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A Case of Congenital Reddish Neurofibromatous Dermal Hypoplasia

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A 17-year-old Korean boy with neurofibromatosis (NF) type 1 showed well-demarcated congenital reddish atrophic patches with follicular papules on the abdomen and left thigh. Results of a histologic examination of an atrophic patch showed collagen reduction in the reticular dermis with neuroid cuffs around thick-walled blood vessels. Dermatologists should be aware of this uncommon clinical finding of NF because it may be useful for early diagnosis.

Neurofibromatosis (NF) is a dominantly inherited or spontaneously mutated neuroectodermal abnormality with an estimated incidence of 1:3500 persons. The prototypical skin lesions of NF type 1 (NF1) are neurofibromas, café au lait macules, and axillary or inguinal freckling.[1] We report a case of NF1 involving a rare clinical manifestation characterized by reddish atrophic patches with follicular accentuations and a history of congenital onset.

Case Report

A 17-year-old Korean boy had noted several kinds of skin lesions from birth. His diagnosis of NF1 was based on more than 20 café au lait macules (largest diameter, >15 mm), 5 cutaneous neurofibromas, bilateral axillary freckling, and bilateral Lisch nodules. The patient's sexual development had been normal, and none of his first-degree relatives had features of NF.

Physical examination showed 2 reddish atrophic patches (present since birth): 1 on the left thigh and 1 on the right side of the abdomen, including the umbilicus (Figure 1). The lesions were slightly depressed, well-demarcated, roughly oval patches 20 to 30 cm in diameter. The skin overlying the atrophic patches was soft, but numerous accentuated follicular papules were present (Figure 2). The reddish

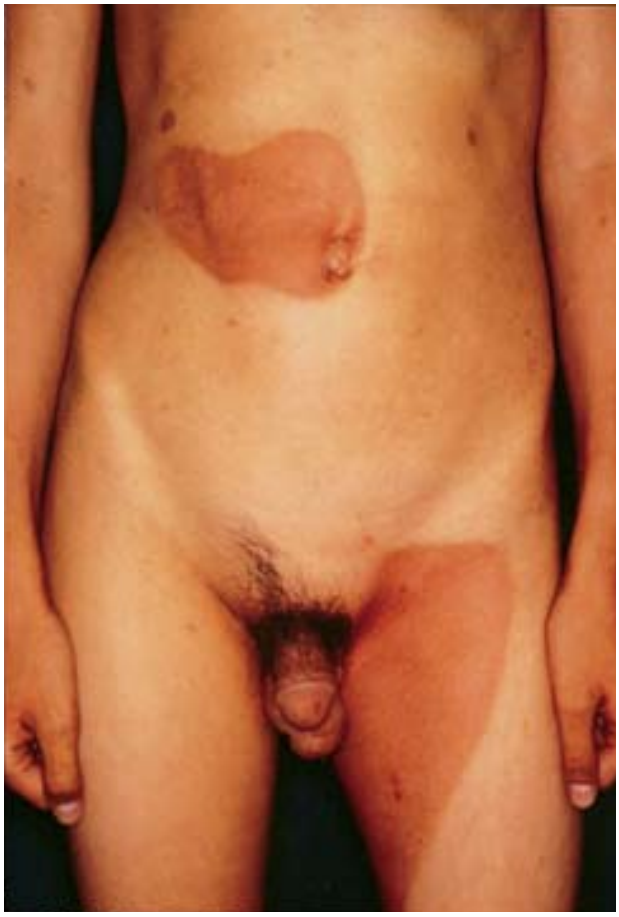

Figure 1. Two reddish, well-demarcated, 20- to 30-cm atrophic patches on the patient's abdomen and left thigh.

