Theriogenology Question of the Month

This feature is sponsored by the American College of Theriogenologists. Readers of the *JAVMA* are invited to submit contributions. Contributions should provide a learning exercise about theriogenology. A specific question should be posed for the readers. The author's answer to the question and a brief discussion should be presented. Possible topics include commonly seen problems in domestic or exotic animals. Herd problems in dairy and beef cattle, sheep, goats, horses, and exotic hoofstock, problems in kennels or catteries, or flock problems in domestic and exotic fowl also are appropriate. Please contact Dr. Craig A. Smith, Associate Editor (800/248-2862, ext 259, or FAX 847/925-1329), for further details.

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History

A 10-month-old spayed female domestic shorthair cat was examined because of a history of estrus behavior, including lordosis, increased vocalization, and urine marking, at 2-week intervals since having undergone **ovariohysterectomy** (**OHE**) 4 months previously. The veterinarian did not detect abnormalities of the reproductive tract at the time of the OHE.

The cat was examined during a period when it was displaying estrus behavior. Results of physical examination were normal. A vaginal specimen was collected for cytologic examination (**Fig 1**).

Question

What are the 2 most likely differential diagnoses for this cat? ***Please turn the page.***

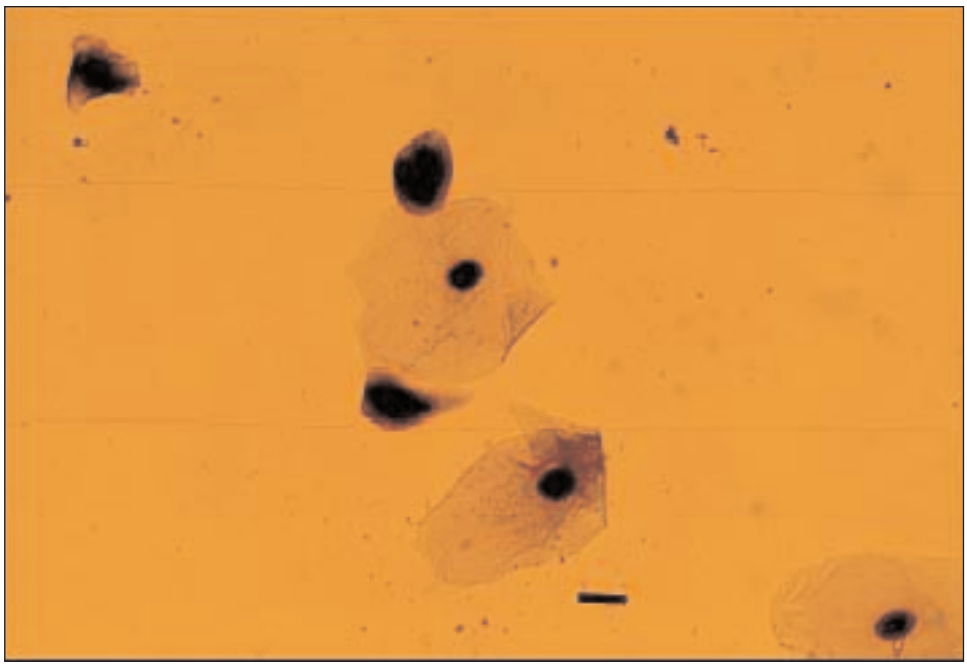

Figure 1—Photomicrograph of vaginal epithelial cells obtained from a spayed female cat that had displays of estrus behavior at regular intervals following ovariohysterectomy. The specimen was obtained during a period of estrus behavior. Modified Wright-Giemsa stain. Bar = 20 μm.

Answer

Functional ovarian remnant containing estrogen-secreting follicles or ovarian remnant containing an estrogen-secreting neoplasm.

Results

The cat was treated with **gonadotropin-releasing hormone (GnRH**; 25 µg, IM) in an attempt to induce luteinization of suspected estrogen-secreting follicular tissue. Estrus behavior or results of cytologic examination of a sample obtained from the vagina did not change within 5 days after treatment. Exploratory surgery of the abdomen was performed. A 2-cm diameter mass was detected in the area of the right ovarian pedicle. The mass appeared to be encapsulated. Examination of the cut surface of the mass revealed dense tissue, clear fluid, hair, and purulent material. The mass was fixed in formalin and submitted for histologic examination. The left ovarian pedicle and remainder of the abdomen were grossly normal.

