의학 석사학위 논문

Clinical and Histopathological Characteristics of Nevus Depigmentosus

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김 성 권

Clinical and Histopathological Characteristics of Nevus Depigmentosus

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- ABSTRACT -

Clinical and Histopathological Characteristics of Nevus Depigmentosus

Purpose: Nevus depigmentosus (ND) is known to be a rare congenital, nonprogressive disorder characterized by hypopigmented lesion that remains stable over time. There have been only few studies of clinical and histopathological characteristics of ND, and the etiopathogenesis is not fully established. The purpose of this study was to investigate the clinical and histopathological characteristics of ND.

Materials and Methods: A clinical survey was carried out with 60 patients diagnosed as having ND. Two millimeter punch biopsies from lesional and perilesional normal skin were done. The sections were stained with hematoxylin-eosin, Fontana-Masson, antibodies to S-100 protein, MART-1, GP-100, CD1a, CD3, CD20, and CD68.

Results: The lesions were usually present before the age of 3 years (68.3%), but some lesions appeared later in childhood (31.7%). Twenty seven patients (45.0%) had one lesion, but there were 14 patients (23.3%) who had more than ten lesions. Fontana-Masson stain showed

that the amount of melanin was significantly decreased in ND skin compared with perilesional normal skin. Melanocyte counts were significantly decreased in ND skin when stained with antibodies to GP-100 and MART-1. However, there were no significant differences in the number of melanocytes identified as S-100 protein positive cells. There were no significant differences in histologic findings or dermal inflammatory infiltrates between ND skin and perilesional normal skin.

Conclusion: Only 18 patients (30.0%) presented with ND at birth and only 27 patients (45.0%) had 1 lesion. Both the amount of melanin and the number of melanocytes in ND skin were decreased in patients with ND. However melanin and melanocytes may also be present in vitiligo skin. Therefore, both clinical and histologic findings should be considered together to make a diagnosis of ND.

Key Words: Nevus depigmentosus, Melanin, Melanocyte

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I. INTRODUCTION

Nevus depigmentosus (ND) is generally known to be a well-circumscribed hypomelanosis that is present at birth and remains stable in its relative size and distribution throughout life (Lesser, 1884; Bolognia and Pawelek JM, 1988). Some authors have reported its initial presentation at various ages, probably because infants or young children have untanned skin and the color contrast of ND lesions may not be readily visible (Lee et al., 1999). ND occurs sporadically, and there is no known pattern of inheritance or familial tendency. But its pathophysiology is probably associated with a developmental defect of the fetal melanocytes. In particular a defect has been reported in the transfer of melanosomes from melanocytes to keratinocytes (Bolognia and Pawelek , 1988; Lee et al., 1999).

Clinical diagnostic criteria commonly accepted and proposed by Coupe (Coupe, 1976) in 1976 are: (1) Leukoderma present at birth or onset early in life, (2) No alteration in distribution of leukoderma throughout life, (3) No alteration in texture, or change of sensation, in the affected area, (4) No hyperpigmented border around the achromic area.

The lesions are uniformly hypomelanotic and under Wood's lamp examination, the lesion shows an off-white accentuation in contrast to the chalky-white accentuation observed in vitiligo (Lee et al., 1999). Histological

study on lesional skin compared with perilesional normal skin shows a marked reduction in the density of the melanosomes, but variable results in the number of melanocytes (Lee et al., 1999; Jimbow et al., 1975; Jelineck et al., 1973)

Knowledge of the clinical and histopathological changes in ND skin is essential not only to diagnosis but also to understanding the pathogenesis of ND. However, only a few studies (Lee et al., 1999; Yu et al., 2000) have been reported. We investigated clinical and histopathological features in a large number of patients with ND.

II. MATERIALS AND METHODS

A. Subjects

We examined 60 Korean patients with ND who attended the Department of Dermatology, Ajou University Hospital (Suwon, Korea), between January 2001 and December 2004. In each patient, the diagnosis of ND was determined by clinical diagnostic criteria proposed by Coupe (Coupe, 1976) and Wood's lamp examination. The clinical data compiled included gender, age, age of onset, number of lesions, involved sites, shape and pattern of lesions, and associated systemic disease.