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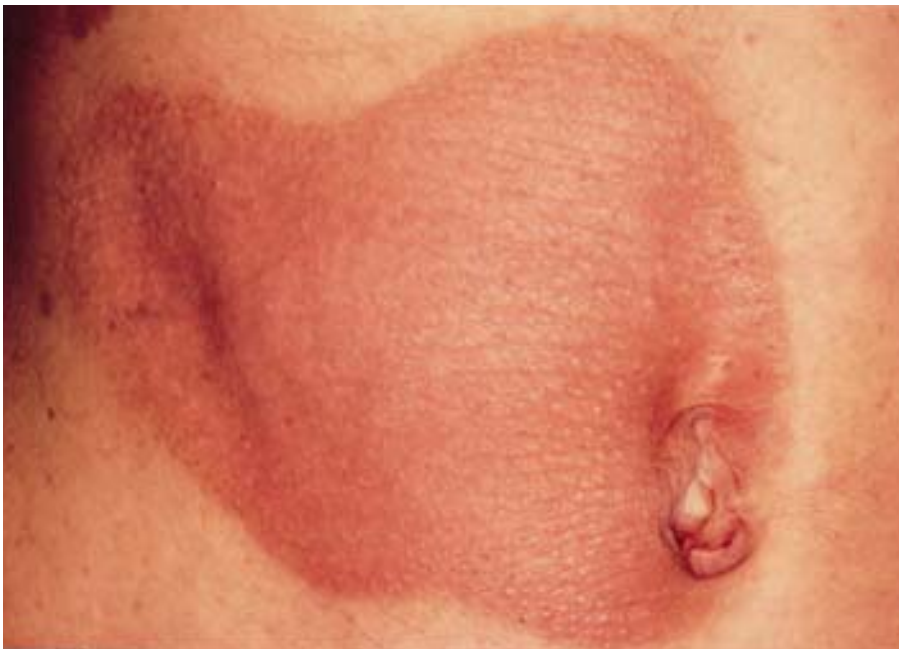

Figure 2. Numerous accentuated follicular papules on the patient's abdominal atrophic patch.

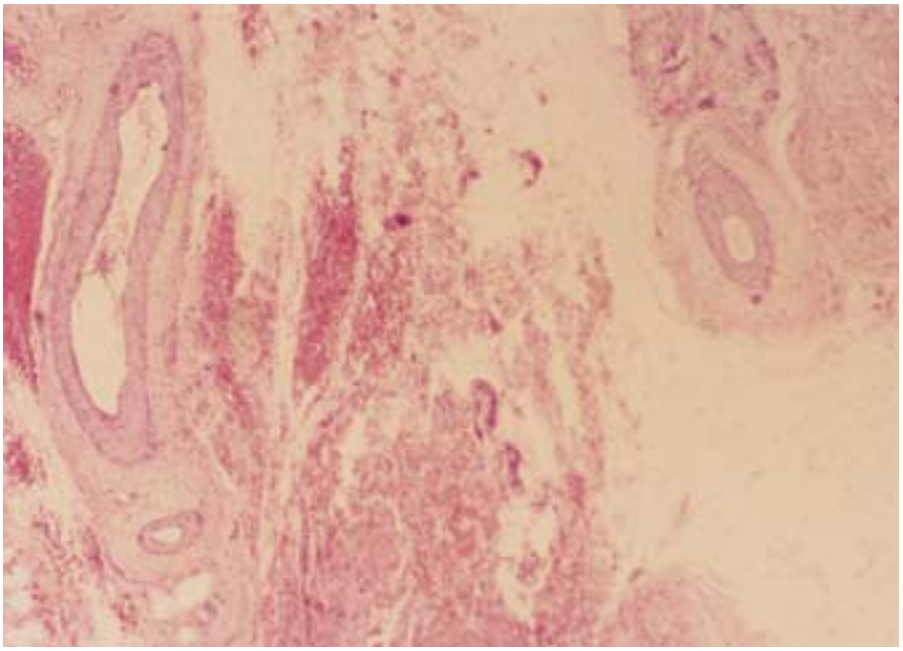

Figure 3. Perivascular cuffs of neuroid tissues in reticular dermis (H&E, original magnification ×40).

lesions were distinct from the surrounding yellowish skin. Palpation seemed to show that some of the underlying subcutaneous tissue was absent.

The patient had been experiencing abdominal pain during the previous 3 months. An enlarged spleen was palpated on routine physical examination. Computed tomography of the abdomen showed marked splenomegaly and portocavernous transformation. Roentgenographic examination of the skeleton showed no defects. Except for slightly increased levels of hepatic enzymes (aspartate aminotransferase/alanine aminotransferase), the results of routine analyses of blood, urine, and stool were negative or within normal limits. Results of the remainder of the physical examination were normal.

