Vaginal leiomyosarcoma in a degu (*Octodon degus*): a case report

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ABSTRACT: A 6-year-old pet female degu (*Octodon degus*), in good body condition, was referred to a clinic with the presence of a large tumour in the anogenital area. The mass was bluntly dissected from the surrounding skin and muscles. The medial part of the tumour was associated with the vaginal wall which was also excised with 2 mm margins. No visible changes on the inner vaginal surface were seen. On gross examination the surface of the mass was glossy and pink-coloured; the cut surface was grey to red with greyish-white foci in a part of the mass. Histopathological examination showed a tumour composed of pleomorphic spindle to ovoid cells forming interlacing bundles and variably dense fibrous connective tissue separated by streams of neoplastic cells. Several smaller foci of coagulation necrosis were present within the tumour tissue. The neoplastic cells exhibited a high mitotic index, which ranged from six to seven mitoses per 10 high power fields. By immunohistochemical examination the positivity of neoplastic cells was demonstrated with smooth muscle actin (SMA) and vimentin, while no immunoreactivity was acquired for cytokeratins. Based on morphological features of the tumour and immunohistochemical examination a diagnosis of vaginal leiomyosarcoma was made. To our knowledge, this is the first report of a vaginal leiomyosarcoma in a degu.

Keywords: mesenchymal tumour; genital tract; rodent; immunohistochemistry; smooth muscle actin

Degus (*Octodon degus*) are rodents belonging to the family Octodontidae and are native to South America. Over the past few years, they have become very popular as pet animals in the Czech Republic. The average weight of an adult degu is approximately 200g and they have lifespans of three to five years. Degus typically live in small groups and are very social animals. They are used in research studies investigating circadian rhythms, diurnal behaviour and physiology (Fulk, 1976; Nowak, 1999; Lee, 2004). There are only a limited number of reports in the literature regarding tumours in degus (Murphy et al., 1980; Anderson et al., 1990; Lester et al., 2005; Jekl et al., 2008) and, there is no publication documenting a genital tumour in the ovary, uterus or vagina of a degu.

Leiomyosarcomas are malignant mesenchymal tumours arising from smooth muscle cells. They are much less common than leiomyomas but have been reported in some rodent species such as rat and hamster (Solleveld, 1987; Ribas and Pletcher, 1996; Kondo et al., 2007; Kasahara et al., 2009). The present report details a case of a spontaneous vaginal leiomyosarcoma occurring in a pet degu.

Case description

A 6-year-old female degu was presented with a tumorous mass in the anogenital area. The degu was kept as a single pet animal, housed in a wooden cage with wooden shavings. A commercial grain mixture, alfalfa pellets, hay and water were provided *ad libitum*. Dried bread and apple tree branches were provided to the animal to gnaw on. At the time of the initial examination the degu weighed 210 g and was

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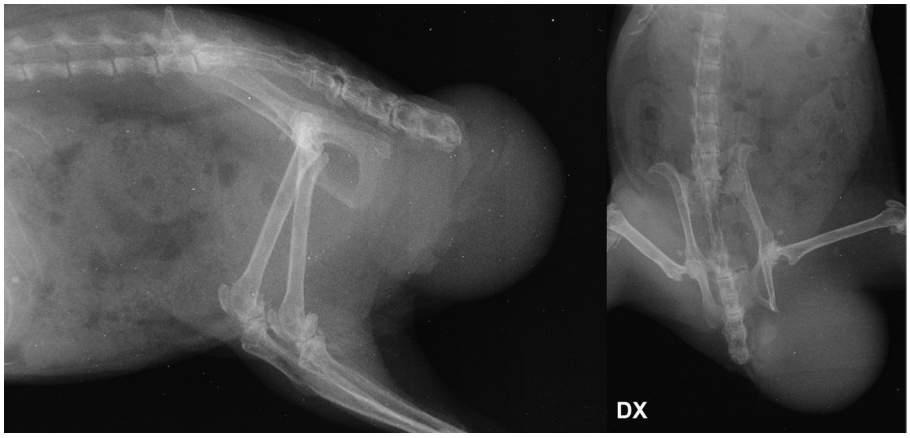

