



NEOPLASTIC DISEASE

Spontaneously Arising Tumours and Tumour-like Lesions of the Cervix and Uterus in 83 Pet Guinea Pigs (*Cavia porcellus*)

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Summary

Tumours and tumour-like lesions are rare findings in the genital system of guinea pigs. The aim of the present study was to characterize nodular lesions in the cervix and uterus of guinea pigs submitted for histopathological diagnosis. Samples from 83 pet animals were investigated. Cases included 64 surgically excised masses including complete uteri ($n = 37$), parts from uteri containing masses ($n = 8$), complete masses ($n = 12$) or samples from masses ($n = 7$) and 19 complete necropsy examinations. In 55 of the cases, only solitary changes were observed; in 28 cases two or more lesions were diagnosed. Histopathological diagnoses included polyps in the vagina, cervix or uterus ($n = 8$), hyperplastic lesions of the endocervix ($n = 10$) and seven adenomas and two adenocarcinomas of the endocervix. Endometrial alterations included single small glandular cysts ($n = 3$), nodular glandular–cystic hyperplasia ($n = 8$), adenoma ($n = 20$) and adenocarcinoma ($n = 3$). Four placentas, 10 focal decidualizations and six deciduomas were found. Furthermore, 18 leiomyomas and nine leiomyosarcomas were diagnosed. Uterine malignant mixed Müllerian tumours were observed in seven cases. Overall, benign lesions outnumbered malignant tumours in the female genital tract of pet guinea pigs. Therefore, surgical excision or ovariohysterectomy should be recommended as therapy.

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Introduction

In recent years, guinea pigs (*Cavia porcellus*) have become increasingly common pet animals that are often seen in veterinary practice. Female guinea pigs achieve sexual maturity at 2 months of age. They are non-seasonally polyoestrous with an oestrus cycle of 15–17 days and spontaneous ovulation. They have a discoidal, haemomonochorial placenta, with a gestation period of 63–72 days (Quesenberry

et al., 2012). The ovaries measure 3–6 mm in length and 2–3 mm in diameter, with oviducts 50–60 mm in length and 1 mm in diameter. The uterus of guinea pigs is bicornuate with paired uterine horns each 30–50 mm in length and 3 mm in diameter. They open into a short uterine body, 12–20 mm in length and 6 mm in diameter, followed by a 25 mm long cervix, with a single os cervix. The vagina has a length of approximately 30–40 mm. Prominent longitudinal ridges can be seen in the cervical and vaginal canal. The vaginal orifice is U shaped and closed by a vaginal closure membrane. This membrane only opens at oestrus, parturition and between the 20th

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and 35th day of gestation (Hargaden and Singer, 2012; Quesenberry *et al.*, 2012).

In general, tumours of the female genital tract are uncommon in most species of rodents and small mammals except in rabbits, where uterine adenocarcinomas are frequently reported (Weisbroth *et al.*, 1974). Little is known about spontaneously arising hyperplastic and neoplastic lesions of the cervix and uterus of guinea pigs. The aim of this retrospective study was to characterize the occurrence and morphology of spontaneously arising cervical and uterine neoplasms and hyperplastic lesions in pet guinea pigs, which were submitted for routine histopathological examination.

Materials and Methods

Samples from 83 guinea pigs were examined. The age of the animals ranged from 1 to 8 years (median 4 years) and age was unknown in 18 cases. Breeds in the present study included silky ($n = 11$), Abyssinian ($n = 11$), Peruvian ($n = 2$), American ($n = 1$) and Teddy ($n = 1$). No breed was reported in 57 cases.

Six cases were submitted to the Institute of Veterinary Pathology, University of Leipzig (2002–2011), samples from 18 animals were submitted to the University of Berlin (1990–2012) and 59 cases were submitted to Laboklin (2006–2016). The specimens included parts of the female genital tract obtained from 19 animals subjected to necropsy examination, as well as the following surgical specimens: 37 complete uteri, eight tissue parts from uteri with masses, 12 complete nodular masses and seven tissue samples collected from masses. Ovaries were submitted in 44 cases. In eight cases, cystic ovaries were mentioned in the clinical history report, but were not submitted for investigation.

The uteri and ovaries were measured and inspected grossly in detail with a focus on size, cut surface and colour. Representative samples were prepared for histopathological examination and embedded in paraffin wax according to standard procedures. Sections were stained with haematoxylin and eosin (HE). Histological criteria were evaluated according to the international classification of rodent tumours (Mohr, 1997) and the histological classification of the tumours of the genital system of domestic animals (Kennedy *et al.*, 1998), with special attention to cellular and nuclear morphology, growth pattern, invasive growth, haemorrhage and necrosis. Mitotic figures were counted within 10 high-power fields (HPFs; $\times 400$; Nikon Eclipse Ci microscope; Nikon, Tokyo, Japan) in areas with the highest mitotic activity.

Results

Clinical Data

In 13 cases, masses were found during routine ovariohysterectomy or during clinical investigation. Serosanguineous vaginal discharge was observed in seven cases. In three animals, masses were prolapsed into the vagina. Discharge from a mass was reported twice. Recurrent ovarian cysts were described in one case. Flank alopecia was observed in one animal. Poor general condition was reported in five cases.

Three of the uterine specimens were sent together with additional tissue samples (one skin papilloma, one sarcoma of the skin and one splenic sarcoma). In addition to the uterine/cervical masses, animals subjected to necropsy examination had one or several additional diseases. These included: inflammatory/infectious diseases in 11 animals (pneumonia, enteritis, cystitis, pyometron, pancreatitis, hepatitis, sepsis, glomerulonephritis and gonarthrititis); non-infectious diseases (cardiac congestion [$n = 1$] and cardiomyopathy [$n = 3$]); and neoplastic lesions detected outside the genital tract (bronchial adenoma [$n = 5$], haemangiosarcoma of the spleen [$n = 1$], sarcoma of the skin [$n = 1$] and thyroid adenoma [$n = 1$]).

In one of the 19 guinea pigs subjected to necropsy examination, a malignant uterine tumour (malignant mixed Müllerian tumour; MMMT) was diagnosed, but metastases were not found. In this animal, a sarcoma of the skin, a bronchial adenoma and a thyroid adenoma were diagnosed concurrently with the malignant uterine tumour.

Pathological Findings

The ovaries were available for microscopical examination in 44 of the 83 cases. Cystic ovaries were observed in 42 cases (rete ovarii cysts [$n = 23$], rete ovarii cysts and simple cysts [$n = 12$], rete ovarii cysts and follicular cysts [$n = 4$]). One cystadenocarcinoma, one leiomyoma and one leiomyosarcoma were diagnosed in addition to the rete ovarii cysts in the ovaries of three animals.

Macroscopically, masses of various sizes were seen in the cervix and uterus. The gross appearance was variable, ranging from single solid, smooth masses with expansive or polypoid growth and intact serosal surface to multinodular or cauliflower-like masses with non-homogeneous, multicoloured cut surfaces, foci of necrosis and serosal ulceration. The histopathological diagnoses are given below. In 55 cases, only solitary changes were observed (Table 1) and in 28 cases two or more lesions were diagnosed in the vagina, cervix and uterus of a single animal (Table 2).

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