Biopsy specimens were taken from the atrophic patch on the abdomen and from the soft nodule on the buttock. Results of a microscopic examination of the biopsy specimen from the abdominal atrophic patch showed that the epidermis, papillary dermis,

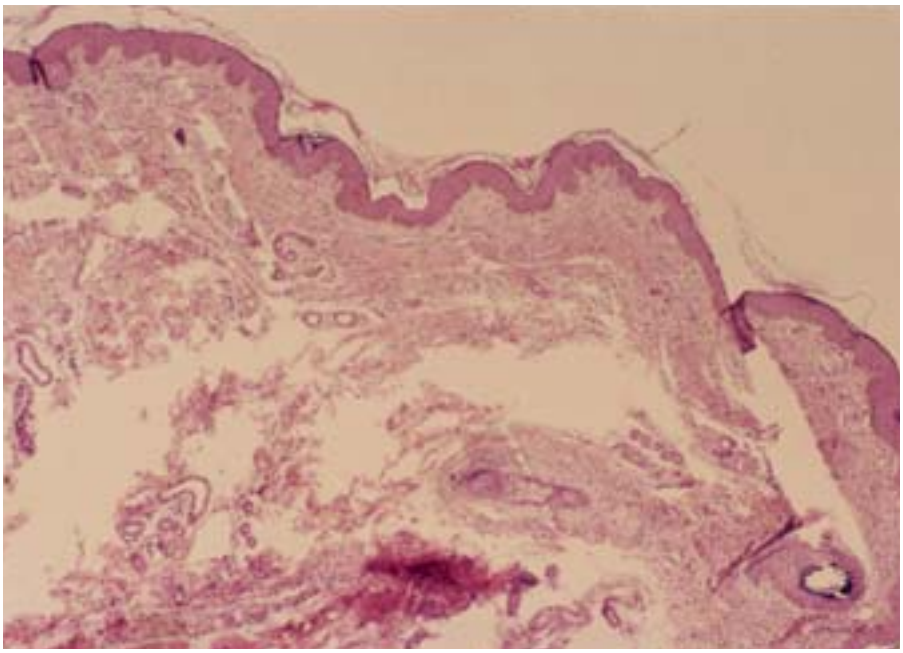

Figure 4. Upward displacement of appendage structures because of reduction in dermal collagen (H&E, original magnification ×40).

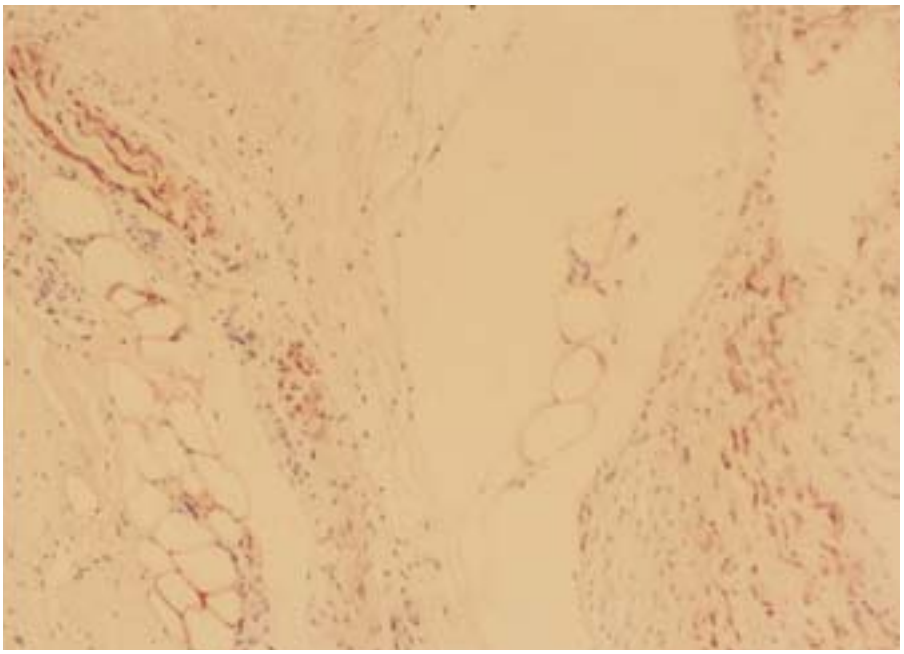

Figure 5. S-100 protein positivity of neuroid tissues in deep dermis (S-100 protein stain, original magnification ×100).

