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# Dermal melanocytoma-acanthoma in an adult mixed breed dog

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## Abstract

**A cutaneous melanocytoma-acanthoma was diagnosed in a 7-year-old intact female mixed breed dog. Grossly, this tumor was a solitary and darkly pigmented nodule located in the face. Histologically, the lesions consisted of melanocytic and epithelial tumor cells. The melanocytic component consisted predominantly of large round-to-polygonal and heavily pigmented melanocytic cells arranged in nests and clusters. These melanocytes were positive for S-100 and vimentin. The epithelial component was composed of multiple small horn cysts with concentric keratin within the cyst lumina and was positive for cytokeratin. Atypism was not observed in both components. Since this tumor has previously been reported in only two dogs, this report adds to the data that will help determining predilections of age, breed, sex and site.**

Key words: dog, melanocytoma-acanthoma, skin.

Melanocytoma-acanthoma is a benign mixed tumor of dogs that has features of both melanocytoma and epithelial neoplasia<sup>2-4</sup>. This tumor is an extremely rare skin neoplasm in dogs, described only twice in the veterinary literature<sup>2-4</sup>. Therefore, age, breed, sex, and site predilections remain unclear. This report describes the histological and immunohistochemical features of a melanocytoma-acanthoma in an adult mixed breed dog.

A 7-year-old intact female mixed breed dog was admitted to the local animal clinic in Busan, South Korea with a solitary and darkly pigmented nodule located in the skin 1.5 cm

from the right eye toward the nose. The duration of the nodule was unknown. The 0.8 cm-diameter mass was circumscribed, alopecic, fleshy, and dome-shaped. There were no other clinical signs or evidence of metastasis.

A biopsy specimen was fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin (H&E). The selected sections were bleached for melanins using a potassium permanganate-oxalic acid method (KMnO<sub>4</sub>/OA) and then were further subjected to H&E staining and immunohistochemical evaluation.

The immunohistochemical study was

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performed to evaluate the immunophenotype of this tumor. The primary antibodies used were cytokeratin, vimentin, and desmin mouse monoclonal antibodies, and S-100 rabbit polyclonal antibody (Dako North America, Carpinteria, CA, USA). All sections were stained by an established peroxidase-labeled streptavidin-biotin method using the Universal Dako LSAB kit (Dako North America). Antigen localization was visualized by incubation of the sections with 3,3'-diaminobenzidine-hydrogen peroxide solution. The sections were then weakly counterstained with hematoxylin. Negative controls included the substitution of the primary specific reagents for phosphate buffered saline.

Histologically, the lesions were composed of two characteristic features: compound melanocytoma and benign epithelial neoplasia (Fig. 1A). The compound melanocytoma lesions were mainly in the dermis and consisted predominantly of large round-to-polygonal heavily pigmented epithelioid cells with small polygonal and spindle cells (Fig. 1B). These tumor cells were arranged in nests and clusters. Some small nests were localized at the epidermal-dermal junction, and some of them extended into the epidermis and sweat glands. Small nests of the pigmented melanocytes were present in the epithelial layer of horn cysts (Fig. 1B). On sections treated with the bleaching method, mitotic figures and mitotic atypia were not observed in the melanocytoma lesions.

