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Apocrine sweat gland ductal carcinoma in a 5-year-old Arabian stallion

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Abstract Apocrine sweat gland carcinomas are very rare skin tumors in horses. A 5-year-old Arabian stallion was presented with a mass in the pastern region of the left forelimb. Grossly, a hairless and ulcerative mass measuring approximately 1 × 1 cm was noted. Complete surgical excision with wide, clean margins was selected as a method of treatment. Histopathological examination of the excised mass identified the apocrine sweat gland ductal carcinoma. There was no evidence of local tumor recurrence during the subsequent follow-up evaluations.

Keywords Apocrine ductal carcinoma · Sweat glands · Tumor · Horse

Introduction

The incidence of tumors in horses has been increasing in recent years due to longer life related to improvement of preventive and therapeutic veterinary practices and life quality (Meierhenry and Ferraro 2008). Skin and subcutaneous tissues are the most common sites for tumors in horses (Meierhenry and Ferraro 2008; Scott and Miller, 2011a).

Sarcoid, squamous cell carcinoma, papilloma, and melanoma are the most common cutaneous tumors in horses (Cihocki 2007; Meierhenry and Ferraro 2008; Scott and Miller, 2011b). Tumors arising from sweat glands are uncommon to rare in human and different animal species (Urayama et al. 2001; Chintamani et al. 2003; Cihocki et al. 2007; Scott and Miller, 2011a; Akhtardanesh et al. 2012). These tumors can develop in eccrine (atrichial), apocrine (epitrichial), or modified apocrine sweat glands (Sharif 2006). According to the World Health Organization (WHO) classification system, apocrine sweat gland tumors in domestic animals are categorized into apocrine adenoma, complex and mixed apocrine adenoma, apocrine ductal adenoma, apocrine carcinoma, complex and mixed apocrine carcinoma, and apocrine ductal carcinoma (Nibe et al. 2005; Matthias et al. 2012; Akhtardanesh et al. 2012). Apocrine sweat gland carcinomas are very rare skin tumors in equines with a few well-documented cases reported in the veterinary literatures based on some researchers' knowledge (Cotchin 1960; Anderson et al. 1990; Cihocki et al. 2007). The present report, describes the morphological and histopathological features of an apocrine sweat gland ductal carcinoma found in the pastern region of a young 5-year-old Arabian stallion treated by surgical excision.

Case presentation

A 5-year-old Arabian stallion was referred to the surgical section of the Veterinary Teaching Hospital, Ferdowsi University of Mashhad, with a 1-year history of a mass in the left forelimb. On physical examination, a firm raised mass about 1 × 1 cm was palpated at the lateral side of palmar aspect of the pastern region. The mass was hairless and ulcerative on the surface, well-circumscribed and adhered to the underlying structures (Fig. 1). General physical examination and

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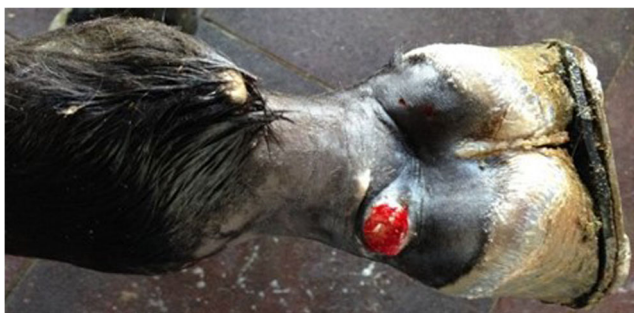


Fig. 1 Clinical photograph is showing the appearance of apocrine ductal carcinoma located on the pastern region of the left forelimb in a 5-year-old Arabian stallion

laboratory parameters were normal. The horse was free of lameness and pain when the mass was manipulated. The radiographs showed no abnormalities and no periosteal reactions in the underlying bone. Topical treatment by caustic and anti-inflammatory agents and mass removal had been performed before patient referral according to his owner, but no improvement had been observed and recurrence had been occurred. So the clinicians decided to remove it surgically.

The horse was restrained chemically with xylazine hydrochloride (0.5 mg/kg, IV, Alfazyme 2%). Abaxial sesamoid nerve block was performed using 2 ml of lidocaine hydrochloride (Vetecaine 2%) for local anesthesia. The pastern region was prepared for aseptic surgery. The mass was completely removed from underlying subcutaneous tissue through an elliptical incision made around it with wide surgical margin. The skin was closed with using a zero nylon suture in a vertical mattress pattern. For immobilization of the limb, a well-padded cast was applied. The tissue sample was preserved in 10% neutral buffered formalin for histopathological examination. Postsurgical medication including cefazolin sodium (15 mg/kg, IV, b.i.d., cefazolin) and flunixin meglumine (1.1 mg/kg, IV, s.i.d., Flunex 5%) were administered for 5 days. No significant complications related to incision site were observed 14 days later. Following mass resection, no evidence of recurrence or other complications have been observed during the subsequent 1, 3, and 6-month follow-up evaluations and ongoing follow-up examinations every 3–6 months.

