Multifocal Papillary Apocrine Adenoma Arising in a Systematized Linear Epidermal Nevus

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Previous reports indicate that a linear epidermal nevus (LEN) may serve as a source of development for additional skin tumors. We report an unusual case of multifocal papillary apocrine adenoma (PAA) arising in an LEN. This is the first case of its kind documented in the literature.

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Epidermal nevi are a proliferation of keratinocytes and skin appendages of unknown etiology. They arise from pluripotent cells in the germinal layer of the embryonic ectoderm. The most common form of epidermal nevi is a linear epidermal nevus (LEN). An LEN is mostly asymptomatic, and, when extensive, cosmetically disfiguring. Rarely, neoplasms such as basal cell carcinoma, squamous cell carcinoma, and keratoacanthoma can arise in an LEN.[1-13] We describe a case of multifocal papillary apocrine adenoma (PAA) arising in an LEN.

Case Report

A 31-year-old otherwise healthy woman was seen in our clinic for a brown-black, rough lesion on her left upper chest. This lesion had been present since birth and had slowly increased in size. It was mostly asymptomatic, with occasional episodes of bleeding after irritation from the patient's clothing. There was no family history of similar lesions. The physical examination revealed a linear configuration of brown-black, verrucous, cutaneous plaques and papular clusters on the left anterior chest wall (Figure 1). The plaque over the sternum measured 10.5×3.0×0.6 cm and extended from the second intercostal space to the xiphoid process. The portion over the left upper chest area measured 7.5×3.0×0.6 cm. Just lateral to these main plaques were a few verrucous clusters that extended up to the anterior axillary fold. Similar tan-yellow plaques on the patient's right hand (both palmar and dorsal aspects) and tan-brown, minimally keratotic plaques on the left medial forearm were noted. Clinically, the patient was diagnosed to have an LEN, systematized type.

The benign nature of the cutaneous processes was explained to the patient. The patient opted for removal of her chest lesions secondary to irritation and cosmetic reasons. The LEN was excised surgically in 2 stages, with a 6-month interval between excisions. The 4- to 6-week postsurgery follow-up examination revealed slightly hypertrophic scars. The patient subsequently failed to maintain her follow-up appointments.

The resected specimens from both surgeries were sent for histopathologic examination. The excised specimens measured 10.5×3.0×1.5 cm (midsternal nevus), 7.5×3.0×1.5 cm (left upper chest nevus), and 1.0×0.8×0.8 cm (papillary clusters). All 3 specimens showed a rough, black verrucous surface surrounded by a small rim of normal skin. The specimens were formalin fixed, and the sections were stained with hematoxylin-eosin.

Histologically, the sections showed features characteristic of an LEN, with hyperkeratosis, acanthosis, and papillomatosis. A focal band of lymphocytic inflammation in the papillary dermis accompanied the epidermal proliferation. The presence of well-formed sebaceous lobules, aborted or abnormal hair follicles, or both, and apocrine glands deep in the dermis (features characteristic of nevus sebaceus) were not observed in any of the

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The authors report no conflict of interest.

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Figure 1. Linear epidermal nevus with verrucous surface occupying the midsternal area and upper chest area. Note the hypertrophic scar from the first staged resection on the sternum.