Histologic examination revealed a background of smooth muscle and adipose cells with superimposition of hair shafts and a pronounced pyogranulomatous inflammatory response. Nests of keratin debris and cartilage with abundant necrosis and mineralization of stroma also were evident. The mass was not completely encapsulated, and there was a lack of normal epithelium overlying the hair shafts, presumably as a result of disturbance of the nascent neoplastic cells at the time of OHE. The final diagnosis was ovarian teratoma.

Discussion

Cornification of vaginal epithelial cells is indicative of increased serum estrogen concentrations. Cornified vaginal epithelial cells in cats are large and misshapen. Large sheets of anuclear cells, similar to those seen in female dogs under the influence of estrogen, usually are not seen when examining vaginal specimens obtained from cats.

Estrogen can be secreted from the ovaries or adrenal glands of domestic animals. Excessive production of estrogen from the adrenal glands has not been reported in cats, leaving ovarian abnormalities as the primary consideration. In spayed females, ovarian remnant syndrome is the primary differential diagnosis in cats that have cornified vaginal epithelial cells. Estrogen-secreting ovarian neoplasms are another possible differential diagnosis.

Ovarian remnant syndrome is a common disorder in which ovarian tissue is not removed during OHE as a result of surgeon error or because extraovarian tissue is located deep within the broad ligament. These tissues may have vascular attachments and become functional. Regular cyclic estrus behavior that is a result of increased serum estrogen concentrations may resume anywhere from 17 days to 9 years after OHE.[1] Diagnosis involves verification of estrogen production by documentation of cornified vaginal epithelial cells or by documentation of serum estrogen concentrations > 20 pg/ml during behavioral estrus. To achieve life-long estrus suppression, surgical treatment is preferred to administration of drugs. Laparotomy should be performed when there is a structure on the remnant that makes it most evident. Surgeons can look for a follicle during behavioral estrus. Alternatively, GnRH can be administered (25 µg, IM) during behavioral estrus, which should induce formation of luteal tissue. Two weeks after administration of GnRH, surgeons can perform abdominal laparotomy and look for this luteal tissue.

Estrogen-secreting ovarian neoplasms in cats include granulosa cell tumors and cystadenomas-lipomas.[2-5] Functional neoplasms usually produce hormones constantly, so persistent estrus, rather than regular cyclic estrus behavior, is the most common primary clinical sign.

To our knowledge, functional teratomas have not been reported in cats. Teratomas are neoplasms of the germ-cell line within the ovary. These masses differentiate into 3 germ layers and may include hair, squamous or glandular epithelium, fat, cartilage or bone, teeth, muscle tissue, nervous tissue, sebaceous fluid, and sweat glands. Teratomas in cats range from a cystic mass 1.5 cm in diameter in 1 cat to a solid mass weighing 1,000 g in another cat.[5] Teratomas may be found in young animals, with the reported age at time of diagnosis ranging from 6 months to 6 years of age.[4,6-8] Propensity for metastasis or recurrence of teratomas has not been reported.

The cat described here was unusual in that it apparently displayed regular cyclic estrus behavior rather than persistent estrus, despite the fact it had a functional ovarian neoplasm. None of the cats with an ovarian teratoma reported in the veterinary literature had clinical signs suggestive of estrogen secretion by the neoplasm. It is possible that the teratoma in this cat was not functional at the time of OHE. It also is possible there was abnormal ovarian tissue that precluded complete ovariectomy at the time of OHE; however, normal functioning ovarian tissue was not detected within the mass removed from the ovarian pedicle during the second surgery. Estrogen concentrations were not measured in the fluid within the mass.

Outcome

The cat recovered without additional complications after surgical removal of the teratoma. All signs of estrus behavior resolved and did not recur after the teratoma was removed.

References

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