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Case Report

Ovarian papillary carcinoma in a Mongolian gerbil (*Meriones unguiculatus*)

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Abstract
Neoplasms are among the most impacting disease diagnoses in veterinary medicine and have become increasingly common due to the greater longevity of animals as living conditions improved. The Mongolian gerbil is a small rodent species that has become popular recently. In these animals, the occurrence of neoplastic processes is relatively common, mainly tumors of the ventral gland in males and ovarian tumors in females. This work aims to report an ovarian tumor in a Mongolian gerbil *Meriones unguiculatus* Milne-Edwards 1867 (Rodentia, Muridae). At the initial presentation, the animal had dyspnea, prostration, and increased abdominal volume in the topography of the right ovary of approximately 2 cm. The animal was submitted to exploratory laparotomy because of the emergency nature of the case and the owners' refusal of additional exams due to financial restrictions. Thus, an ovariohysterectomy was performed, followed by a histopathological examination. The histopathology revealed an ovarian papillary carcinoma affecting both ovaries and cystic endometrial hyperplasia. With surgical removal and drainage of the thoracic fluid, the animal showed good recovery, with general improvement and return to regular activity, with a life expectancy of two years. Currently, the demand for specialized veterinarians for unconventional pets is increasing. This condition allows owners to raise their animals more properly, favoring greater longevity. Knowledge about the prevalence and incidence of diseases in different species is of enormous relevance in establishing the appropriate therapy, improving life quality, and increasing life expectancy in animals' lives.

Keywords: rodent, tumor, female reproductive system.

Introduction

Mongolian squirrels (*Meriones unguiculatus* Milne-Edwards 1867), or gerbils, are rodents in the order Rodentia, family Muridae, and subfamily Gerbillinae. Native to the desert regions of Mongolia, they are small diurnal animals weighing an average of 46 to 131 grams (males) and 55 to 100 grams (females) and with a life expectancy of 2 to 5 years (10). In this species, the occurrence of tumors in females has been reported since 1965, when 25 spontaneous tumors were described by Benitz and Kramer (4).

Later, Meckley and Zwicker (13) observed ten spontaneous tumors in Mongolian gerbils, among which the occurrence of cutaneous papilloma in the region of the ventral abdominal sebaceous gland, and ovarian tumors such as granulosa cell tumor, carcinoma of the thecal cell, teratoma and leiomyoma were described. In the microscopic description of the cutaneous papilloma, the lesions consisted of multiple squamous epithelial projections, covered by keratin and with a scarcity of stroma, in addition to hyperchromatic epithelial cells with a single, wide and ovoid nucleus, absence of mitotic figures and squamous metaplasia with keratinization in the sebaceous glands.

Ovarian neoplasms in Mongolian gerbils include, in addition to those mentioned above, papillary cystadenoma (15) and ovarian interstitial cell tumor (11). However, many

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ovarian enlargements are related to cystic ovarian disease (14). In dogs, the incidence of ovarian tumors of epithelial origin varies from 1% to 6%, commonly diagnosed in older bitches, a condition unknown to Mongolian gerbils (17). In their study, Singh et al. (18) described canine ovarian papillary adenocarcinoma on the section as an irregular mass predominantly covered by irregularly sized cystic areas, in addition to the occurrence of concomitant endometrial hyperplasia.

The investigation of ovarian neoplasms in Mongolian gerbils and the lack of data on the species were compared with reports of ovarian papillary carcinoma in dogs but not in Mongolian gerbils. Therefore, to the authors' knowledge, this is the first case report of an ovarian tumor of papillary carcinoma type and cystic endometrial hyperplasia in a two-year-old female Mongolian gerbil.

Case Description

A two-year-old female Mongolian gerbil, weighing 92 grams, was taken to the Amazoo Pets Veterinary Clinic with complaints of dyspnea, apathy, prostration, and increased abdominal volume. The owners reported that the animal was eating, urinating, and defecating normally, and the diet was based on seeds, nuts, and pelleted rodent food. There was no history of previous diseases or treatments. Another female of the same species in the owners' house was healthy.

In the physical examination, a marked increase in abdominal volume was observed. It allowed the identification by abdominal palpation of an increase in volume in the topography of the right ovary of approximately 2 cm. In addition, the animal had dyspnea, evident prostration, a rectal temperature of 38.5°C, pinky ocular e oral mucosa, and muffled cardiorespiratory auscultation. The other physiological parameters were within normality.

Due to financial restrictions (refusal of the owner to carry out additional investigations) and the emergency nature, the decision was to perform respiratory stabilization followed by immediate exploratory laparotomy, which took place after the consultation. As a pre-anesthetic medication, butorphanol (Butorfin® 1 mg/kg IM), meloxicam (Maxican® 2 mg/kg IM), and dipyrone (Dornil® 50 mg/kg IM) were administered, followed by induction and maintenance with isoflurane (Isoforine® inhalation) via mask.