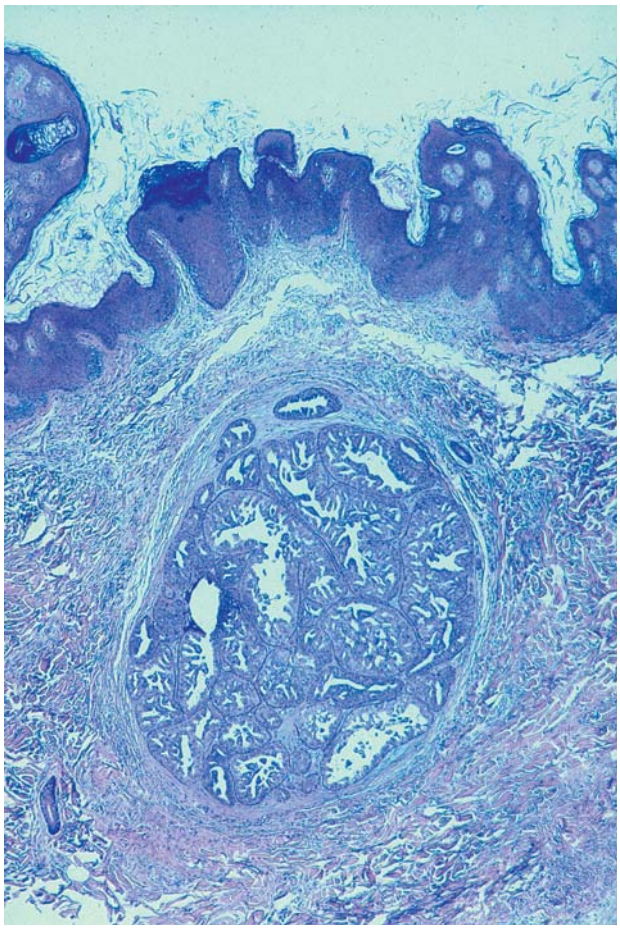

Figure 2. Hyperkeratosis, mild acanthosis, and papillomatosis with elongated rete ridges and a well-circumscribed nodule of papillary apocrine adenoma arising in the dermis (H&E, original magnification ×20).

sections. However, the unusual feature was the presence of multiple foci of well-circumscribed nodules of ductular proliferation in the dermis (Figure 2). Each nodule was composed of 4 to 12 dilated tortuous ducts with prominent intraluminal papillary units with occasional bridging (Figure 3). A few of the dilated ducts were filled entirely with multiple papillary units, giving a solid appearance to a few nests. An outer layer of flattened myoepithelial cells and an inner layer of tall columnar cells, showing some pseudostratification (Figure 4), lined the ducts. Features of apocrine differentiation, such as the presence of eosinophilic cytoplasm, decapitation secretions, and apical knobs, were evident in the neoplasm. The nodules did not exhibit any infiltrating growth pattern.

Comment

Epidermal nevi are developmental (hamartomatous) malformations of the skin, characterized by hyperplasia of epidermal structures. These nevi may be keratinocytic, follicular, sebaceous, eccrine, or apocrine in origin. The incidence ratio is 1:1000 live births. The most common type of epidermal nevi is keratinocytic nevi, also called *linear epidermal nevi*. They often appear at birth or infancy and slowly enlarge during childhood. They usually reach a stable size by adolescence. Most LEN occur sporadically, though rare familial occurrences have been described. There is no sex predilection.

Clinically, LEN are characterized by closely set, skin-colored or brown-black verrucous papules often coalescing into well-demarcated plaques. The linear arrangement typically follows the Blaschko lines. LEN may be localized or diffuse. LEN with diffuse or extensive distribution are called *systematized epidermal nevi*. When located on one half of the body, they are called *nevus unius lateris*. Ichthyosis hystrix is an epidermal nevus with extensive bilateral distribution and may be associated with developmental abnormalities in other systems (the epidermal nevus syndrome).[14] Inflammatory linear verrucous epidermal nevus is an inflammatory variant of the epidermal nevus, with a characteristic histologic pattern of alternating hyperkeratosis with hypergranulosis and parakeratosis with hypogranulosis.

Different histopathologic patterns of LEN have been described.[15] The most common pattern is a simple squamous papilloma, characterized by hyperkeratosis, acanthosis, and papillomatosis with elongated rete ridges. Occasionally, epidermolytic hyperkeratosis, Darier disease, seborrheic keratosis, verruca, porokeratosis, acanthosis nigricans, and

