CASE REPORT

Becker nevus syndrome

Síndrome do nevo de Becker

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Abstract: Becker nevus syndrome is a phenotype characterized by the fundamental presence of Becker's nevus with ipsilateral hypoplasia of the breast or other skin, skeletal and/or muscular disorders. This syndrome generally originates at birth, intensifies significantly in adolescence and is one of the syndromes that constitute epidermal nevus syndrome. To the best of our knowledge, this is the first case published in the Brazilian literature of Becker nevus syndrome associated with Becker's nevus, ipsilateral breast hypoplasia and scoliosis in a 14-year-old girl.
Keywords: hamartoma; hypertrichosis; nevus; scoliosis.

Resumo: A síndrome do nevo de Becker é considerada um fenótipo caracterizado pela presença fundamental do nevo de Becker associado à hipoplasia mamária unilateral ou a outras alterações cutâneas, esqueléticas e/ou musculares. Geralmente, surge ao nascimento, aumenta significativamente na adolescência e é uma das síndromes que constituem a síndrome do nevo epidérmico. O artigo relata o primeiro caso da literatura brasileira da síndrome do nevo de Becker em uma paciente de 14 anos com associação de nevo de Becker, hipoplasia mamária unilateral e escoliose.
Palavras-chave: Escoliose; Hamartoma; Hipertricose; Nevo

INTRODUCTION

Becker's nevus (BN) is a cutaneous hamartoma characterized by circumscribed hyperpigmentation with hypertrichosis, which was described for the first time by Becker in 1949. [1,2]

In the past, many authors have observed the association between BN and other disorders such as breast hypoplasia or scoliosis. [1] However, it was only in 1995 that the term *hairy epidermal nevus syndrome* or Becker nevus syndrome was described for the first time by Happle as an association of BN with unilateral breast hypoplasia and muscle, skin and/or skeletal abnormalities. [1] This recently described entity forms part of the epidermal nevus syndrome.

CASE REPORT

A 14-year-old female patient from Realengo, Brazil reported a small, slightly brownish mark on her left breast that had been present since birth. She reported that in adolescence the lesion had spread onto her back and right leg with a concomitant increase in body hair in that region. She reported no hirsutism, irregular menstruation or any similar cases in the family. At dermatological examination, a hyperchromic macule with well-defined, irregular borders was found in the right scapular region, extending towards the shoulder and anterior chest region and a hyperchromic macule with hypertrichosis on her right ipsilateral leg (Figures 1 and 2A). Clinical examina-

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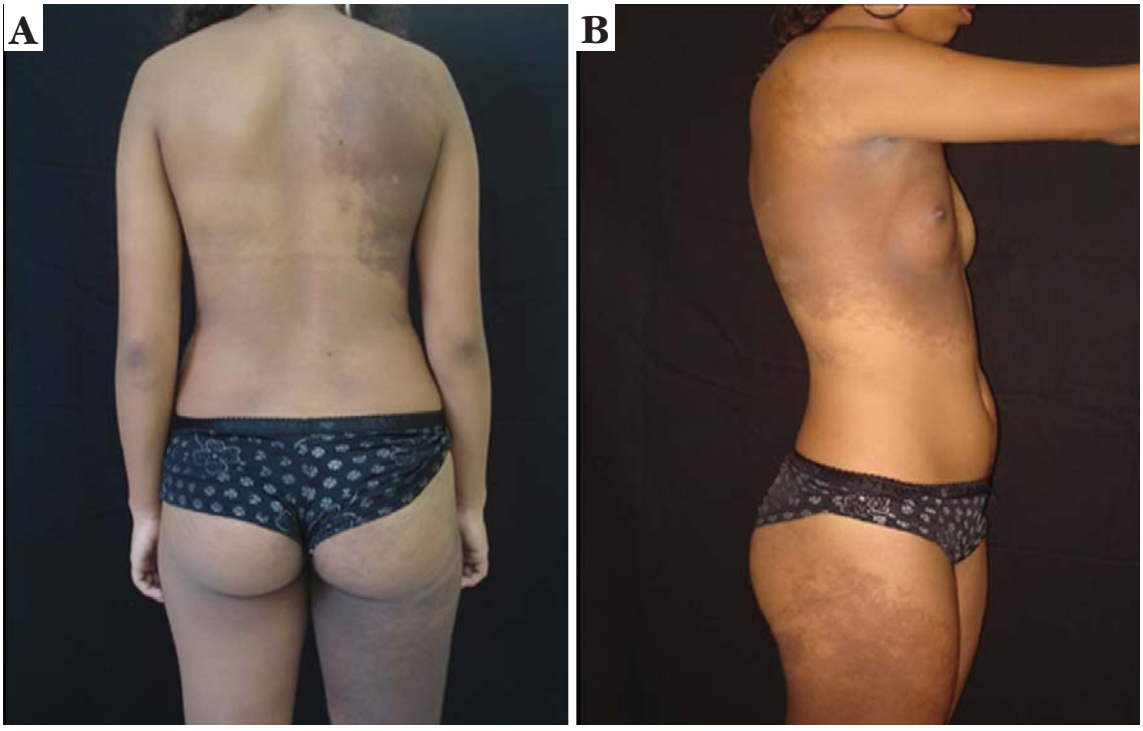

