Acta Veterinaria Brasilica

Journal homepage: https://periodicos.ufersa.edu.br/index.php/acta/index

Case Report

Squamous cell carcinoma in Mongolian gerbils (*Meriones unguiculatus*)

Carcinoma de células escamosas em gerbil (*Meriones unguiculatus*)

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A R T I C L E I N F O

Article history
Received 16 May 2019
Accepted 02 March 2020

Keywords:
Ventral gland
Neoplasm
Histopathological

A B S T R A C T

The Mongolian gerbil (*Meriones unguiculatus*), also known as Mongolian jird, is a rodent of the family Cricetidae. One of its most noticeable anatomical characteristics is the presence of ventral and dorsal scent glands, the former located in the abdominal region. The present study aimed at describing an incidence of squamous cell carcinoma (SCC) of the ventral scent gland in the species. A two-year-old animal characterized by an increased volume in the ventral abdominal region was treated at the Veterinary Hospital. After evaluating the macro- and microscopic characteristics of the mass tissue, a diagnosis of SCC could be confirmed. However, further studies on the physiology of neoplasms in Mongolian gerbils are needed in order to promote the well-being and longevity of individuals. Hormonal dysfunction of sexual origin is likely the most common factor associated with the occurrence of this type of neoplasm in the species.

Palavras-chave:
Glândula ventral
Neoplasia
Histopatológico

R E S U M O

O esquilo-da-mongólia (Meriones unguiculatus), conhecido também como gerbil, é um roedor da família Cricetidae. Uma das características anatômicas evidentes nesses animais é a presença de glândulas ventrais e dorsais. Este trabalho teve como objetivo relatar um carcinoma de células escamosas (CCE) na glândula ventral da região abdominal, em um esquilo-da-mongólia. O animal de 2 anos de idade foi atendido no hospital veterinário, apresentando um aumento de volume na região abdominal ventral. Após avaliar as características macro e microscópicas, foi confirmado o diagnóstico de CCE. Novos estudos são necessários na área para a compreensão de neoplasias em gerbis, para o melhor entendimento de sua fisiologia, o que garantirá o bem-estar e longevidade à esses animais. Nesta espécie, a disfunção hormonal de origem sexual é o que mais está associado à ocorrência desse tipo de neoplasia.

INTRODUCTION

The introduction of a non-native species into a geographical region may have various purposes from the production of meat or other derivatives (wild boar, ostrich) to providing biological models (hamsters, gerbils, primates) for scientific research, to promoting environmental education and preservation (zoos and similar environments) or providing pets to fairs or exhibitions (JENKINS, 1969).

Moreover, certain species have been adopted as domestic pets owing to their desirable behavior and variations of external body patterns or colors. This demand has resulted in a higher incidence of exotic animals in veterinary clinics providing specialized care (CUBAS et al., 2014).

Poor care resulting from a lack of appropriate knowledge and sanitary measures may result in viral, bacterial, or fungal infections, as well as neoplasms (CUBAS et al., 2014). Inbreeding is a further common

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http://dx.doi.org/10.21708/avb.2020.14.1.8488

issue in these animals with its associated pathological conditions.

Neoplasms have been increasingly reported in antemortem diagnoses because of the improvement of understanding and advances in exotic animal medicine. However, published studies on neoplasms of exotic animals are still scarce (REAVILL, 2004).

Squamous cell carcinoma (SCC) is characterized by a malignant neoformation of epidermal cells differentiating into keratinocytes (GOLDSCHMIDT; HENDRICK, 2002; SOUZA, 2005). This occurs more frequently in species with depigmented or glabrous skin, or in those vulnerable to sunlight. Moreover, it can be associated with individual and nutritional factors, traumatic injuries, and a lack of hygiene (XAVIER et al., 2005).

The condition is characteristically invasive, and metastases are rare; however, lungs, bones, lymph nodes in the associated region and other organs can also be affected (GOLDSCHMIDT; HENDRICK, 2002). The disease is still poorly described in less common groups of pets such as birds, reptiles, and small mammals. In general, a surgical procedure with a large safety margin is the most appropriate treatment (GOLDSCHMIDT; HENDRICK, 2002).

The Mongolian gerbil (*Meriones unguiculatus*), also known as Mongolian jird, is a rodent species of the family Cricetidae (previously attributed to Muridae, the largest family of Rodentia). The species is native to areas of desert climate in Northwest Mongolia and Northwest China. It is a fossorial animal with complex social behavior, and generally nocturnal habits. One of its most noticeable anatomical characteristics is the presence of dorsal and ventral sebaceous scent glands. The ventral gland is located in the umbilical region and secretes a yellow colored sebaceous liquid (GIRLING, 2003). It is more developed in males owing to androgen hormone dependence. In males, its secretion is used to delimit territories, and, in females, to mark offspring (QUINTON, 2005). The dorsal gland is located in the lateral region of the back (QUESENBERRY; CARPENTER, 2003).