For microscopic evaluation, after fixation, paraffin sections of 5- μ m thickness were stained by hematoxylin and eosin stain and were examined by a light microscope. Histopathologic examination revealed relatively well-circumscribed multiple lesions in the dermis containing solid aggregations composed of neoplastic cells (Fig. 2). There were sheets of neoplastic cells showing focal lumen formation, lined by a layer of epithelial cells with accumulation of eosinophilic secretion within the lumina of some tubules (Fig. 3). The neoplastic cells had a moderate amount of eosinophilic cytoplasm with a fairly distinct cellular border. Tumor cells showed nuclear and cellular pleomorphism, nuclear hyperchromasia, and mitotic activity. Anisokaryotic nuclei contained predominantly finely clumped chromatin and,

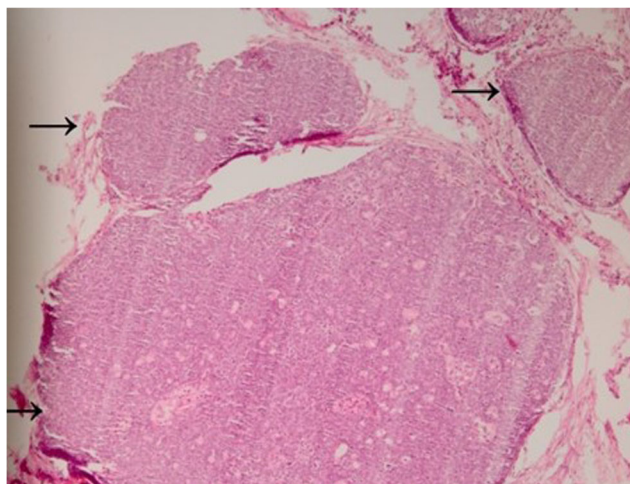


Fig. 2 Multiple lesions in the dermis composed of neoplastic cells (arrows) ($\times 40$, hematoxylin and eosin stain)

sometimes, a prominent, centrally located single nucleolus. Mitoses ranged from two to four per high-power field (Fig. 4). Based on the histopathological findings, the apocrine sweat gland ductal carcinoma was confirmed in this horse. To date, the horse is asymptomatic with no evidence of recurrence or residual tumor after 3 years of follow-up.

Discussion

Epidermal adnexal tumors comprise a diverse group of benign and malignant neoplasms which are classified based on their appendageal differentiation (Alsaad et al. 2007; London et al. 2012). In horses, sweat glands are important and contribute in thermoregulation. These glands in horses are tubular and classified as apocrine since their ducts open under skin surface into the hair follicles. They are most abundant near mucocutaneous

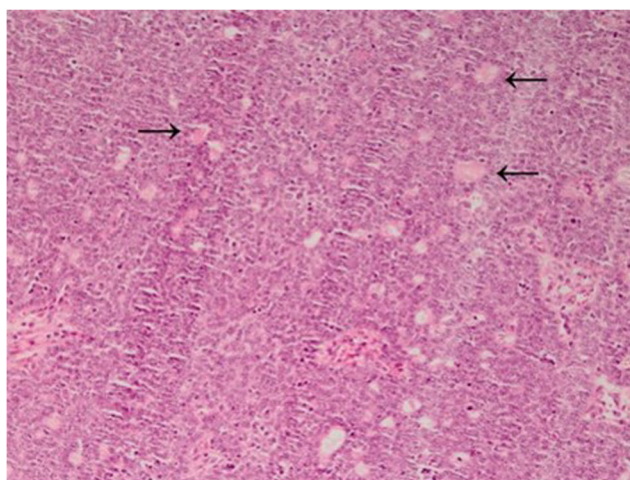


Fig. 3 Accumulation of eosinophilic secretion within the lumina of some tubules (arrows), ($\times 100$, hematoxylin and eosin stain)