Figure 1: A and B. Hyperchromic macule with well-defined, irregular borders in the right scapular region extending to the shoulder and anterior region of the chest in Becker nevus syndrome

tion showed hypogenesis of the right breast and scoliosis (Figure 2B). Gynecological examination was normal. Histopathology of the macule showed moderate acanthosis, hyperpigmentation of the basal layer with coarse granules of melanin, presence of melanophages in the papillary dermis and hyperplasia of the arrector pili muscle, compatible with Becker's nevus (Figure 3). The following laboratory tests were performed: full blood count, liver function tests, kidney function tests, 17 OH progesterone, LH, FSH, prolactin, free T_4 and TSH, which were all normal. Imaging exams performed included radiography of the spinal column, which confirmed the presence of scoliosis, and breast ultrasonography, which revealed thickened fibroglandular tissue in the left breast and hypotrophy of the right breast.

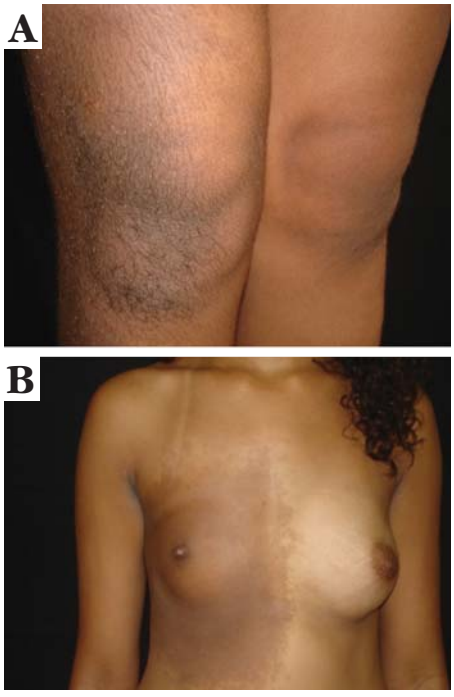

Figure 2: A and B. Hyperchromic macule with hypertrichosis and hypogenesis of the right breast

DISCUSSION

Becker's nevus is a hyperpigmented hamartoma with hypertrichosis and well-defined borders that may appear in any part of the body, but is more common on the trunk and upper limbs. [1-3] Spontaneous regression of the lesion may occur. In 1984, Person and Longcope detected an increase in androgen receptor levels in Becker's nevus. Later studies confirmed this increase, leading to the hypothesis of hormonal hyperresponsiveness in this cutaneous hamartoma. There have been reports in the literature of some patients with acneiform lesions of Becker's nevus and the hypothesis is that this lesion may be mediated by androgens. As an androgen-dependent disorder, it is much more common in males (5:1) and in adolescence. [1,4]

In the epidermis, histopathology shows acanthosis and hyperpigmentation of the basal layer and in the dermis there is hyperplasia of the arrector pili muscle with melanophages, as seen in this patient.[1,2,4]