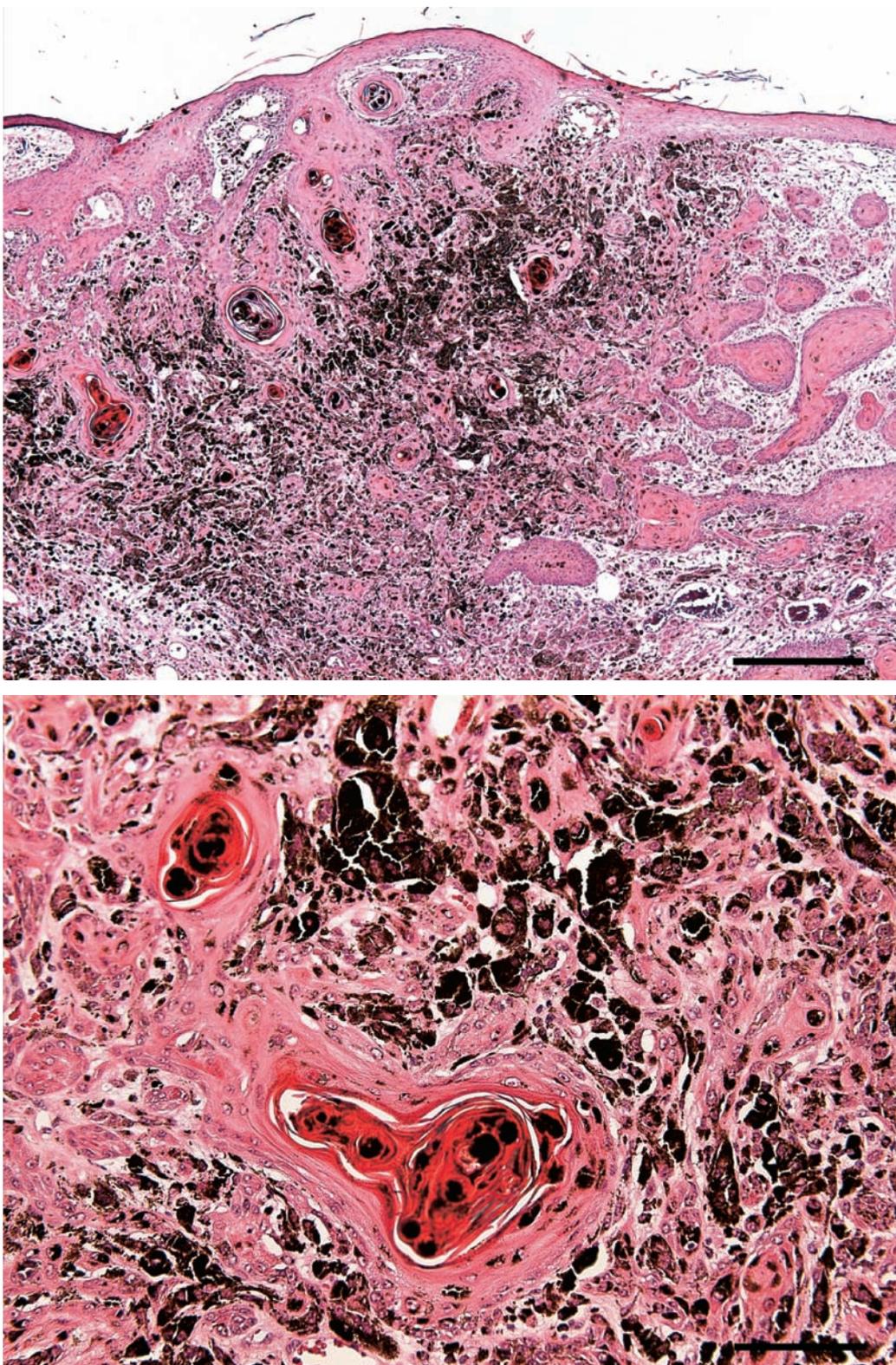
The benign epithelial neoplasia lesions, intermingled with or surrounded the melanocytoma, were composed of multiple small horn cysts with lamellar, flaky keratin of infundibular type within the cyst lumina, interconnected by delicate cords of epithelial cells (Fig. 1A). Some of the cysts were connected with the epidermis. The horn cysts consisted of peripheral stratum basale, stratum spinosum, and stratum granulosum, the latter contained keratohyaline granules in the cytoplasm. However, some of the cysts were lined by epithelium that had a sparse or absent granular cell layer. In some horn

cysts, melanin granules were present in the cytoplasm of some epithelium and keratin pearls. Surrounding regions showed purulent inflammation and bacteria colonies. Neither mitotic figures nor mitotic atypia were observed.

