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Case Report

Mixed apocrine adenocarcinoma of the tail in a cow

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Abstract

This report describes an uncommon case of neoplasm in domesticated animals, mixed apocrine adenocarcinoma (MAA). A cutaneous mass from the tail and anal region of an adult cow was detected during the routine *antemortem* examination of cattle in a slaughterhouse. The mass was ulcerated, firm, measured 23 x 20 x 20 cm and weighed 10 Kg. There were extensive areas of hemorrhage and necrosis admixed with irregular islands of bone. Histopathological examination revealed multiple cysts with papillary projections into lumen. Periodic acid-Schiff (PAS) reaction revealed amorphous eosinophilic secretory material into luminal spaces and on the apical surface of neoplastic cells. Immunohistochemical investigation revealed strong cytoplasmic immunostaining of the epithelial neoplastic cells for cytokeratin 19 (CK19) and strong positive immunostaining of the myoepithelial cells for smooth muscle actin (αSMA) and S-100 protein. These gross and histopathological findings observed during this study led to a final diagnosis of MAA.

Key words: cattle, abattoir lesions, tumors, apocrine gland.

Introduction

Malignant neoplasms of the sweat gland tumors are, in general, infrequent (20). Apocrine adenocarcinoma is relatively common in dogs (4, 13) and less so in cats (13). Reports in other species are infrequent and include one case in the skin of a mouflon (16), a case in the prepuce of a horse (3) and a case in the subcutis of the caudal abdomen of a rabbit (15). Apocrine adenocarcinomas are rare in human beings (22). This neoplasm consist of a mixed variant characterized by either condroid or osseous metaplasia of myoepithelial cells (9). Mixed apocrine adenocarcinomas (MAA) was described before in the tail region of cattle (6, 10, 18).Although adult animals are more likely to develop MAA, it seems that there is no predilection for sex or breed (10).This study describes a case of MAA in the tail of an adult cow of slaughterhouse.

Case report

A cutaneous mass from the tail and anal region of an adult cow was submitted for gross and histological evaluation at the Laboratory of Veterinary Pathology (LVP), Universidade Federal de Santa Maria, Brazil. The mass was detected during the routine *antemortem* examination of cattle in a slaughterhouse. A physical examination performed by the official veterinarian at the slaughterhouse revealed that the cow was in poor body condition but otherwise normal. After slaughter the affected region was sectioned by the veterinarian and submitted to the LVP for examination. Grossly the mass was ulcerated, firm, measured 23 x 20 x 20 cm, and weighed 10 Kg. It was located subcutaneously at the insertion of the tail and extended caudoventrally, dislocating the anus (Fig. 1). At cut surface the mass consisted of multiple cystic lobules containing dark-red, gelatinous material. These lobules were further subdivided by thick white septa of connective tissue. Multifocally, there were extensive areas of hemorrhage and necrosis

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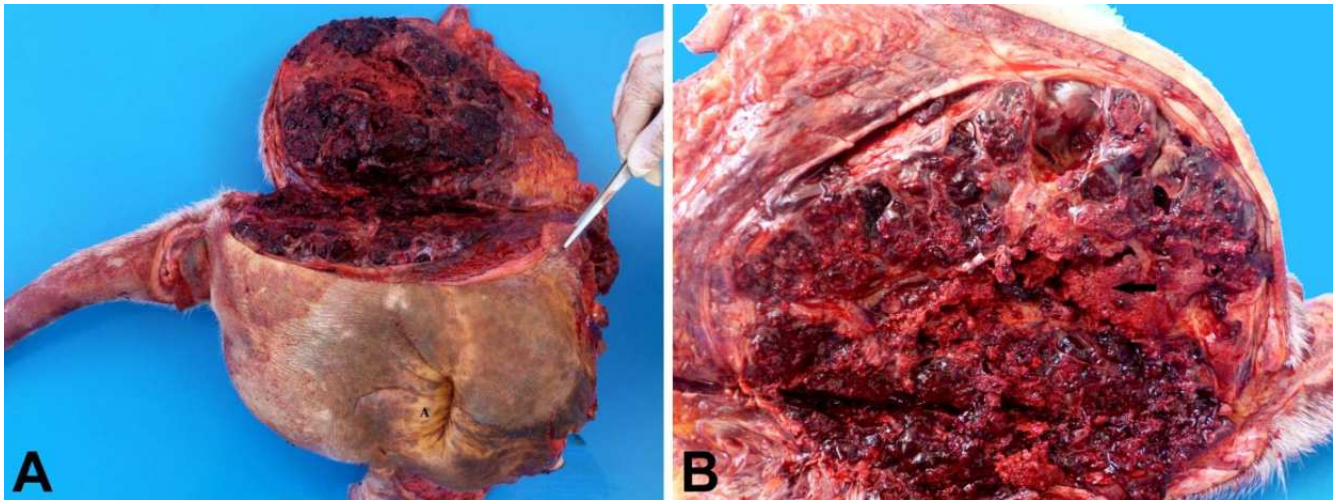