Despite the hyperchromia, Becker's nevus does not belong to the group of melanocytic lesions. It is

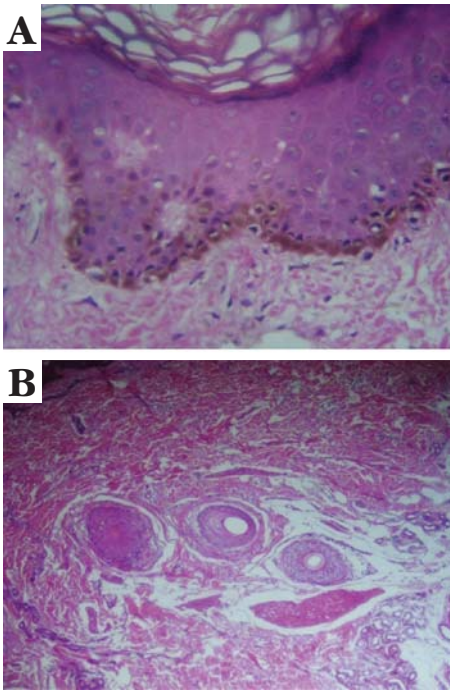

Figure 3: A. Hyperpigmentation of the basal layer with coarse granules of melanin; **B.** Hyperplasia of the arrector pili muscle

considered a particular form of epidermal nevi similar to verrucous epidermal nevus, sebaceous nevus of Jadassohn, nevus comedonicus, eccrine nevus, apocrine nevus and white sponge nevus, which are named in accordance with the preponderant structure (Table 1). [1,5]

Conceptually, epidermal nevi are considered to constitute a hamartomatous proliferation developed from the embryonic ectoderm and characterized by hyperplasia of the epidermal structures such as keratinocytes, apocrine and eccrine glands, hair follicles and sebaceous glands. [5]

In 1968, Solomon et al. described epidermal nevus syndrome, which consists of the association of epidermal nevi, which are generally more extensive, with various abnormalities of the skin, eyes, central nervous system and skeleton that originate in the ectoderm and that may, albeit rarely, be accompanied by abnormalities in the urogenital tract and cardiovascular system, which originate in the embryonic mesoderm. [5-7]

Table 1: Classification of epidermal nevi

Variants	Predominant Structure
Verrucous epidermal nevus	Epidermal surface
Sebaceous nevus of Jadassohn	Sebaceous gland
Nevus comedonicus	Hair follicle
Eccrine nevus	Eccrine sweat gland
Apocrine nevus	Apocrine sweat gland
Becker nevus	Epidermal surface, hair follicle, smooth muscle
White sponge nevus	Mucosa

The cutaneous appearance of epidermal nevi depends partly on the predominant type of cell involved, on the patient's age, the area of the body affected and the degree of cell differentiation. Epidermal nevi follow the lines of Blaschko. The association of epidermal nevi with abnormalities of the central nervous system was described for the first time by Schimmelpenning and later by Feuerstein and Mims. [3] The greater the number of extracutaneous lesions and the more disseminated the epidermal nevus, the greater the probability that the central nervous system will be involved and that there will be other systemic manifestations, which may be a reflex of the severity of the biological inheritance caused by mutation during development. [5,6,8] There is systemic involvement in around 8% of patients with epidermal nevi. In addition to the epidermal nevus, other skin abnormalities may occur in epidermal nevus syndrome such as café-au-lait spots, speckled lentiginous nevus, multiple melanocytic nevi and vascular malformations (phakomatosis pigmentovascularis) [5] The following entities described by Happle are part of an even larger concept of epidermal nevus syndrome: Proteus syndrome, sebaceous nevus syndrome, Becker nevus syndrome, phacomatosis pigmentokeratotica, CHILD syndrome and nevus comedonicus syndrome (Table 2). [5,6,8]

In 1995, Happle first described Becker nevus syndrome or hairy epidermal nevus syndrome. The presence of Becker's nevus is fundamental in characterizing the syndrome; however, its association with breast hypoplasia or other skin, muscle and/or skeletal disorders is also necessary (Table 3). [1,2] In general, these disorders involve the same side of the body; however, they may be bilateral. Breast hypogenesis, scoliosis or any other findings alone are insufficient to establish diagnosis of the syndrome. [1]