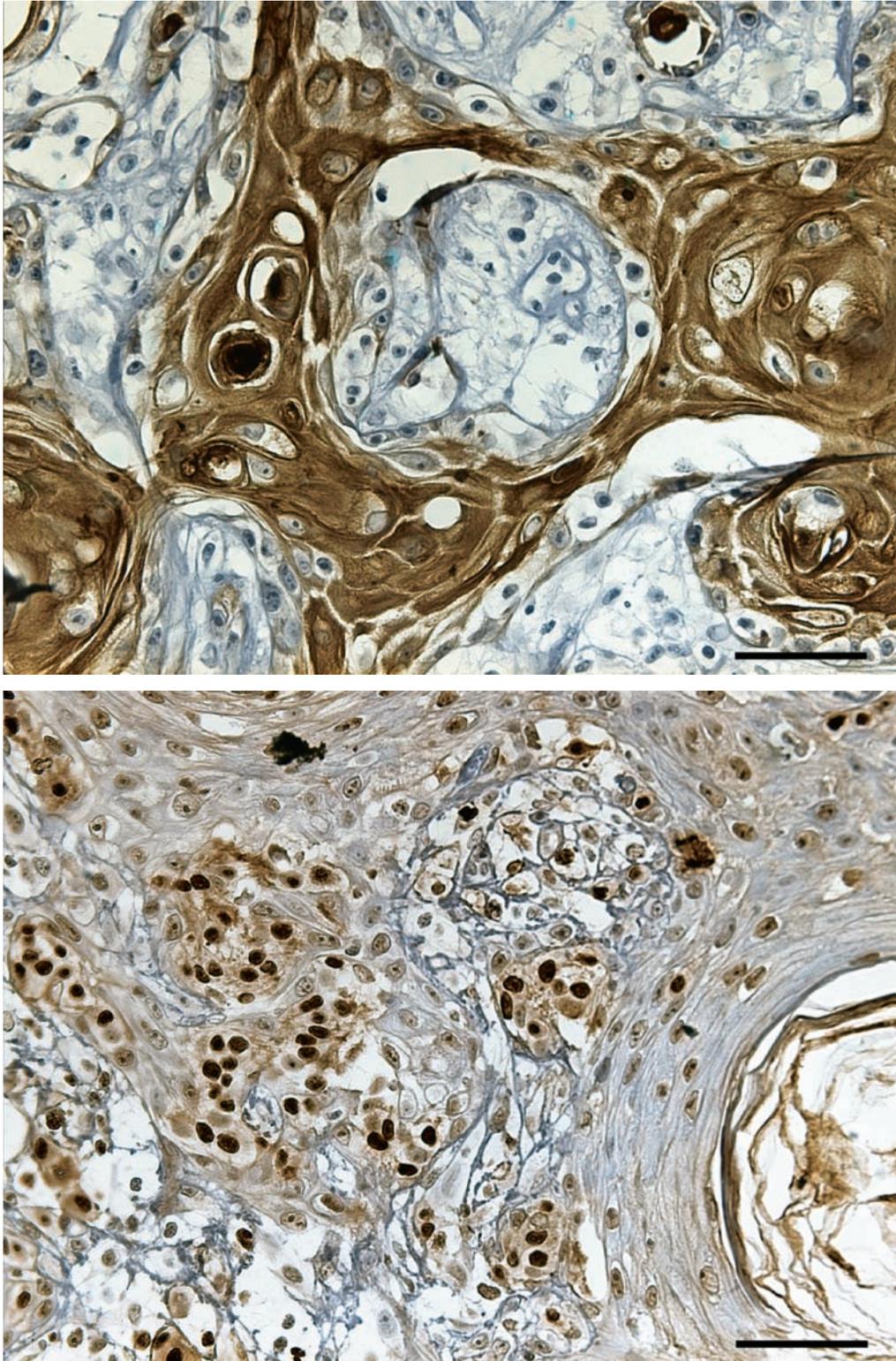
Immunohistochemically, the epithelial components of multiple small horn cysts as well as normal epithelial layers were positive for cytokeratin, but were negative for vimentin, desmin, and S-100 (Fig. 2A). In contrast, melanocytic cells were positive for S-100 and vimentin, but were negative for cytokeratin and desmin (Fig. 2B). In addition, melanin granules in some epithelial cells in horn cysts and in the keratin pearls showed positive reaction for S-100.

