

- malignant melanoma on glabrous skin: a videomicroscopic study. *Arch Dermatol.* 1998;134:563–8.
5. Saida T. Malignant melanoma in situ on the sole of the foot: its clinical and histopathologic characteristics. *Am J Dermatopathol.* 1989;11:124–30.
 6. Saida T, Yoshida N, Ikegawa S, Ishihara K, Nakajima T. Clinical guidelines for the early detection of plantar malignant melanoma. *J Am Acad Dermatol.* 1990;23:37–40.
 7. Kokgil TD, Ekmekci TR, Yasar S. Videodermoscopic pattern analysis of acral melanocytic nevi. *J Dermatol.* 2012;39:290–4.

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Idiopathic Acquired Leukonychia Totalis of the Fingernails in a Child Treated Successfully with Zinc and Amino Acid Supplementation



Leuconiquia totalis idiopática, adquirida de las uñas de las manos tratada con éxito mediante suplementos de zinc y aminoácidos

Leukonychia is whitening of the nail plate. In 1919, Mees first described leukonychia in arsenic intoxication.¹ Baran classified leukonychia into true, apparent, and pseudo-leukonychia. True leukonychia can be acquired or inherited, and based on the distribution of white blotches, can be further subclassified as leukonychia punctata, leukonychia striata, leukonychia partialis, or leukonychia totalis.² There are very few reported cases of idiopathic acquired leukonychia totalis³ and we report the present case to demonstrate this uncommon clinical entity in a 10-year-old boy and his response to micronutrient supplementation.

A 10-year-old boy presented at our clinic with porcelain white finger nails that he had had since 4 years of age. Leukonychia totalis and leukonychia striata were seen on the fingernails, with leukonychia partialis in both the thumbnails (Fig. 1). A detailed history demonstrated progression from leukonychia partialis to striata and totalis over the years. The strength of the nail plate was normal. Pressure over the nail plate caused no fading of the leukonychia, suggesting nail matrix origin and ruling out Muehrcke's lines (apparent leukonychia striata), a common clinical differential diagnosis.³ His hair, eyes, teeth, and the remainder of the cutaneous examination were normal. There was no clinical evidence of malnutrition, alopecia areata, psoriasis, or lichen planus. The patient gave no history of preceding illness, surgery, trauma, chemical exposure and drug intake, including herbal medicines. The patient was born out of a nonconsanguineous marriage and there was no family history of leukonychia. Repeated cultures and microscopic examination of the nail clippings with 10% potassium hydroxide were negative. All the routine investigations, including serum proteins, liver function tests, serum calcium, and zinc levels were within normal limits. With the aforementioned clinical and laboratory assessment a diagnosis of idiopathic leukonychia partialis to totalis of the fingernails was established. The patient's parents did not consent to a nail biopsy.

The boy was started orally on Zinc sulfate 137.5 mg (containing 50 mg elemental zinc) capsule once daily, along with a single daily capsule of 8 essential amino acids and vitamins A, B complex, C, D, and E (containing 18.3 mg L-leucine, 5.9 mg L-isoleucine, 25 mg L-lysine hydrochloride, 5 mg L-phenylalanine, 4.2 mg L-threonine, 6.7 mg L-valine, 5 mg L-tryptophan, 18.4 mg DL-methionine, 2500 IU vit A, 200 IU vit D, 5 mg vit B1, 3 mg vit B2, 25 mg vit B3, 5 mg vit B5, 1.5 mg vit B6, 2.5 mg vit B12, 0.75 mg folic acid, 40 mg vit C, and 7.5 IU vit E). Two monthly follow-ups showed serial improvement at each visit, and complete resolution of the leukonychia was observed at the end of 7 months (Fig. 2). The treatment was continued for 3 months after resolution of the leukonychia, and there was no relapse in the 6 months after treatment was discontinued. The patient is presently monitored.