As the animal had dyspnea and respiratory effort, the performance of pleural puncture was initially necessary as pleural liquid accumulation was suspected, which resulted in 2 ml of effusion draining (Fig. 1). The drainage was performed with the animal in the left lateral recumbency, with the insertion of a 30mm x 07mm needle coupled to a 3ml syringe in the ventral region of the chest, between the fifth and sixth rib. After the maneuver, the animal showed an evident improvement in its respiratory condition, remaining stable throughout the anesthesia. The surgical procedure was performed according to the technique described by Fingland and Waldron (7), and in the immediate postoperative period, enrofloxacin (Kinetomax®, 10 mg/kg IM) in a single dose was administered.

The animal remained hospitalized for about 6 hours, during which the surgical wound was cleaned, and clinical monitoring was performed. After medical discharge, ibuprofen (Alivium®, 10 mg/kg PO) and dipyrone (Dipirona Biovet® 50 mg/kg PO) were prescribed every 12 hours for three days. In the follow-up visit, three days after the procedure, the owners reported a total improvement in the animal's condition, with no signs of pain. The animal was active and responsive, eating, urinating, and defecating normally.

In the macroscopic evaluation (Fig. 2), the right ovary measured 2.0 x 1.7 x 2.0 cm, presenting a multilobed mass of elastic consistency and whitish coloration with blackened points on the section. The left ovary measured 0.3 x 0.2 x 0.1 cm with a firm and elastic consistency and whitish color. The uterus measured 3.0 x 0.3 x 0.1 cm, presenting a firm and elastic consistency in all its extension and brownish color.

In the histopathological evaluation of the right ovary (Fig. 3), epithelial cells were observed in the architecture of cords and papillae, tending to solid. Cells round to

Figure 1. Appearance and volume of drained pleural fluid.

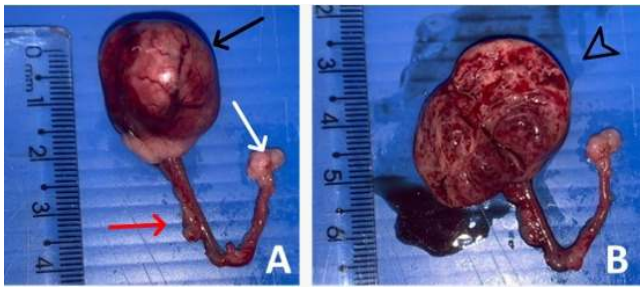

Figure 2. Macroscopic examination of uterus and ovaries (A) Right ovary (black arrow), left ovary (white arrow), and uterus (red arrow). (B) Inner face of the right ovary, highlighting the soft, non-invasive and non-characteristic consistency (arrow).

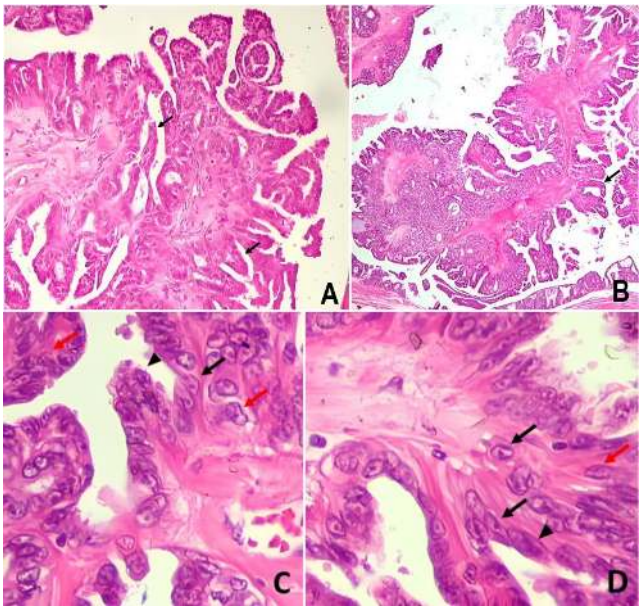

Figure 3. Histological examination of the right ovary. (A-B) Epithelial cells in cord architecture (black arrow) and absence of typical ovarian architecture, HE, 100x magnification. (C-D) Cell irregularity (red arrow), coarse chromatin (arrowhead), and evident nucleoli (black arrow), HE, 1000x magnification.

cubic, small, with round hyperchromatic nuclei, dense to coarse chromatin, prominent nucleolus, and scant cytoplasm. These cells formed a cystic pattern containing red blood cells and eosinophilic material in their lumen. The groups were divided by a thin collagenous septum. The presence of five typical mitotic figures in ten 40X fields (2.5mm2), discrete anisocytosis, and anisokaryosis pleomorphism was observed. No typical ovarian architecture or tissue was found.

