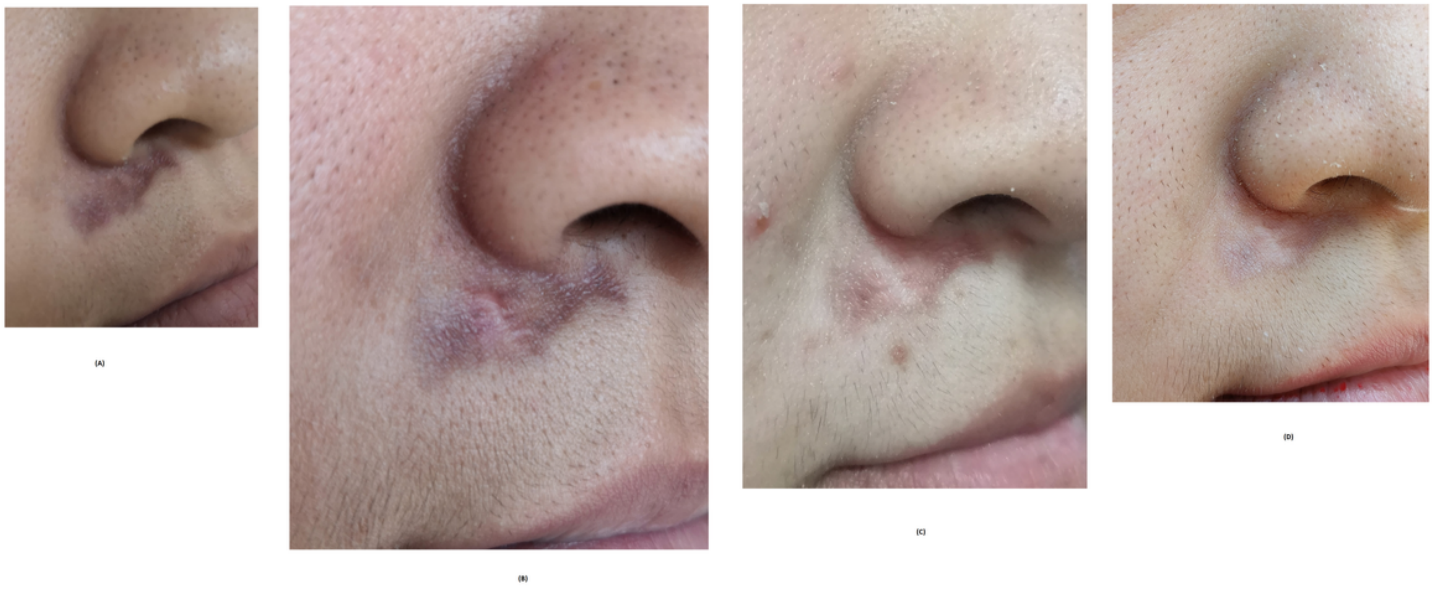
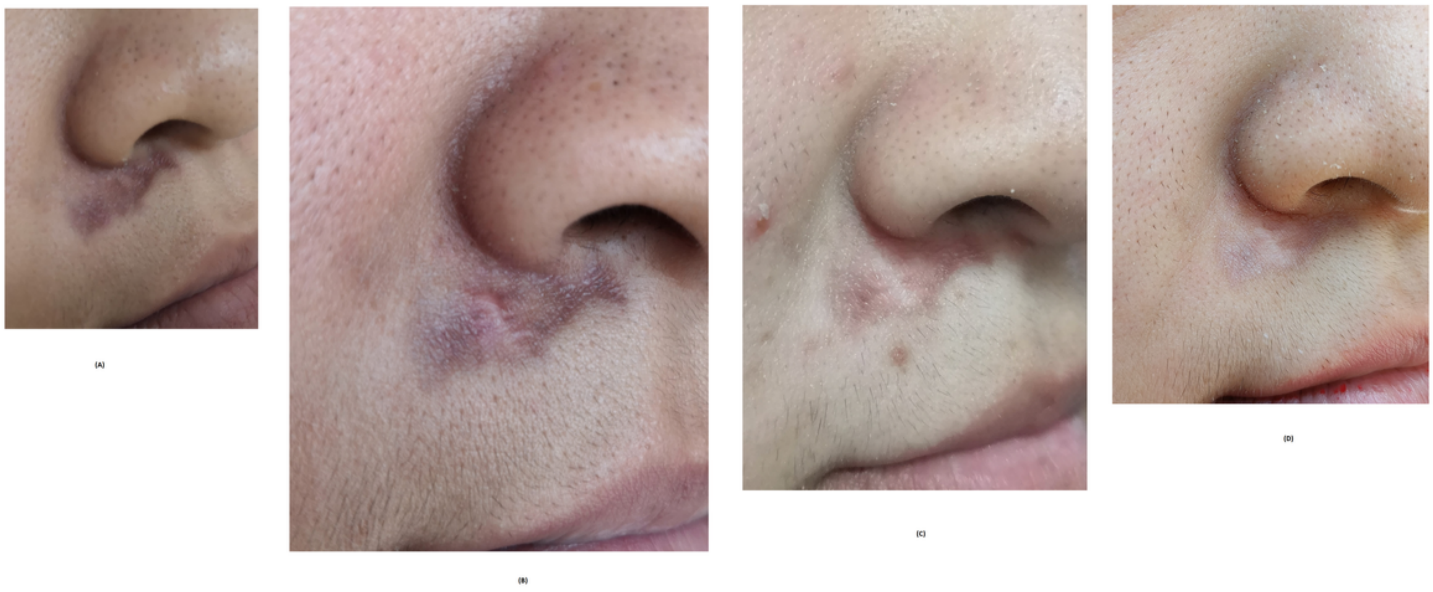