Leukonychia is the most common chromatic abnormality of the nail; however the physiologic mechanisms causing it are not entirely clear and Newton's theorem (i.e. a surface appears white when it reflects the radiation of visible light), has been proposed to explain leukonychia. In true leukonychia there is abnormal matrix keratinization, with persistent parakeratosis and keratohyalin granules in the nail plate, which might play a role in the modification of the light reflection by the ungual plates.³ Baran classified leukonychia into the following 3 primary types: (1) true leukonychia, where in the nail plate involvement originates in the matrix; (2) apparent leukonychia, in which the pathology lies in the subungual tissue; and (3) pseudo-leukonychia, which is due to keratin granulations, as seen in superficial white onychomycosis.² Inherited leukonychia can be presented as an isolated condition or as one of the several other reported syndromes. There is an autosomal, dominantly inherited syndrome in which leukonychia occurs in combination with kidney stones and sebaceous cysts, with sensory-neural deafness and knuckle pads, which is known as the Bart-Pumphrey syndrome.³ Popular lay media claim that the etiology of leukonychia is due to calcium and/or zinc deficiency. However, no studies are available in the scientific literature to support or refute these claims.⁵ Acquired leukonychia has been reported due to trauma, drugs such as chemotherapeutic agents (e.g., anthracyclines, cyclophosphamide, vincristine, cyclosporine, fluorouracil, and methotrexate), and systemic or local infections (e.g., typhoid fever, hepatic cirrhosis, ulcerative colitis, leprosy, and recently due to selenium deficiency in Crohn's disease).^{3,5,6} In children, increased requirements for macro- and micronutrients



Figure 1 Idiopathic acquired leukonychia totalis of the fingernails in a 10-year old child.



Figure 2 Six-month follow-up showing near complete resolution of the leukonychia.

during the growing years might not be met adequately through routine meals. This deficiency could not be reflected in their serum values; however it could lead to subtle manifestations of nutritional deficiencies such as leukonychia, as in the present case. Clinicians should consider oral supplementation of relevant micronutrients in cases of acquired leukonychia, even in patients for whom serum

levels do not reveal any evidence of nutritional deficiency. To the best of our knowledge, only 7 cases of idiopathic acquired leukonychia totalis have been reported to date.^{4,7-12} Our case is the eighth addition to the list; furthermore, it is the first case of acquired leukonychia totalis of the fingernails in which a successful resolution following therapy has been reported.

Bibliografía

1. Mees Een verschijnsel bij polyneuritis arsenicosa. *Nederl Tijdschr Geneesk.* 1919;1:391-6.
2. Baran RDR, de Berker DAR, Haneke E, Tosti A. Baran and Dawber's diseases of the nails and their management. 3rd ed. Oxford: Blackwell-Science Ltd.; 2001. p. 95-102.
3. Dasanu CA, Ichim TE, Alexandrescu DT. Muehrcke's lines (Leukonychia striata) due to transretinoic acid therapy for acute promyelocytic leukemia. *J Oncol Pharm Pract.* 2013;19:377-9.
4. Bongiorno MR, Aricò M. Idiopathic acquired leukonychia in a 34-year-old patient. *Case Rep Med.* 2009;2009:495809.
5. Morgan Z, Wickett H. Leukonychia on finger nails as a marker of calcium and/or zinc deficiency. *J Hum Nutr Diet.* 2011;24:294-5.
6. Hasunuma N, Umabayashi Y, Manabe. True leukonychia in Crohn disease induced by selenium deficiency. *JAMA Dermatol.* 2014;150:779-80.
7. Butterworth T. Leukonychia partialis: a phase of leukonychia totalis. *Cutis.* 1982;29:363-4, 367.
8. Stewart L, Young E, Lim HW. Idiopathic leukonychia totalis and partialis. *J Am Acad Dermatol.* 1985;13:157-8.
9. Grossman M, Scher RK. Leukonychia: review and classification. *Int J Dermatol.* 1990;29:535-41.
10. Claudel CD, Zic JA, Boyd AS. Idiopathic leukonychia totalis and partialis in a 12-year-old patient. *J Am Acad Dermatol.* 2001;44:379-80.
11. Park HJ, Lee CN, Kim JE, Jeong E, Lee JY, Cho BK. A case of idiopathic leukonychia totalis and partialis. *Br J Dermatol.* 2005;152:401-2.
12. Arsiwala SZ. Idiopathic acquired persistent true partial to total leukonychia. *Indian J Dermatol Venereol Leprol.* 2012;78:107-8.

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