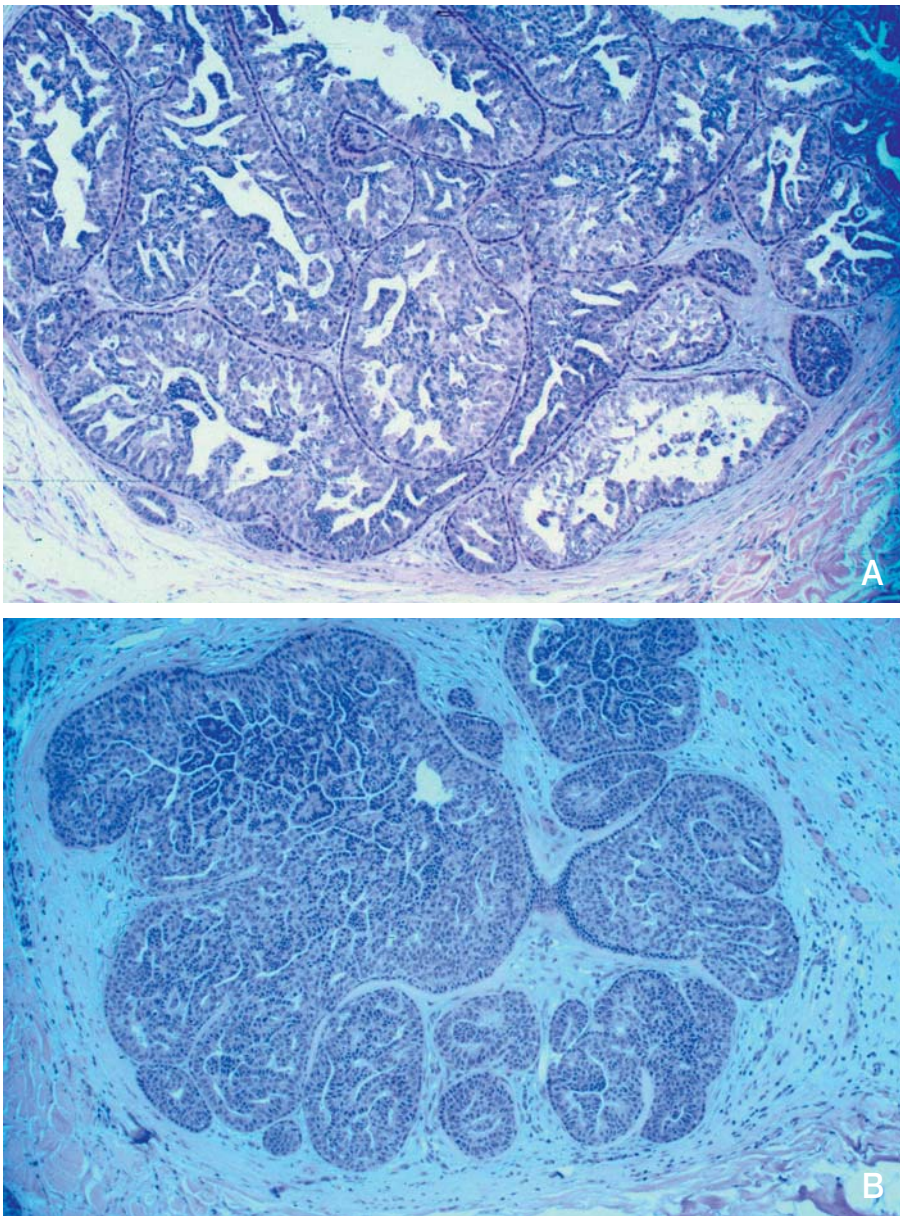

Figure 3. Ductular units containing multiple intraluminal papillary units with bridging (A). Another view shows nodule with ducts filled entirely with papillary units, imparting a solid appearance to the neoplasm (B) (H&E, original magnifications ×200).

acrokeratosis verruciformis-like patterns have been described in LEN.[15]

The development of neoplasms, benign or malignant, epidermal or adnexal, is well documented in nevus sebaceus of Jadassohn.[16,17] Their incidence ranges from 6.5% to 22% according to various reports. Rarely, however, neoplasms have been described arising in an LEN. A review of the literature revealed 13 such cases,[1-13] which are summarized in the Table. Except for one case[13] of adnexal origin, all other tumors were of epidermal origin.[1-12] Most neoplasms were diagnosed in early-to-mid-adult life, long after the initial appearance of the LEN.

The LEN we describe in this case report is very unusual. Although the nevus had microscopic features characteristic of an LEN, a unique and unusual finding was the presence of a multifocal PAA in the dermis. Despite the lesion being multifocal, we believe that the apocrine glandular proliferation present in the dermis represents a neoplastic process rather than a hamartoma. To our knowledge, the occurrence of multifocal PAA in an LEN has not been described previously in the literature.