Figure 1

Black-brown atrophic patch located beside the patient's alae nasi on the supramaxillary area 2 cm×1cm A Patient with initial encounter; (B) after 2 months of calcineurin inhibitor treatment, symptoms were improved but no significant changes were

observed in skin lesions;C after 4 months of local treatment with glucocorticoids, the plaque color has been changed and the area was decreased by 50%; (D) after 10 months of treatment, the skin lesion was improved without atrophy or pigmentation.



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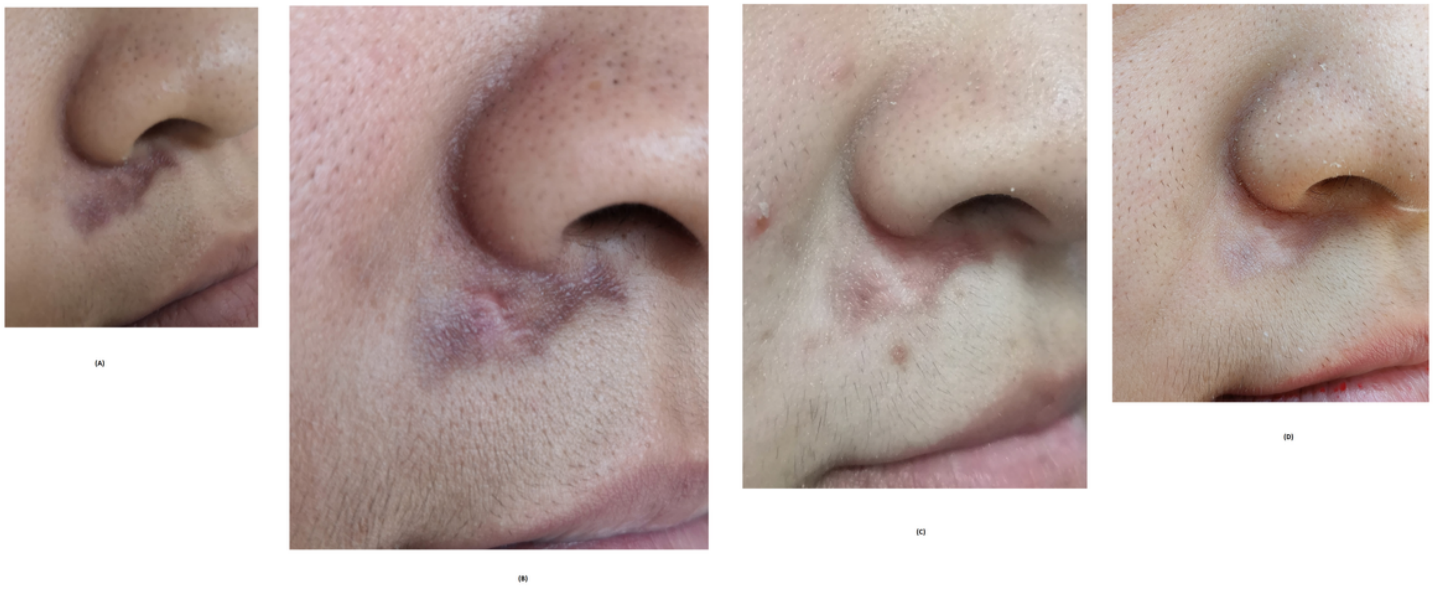

