Linear and Whorled Nevoid Hypermelanosis with Delayed Psychomotor Development

Shin Young Yim, Il Yung Lee, Ueon Woo Rah, Hae Won Moon
Si Houn Hahn*, Eun So Lee**, and Hyun Lee Yim***

We report a case of a 25-month-old girl presented to us for the evaluation of a severe delayed psychomotor development who also has pigmented abnormalities. Linear and whorled hyperpigmentations following Blaschko's lines were noticed on her entire body except on her face, palms, soles, eyes and mucous membranes, which closely resembled those found in hypomelanosis of Ito, but inversely pigmented. Histologic examination revealed basal layer hyperpigmentation without incontinence of pigment or dermal melanophages. Chromosomal analysis of cultured peripheral leukocytes and fibroblasts from the hyperpigmented and the hypopigmented skin revealed normal female karyotype with no evidence of mosaicism or chimerism. This entity represents a kind of neurocutaneous syndrome referred to by some authors as linear and whorled nevoid hypermelanosis.

Key Words: Linear and whorled nevoid hypermelanosis, delayed development, neurocutaneous syndrome

The neurocutaneous syndromes are a heterogeneous group of disorders that involve, by definition, the skin and the nervous system (Zvulunov and Esterly, 1995). The association of defects affecting two different cell types may be related to their parallel embryologic development (Nordlund, 1992).

We present a girl with hyperpigmented whorls and stresks along Blaschko's lines, who also suffers from severe delayed psychomotor development, the combination of which represents a kind of neurocutaneous syndrome.

CASE REPORT

The female patient is now 45 months old. She was first presented to us at the age of 25 months for the evaluation of delayed psychomotor development.

She is an only child and her mother has no history of spontaneous abortions. There is no indication of pigmented anomalies or other neurocutaneous syndromes in her family, except that her uncle on her mother's side died of an unknown disease in early childhood. Parents deny consanguinity.

She weighed 3.0 kg at birth, and due to maternal toxemia, C-section was required. The pregnancy was complicated by maternal toxemia but normal fetal movement was noticed by the mother. There was transitory neonatal hyperbilirubinemia but the infant grew at a normal rate.

Her parents first noticed her dark and light skin color when she was 2.5 months old but
thought that these pigmented lesions were present from birth. There were no prior inflamations or any preceeding eruptions, and her parents reported that the skin pigentaions had not changed since their first notice. They also noticed delayed acquisitions of her motor milestones. For example, she rolled over at 9 months, and sat with support of her two hands at 9 months. She was treated with Vojta technique for delayed motor development at a local rehabilitation clinic at the age of 18 months. She was also diagnosed with incontinencia pigmenti for her pigmenatry lesions at a local hospital at the age of 2½ months.

On her first presentation to us, she was 88cm tall (50–75th percentile), weighed 13.8 kg (75–90th percenttile), and her head circumference was 50 cm (50–75th percentile). His facial features were slightly dysmorphic: depressed nasal bridge, broad face, and slightly hypertelorism eyes. On inspection, there were mottled whorls and streaks following Blaschko's lines on her whole body except on her face, palms, soles, eyes and mucous membranes(Fig. 1). The patient's hair, teeth, and dermatoglyphics were normal. Functionally, she was able to hold her head up, roll over, and maintain sitting supported by her two hands. She could not creep, crawl, or walk alone and her only expressive language was "mum" at the age of 25 months.

Neurological examination revealed alert mental status, and equal pupill size with prompt light reflexes. She did not show any nystagmus or strabismus. She showed no spasticity or tremor. Deep tendon reflexes were slightly hyperactive in both lower extremities, and plantar reflexes were flexor. Cerebellar functions were normal. Facial muscle weakness was not apparent.

Complete blood count was within normal range on two occasions, with eosinophil counts of 6.6% and 4.6%. Analysis of urine and blood chemistry including muscle enzymes and thyroid function test were all within normal range. Brain MRI showed normal findings without heterotopias except a wide subarachnoid space at the posterior fossa. Electroencephalogram and electrophysiologic findings were normal.