Patients with LEN or their variants usually seek medical care either for relief of symptoms or for cosmetic concerns. Many reports in the literature

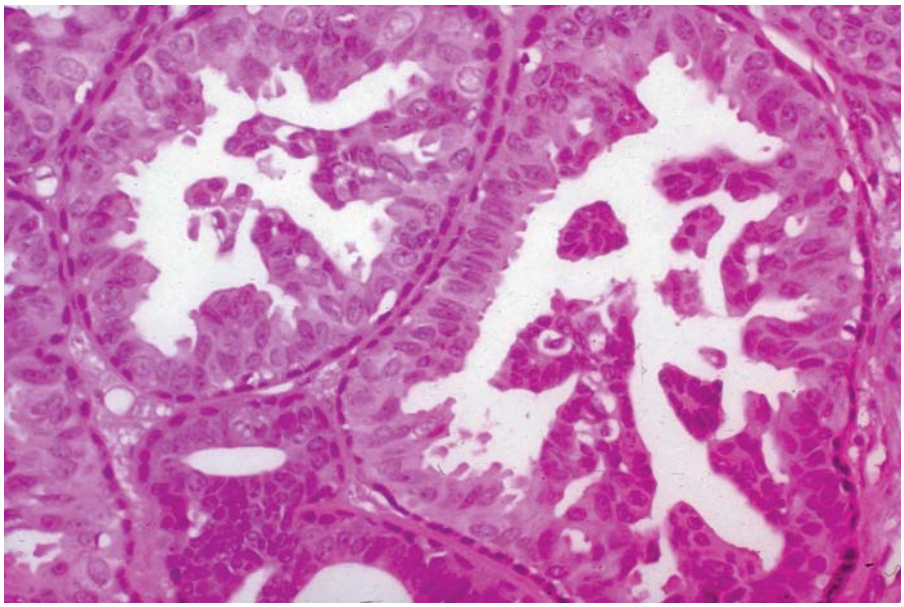

Figure 4. Tall columnar cells with eosinophilic cytoplasm with terminal knobs and decapitation secretions. Note the layer of myoepithelial cells at the periphery of each duct (H&E, original magnification ×400).

Review of Different Neoplasms Arising in a Linear Epidermal Nevus*

Reference	Age, y (sex)	Location	Diagnosis	Associated Neoplasm(s)
Toyama et al, 1936[1]	47 (F)	Generalized	Verrucous nevi	BCC, Bowen, SCC
Pack et al, 1941[2]	36 (M)	Right trunk/ upper limb	Nevus unius lateris	BCC
Carney, 1952[3]	Unknown	Unknown	Epidermal nevus	BCC
Litzow et al, 1961[4]	50 (F)	Right ear/neck	Linear nevus	BCC, multiple
Swint et al, 1970[5]	64 (M)	Left thigh	Linear nevus	Bowen, SCC
Dogliotti et al, 1978[6]	41 (M)	Left palm	Verrucous nevus	SCC
Goldberg, 1980[7]	57 (M)	Left preauricular	Unknown	BCC
Horn et al, 1981[8]	42 (M)	Abdomen	LEN	BCC
Cramer et al, 1982[9]	17 (F)	Right breast	LEN	SCC
Rosen, 1982[10]	32 (M)	Left axilla/arm	LEN	KA
Braunstein et al, 1982[11]	26 (F)	Right arm/shoulder	LEN	KA
Ichikawa et al, 1996[12]	74 (F)	Trunk	VEN	SCC
Hamanaka et al, 1996[13]	68 (F)	Right arm	LEN	Malignant eccrine poroma
Present case, 2004	31 (F)	Left chest	LEN, systematized	Papillary apocrine adenoma

*F indicates female; M, male; BCC, basal cell carcinoma; SCC, squamous cell carcinoma; LEN, linear epidermal nevus; KA, keratoacanthoma; and VEN, verrucous epidermal nevus.

suggest benefit from a variety of treatment modalities, ranging from topical therapy to surgical procedures.[18] However, a full-thickness surgical excision is considered by many to be a very effective form of treatment.[19]

Conclusion

In this article, we describe a case of a multifocal PAA arising in an LEN. To our knowledge, this is the first one to be reported in the literature. A full-thickness surgical excision with clear margins appears to be an effective treatment for these types of lesions.

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