The left ovary showed the same cell proliferation observed in the right ovary but still had preserved ovarian architecture. Mitosis figures were not visualized. In the tissue sections of the fallopian tubes, a discrete thickening of the endometrium and tubular dilated glands in the endometrium with amorphous eosinophilic content was observed. Other structures showed no alterations.

These histopathological findings suggested bilateral papillary ovarian carcinoma and grade I cystic endometrial hyperplasia.

Discussion

Although several types of ovarian neoplasms have been recognized and documented in Mongolian gerbils (8,9,11-13,15,19), the occurrence of papillary ovarian carcinoma exposed here differs from other reports described for the species, which highlights the importance of its explanation regarding the clinical presentation, therapeutic management, histopathological evaluation, prognosis, and prophylaxis.

Epithelial cells of ovarian neoplasms, whose ovarian papillary carcinoma belongs, generally do not produce hormones but may result in clinical signs associated with the mass in the abdominal cavity (16). These findings justify the clinical presentation seen in the present report since the existence of thoracic effusion and dyspnea probably occurred due to the pressure that the mass exerted on the structures, compressing the vessels and leading to fluid leakage, a clinical condition also observed in other types of ovarian tumors previously reported (6,11,17). Furthermore, after the surgical removal of the mass, the recurrence of the clinical condition was not observed, reinforcing the mechanical influence of the neoplasm in the initial clinical presentation.

Due to the impossibility of performing diagnostic tests in the present case, exploratory laparotomy and the consequent ovariohysterectomy represented both diagnostic and definitive treatment measures. Ovariectomy and ovariohysterectomy are described as curative measures in Mongolian gerbils and dogs with ovarian tumors (1,11), corroborating the outcome obtained in this case. However, considered a malignant neoplasm, papillary ovarian carcinoma, as well as other ovarian tumors, can present a considerable risk of cell implantation and dissemination at the time of surgical removal, which requires both additional care during the procedure and manipulation of the organ (16), and a post-surgical follow-up. In women, the removal of this type of tumor does not represent an isolated treatment measure, being required, in advanced or high-risk cases, chemotherapy associated with a therapeutic protocol (2,5).

Characteristics of ovarian epithelial cells proliferation, with consequent subversion of other cell types, reaching the stage of not being identified, were evidenced in the histopathological findings described here and are histopathological characteristics attributed to ovarian papillary carcinoma (16). The reported findings of pleomorphism, mitosis, anisokaryosis, and anisocytosis have also been described for ovarian epithelial neoplasia in dogs, assuming findings consistent with adenocarcinoma (3). Furthermore, corroborating the bilateral involvement presented here, this presentation is also frequently documented in dogs with this type of tumor (6).

It is noteworthy that cystic endometrial hyperplasia was also identified in the uterine histopathological evaluation of the animal focus of this report. Such finding may suggest the atypical existence of hormonal involvement as described in a rare report of canine ovarian papillary adenocarcinoma (18), or only a coincidence of findings since the concomitance and relationship between such findings are unlikely as it is a typically non-hormone-producing neoplasm (16), associated with the lack of other clinical findings of hormonal nature.

As exposed and reinforced by the outcome obtained in the present report, the possibility of a curative approach to ovarian tumors in Mongolian gerbils through surgical excision is favorable to the prognosis when such a procedure can be considered, and there are no additional compromises. However, with a limitation of reports regarding the neoplasm exposed here and considering its malignant characteristic, different outcomes may be observed depending, for example, on the existence of invasion and metastases at the time of diagnosis. In addition, as seen, the clinical manifestations mechanically attributed to the tumor can incite an emergency presentation with significant respiratory compromise. This effect makes the prognosis reserved and emphasizes the need for knowledge about the diagnostic possibilities and appropriate and efficient conduction in the presence of this type of clinical presentation.

Considering the high incidence of ovarian tumors in Mongolian gerbils, mainly described in animals over 24 months of age (4,13), together with the possibility of an emergency presentation, as seen in this report, the performance of elective castration of females during puberty or up to two years of age can be seen as an important prophylaxis measure avoiding the development of a tumor and consequently, the clinical scenario presented here.

In conclusion, the occurrence of ovarian papillary carcinoma is an uncommon possibility of neoplastic involvement in Mongolian gerbils, which should be included in the differential diagnoses involving the existence of an abdominal mass and possible emergency presentation of respiratory nature. Information about prognosis still requires new reports of the exact nature in the species. However, in this scenario, preventive castration of females under two years of age may represent an important prophylaxis measure.

Conflict of Interest

The authors declare no competing interests.

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