At a chronological age of 25 months, her fine motor functions were at 14 months, cognitive function at 14 months, and performance of daily activities at 11 months, according to the DARBAS(Developmental Age Referenced Breakdown Assessment Scale) evaluation. Speech development was also delayed: her receptive and expressive language skills were under the 16-month level at a chronological age of 25 months.

Chromosomal analysis of cultured peripheral leukocytes and cultured fibroblasts from the hyperpigmented and hypopigmented skin revealed a normal female karyotype of 46 XX, without any evidence of mosaicism or chimerism.

We conducted punch biopsies of the skin at both the hyperpigmented and the hypopigmented areas. On Fontana-Masson staining, hyperpigmented skin showed increased pigmentations of the basal layer without pigmenatry incontinence or dermal melanophages.

Fig. 1. Linear and whorled patterns of hypopigmen- tation are observed on the back.

Number
Fig. 2. Photomicrograph of skin biopsy specimen (×200).

A: Fontana-Masson staining of the darker colored skin shows hyperpigmentation of the basal layer (arrows) without pigmentary incontinence or dermal melanophages.

B: Fontana-Masson staining of the lighter colored skin shows normal pigmentation of the basal layer.
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Hypopigmented skin showed normal pigmentation of the basal layer (Fig. 2). Electron microscopic studies of the hyperpigmented area revealed evenly-distributed, mature melanosomes on keratinocytes (Fig. 3).

Although she has received a rehabilitational therapy at our hospital for 12 months consisting of both neurodevelopmental therapy and sensory integration, she has shown limited signs of functional improvement. She was able to creep, but not crawl nor walk alone at the age of 40 months.

DISCUSSION

The neurocutaneous syndromes are a heterogeneous group of disorders that involve, by definition, the skin and the nervous system (Zvulunov and Esterly, 1995). Current concept of embryological migration of both melanoblasts and cortical neurons from the neural crest may explain a common mechanism for the skin and brain lesions (Nordlund, 1992).

Hyperpigmented or hypopigmented macules in streaky configurations along Blaschko’s lines which represent the paths of migration are observed in some disease entities such as incontinentia pigmenti, early systematized epidermal nevus, hypomelanosis of Ito, and so on, and differential diagnosis should be done (Jackson 1976; Alimurung et al. 1979; Griffiths, 1984; Kalter et al. 1988). Often, it is initially difficult to decide whether the basic anomaly is one of hypopigmentation or hyperpigmentation. From skin biopsy, our patient showed hyperpigmentation in dark-colored skin and normal pigmentation in light-colored skin. The pattern displayed by our patient closely resembled that found in hypomelanosis of Ito but inversely pigmented. The only histologic abnormalities in hypomelanosis of Ito are decreased amount of melanin and fewer melanocytes (Pinto and Bologna, 1991). Incontinentia pigmenti shows absence of pigment in the basal layer and abundant pigments and melanophages in the upper dermis. Pigmentary incontinence and dermal melanophages were not observed in our patient. We were able to exclude epidermal nevus due to the absence of epidermal hyperplasia upon histology (Solomon et al. 1968; Findlay and Moores, 1986; Alvarez et al. 1993).

In 1988, Kalter et al. first used the term linear and whorled nevoidal hypermelanosis for patients with congenital hyperpigmented macules in streaky configurations along Blaschko’s lines (Kalter et al. 1988). Histologically the hyperpigmented macules showed basal melanosis without pigmentary incontinence. We think that our case is compatible with linear and whorled nevoidal hypermelanosis with severe delayed psychomotor development, which represents a new form of neurocutaneous syndrome.

The pathogenesis of linear and whorled nevoidal hypermelanosis is unknown, although the developmental somatic mosaicism and genetic factors are thought to be the possible causes (Akiyama et al. 1994). Further studies are necessary to elucidate the pathomechanism of
linear and whorled nevoid hypermelanosis.

REFERENCES