Becker nevus syndrome is also an androgen-dependent disorder as is Becker's nevus and is therefore more commonly found in adolescence due to the increased hyperpigmentation of the nevus and the hair. [1-5] The proportion of women sufferers is the same as that of men, although it is more easily diagnosed in women due to the more visible breast hypoplasia. [1,2]

Many of the findings associated with this syndrome are believed to be the result of the increase in the number of androgen receptors in certain areas. Androgen is one of the hormones responsible for hair growth, bone development and muscle mass. Person

Table 2: Classification of epidermal nevus syndrome

Proteus syndrome	Linear verrucous-keratotic epidermal nevus, partial gigantism of the hands and feet, cerebriform plantar hyperplasia, hemangiomas, lipomas, lipohypoplasia, focal dermal hypoplasia, macrocephalia, hyperostosis, muscle hypoplasia, long bone hypertrophy
Sebaceous nevus syndrome(Schimmelpenning)	Sebaceous nevus associated with cerebral abnormalities, coloboma and conjunctival lipodermoid
Nevus comedonicus syndrome	Associated with cataract, scoliosis and neurological abnormalities.
CHILD syndrome (congenital hemidysplasia with ichthyosiform erythroderma and limb defects)	Unilateral inflammatory epidermal nevi and hypoplasia or defects in the ipsilateral limbs. The musculoskeletal, cardiovascular and central nervous systems may be affected.
Phacomatosis pigmentokeratotica	Association of organoid or sebaceous nevus, speckled lentiginous nevus and hypophosphatemic rickets.
Becker nevus syndrome	Becker's nevus, ipsilateral breast hypoplasia and muscular, skeletal and/or skin defects.

Table 3: Clinical findings in Becker nevus syndrome

Becker's nevus
Adrenal hyperplasia
Ipsilateral hypoplasia of the shoulder, arm
Herniated disk, occult spina bifida
Hemivertebra, spinal fusion
Pectus carinatum, pectus excavatum
Scoliosis
Localized lipodystrophy
Bilateral tibial stress fracture, additional vertebra
Ipsilateral hypoplasia of the breast
Scapular asymmetry, supernumerary nipple
Facial asymmetry
Skin hypoplasia of the temporal region
Accessory scrotum
Umbilical hernia
Sparse hair on ipsilateral axilla
Contralateral hypoplasia of the labia minora.

and Nirde et al. measured androgen receptors in a lesion of Becker's nevus and in the normal skin of a patient with Becker's nevus and found an increase in these receptors in the lesion. They proposed that Becker's nevus could be considered a component of the androgen receptor hypersensitivity syndrome spectrum. [9] The pathogenesis of breast hypoplasia remains to be clarified; however, it is possible that it could be the same as that of Becker's nevus, although androgen receptor levels in the breast may counterbalance the effect of estrogen on the growth of the normal breast, resulting in hypoplasia. Spironolactone is an antiandrogen used to treat acne, hirsutism and androgenic alopecia. Its mechanism of action is still not fully understood; however, it is believed that it may result from negative feedback of androgen receptors and may therefore improve hypoplasia. In the present study, an increase in the breast with hypoplasia was found following use of spironolactone 50 mg/day. [9] This finding corroborates the hypothesis of an increase in androgen receptors in Becker's nevus and in the hypoplastic breast. Nevertheless, this could not be evaluated in the patient in the present study because she preferred to undergo breast implant surgery.

In the majority of cases, the syndrome occurs sporadically and a family association has rarely been found. Heterozygotic individuals would be phenotypically normal and the allele responsible would then be transmitted through several generations. Genetic studies suggest that the nevus and its associated disorders would only originate when a somatic recombination occurred in the early stage of embryogenesis, resulting in a population of homozygotic cells. [1,6] However, the genetic basis of this syndrome has yet to be fully clarified. Becker nevus syndrome involves extremely subtle clinical findings and many cases may have remained undetected. ❑

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