CASE REPORT

Ichthyosis linearis circumflexa with bamboo hair: challenges in the diagnosis and management

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SUMMARY

A 15-year-old boy had persistent and refractory erythroderma since early childhood. His parents noticed polycyclic skin lesions and hair fragility around the age of 5 years. He was treated by a local untrained practitioner for more than 3 years without any significant improvement, and he developed weight gain, thinning of skin, muscle weakness and growth retardation. He was evaluated in 2015 and found to have iatrogenic Cushing's disease with severe skeletal complications and pituitary-adrenal-gonadal suppression, which persisted despite gradual withdrawal of steroids.

BACKGROUND

Netherton syndrome (NS) is an autosomal recessive disorder due to loss of function mutations in SPINK 5 gene that encodes the serine protease inhibitor LEKT1. It manifests as collodion baby at birth and refractory erythroderma during infancy and early childhood days. Ichthyosis linearis circumflexa (ILC), the characteristic cutaneous finding, develops later. The other associated features are trichorrhexis invaginata (bamboo hair) and atopy. Treatment of NS is often difficult and refractory. We present a classical case of NS who was treated with steroid preparations for more than 2 years and later developed iatrogenic Cushing's disease. This interesting case highlights the importance of understanding the natural history of NS, difficulties in its management and also the need for counselling the parents regarding non-responsiveness to most medications.

CASE PRESENTATION

A 15-year-old boy, born to consanguineous parents, presented with itchy erythematous scaly plaques and increased fragility of hairs since early childhood. During infancy, he had severe persistent erythroderma that gradually decreased over a period of time and developed multiple polycyclic skin lesions around the age of 5 years. There was no history suggestive of atopy or developmental delay. There was no family history of similar complaints. He was managed with several courses of topical and systemic medications by the local medical practitioners without significant improvement. Thereafter, his family consulted a local hakeem (untrained practitioner), who gave medication for over 3 years following which he developed weight gain, thinning of skin, muscle weakness and growth retardation with minimal improvement in skin lesions.

INVESTIGATIONS

He was evaluated in 2015 and found to have multiple plaques in a linear and serpiginous pattern having the typical double-edged scaling at their margins, on the trunk and extremities with prominent erythematous background (figure 1). Hair microscopy showed trichorrhexis invaginata (figure 2). The physical examination revealed short stature with height (128 cm) and weight (35 kg) below the third centile, absence of pubic and axillary hair and testicular volume of approximately 2 mL suggesting prepubertal status. He also had cushingoid features, transaminitis, steroid suppression (serum cortisol 0.89 µg/dL), severe osteoporosis (Z score -3.9) and vitamin D deficiency.

He reported again in December 2016 after a gap of 1 year for his persistent skin lesions. The bone age was markedly delayed (9.4–11.6 years). The hormone evaluation showed persistent low levels of serum cortisol (0.155 µg/dL (6.2–19.4)) and testosterone (<0.025 ng/mL (2.4–8.3)). Pituitary hormone assays for adrenocorticotrophic hormone (5.34 pg/mL (7.2–63.3)), luteinizing hormone (0.318 mIU/mL (1.7–8.6)) and follicle-stimulating hormone (1.37 mIU/mL (1.5–12.4)) were found to be suppressed, while growth hormone and thyroid functions were normal. Repeat DEXA scan showed marked osteoporosis (Z score -4.1). Serum 25 (OH) D and parathyroid hormone levels were 17 ng/mL (30–100) and 48.15 pg/mL (15–65), respectively. The molecular genetic testing could not be done due to financial constraints on the family.

OUTCOME AND FOLLOW-UP

His steroid dose was gradually tapered off and was put on vitamin D and calcium supplements along with high-protein diet. He was also advised a short course of steroids during times of fever or infections. For the skin, he was advised regular emollients.

DISCUSSION

NS is a rare autosomal recessive disorder characterised by the triad of ILC, trichorrhexis invaginata and atopic diathesis. The reported incidence of NS is approximately 1 in 200 000.¹ It is due to loss of function mutations in SPINK 5 gene that encodes the serine protease inhibitor LEKT1. Most of the children with NS have erythroderma at or shortly after birth. During infancy, many of the children develop episodes of sepsis and hypernatraemic dehydration. Due to severe impairment

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Figure 1 A case of childhood erythroderma showing ichthyosis linearis circumflexa. Linear and serpiginous plaques with characteristic double-edged scaling seen on the extremities and trunk.

of permeability barrier, there is excessive loss of calories that may lead to growth failure in some cases. Erythroderma is often refractory and persists. Over the course of time, older children and adults may develop ILC, which is a unique feature of NS.^{1 2}

Figure 2 Hair microscopy showing trichorrhexis invaginata (bamboo hair).

ILC has been reported in 48% of cases and is characterised by linear and serpiginous plaques with 'double-edged' scaling.¹

In the pathognomonic hair shaft abnormality known as Bamboo hair or trichorrhexis invaginata, the distal hair segment telescopes into the proximal portion of the hair shaft giving rise to small bulbous areas along the hair shaft. This abnormality is mostly seen in scalp hairs of older children and eyelashes in younger children. This is also associated with increased hair fragility. Other associated conditions include atopy, pancreatitis, hypothyroidism, malnutrition and increased incidence of papillomavirus infection.^{1 3}

NS needs to be differentiated from other ichthyosiform erythroderma during neonatal period and infancy. It is often confused with autosomal recessive congenital ichthyosis that is characterised by coarse dark brown scaling all over the body along with ectropion. Immunodeficiency syndromes particularly Omenn syndrome (OS) may also be confused with NS, but the presence of lymphadenopathy, hepatosplenomegaly and alopecia universalis favours OS.⁴

Treatment of NS is difficult, and emollients are the mainstay of therapy. Topical steroids, tacrolimus and pimecrolimus have been tried with variable response. Topical medications should be used with caution, as the skin in NS is very thin with defective barrier function that may lead to systemic absorption. Oral etretinate and phototherapy have also been tried in NS.^{5 6}

Diagnosing NS during neonatal period and infancy is crucial as the natural course of this condition is persistent with poor response to treatment. Paediatricians and dermatologists should be aware of the chronic course of NS and its management difficulties. In this case, the diagnosis was missed by the local practitioners and mismanaged with steroid-containing preparation for several years leading to iatrogenic Cushing's disease, severe growth retardation, osteoporosis, myopathy and long-term steroid suppression. Pituitary and gonadal suppression with delayed puberty was also observed.

The present case highlights the challenges in the diagnosis and management of NS. It also sheds light on the misuse of steroid and its side effects in a growing child. Hence, understanding the natural history of NS and difficulties in its management and counselling the parents regarding non-responsiveness to most medications are crucial in handling of such cases.

Learning points

- ▶ Netherton syndrome (NS) is a rare genodermatosis manifesting as neonatal and infantile erythroderma.
- ▶ Children with recalcitrant erythroderma along with hair shaft abnormalities need to be evaluated for NS.
- ▶ Treatment is difficult, and supportive management with emollients is the mainstay of therapy.
- ▶ Steroids are not recommended in the management of NS.

Contributors TD and GS evaluated and managed the case. MRK evaluated the endocrine part. TD and GS wrote the manuscript and critically revised and approved it. MRK critically revised and approved the manuscript.

Competing interests None declared.

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