B. Methods

1. Biopsies

Two millimeter punch biopsies from lesional and perilesional normal appearing (usually 6 cm or more distant) skin was done under local anesthesia (1% lidocaine). Tissues were prepared for light microscopic study by 10% formalin fixation.

2. Stains

Paraffin-embeded tissue sections of 3 μm thickness were processed for light microscopic examination. A hematoxylin and eosin stain was used for

studying the general histopathological changes in the ND skin. Melanin pigment was visualized with the Fontana-Masson stain performed by the usual methods without eosin background stain for image analysis.

3. Immunohistochemistry

Four micrometer paraffin-embeded sections of both lesional and control skin were mounted on Polysine microscope slide (Menzel-Glaser, Germany) coated with 0.1% poly p-lysine. Tissues were deparaffinized and rehydrated by sequential immersion in xylene, graded concentrations of ethanol, and distilled water. They were incubated for 30 min at room temperature in a solution of 0.5% hydrogen peroxidase in methanol to quench endogenous peroxidase activity, followed by washing three times in Tris-buffered saline (TBS, 0.1 mol/L, pH 7.4, Dako, Carpinteria, CA). They were subsequently incubated in 0.05% trypsin in TBS for 20 min at 37 °C (GP-100) or boiled in 10 mM citrate buffer, pH 6.0 for 15 minutes followed by cooling at room temperature for 20 minutes (MART-1, CD1a, CD3, CD20, and CD68). After washing three times in TBS, they were flooded with a protein-blocking agent (PBA; Immunon, Pittsburgh, PA) for 10 min at room temperature. Excess PBA was drained and the primary antibodies were applied to the tissue sections. These antibodies include S-100 protein, MART-1, NKI/beteb for melanocytes, CD3, CD20, CD68, and CD1a (Table 1). The slides were then incubated for 1 h at room temperature

and for 30 min at 37 °C in a humid chamber. Following three washes in TBS, sections were incubated for 30 min at room temperature while being flooded with a biotinylated universal secondary antibody reagent (Immunon). The slides were then washed in TBS, followed by incubation in streptavidin alkaline phosphatase reagent (Immunon, ThermoShandon, Pittsburgh, PA) for 30 min. After washes in TBS, sections were incubated in fast red chromogen (Immunon) for 10 min. The sections were counterstained with haematoxylin modified solution (Merck, Darmstadt, Germany) and mounted in an aqueous mounting medium (Biomeda, Foster City, CA).

Table 1. Antibodies and their working dilutions

Antigen	Antibody	Source	Dilution
S-100 protein	rabbit polyclonal clone S-100	Dako Corp., Carpinteria, CA	1:100
MART-1	mouse monoclonal clone A103	Neomarker, Fremont, CA	1:100
GP-100	mouse monoclonal clone NKI/beteb	Monosan, The Netherlands	1:20
CD1a	mouse monoclonal clone MTB1	Dako	1:30
CD3	mouse monoclonal clone PS1	Novocastra, UK	1:100
CD20	mouse monoclonal clone L26	Dako	1:200
CD68	mouse monoclonal clone KP1	Dako	1:200

4. Image analysis

A CCD camera (CCD-IRIS, Sony, Tokyo, Japan) mounted on a microscope (Olympus BX50F, Olympus Optical Co., Tokyo, Japan) was connected to an IBM personal computer. The image signals taken by the personal computer were evaluated using Image Pro Plus Version 4.5 (Media Cybertics Co., Silver Spring, MD, U.S.A.). The image analysis was performed on a representative area of each specimen. In Fontana-Masson staining, the amount of melanin pigment was measured under constant magnification (x200). The ratio of pigmented area to measured epidermal area (PA/EA) was measured in lesional and control skin. In the immunohistochemical stain for melanocytes (S-100 protein, MART-1, GP-100), the number of melanocytes was estimated using two methods: the number of melanocytes per millimetre length of rete ridge (MC/1R) and the ratio of number of melanocytes to measured epidermal area (MC/EA) (Kang, 2002). Each measurement was evaluated under constant magnification. Careful examination was performed and each melanocyte was counted as one cell when its nucleus was confirmed. All morphometric procedures were performed by manually tracing the borders of the epidermis and rete ridges, and epidermal areas that contained hair follicles were excluded from this tracing. For each frame, the tracing was repeated three times and the mean was used for evaluation; all morphometric measurements were performed by the same person.