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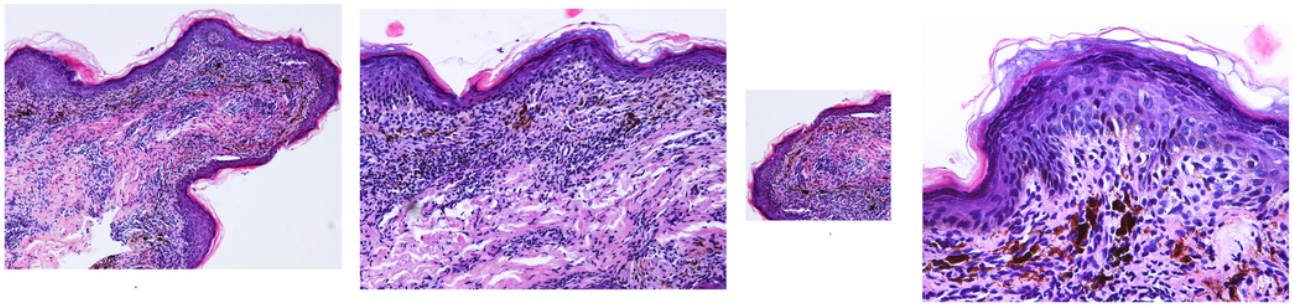
Figure 2

Microscopically, mixed manifestations of LPP and ALP were observed, with epidermal atrophy, loss of epidermal processes, liquefaction degeneration of basal cells, pigment incontinence, and lichenoid lymphocyte infiltration（A）HE 10×4（B）HE 10×20（C）HE 10×20（D）HE 10×4



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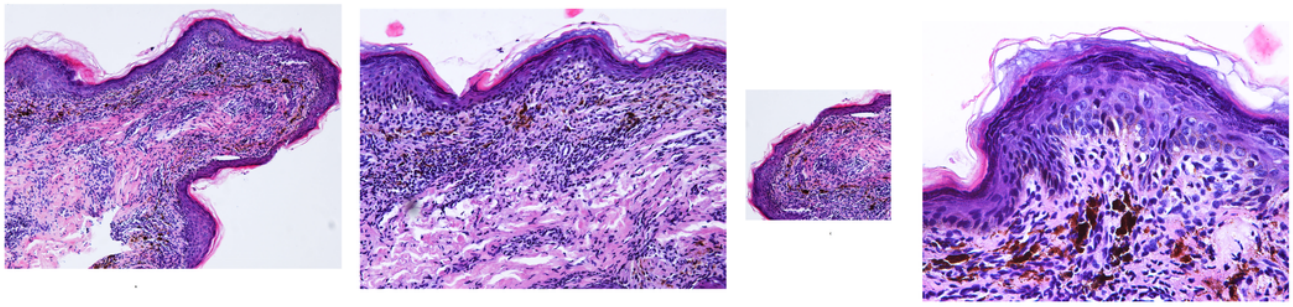

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HE 10×20□D□HE 10×4

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