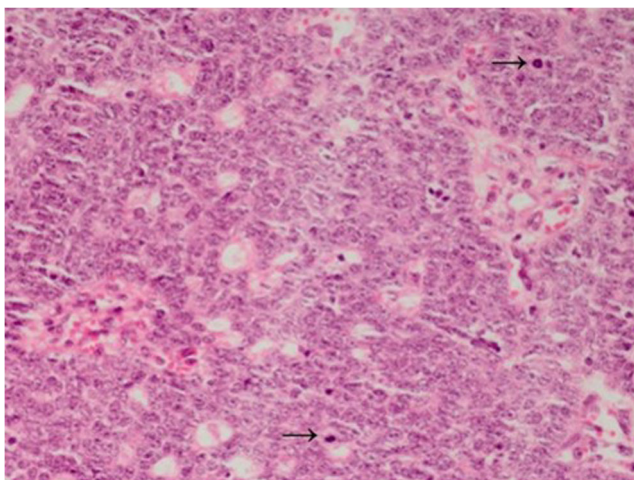


Fig. 4 Anisokaryotic nuclei contained predominantly finely clumped chromatin with mitotic figures (arrows), ($\times 400$, hematoxylin and eosin stain)

junctions, the submandibular region, mane, and near the coronet (Scott et al. 2001; Cihocki et al. 2007; Scott and Miller, 2011b). Apocrine tumors have been occasionally reported in dogs and cats and rarely in horses (Gulbahar et al. 2002; Scott and Miller, 2011a). The etiology of apocrine tumors is unknown (Bujas et al. 2007; Scott and Miller, 2011b). Age, breed, sex, and site predilections for apocrine tumors are difficult to identify because there are limited clinical reported cases (Hazirolu et al., 2014). Apocrine sweat gland carcinomas have been previously reported in only three equine species cases. In two reported cases, apocrine sweat gland tumors were located on the genital regions (Cotchin 1960; Anderson et al. 1990). In a 17-year-old pony, the apocrine adenocarcinoma was located on the prepuce and the other on the vulva in an older pony (Cotchin 1960; Anderson et al. 1990; Cihocki et al. 2007). Cihocki et al. (2007) reported the apocrine sweat gland ductal carcinomas on the pasterns of both hindlimbs in a 14-year-old male Danish warmblood horse. In our study, the apocrine sweat gland ductal carcinoma was located on the pastern of the left forelimb in a 5-year-old stallion. Although there is only a small number of clinical data for apocrine sweat gland carcinomas in horses, but the available reported cases suggest that the pastern region is susceptible to apocrine sweat gland carcinomas in addition to genital regions in horses. It seems that apocrine sweat gland tumors probably tend to appear as sweat gland ductal carcinomas in the pastern region of horses. In contrast to mentioned equine cases (Cotchin 1960; Anderson et al. 1990; Cihocki et al. 2007), in our report, apocrine sweat gland ductal carcinoma occurred in a young horse.

Apocrine sweat gland tumors may be benign and malignant but they have a potential for destructive local invasion, regional and distant metastasis via lymphatic and vascular routes

(Tlemceni et al. 2010; Hauck 2013). A wide local surgical excision with complete removal of tumor is a recommended treatment for different types of sweat gland tumors (Hauck 2013).

Behavioral features of apocrine sweat gland carcinomas in horses are not well recognized. In the horse described by Cihocki et al. (2007), surgical excision and local injection of cisplatin were used as treatment methods but local recurrence of apocrine sweat gland ductal carcinoma occurred at different sites over a period of 2 years. They observed no evidence of blood or lymphatic vessel invasion in the specimens sampled (Cihocki et al. 2007). The mass was completely excised surgically with surgical margins and separated from its underlying tissues. The postoperative period in our case was uneventful. No progress of the tumor such as local recurrence and distant metastasis occurred after a three-year follow-up.

The role of radiotherapy and chemotherapy or some specific drugs for treatment of sweat gland carcinomas is not clearly established but these methods have been infrequently employed in human and veterinary medicine (Chintamani et al. 2003; Tlemceni et al. 2010; Hauck 2013). Imiquimod, a drug with anti-tumor properties, was topically used by Cihocki et al. for treatment of apocrine sweat gland ductal carcinoma that remained after surgery in their reported horse and obtained good results (Cihocki et al. 2007).

Clinical diagnosis of sweat gland tumors is often difficult, and histopathology is an important diagnostic tool (Chintamani et al. 2003). Due to the rarity of sweat gland carcinomas and little behavioral information or standardized criteria for the diagnosis, the prognosis of apocrine sweat gland tumors remains challenging (Chintamani et al. 2003). Tumor size, histopathological type, lymph nodes involvement, and distant metastasis are the main prognostic factors that possibly affect survival rate and treatment response (Chintamani et al. 2003).

In conclusion, apocrine sweat gland ductal carcinoma as a rare subtype of apocrine sweat gland carcinomas in horses with slow growth is manageable by wide local surgical excision. It is suggested that the pastern region may be a likely site to develop the apocrine sweat gland ductal carcinoma in horses. More reports of apocrine sweat gland carcinomas and researches are needed to further elucidate the clinicopathological features, diagnosis, treatment, and prognosis of apocrine sweat gland carcinomas in horses.

Compliance with ethical standards

Ethical approval This is a case report, thus, without any experimental model or designs. Therefore, this article does not contain any studies with animals performed by any of the authors.

Conflict of interest The authors declare that they have no conflicts of interest.

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