and adnexal tissues were normal. An increase in neuroid tissue was seen in the reticular dermis, especially in a perivascular arrangement (Figure 3). There was an increase in thick-walled blood vessels with notably widened lumina. Because of collagen reduction in the dermis, upward displacement of appendage structures was visible (Figure 4). The perivascular neuroid cuffs were composed of wavy nuclei intermingled with thin wavy collagen fibers. Results of an elastic fiber stain showed an absence of elastic fibers within the neuroid tissues. An immunohistochemical study showed positive S-100 protein in the neuroid tissues (Figure 5). Microscopic examination showed that the soft mass on the buttock had characteristics of a typical neurofibroma.

Comment

Most dermatologists accept the 8 NF types classified by Riccardi.[2] Our patient's diagnosis of NF1 was based on more than 20 café au lait macules,

5 cutaneous neurofibromas, bilateral axillary freckling, and bilateral Lisch nodules. In addition, the patient presented with intermittently pruritic reddish patches that were sharply demarcated; were more depressed than the surrounding normal skin; and showed neurofibroma features, vascular proliferation, and, on histopathologic examination, collagen decrease in the dermis.

"Pseudoatrophic" lesions were mentioned early in the German literature on NF, but their nature and incidence were not reported.[3] More recently, these atrophic lesions in NF have begun receiving more attention.[4-6] In 1982, Westerhof and Konrad[4] reported the case of a 19-year-old woman with 4 skin-colored pseudoatrophic macules in which dermal collagen had been replaced with neuroid tissue. The absence of collagen bundles, however, was not complete—in contrast with the neurofibroma that exhibit the buttonhole effect on palpation. Westerhof and Konrad[4] emphasized earlier reports of these pseudoatrophic lesions in NF, but references to this peculiar variant of neurofibroma are lacking in most recent textbooks of dermatology. In 1996, Pique et al[5] reported a case of a 19-year-old man with a 10×15-cm white-to-grayish pseudoatrophic macule showing neurofibromatous features on histopathologic examination.

Norris et al, [6] reporting on 3 cases of this type of neurofibroma, named the lesions *neurofibromatous dermal hypoplasia* (NDH). They noted that the areas of dermal hypoplasia showed neurofibromatous tissue on histopathologic and ultrastructural studies. These lesions failed to react to vasodilator stimuli and responded poorly to a vasoconstrictor stimulus. To explain these results, Norris et al[6] suggested that the poor vascular responses seen in NDH areas might be caused by perineural cells acting as a physical perivascular splint—creating a barrier to diffusion of pharmacologic agents into vascular receptor sites.

To our knowledge, several characteristics of our patient's case have not been described before or differ significantly from characteristics reported earlier: reddish color, well-demarcated atrophic margin surrounded by normal skin, follicular accentuations, larger size (20–30 cm), congenital presentation, and combination with portocavernous transformation and splenomegaly. Small- to medium-size blood vessels, which proliferate in the dermis, may give the hypoplastic skin a reddish or more deep-purple appearance where there is stasis of blood. The reddish color of our patient's skin may be due to such dilated thickened vessels, which were present in the reticular dermis. The decrease in dermal collagen may lead to the follicular accentuations and to the lesions becoming thinner or softer than the surrounding normal skin. Our patient's lesions were truly atrophic (not pseudoatrophic) and patches (not macules). As a result, we identify them as NDH, not as pseudoatrophic macules.

Westerhof and Konrad[4] suggested that 2 signs—presence of blue-red macules and presence of pseudoatrophic macules—can be used for early diagnosis of NF. We believe that NDH also may be helpful in early diagnosis of NF; that it may allow NF genetic counseling to be started at an early stage of family planning; that recognition of this variant of neurofibroma may be helpful in identifying the various NF types; and that NF1 can be diagnosed using NDH and the other NF1 criteria.

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