5. Statistical analysis

Data were expressed as mean ± standard deviation. A possibility value of less than 0.05 was considered as statistically significant. SPSS 11.0 statistics program was used for analysis.

III. RESULTS

A. Clinical findings (Table 2)

Of the 60 patients with ND, 33 (55%) were men and 27 (45%) were women. Their ages ranged from 3 months to 35 years (mean 9.4 years, median 1.0 year) and onset age of ND ranged from immediately after birth to 13 years (mean 2.1 years). The earliest onset was immediately after birth, whereas in 19 patients (31.7%) it appeared after 3 years of age. Twenty-seven patients (45%) had only one lesion, while 9 patients (15.0%) had more than 20 lesions. Trunk was the most commonly affected site. Face, neck, arms, and legs were also affected in descending order of frequency. The patients showed different shapes of lesions, irregular, round, guttate, polygonal, and linear types. There were 32 patients (53.3%) with segmental pattern and 28 patients (46.7%) with isolated pattern of lesion (Fig. 1), but whorled pattern was not noticed. There was only one patient who showed systemic abnormalities. She had history of seizures but had an isolated type of ND.

Patients were asked if there was any change in relative size and/or distribution of lesions, and 29 patients responded. Twenty-seven patients (93%) responded no change in size, number, shape, or distribution of lesions. Two patients (7%) responded increase in size of lesion, about 10% and 20% respectively, taking their body growth into consideration. The average follow-up

period after initial diagnosis was 68 months.

Table 2. Clinical characteristics (N=60)

Characteristics		Patients (%)
Age of onset	at birth	18 (30.0)
	< 3 mo	2 (3.3)
	3-6 mo	6 (10.0)
	6 mo - 1yr	2 (3.3)
	1 -3 yr	13 (21.7)
	> 3 yr	19 (31.7)
Number of lesions	1	27 (45.0)
	2-5	13 (21.7)
	6-10	6 (10.0)
	11-20	5 (8.3)
	> 21	9 (15.0)
Site of lesions	Face	13 (21.7)
	Neck	9 (15.0)
	Trunk	27 (45.0)
	Arms	6 (10.0)
	Legs	5 (8.3)
Shape of lesions	Irregular	23 (38.3)
	Round	14 (23.3)
	Guttate	11 (18.3)
	Polygonal	8 (13.3)
	Linear	4 (6.7)
Pattern of lesions	Segmental	32 (53.3)
	Isolated	28 (46.7)
	Whorled	0 (0.0)

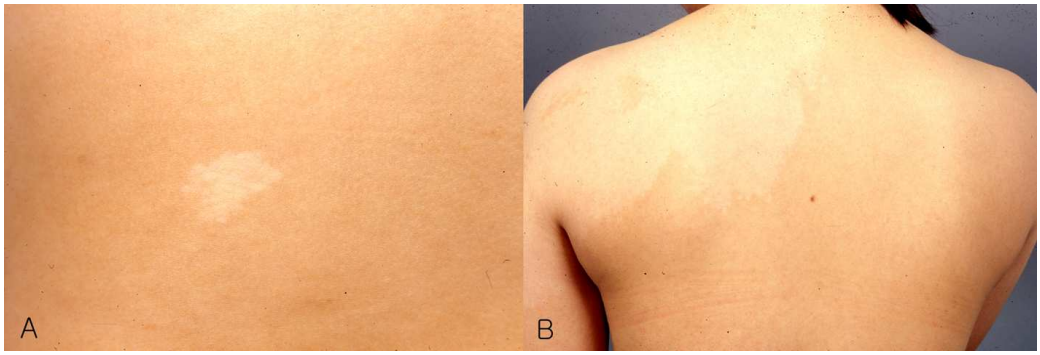

Fig. 1. Clinical pattern of nevus depigmentosus. A. Isolated pattern, B. Segmental pattern.