Figure 1. Lateral and ventrodorsal body radiographs. Tumorous mass of soft tissue radioopacity is present in the vicinity of the anus

in good body condition (body condition score, 4/5). The only pathology seen on clinical presentation was the presence of a soft swelling at the left side of the anogenital area. The mass was oval (4 × 6 cm in diameter) and it was not possible to demarcate the medial borders. No other abnormalities were detected. The degu was anaesthetized with isoflurane (Isoflurane Rhodia, Torrex Pharma GmbH, Austria) by facemask, and a blood sample was collected from the cranial vena cava. The degu was administered buprenorphine (Temgesic, Reckitt and Coleman Products Ltd., UK) at 0.04 mg/kg *i.m.* and meloxicam (Metacam, Labiana Life Sciences S. A., Spain) at 0.4 mg/kg *s.q.* for analgesia and was placed on a heating pad maintained at 39°C and given 20 ml/kg of an electrolyte solution (saline) subcutaneously. Ventrodorsal and lateral abdominal radiographs were obtained, samples of urine collected and then the animal was allowed to recover. Haematological and plasma chemistry analyses revealed mild hypochromia and a slightly elevated urea level. Radiography showed an oval solid mass of soft tissue radioopacity localised caudal to the pelvis (Figure 1). No association with pelvic bones was seen. The day after presentation the degu underwent surgery. The patient was premedicated with analgesia as on the day before. Isoflurane anaesthesia was used for induction and maintenance through the surgical procedure. The mass was bluntly dissected from the surrounding skin and muscles. The medial part of the tumour was associated with the vaginal wall which was also excised with 2 mm margins. No visible changes on the inner vaginal surface were seen. The vaginal wall and skin was closed with absorbable suture material (polyglactin 910, Vicryl 4-0, Ethicon Johnson and Johnson). After surgery, the patient was alert and recovery was uneventful. The tumour was 6 × 4 × 4 cm in size and the surface was glossy and pink coloured. The cut surface was grey to red with greyish-white foci present in a part of the mass. Samples were fixed in buffered 10% neutral formalin, dehydrated, embedded in paraffin wax, sectioned on a microtome at a thickness of 4 μm, and stained with haematoxylin and eosin (H&E), Masson's trichrome and van Gieson's stain. The primary antibodies used were monoclonal mouse anti-human smooth muscle actin (DAKO, clone 1A4, dilution 1 : 100), monoclonal mouse anti vimentin (DAKO, clone V9, prediluted antibody) and a mixture of two different clones of anti-cytokeratin mouse monoclonal antibodies AE1 and AE3, which detect certain high and low molecular weight cytokeratins (DAKO, clone AE1/AE3, prediluted antibody). Sections were deparaffinized in xylen and endogenous peroxidase (in a solution of 3% hydrogenperoxid in methanol) was blocked. Smooth muscle actin antigen was demasked in a citrate buffer with pH 6.0 in a microwave oven. For antigen demasking of vimentin and cytokeratins proteinase K was used. Incubation with primary antibody lasted one hour at room temperature. The EnVision detection system (DAKO) was used to detect binding of the primary antibody and 3,3'-diaminobenzidine-tetrahydrochloride (DAB, Fluka) was used for visualization of the reaction. Sections were counterstained with Gill's haematoxylin and mounted in entellan and were rinsed with phosphate buffer pH 7.2–7.3 at each step during the staining procedure. Histopathological examination of the vaginal mass revealed a tumour composed of elongated to ovoid neoplastic cells forming interlacing bundles and streams with variably dense fibrous connective tissue separated by streams of neoplastic cells (Figure 2). The tumour was highly cellular. Interweaving neoplastic cells in

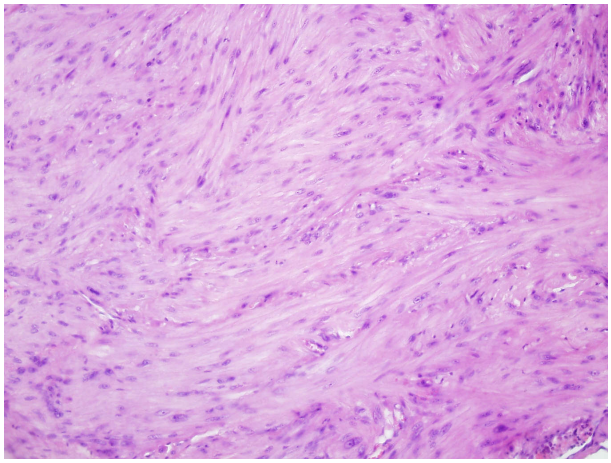

Figure 2. Leiomyosarcoma: elongated to ovoid neoplastic cells forming interlacing bundles and streams; Haematoxylin and eosin stain, 200×

