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.

History

An 8-month-old spayed female mixed-breed dog was examined at our veterinary medical teaching hospital to determine the cause of a green vaginal discharge of several days' duration. The owners reported that the dog licked frequently at the vulva and behaved in a manner that indicated the dog wanted to be let outside to urinate more frequently than usual. The dog had undergone elective **ovariohysterectomy (OHE)** 6 weeks prior to admission to our facility. At the time of OHE, results of a CBC and serum biochemical analyses were within reference limits.

Physical examination revealed a bright, alert dog. Mild pyrexia was evident (39.7 C [103.6 F]). Digital vaginal examination did not reveal abnormalities. Results of urinalysis were unremarkable, and aerobic bacterial culture of a urine specimen did not yield growth. Serum thyroxine and triiodothyronine concentrations were within reference ranges. Use of a cotton-tipped swab to obtain a sample from the vagina yielded a cellular sample consisting of noncornified epithelial cells and moderate numbers of healthy-appearing neutrophils. Treatment with amoxicillin-clavulanic acid and prednisone was recommended; however, the owners chose to not medicate the dog at that time because the discharge was not excessive in volume and the dog did not appear to be uncomfortable. The episode of vaginal discharge resolved without treatment.

This report was submitted by Philip D. Pacchiana, DVM, and Margaret V. Root Kustritz, DVM, PhD, DACT; from the Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Minnesota, St Paul, MN 55108.

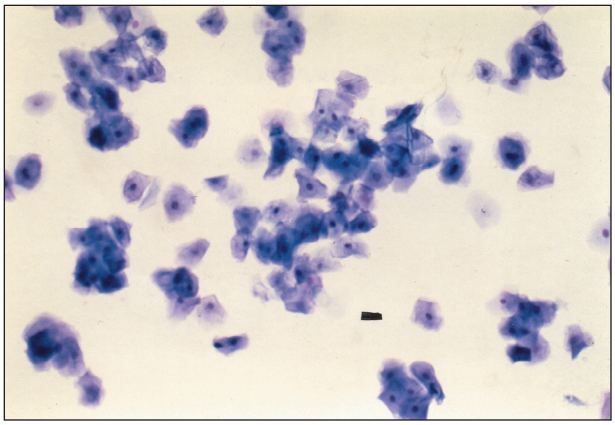

Figure 1—Photomicrograph of a vaginal swab specimen obtained from a 1.5-year-old spayed female mixed-breed dog with a 9-month history of intermittent vaginal discharge. Rapid Wright stain; bar = 40 μm.

Approximately 6 weeks later, the dog was reexamined because of recurrence of vaginal discharge and vulvar licking. The owners reported that the discharge was bloody. A slightly hemorrhagic discharge was detected during physical examination, but other abnormalities were not identified. Examination of a vaginal swab specimen revealed noncornified epithelial cells, a few healthy-appearing neutrophils, and numerous RBC. The owners elected to observe the dog without further diagnostic testing or treatment. This episode of vaginal discharge resolved without further incident.

Seven months later, the dog was again evaluated because of bloody vaginal discharge. Physical examination at that time revealed vulvar swelling. Vaginal discharge was not detected at the time of physical examination. A vaginal swab specimen was obtained (**Fig 1**). We established a tentative diagnosis of **ovarian remnant syndrome (ORS)**.

Question

What additional test should be performed to confirm the diagnosis? *Please turn the page.*

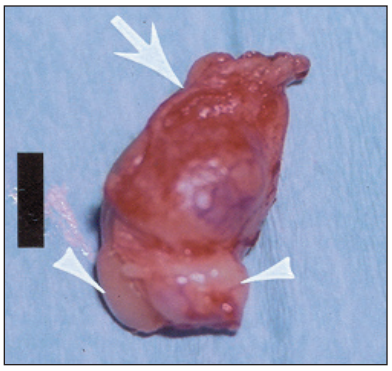

Figure 2—Photograph of ovarian tissue removed from a 1.5-year-old spayed female mixed-breed dog with a 9-month history of intermittent vaginal discharge. Notice the highly vascularized follicle (arrow) and corpora lutea (arrowheads). Bar = 1 cm.

Answer

Measurement of serum progesterone concentrations during diestrus.

Results

Ovarian remnant syndrome was considered likely in the dog reported here on the basis of a pattern of periodic vulvar discharge (interval of 7 months) and the fact that the discharge was hemorrhagic and cornification of vaginal epithelial cells was evident (Fig 1). The owners of the dog were asked to return the dog to our facility 2 weeks after the last episode of bloody vulvar discharge (ie, during anticipated diestrus) to enable us to measure the serum progesterone concentration. At that time, the serum progesterone concentration was 5.2 ng/ml, consistent with luteal function. An ovarian remnant was diagnosed, and exploratory abdominal surgery was recommended.

Ventral midline celiotomy was performed, and a 1 × 2-cm mass of tissue was identified in the area of the left ovarian pedicle. The mass appeared to consist of ovarian tissue (ie, corpora lutea and follicular structures), and the tissue was excised and submitted for histologic examination (**Fig 2**). Other abnormalities or other aberrant tissue were not identified, and the dog had an uncomplicated recovery from anesthesia. Histologic examination revealed mesovarium adipose tissue and ovarian tissue characterized by several large corpora lutea and several large Graafian follicles, confirming the diagnosis of ORS.