B. Histopathological findings

1. Histopathological features of ND (Table 3)

The general histopathological features of ND skin were compared with those of the perilesional normal skin. Basal hypopigmentation, dermal melanophage, and dermal inflammation were seen more frequently in the lesions of the ND group than in the normal control group. But they were not statistically significant. The other features such as hyperkeratosis, acanthosis, exocytosis, spongiosis, rete ridge flattening, and telangiectasia were unremarkable.

Table 3. Histopathological characteristics

	Normal	Lesion
	Number (%)	Number (%)
Hyperkeratosis	0 (0)	2 (3)
Acanthosis	0 (0)	2 (3)
Exocytosis	0 (0)	0 (0)
Spongiosis	0 (0)	0 (0)
Basal hypopigmentation	0 (0)	11 (18)
Dermal melanophage	1 (2)	7 (12)
Inflammation	7 (12)	13 (22)
Rete ridge flattening	0 (0)	2 (3)
Telangiectasia	2 (3)	6 (10)

2. Quantitative analysis of melanin pigment in ND (Fig. 2)

In the Fontana-Masson stain, the amount of melanin, or the ratio of pigmented area to measured epidermal area was significantly decreased in epidermal layers of ND skin (0.66 ± 0.61) compared with perilesional normal skin (0.32 ± 0.23) ($p=0.0001$).

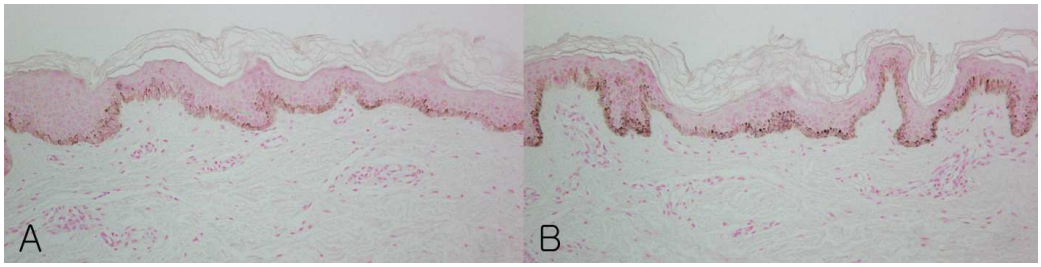

Fig. 2. Staining for melanin pigment. The amount of melanin was significantly decreased in epidermal layers of lesional skin (A) compared with perilesional normal skin (B) (Fontana-Masson stain, original magnification x200).

3. Quantitative analysis of number of melanocytes in ND (Table 4)

In NKI/beteb stain, melanocyte counts were significantly decreased in epidermal layers of ND skin (MC/EA: 243.85±149.08) compared with perilesional normal skin (384.65±152.76) ($p<0.0001$). In MART-1 stain, melanocyte counts were significantly decreased in epidermal layers of ND skin (209.58±107.36) compared with perilesional normal skin (411.60±172.19) ($p<0.0001$). S-100 protein positive cells were mildly decreased in ND skin (466.50±267.45) compared with perilesional normal skin (560.49±327.20), but there was no statistically significant difference between these groups ($p=0.08$) (Fig. 3).