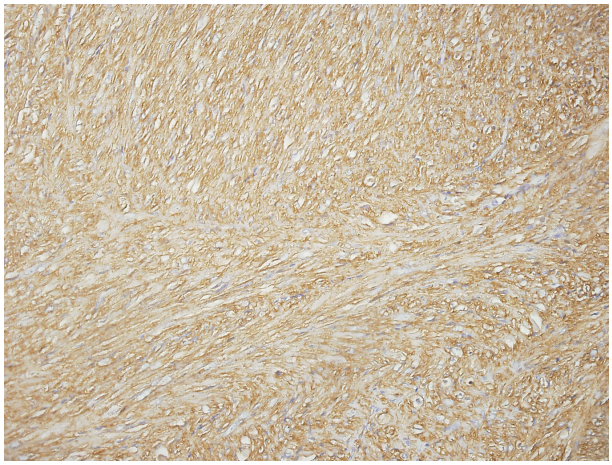

Figure 3. Leiomyosarcoma: strong SMA cytoplasmatic positivity; 200×

different directions were also evident. The neoplastic cells contained elliptic, cigar-shaped nuclei with rounded ends and markedly eosinophilic-abundant cytoplasm. The nuclei contained 1–2 nucleoli. In a major part of the tumour neoplastic cells displayed moderate to marked cellular pleomorphism, including hyperchromasia, anisokaryosis, multinucleated cells, anisocytosis and bizarre mitoses. The mitotic index ranged from six to seven mitoses per 10 high power fields. The cytoplasm of neoplastic cells stained red with Masson's trichrome stain and yellow with van Gieson's stain. In the tumour were present several smaller foci of coagulation necrosis. The tumour showed infiltrative growth within the vaginal wall. Immunohistochemically, the neoplastic cells showed marked positivity for vimentin and smooth muscle actin (Figure 3). No immunoreactivity was demonstrated for cytokeratins. Based on the results of the clinical examination, radiography, histopathology and immunochemistry, a vaginal leiomyosarcoma was determined to be the final diagnosis. The female degu did not show any clinical symptoms associated with the vaginal tumour eight months after surgery.

DISCUSSION AND CONCLUSIONS

There is no reported case in the literature describing a vaginal leiomyosarcoma or other genital mesenchymal tumours in the degu. The histopathological features of the leiomyosarcoma in the presented case were similar to those described in the genital system and also in other organ systems of different species with highest frequency in dogs and cats. In these species the tumour was composed of proliferating elongated cells forming interlacing bundles and streams (Ribas and Pletcher, 1996; Kennedy et al., 1998; Cooper and Valentine, 2002; MacLachlan and Kennedy, 2002; Sato et al., 2003; Firat et al., 2007). Certain authors have suggested the following criteria for distinguishing leiomyomas from leiomyosarcomas: the number of mitotic figures, increased cellularity, cellular pleomorphism and invasive growth; with such criteria tumours with 10 mitoses per 10 high power fields are considered as malignant regardless of cellular differentiation (Solleveld, 1987; Ribas and Pletcher, 1996). Tumours with fewer mitotic figures can also be considered as malignant, but they show a marked cellular pleomorphism. Tumours composed of well differentiated cells with less than four mitotic figures per 10 high power fields are considered as benign (Solleveld, 1987; Ribas and Pletcher, 1996). In the reported case, marked cellular pleomorphism, including hyperchromasia, anisokaryosis, multinucleated cells, anisocytosis and bizarre mitoses were observed. The neoplastic cells contained cigar-shaped nuclei with rounded ends and eosinophilically abundant cytoplasm and exhibited a high mitotic index. These findings supported the diagnosis of a leiomyosarcoma. It has been suggested that leiomyosarcomas of the tubular genital organs can arise from either normal smooth muscle cells in the wall of uterus and vagina or from leiomyomas (Cooper and Valentine, 2002). Immunohistochemically, in the current case, a mesenchymal origin of the tumour was confirmed by strong positivity for vimentin and the tumour exhibited also strong positivity for SMA. No immu-

noreactivity was detected for cytokeratins. All these results supported the diagnosis of a leiomyosarcoma. Age and breed predisposition for genital leiomyosarcomas in degus are unclear due to the absence of reported cases. The role of the gonadal hormones in the development of the tumour is unknown; however, it is believed that hormones promote the growth of leiomyomas and leiomyosarcomas (Cooper and Valentine, 2002). Generally, the tumour may be responsible for urinary or colonic obstruction, reproductive complications and can cause occlusion of the pelvic canal. In addition, leiomyosarcomas might show marked infiltrative growth within the vaginal wall, which was also observed in our case. No metastases were found in our patient, in accordance with clinical and radiographic findings. To our knowledge, this is the first report of a vaginal leiomyosarcoma occurring in a degu, evaluated both histopathologically and immunohistochemically.

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