Discussion

Vulvar discharges are relatively common in bitches.[1] Differential diagnoses include urinary tract infections, vaginal foreign bodies, vaginal neoplasia, vaginal bacterial or viral infections, uterine stump pyometra, normal estral hemorrhage, and vaginitis.[2] A minimum database should include a thorough physical examination, including digital vaginal examination, vaginal cytologic examination, and bacterial culture and susceptibility testing of a specimen obtained from the vagina. Urinalysis and aerobic bacterial culture of a urine sample collected by cystocentesis are rapid, easy tests that can be used to rule out the urinary tract as a source of the discharge. Additional diagnostic tests may be warranted and include vaginoscopy, contrast radiography, ultrasonography, and examination of a biopsy specimen.

Vaginitis was originally suspected as the cause of the discharge in this dog. Vaginitis can occur in sexually intact or spayed bitches of any age and breed.[2,3] However, it is more common in prepubertal puppies (ie, puppy vaginitis). Other causes include neoplasms, foreign bodies, infections, and anatomic abnormalities of the vagina. Patients usually have a history of intermittent vaginal discharge. The discharge may be mucoid, mucopurulent, or purulent.[2,3] It is rarely hemorrhagic or blood-tinged.[2,3] Other signs can include pollakiuria, dysuria, licking of the vulva, polyuria-polydipsia, urinary incontinence, recurrent urinary tract infections, infertility, and attraction of male dogs.[2,3] Treatment is aimed at the underlying cause. Surgical correction of anatomic defects may be curative. Nonsurgical treatment options include administration of antimicrobials, vaginal douches, nitrofurazone suppositories, and cleansing of the perianal area. However, these treatments are of questionable benefit. In 1 report,[3] vaginitis resolved in 31 of 37 (89%) young bitches with or without treatment.

Estrogen causes proliferation and maturation (cornification) of the vaginal epithelium. These effects are easily monitored by the use of vaginal cytologic examinations, which can document hormonal influence. Estradiol concentrations of > 20 pg/ml (73 pmol/L) are considered evidence of follicular activity in dogs and cats.[4] However, results of a single serum assay can be misleading, and the small concentrations being measured (picograms of estrogen) may be less than the sensitivity of the assay.[4] Therefore, the use of vaginal cytologic assessment as a bioassay for increased serum estrogen concentrations is preferred to results of hormonal assays.

The ovaries are by far the most common source of progesterone in bitches. All steroids can be produced in the adrenal glands, but only the ovaries are likely to secrete estrogen and progesterone in sequence. Serum progesterone concentrations ≥ 2 ng/ml (6.4 mmol/L) confirm functional corpora lutea in an ovarian remnant.[4,5] Ovarian remnant syndrome refers to the detection of functional ovarian tissue in an ovariohysterectomized bitch or queen.[4,5] Progesterone concentrations are always < 2 ng/ml during proestrus in bitches; therefore, measurement of progesterone concentrations for the diagnosis of ORS should be conducted after signs of estrus have ceased and the bitch is in diestrus.[4]

In women, ORS is associated with surgical difficulty in removal of the ovaries as a result of local inflammation and adhesions.[4] In contrast, most cases in animals are detected after elective OHE, and the incidence of ORS does not appear to increase in animals with difficult surgical conditions such as obese dogs, deep-chested dogs, or animals with pyometra.[4] Failure to remove all ovarian tissue may result from improper placement of clamps or ligatures or from poor visibility of the surgical field as a consequence of a small incision.[4] The right ovarian pedicle is involved more commonly than the left, probably because of its cranial location.[4] Although not a common cause of ORS, evidence also suggests that ovarian tissue can revascularize and become functional if dropped into the abdominal cavity.[4,6]

Surgical removal of the ovarian remnant is the preferred method of treatment. It is uncommon to find

a large tissue mass, such as the mass in the dog of this report, as an ovarian remnant. Detection of small tissue masses may be improved by delaying the surgery until the animal is in estrus, which allows identification of follicles in the mesovarium. However, in the dog of this report, the corpora lutea were easily visible at surgery.

Outcome

Four months after surgery to remove the ovarian remnant, the owners reported that the dog was doing well. The dog had not had additional episodes of vulvar discharge or signs of estrus.

References

1. Johnson CA. Vulvar discharges. In: Kirk RW, Bonagura JD, eds. *Current veterinary therapy X*. Philadelphia: WB Saunders Co, 1989;1310–1312.
2. Parker NA. Clinical approach to canine vaginitis: a review, in *Proceedings*. Annu Meet Soc Theriogenol 1998;112–115.
3. Johnson CA. Diagnosis and treatment of chronic vaginitis in the bitch. *Vet Clin North Am Small Anim Pract* 1991;21:523–531.
4. Wallace MS. The ovarian remnant syndrome in the bitch and queen. *Vet Clin North Am Small Anim Pract* 1991;21:501–507.
5. Miller DM. Ovarian remnant syndrome in dogs and cats: 46 cases (1988–1992). *J Vet Diagn Invest* 1995;7:572–574.
6. Denardo GA, Becker K, Brown NO, et al. Ovarian remnant syndrome: revascularization of free-floating ovarian tissue in the feline abdominal cavity. *J Am Anim Hosp Assoc* 2001;37:290–296.