Table 4. Quantitative analysis of number of stain-positive cells

		Normal	Lesion	*p*-value
NKI/beteb	MC/EA[a]	384.65 ± 152.76	243.85 ± 149.08	<0.0001
	MC/1R[b]	19.26 ± 8.11	12.62 ± 8.01	<0.0001
MART-1	MC/EA	411.60 ± 172.19	209.58 ± 107.36	<0.0001
	MC/1R	17.88 ± 7.24	11.98 ± 6.27	0.0009
S-100 protein	MC/EA	560.49 ± 327.20	466.50 ± 267.45	0.08
	MC/1R	22.67 ± 10.66	20.44 ± 9.52	0.23

[a] MC/EA; number of melanocytes per measured epidermal area (mm^2)

[b] MC/1R; number of melanocytes per 1mm length of rete ridge

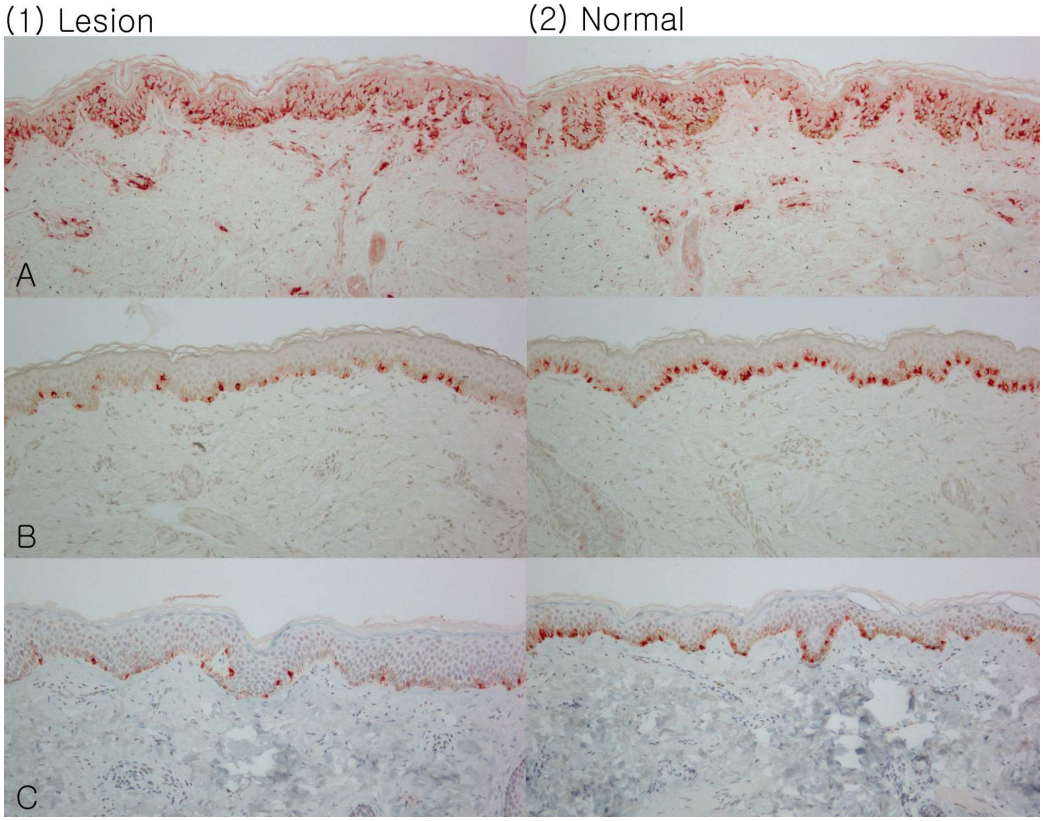

Fig. 3. Staining for melanocytes. There was no difference in number of S-100 protein positive cells between lesional skin and perilesional normal skin (A). However, melanocyte counts were decreased in epidermal layers of lesional skin compared with perilesional normal skin in NKI/beteb (B) and MART-1 stain (C) (original magnification x200).

4. Relationship between 1) the age of onset, 2) the duration of ND and the number of melanocytes (melanin pigment) (Table 5)

There was no definite relationship between 1) the age of onset, 2) the duration of

ND and the number of melanocytes (melanin pigment) in ND skin.