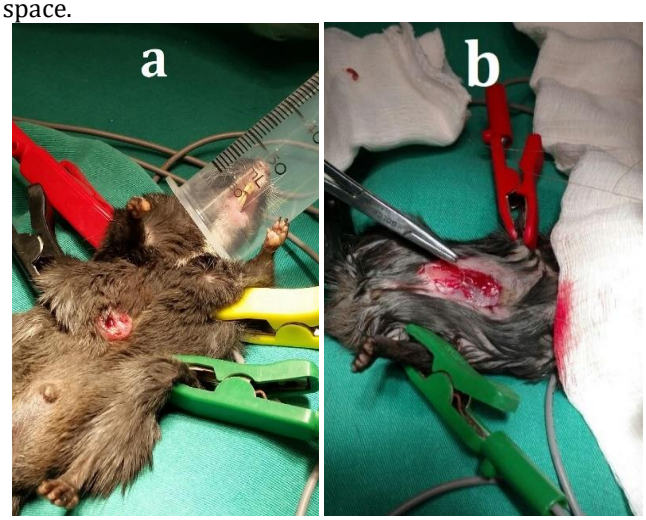
The present study aims to describe an incidence of SCC in Mongolian gerbils, more specifically, in a dark colored male specimen with the ventral gland affected.

MATERIALS AND METHODS

The two-year-old animal was admitted to a Veterinary Hospital, of the municipality of Marechal Deodoro, Brazil with a complaint of caregiver about a nodule in the abdominal region. A clinical examination concluded that the otherwise healthy and active male had a prominent, irregularly shaped, approximately 10-mm diameter ulcerated mass in the mentioned region. Owing to its infiltrated and ulcerated state, surgical excision with subsequent biopsy was indicated to complete the diagnosis.

The animal was alert and was fasted for two hours before admission to the surgical facility. Before the surgery, 2 mg/kg IM morphine was administered as a pre-anesthetic agent, and 20 mg/kg IM tiletamine + zolazepam for induction. After approximately 20 minutes, the animal was submitted to mask induction with isoflurane; vital signs were monitored with a multi-parameter monitor (Figure 1).

Figure 1. a. Mongolian gerbil (*Meriones unguiculatus*) submitted to mask induction with isoflurane and with vital signs monitored by a multi-parameter patient monitor; b. Procedure for neoplastic mass removal and application of a simple, isolated, standard suture for the synthesis of musculature, skin, and reduction of dead space.

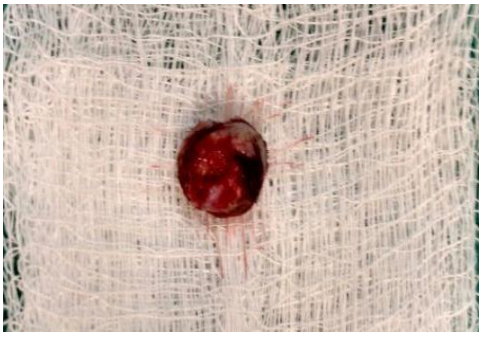


Source: Personal collection.

After performing the steps of trichotomy of the affected region and subsequent antisepsis, tumor removal was initiated. The excision consisted of an elliptical incision with a safety margin around the mass, skin folding, pinching, and removal. Since the affected mass was located in a superficial region, the suture was performed in a single plane using 3-0 Vicryl® in a simple isolated pattern (Figure 1).

The material removed during surgery (Figure 2) was fixed in 10% formaldehyde, sent to the Histopathology Laboratory of the veterinary hospital, cleaved and processed by routine histopathological techniques.

Figure 2. Characteristic tumor mass removed during the surgery.

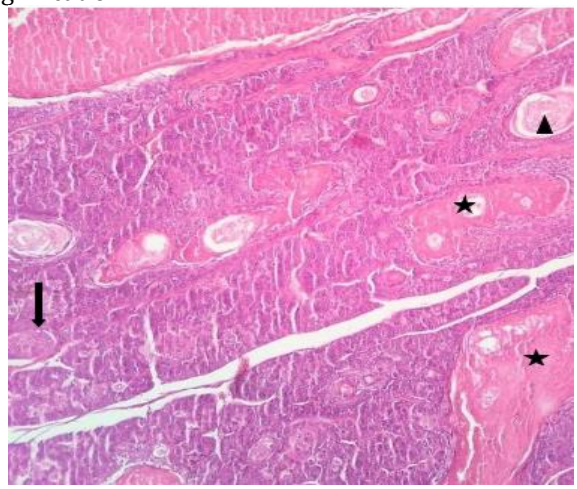


Source: Personal collection.