Figure 1. Cutaneous mass from the tail and anal region of an adult cow detected during routine *ante mortem* examination of cattle in a slaughterhouse. (A) the mass is located at the insertion of the tail and extends to the anus. (B) cut surface of the mass reveals multiple cystic areas supported by thick white septa and containing dark-red gelatinous material, necrotic debris, and areas of hemorrhage. Bone fragments (arrow) can also be seen. The mass was encapsulated by a thick band of white and firm tissue.

admixed with irregular islands of bone. The mass was encapsulated by a thick band of white and firm tissue. Multiple portions of the mass were fixed in 10% neutral buffered formalin, routinely processed for histology, and stained with hematoxylin and eosin. Histopathological examination revealed a malignant neoplasm consisting mainly of epithelial cells arranged in multiple acini and tubules that were occasionally cystic and had multiple papillary projections into an irregular lumen (Fig. 2). Multifocally, the luminal spaces were filled with a mixed population of inflammatory cells and extensive areas of hemorrhage admixed with amorphous eosinophilic secretory material that was positive using periodic acid-Schiff (PAS) reaction. Similar material was observed on the apical surface of neoplastic cells (apocrine decapitation). The acini and tubules were lined by a mono- or bilayer of cuboidal or columnar neoplastic cells with finely granular cytoplasm and indistinct cellular borders. The nuclei were round to oval with condensed chromatin and inconspicuous nucleoli. Mitotic activity was observed only occasionally. Surrounding the neoplastic epithelial component there was abundant fibrovascular stroma with small foci of irregular, partially mineralized osteoid matrix that were occasionally bordered by multinucleated giant cells resembling osteoclasts. In addition, scant clusters of stellate myoepithelial cells were present in the areas surrounding the osteoid matrix. Extensive areas of necrosis and hemorrhage associated with a mixed inflammatory infiltrate that included hemosiderin-laden macrophages were multifocally distributed throughout the neoplastic tissue. Immunohistochemical investigation carried out in sections of the neoplasm revealed strong cytoplasmic immunostaining of the epithelial neoplastic cells for cytokeratin 19 (CK19) and strong positive immunostaining of the myoepithelial cells for smooth muscle actin (αSMA) and S-100 protein (Fig. 2). Osteogenic cells and scattered fusiform cells observed within the neoplasm were positive for vimentin.

Discussion

Although there are few reports of MMA in cattle (6, 10, 18), as in the case reported here all of them were localized at the same anatomical site, that is, skin and subcutis of the base of the tail. This strongly suggests a predisposition for the development of MMA in cattle at this site. Due to the limited number of cases it is not possible to determine based on either age, sex, or breed a higher incidence for the tumor as was previously described (10). The growth rate of apocrine adenocarcinomas is variable, but their mixed variant tends to be slow growing and is usually less malignant, with metastasis occurring only occasionally to regional lymph nodes and less often other organs (9, 16). Information on the evolution of the tumor was unavailable from the cow of this report. In spite of the presence of ulceration and deviation of anatomical structures, such as the anus, the neoplasm in this case was well demarcated and encapsulated, with no metastases being reported during meat inspection at the abattoir. These findings are similar to those reported from previous cases of MAA in cattle (6, 10, 18).

Histologically, apocrine adenocarcinomas may be solid, tubular, or cystic (8). In the case of this report there was predominance of the tubular pattern over the cystic areas. There are controversies about the origin of cartilage and osteoid matrix in mixed tumors in general. Some authors suggest that these components are formed through metaplasia of epithelial cells or alternatively by metaplasia of the fibrous connective tissue stroma (2, 17). However, immunohistochemical investigation on mixed canine

mammary tumors have demonstrated that myoepithelial cells likely undergo transformation to cartilage and bone (7). It has been suggested that the ectopic cartilage formation in these tumors is influenced by the expression of bone morphogenetic protein-6 and its receptors on myoepithelial cells (1, 19). A similar pattern of myoepithelial transformation may occur in apocrine tumors (8). Although the theory that myoepithelial transformation into cartilage or bone is widely accepted, a study carried out in a MAA from the tail of an ox suggested that the osseous component might have developed from undifferentiated stem cells. In this study the myoepithelial cells were abundant and considered to be an important component and considered an important stromal component of the tumor (10). In our case, scant amounts of myoepithelial cells were observed in the proximities of the osteoid matrix which could be circumstantial evidence that most of these cells are no more represented because they underwent metaplasia to originate the osseous component of the neoplasm. The low number of myoepithelial cells found in some of these tumors reportedly results from the destruction caused by neoplastic cells. When the myoepitelial cells are observed, they are considered as a residual component of the tumor. Loss of myoepithelial cells could indicate a higher capacity for invasiveness and metastasis (21).