Based on the histologic and immunohistochemical features, this tumor was diagnosed as melanocytoma-acanthoma. Differential diagnoses for melanocytoma-acanthoma are very limited, since the melanocytoma and acanthoma components of this tumor are very unique. The cell component and morphology of this tumor was somewhat similar to melanocytic matricoma, pigmented pilomatricoma, trichoepithelioma, and tricholemmoma<sup>1,2,4,8</sup>). However, the pigmented nature observed in the previously described tumors is due to melanin granules in basaloid and shadow cells, or mononuclear and multinucleated cells, but is not in the melanocytic cells<sup>1,2,4,8</sup>). The previous and current melanocytoma-acanthomas are intradermal nodules<sup>2-4</sup>). In the veterinary field, the term melanoacanthoma is synonymously used with melanocytoma-acanthoma<sup>3</sup>). It should be noted that the term melanoacanthoma in dogs is different from cutaneous melanoacanthoma in humans. Cutaneous melanoacanthoma in humans is a benign tumor with a typical shape of an epidermal plaque, and consists mainly of epithelial cells with some infiltration of melanocytes<sup>6,10</sup>).

The benign epithelial cell tumor observed here was somewhat similar to the late stage of proliferating isthmus-catagen cyst or infundibular



**Fig. 1. Melanocytoma-acanthoma.** (A) Tumor lesion consists of nests of epithelioid pigmented cells and nests of well-differentiated squamous epithelium. H&E stain. Bar = 500  $\mu$ m. (B) Higher magnification of melanocytoma-acanthoma of Fig. 1A. Note intraepithelial nests of heavily pigmented melanocytes and squamous epithelium making horn cyst. H&E strain. Bar = 100  $\mu$ m.



**Fig. 2. Melanocytoma-acanthoma.** (A) Cytokeratin appears in epithelial cells of horn cysts, but not in melanocytic cells. Note intraepithelial nest of melanocytes surrounded by cytokeratin-positive epithelial cells. Bar = 50  $\mu$ m. (B) S-100 proteins are present in both nuclei and cytoplasm of the melanocytic cells. Note intraepithelial and extraepithelial S-100-positive melanocytes. Bar = 50  $\mu$ m. (Figs. A-B) SAB method after bleaching melanin granules, DAB chromogen, Mayor's hematoxylin counterstain.

keratinizing acanthoma<sup>1-4</sup>). The proliferating isthmus-catagen cyst, an uncommon variant of the isthmus-catagen cyst, has short trabecular projections into the surrounding dermis from the epithelium of the cyst wall<sup>3-5</sup>). When this tumor proliferates continuously and has increased cystic structures, this lesion resembles the early stage of infundibular keratinizing acanthoma<sup>3-5</sup>), which has broad trabecular projections of epithelium extending outward from the cyst wall that develops in the late stage to numerous small keratinous cysts within the trabeculae<sup>4,9</sup>). Finally, the mature lesion has a central cyst whose upper portion is usually open, forming a cup-shaped structure. Given these data, the present benign epithelial lesions may represent a late stage of infundibular keratinizing acanthoma because they consisted of multiple small keratinous cysts within the trabeculae<sup>1-5,9</sup>).

Many tumor cells in the melanocytoma component observed in this study had heavily pigmented melanin granules. These tumor cells were positive for S-100 and vimentin, but not for cytokeratin and desmin. On sections treated with the bleaching method, atypism was not observed. Therefore, the melanocytoma compartment of this tumor is compatible with compound melanocytoma. This type has tumor cells in the dermis, and dermal-epidermal or follicular components<sup>4,7</sup>). The present tumor was also present in the dermis and dermal-epidermal component.

In the present study, a unique benign mixed tumor in the skin of a dog was reported.

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