Table 5. Relationship between 1) the age of onset, 2) the duration of nevus depigmentosus and the number of melanocytes (melanin pigment)

		Correlation coefficients	
		Onset age	Duration
NKI/beteb	MC/EA[a]	0.21	-0.08
	MC/1R[b]	0.21	-0.10
MART-1	MC/EA	0.15	0.04
	MC/1R	0.15	-0.17
Fontana-Masson		0.05	0.06

[a] MC/EA; number of melanocytes per measured epidermal area (mm^2)

[b] MC/1R; number of melanocytes per 1mm length of rete ridge

5. Comparative analysis of the number of melanocytes in ND with inflammation and ND without inflammation (Table 6)

There was no significant difference between the number of MART-1 positive melanocytes in ND with inflammation (219.90±127.95) and ND without inflammation (204.90±99.62) (p=0.72). NKI/beteb stain also showed no significant difference between the number of NKI/beteb positive cells in ND with inflammation (183.38±140.42) and ND without inflammation

(273.35±146.87) (p=0.05).

Table 6. Number of melanocytes in ND according to inflammation

		With inflammation	Without inflammation	*p*-value
NKI/beteb	MC/EA[a]	183.38±140.42	273.35±146.87	0.05
	MC/1R[b]	10.15±8.93	13.30±7.70	0.21
MART-1	MC/EL	219.90±127.95	204.90±99.62	0.72
	MC/1R	13.65±7.76	11.23±5.50	0.32

[a] MC/EA; number of melanocytes per measured epidermal area (mm^2)

[b] MC/1R; number of melanocytes per 1mm length of rete ridge (mm)

6. Analysis of the cells of the dermal inflammatory infiltrates in ND (Table 7)

Inflammation was noticed in 22% of ND skin and 12% of perilesional normal skin. Most of the inflammatory cells in ND skin consisted of CD3 positive cells (51.54%), followed by CD68 positive cells (20.00%), CD20 positive cells (6.54%), and CD1a positive cells (3.84%). CD3 positive cells were also most frequently found in perilesional normal skin, followed by CD68 positive cells, CD20 positive cells, and CD1a positive cells.

Table 7. Component of the dermal inflammatory cells

Cells	Normal (M ± SD[a], %)	Lesion (M ± SD, %)	*p*-value
$CD3^+$ cells	51.54±12.97	55.00±13.07	0.41
$CD20^+$ cells	6.54±6.58	5.38±3.20	
$CD68^+$ cells	20.00±12.91	21.92±9.69	
$CD1a^+$ cells	3.84±3.63	5.38±5.94	

[a] M ± SD: Mean ± Standard deviation

IV. DISCUSSION

ND is generally known to be a congenital, nonfamilial disorder characterized by hypopigmented lesion that remains stable over time. Although the clinical features of ND may appear similar to those of vitiligo, the clinical courses of ND are different from those of vitiligo (Ortonne et al., 2003). We investigated the clinicopathologic features of ND which are essential not only to diagnosis but also to understanding the pathogenesis of ND.

The development of ND usually takes place at an early age. However, sporadic reports have suggested its initial presentation at various ages (Lee et al., 1999). In our study, 30.0% of patients recognized ND at birth, but 31.7% of patients had initial lesions after the age of 3 years. Compared to the results of Lee's study (Lee et al., 1999) in which only 7.5% of patients presented initial lesions after the age of 3 years, more patients showed later development in our study. The results of Lee's study (Lee et al., 1999) and our study show that many ND patients develop the initial lesion at a later age. Therefore we suggest that the age of onset should not be a definite diagnostic criterion for ND.