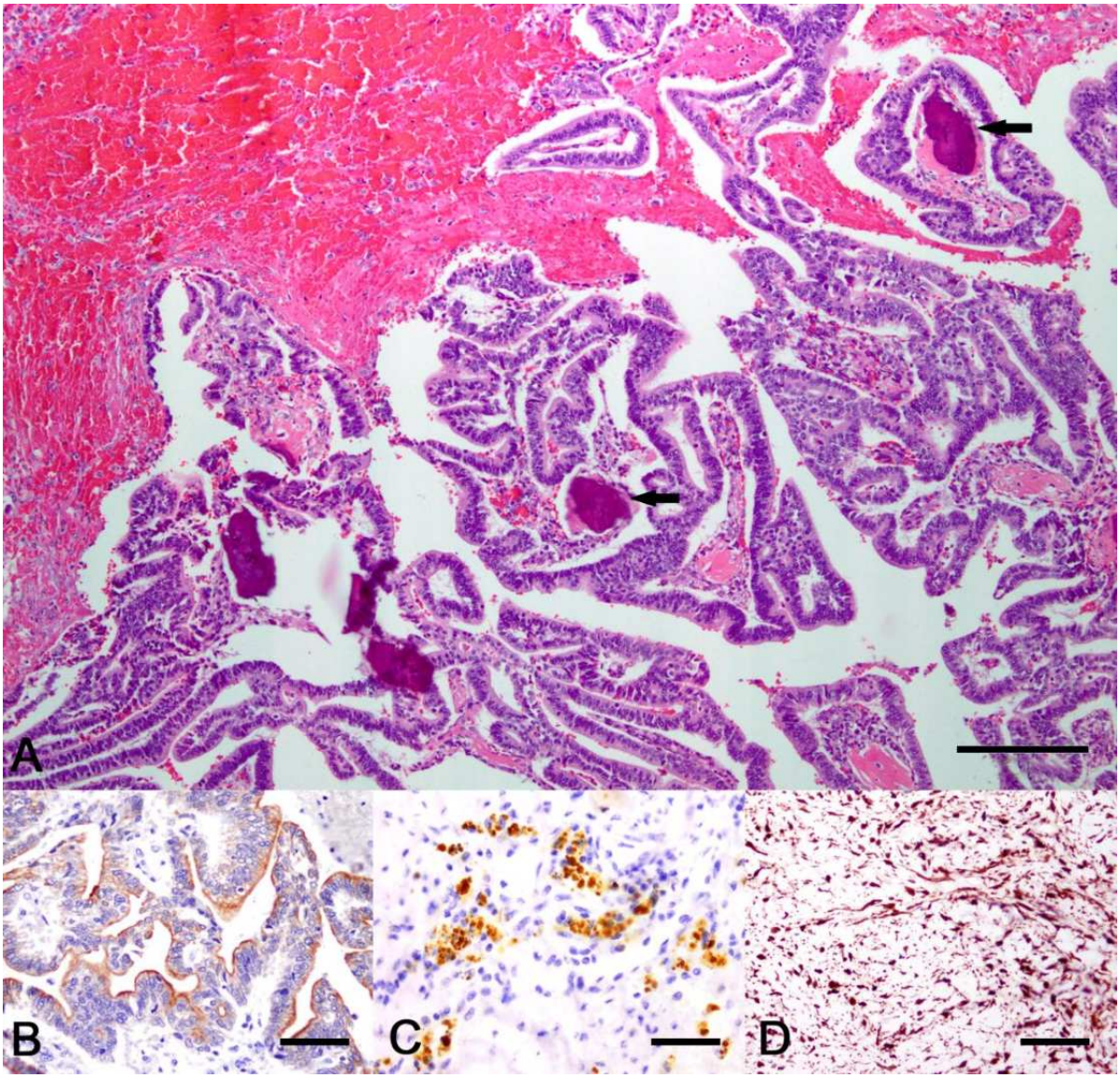


Figure 2. Mixed apocrine adenocarcinoma of the tail in a cow. (**A**) The neoplasm is composed of multiple acini and tubules with papillary projections supported by fibrovascular tissue containing partially mineralized osteoid matrix (arrows). Extensive areas of hemorrhage are also observed (upper left). H&E stain; bar = 100 µm. (**B**) Neoplastic epithelial cells have cytoplasmic immunostaining for cytokeratin 19. Anti-CK19 antibody staining; bar = 50 µm. (**C** and **D**) Neoplastic myoepithelial cells show positive cytoplasmic immunostaining for smooth muscle actin (**C**) and S-100 protein (**D**). Anti-SMA antibody staining and Anti-S-100 antibody staining; bar = 25 µm.

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The tumor reported here was considered of apocrine origin based on the histopathological, histochemical, and immunohistochemical features. Although CK19 have being used as well as a marker for keratinocytes in trichoblastomas and basal cells carcinomas (14) it is consider by several authors (10, 16) as a basic general marker for glandular differentiation in epithelial cutaneous tumors.

αSMA has been used to demonstrate evidence of myoepithelial differentiation in apocrine neoplasia in humans (21). In addition, bovine mammary myoepithelial cells are positive for αSMA (12) and canine mammary myoepithelial cells are positive for S-100 protein (5). In the case reported here, myoepithelial cells were positive for both αSMA and S-100 protein. Adding to these findings is the fact that the osteoid matrix had benign characteristics amidst the neoplastic parenchyma, which led to the final diagnosis of MAA.

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