After inclusion, the material embedded in paraffin was frozen and cut in 5 µm thick sections using a microtome. Sections were stained with hematoxylin-eosin (HE) before mounting on slides for later histological analysis.

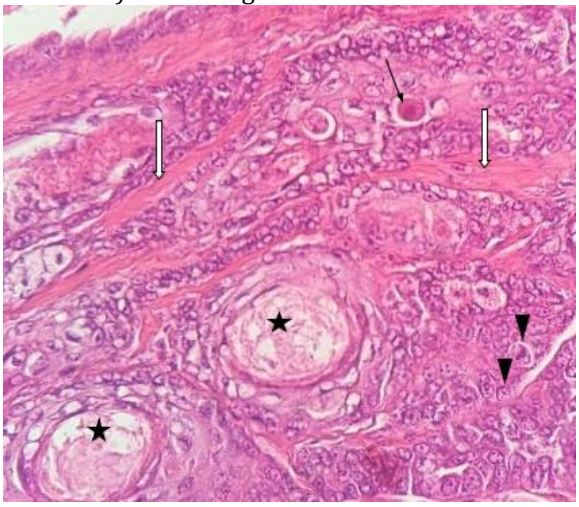
The tumor mass observed during the histopathological exam presented endophytic growth and little defined cell organization in the form of lobes surrounded by discrete connective tissue; some areas had concentric layers of keratin in the center, while others were necrotic (Figure 3). Tumor cells were characterized by sparse cytoplasm and rounded, vacuolated nucleus. Most nuclei presented an evident nucleolus with condensed chromatin in the periphery, rare mitotic figures, moderate pleomorphism, and individual keratinocyte necrosis (Figure 4), in addition to a discrete stroma and moderate lymphocytic inflammatory infiltrate.

Figure 3. Tissue pattern in the shape of islands (arrow), some showing concentric layers of keratin (arrowhead) and moderate areas of tumor necrosis (*)—10x magnification.



Source: Personal collection.

Figure 4. Keratinocyte necrosis (black arrow); moderate pleomorphism (arrowhead); cell nests containing concentric layers of keratin (*), and discrete stroma (white arrow)— 40x magnification.



Source: Personal collection.

RESULTS AND DISCUSSION

The diagnosis of SCC in the animal subject to the present study was confirmed by macro- and microscopic characteristics consistent with individual medical history, thus eliminating differential diagnosis for traumas, adenocarcinomas, and any other types of neoplasm. Stimuli triggering the development of SCC are well-known in most domestic animal species. One of the most influencing factors is continuous exposure of non-pigmented areas, more precisely of stratified squamous epithelium and certain body parts with mucous surfaces, to sunlight (KELLER, 2008).

The neoplasm we found occurred in the abdominal region in line with descriptions in literature (VICENT et al., 1975). Sebaceous glands associated with the area can exhibit several types of pathology in elderly individuals including neoplasms, which are more common in males (GLEN; GRAY, 1965).

Ventral gland neoplasms can be ulcerated or inflamed and have a predisposition to secondary bacterial infections (GREENACRE, 2004). According to Glen and Gray (1965, p. 1115), "Testosterone has an effect on the ventral abdominal sebaceous gland in *M. unguiculatus*, suggesting what may be a secondary sexual characteristic, which may explain the reasons why this gland shows neoplastic alterations" (ESSOA, 2010). The hypothesis that certain hormones contribute to the appearance of some types of tumor was first tested by Bittner et al. (1948). However, there are still adverse hypotheses about the appearance of hormone-dependent neoplasms. It is believed that, multiplication of tumor cells are due to hormonal imbalance at the beginning of the process of carcinoma formation as opposed to cases where the presence of etiological agents are required. Cell multiplication is therefore triggered by hormonal processes alone with subsequent genetic mutations causing neoplastic cell formation (MEUTEN, 2002).

CONCLUSIONS

In-depth studies on neoplasms in rodents are still scarce with existing information mainly published in Brazilian literature. Squamous cell carcinoma in the Mongolian gerbil seems to have a higher prevalence in approximately two-year-old or older males than in females. Mechanisms responsible for pathological processes leading to SCC in the ventral gland are still unknown, although some studies indicate a possible hormonal cause due to secondary sexual characteristics, as opposed to other domestic animals, that usually suffer from this type of neoplasia in areas more exposed to radiation, or in pre-existing lesions. Our histopathological examination was useful to diagnose relevant pathology and is extremely important in understanding new SCC cases in *M. unguiculatus*.

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