It has been reported that most of the ND patients have one lesion (Lee et al., 1999; Yu et al., 2000). In our study, 45% of the patients had one lesion, but this finding was less than in the previous report. There were patients who had more than ten lesions, and in those cases, other depigmented disorders like

vitiligo or idiopathic guttate hypomelanosis should also be considered in the differential diagnosis of ND. Vitiligo can be differentiated from ND in that it is an acquired disorder with uniformly milk or chalk-white color and discrete margin. The amelanotic macules in vitiligo are found particularly in areas that are normally hyperpigmented (for example, the face, axillae, groins, areolae and genitalia) and areas subjected to repeated friction and trauma (for example the dorsa of hands, feet, elbows, knees and ankles). The natural course of vitiligo unpredictable, but often shows abrupt onset, followed by progression for a time, and then a period of stability (Ortonne et al., 2003). Histologically, vitiligo usually shows total loss of skin pigment and well-established lesions are totally devoid of melanocytes (Spielvogel and Kantor, 2005). Idiopathic guttate hypomelanosis shows a few or numerous sharply circumscribed white macules predominantly on the sun-exposed extensor surfaces of the extremities in persons over 30 years of age. They measure 2 to 6 mm in diameter (Cummings Cottel, 1966).

Lee et al (Lee et al., 1999) reported 77.4% of the patients had serrated, irregularly bordered lesion which is a characteristic feature of ND, usually not found in vitiligo. But in our study, only 38.8% of the patients had irregularly shaped lesions. Therefore, the shape of the lesion could not be a characteristic feature in the diagnosis of ND. Three clinical patterns of ND are described: isolated, segmental and whorled types (Lee et al., 1999; Yu et al., 2000; Ortonne

et al., 1983; Bianchi et al., 2004; Di Lernia et al., 1999). However, differentiating whorled ND from hypomelanosis of Ito is rather vague and there are controversies about differences between these two entities (Jelineck et al., 1973; Rubin, 1972). In contrast to ND, hypomelanosis of Ito shows a familial tendency and is usually associated with systemic abnormalities. It also exhibits various changes in skin manifestations over time (Rubin, 1972; Aram, 1970; Harre and Millikan, 1994; Orlow, 1995).

ND is generally known to be stable in its relative size and distribution throughout life (Lesser, 1884; Bolognia and Pawelek, 1988). Our data also support this description. Most of the patients remained stable without any change in size, number, shape, or distribution of lesions. Only two patients responded that there had been an increase in the size of the lesion, about 10% and 20% respectively, taking their body growth into consideration. However we think these were not significant changes.

Most of the earlier studies showed a decrease in the density of melanin in ND (Lee et al., 1999; Jimbow et al., 1975; Jelineck et al., 1973). Our study also showed that the amount of melanin was significantly decreased in epidermal layers of ND skin compared with perilesional normal skin. However, the number of melanocytes in lesional skin varied depending on the reports. Lee et al (Lee et al., 1999) showed no reduction of melanocytes in ND observed by S-100 protein staining, which was confirmation of a previous report by Jimbow

et al(Jimbow et al., 1975). However it was contradictory to the study of Jelineck et al (Jelineck et al., 1973) which showed decreased number of dopa-positive melanocytes in the lesion. In our study, the number of S-100 protein positive cells decreased in ND skin, but they showed no significant difference between the ND group and perilesional control group. However, melanocyte counts were significantly decreased in epidermal layers of ND skin when stained with NKI-beteb and MART-1. It may be that the specificity of S-100 protein is low because S-100 protein can be detected not only in melanocytes but also in other cells like Langerhans cells, histiocytes, eccrine and apocrine cells (Elenitsas et al., 2005). Although the role of decreased number of melanocytes in the pathogenesis of ND is not clear, the result of our study suggest that melanocyte counts are significantly reduced in ND skin compared with perilesional normal skin.

Histopathological evaluation of ND skin could be an important clue to elucidate the pathogenesis of ND. It has been proposed that the pathophysiology of ND is associated with a developmental defect of the fetal melanocytes, in particular, a defect in the transfer of melanosomes from melanocytes to keratinocytes (Bolognia and Pawelek, 1988; Lee et al., 1999; Jimbow et al., 1975). But besides functional alteration of melanocytes, our investigation provides a possible role of decreased number of melanocyte in the pathogenesis of ND. There was no significant difference in histologic findings or dermal

inflammatory infiltrates between ND skin and perilesional normal skin indicating that immunologic or inflammatory process may not be involved in the pathogenesis of ND.

We tried to find out if there is any relationship between the onset age or the duration of ND and the number of melanocytes (melanin pigment) in ND skin. But there was no definite relationship between the onset age of ND and the number of melanocytes in ND skin, nor was there a significant relationship between the duration of ND and the number of melanocytes in ND skin.

In summary, ND is generally known to be a congenital disorder and most of the ND patients have one lesion. However, in our study 19 patients (31.7%) presented with ND after 3 years of age and there were 14 patients (23.3%) who had more than 10 lesions. Based on our histopathological findings we found that both the amount of melanin and the number of melanocytes in ND skin are usually decreased when compared with perilesional normal skin. Therefore, considering both clinical and histologic findings together would be helpful in the diagnosis of ND and differentiating ND from other depigmented disorders.

V. CONCLUSION

1. The lesions of ND were usually present before the age of 3 years (68.3%), but some lesions appeared later in childhood (31.7%).
2. Twenty seven patients (45.0%) had one lesion, but there were 14 patients (23.3%) who had more than ten lesions.
3. Fontana-Masson stain showed that the amount of melanin was significantly decreased in ND skin compared with perilesional normal skin.
4. Melanocyte counts were significantly decreased in ND skin when stained with NKI/beteb and MART-1. However, there were no significant differences in the numbers of S-100 protein positive cells.

Only 18 patients (30.0%) presented with ND at birth and there were 27 patients (45.0%) who had 1 lesion. Both the amount of melanin and the number of melanocytes in ND skin are decreased when compared with perilesional normal skin. Therefore, considering both clinical and histologic findings together would be helpful in the diagnosis of ND and differentiating ND from other depigmented disorders.

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– 국문요약 –

탈색모반의 임상 및 병리조직학적 특성

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연구목적: 탈색모반은 선천적인 비진행적 탈색반을 특징으로 하는 저색소성 피부질환이다. 탈색모반의 임상 및 병리조직학적 특징에 대해서는 문헌 보고가 많지 않으며, 병인도 잘 밝혀져 있지 않다. 따라서 본 연구에서는 다수의 탈색모반 환자군을 대상으로 임상적 특징과 병리조직학적 특징을 관찰하여, 탈색모반을 진단하는데 도움이 되고자 하였다.

재료 및 방법: 탈색모반으로 진단된 60명의 환자를 대상으로 병력과 이학적 검사 등 임상 조사를 실시하였다. 탈색반과 인접 정상피부에서 2mm 생검을 실시하여 Hematoxylin-Eosin, Fontana-Masson, S-100 단백, MART-1,

NKI/beteb, CD1a, CD3, CD20, CD68 염색을 실시하였다

결과: 병변은 대부분의 환자에서 3세 이전(68.3%)에 발견되었으나 3세 이후(31.7%)에 발견된 경우도 많았다. 1개의 병변만 있는 경우가 27명(45.0%)으로 가장 많았으나 10개 이상의 병변을 가진 경우도 14명(23.3%) 있었다. Fontana-Masson 염색 소견상 정상피부에 비해 병변의 멜라닌색소가 의미 있게 감소하였다. MART-1과 NKI/beteb에 양성으로 염색되는 멜라닌세포 수는 인접 정상피부에 비해 병변에서 의미 있게 감소하였으나, S-100 단백에 양성으로 염색되는 멜라닌세포 수는 유의한 차이를 보이지 않았다.

결론: 단지 18명(30.0%)의 환자에서 출생시부터 병변이 발견되었고, 1개의 병변을 가진 환자도 27명(45.0%)에 불과했다. 탈색모반의 피부는 인접 정상피부에 비해 멜라닌색소와 멜라닌세포 수 모두 감소하였다. 그러므로 탈색모반의 진단을 위해서는 이러한 임상적 양상과 조직학적 소견을 모두 종합하여 결정하는 것이 중요할 것으로 생각된다.

핵심어: 탈색모반, 멜라닌색소, 멜라닌세포