A 4-year-old 1.6-kg (3.5-lb) sexually intact female American Satin guinea pig was examined at the University of Wisconsin Veterinary Medical Teaching Hospital (VMTH) because of a 5-day history of decreased urination and defecation, as well as progressive anorexia. Feces were softer than normal, and the guinea pig was reported by the owner to be reclusive and have signs of depression. The guinea pig was housed individually and had never been bred. Its diet consisted of timothy hay, commercial guinea pig pellets, a variety of mixed leafy greens, and occasionally other vegetables and fruits.

At referral, the guinea pig was alert and responsive. Respiratory rate was high (88 breaths/min), but auscultation of the heart and lungs did not reveal abnormalities. Mucous membranes were pink and moist, and the capillary refill time was 1 second. Abdominal distention was obvious, giving the guinea pig a pear-shaped appearance and limiting palpation of the abdomen.

Based on history and results of physical examination, differential diagnoses included cystic rete ovarii, uroperitoneum, urinary obstruction, gastrointestinal tract obstruction, hemoperitoneum, neoplasia, peritonitis, and ascites caused by congestive heart failure, vasculitis, protein-losing enteropathy, or protein-losing nephropathy.

Initial diagnostic evaluation included blood collection for CBC and plasma biochemical analyses, abdominal and thoracic radiography, abdominocentesis, and abdominal ultrasonography. All procedures were performed under isoflurane anesthesia (0.5 to 3.0% isoflurane in oxygen at 1 L/min). To collect an adequate volume of blood and avoid damaging potential catheter sites, blood was collected via venipuncture of the cranial vena cava.

Abnormalities detected by use of CBC included leukocytosis (WBC count, 20,900 cells/µl; reference range, 7,000 to 14,000 cells/µl) characterized by mature neutrophilia (14,839 cells/µl; reference range, 1,400 to 8,400 cells/µl) consistent with either stress or systemic infection. Observation of urination and BUN and creatinine concentrations that were within reference ranges ruled out urinary obstruction, uroperitoneum, and protein-losing nephropathy. Hypoproteinemia (total protein, 3.4 g/dl; reference range, 4.2 to 6.8 g/dl) and hypoalbuminemia (1.2 g/dl; reference range, 2.1 to 3.9 g/dl) were evident, but hepatic disease was unlikely, because total bilirubin concentration and serum activities of alkaline phosphatase, alanine aminotransferase, and aspartate aminotransferase were within reference ranges. Increased serum activity of creatine kinase (4,081 U/L; reference range, 50 to 125 mg/dl) was thought to be related to stress. Important radiographic changes included severe distention of the abdominal cavity with diffuse loss of peritoneal detail, which was most consistent with an effusion, hemoperitoneum, or peritonitis (Fig 1). There was no evidence of gastrointestinal tract obstruction or urinary calculi. The radiographic appearance of the lungs was normal. Fluid obtained via abdominocentesis had a pale orange hazy appearance with specific gravity of 1.017, total protein concentration of 2.5 g/dl, WBC count of 900 cells/µl, and RBC count of <0.10 X 10⁶ cells/µl. Cytologic examination of the fluid revealed large round cells that contained large round or oval nuclei with few nucleoli and several mitotic figures. A tentative diagnosis of neoplasia was made.
A large amount of echogenic fluid, a mass in the region of the right ovary that measured approximately $2 \times 2$ cm with a 7-mm cystic area (Fig 2), splenomegaly, and irregularity of liver margins were observed during abdominal ultrasonography. Several ultrasound-guided fine needle aspirates and an ultrasound-guided needle biopsy of the right ovary were performed. Cytologic examination of the fine needle aspirates revealed low numbers of cells similar to those seen in the abdominal fluid aspirate, in addition to a few macrophages and lymphocytes. Histologic examination of the needle biopsy specimen revealed disorganized poorly differentiated tissue that formed small spaces that resembled alveoli, with larger stellate areas of more solid material between the spaces. These features were consistent with granulosa cell tumor.

The guinea pig was sedated by administration of midazolam (0.31 mg/kg [0.14 mg/lb] of body weight, IM); anesthesia was induced and maintained by administration of isoflurane gas via face mask. A small amount of subcutaneous edema was noticed in the ventral portions of the abdomen and neck. Cause of the edema could not be determined, but it was not considered important enough to delay surgery. A ventral midline approach for an ovariohysterectomy was performed. A large (approx $2 \times 2$ cm) pale encapsulated mass that encompassed the right ovary was removed along with the contralateral ovary, both uterine horns, and the uterus. The abdominal wall was closed with 4-0 polygalactin 910 in a simple continuous pattern, and the skin was closed with 4-0 polygalactin 910 in a simple continuous subcuticular pattern; complications did not develop after surgery.

The guinea pig recovered from anesthesia and was monitored for the next 14 hours in the critical care unit of the VMTH. Supportive care included administration of enrofloxacin (5 mg/kg [2.3 mg/lb], SC, q 12 h), cisapride (0.5 mg/kg [0.23 mg/lb], PO, q 8 h), and hourly force feeding of a pellet slurry made from commercially available guinea pig chow. Opioid analgesics were avoided because of the potential for substantial respiratory depression. Ten days after discharge the subcutaneous edema, hypoproteinemia, hypoalbuminemia, and tachypnea had resolved.

Histologically, the entire right ovary had been replaced by neoplastic cells. There were scattered solid aggregations of plump cells with eosinophilic cytoplasm and smaller, more basophilic cells that lined lumen-like empty spaces that are typical of a granulosa cell tumor (Fig 3). Sections of left and right uterine horns had areas of cystic endometrial hyperplasia in otherwise normal-appearing uterine tissue. The left ovary was microscopically normal. A definitive diagnosis of ovarian granulosa cell tumor was made.

Guinea pigs have low incidence of spontaneous neoplasms, with pulmonary neoplasia and neoplasia of the skin and subcutis being the most common. Of reproductive tract tumors in guinea pigs, leiomyomas are the most common and are typically seen in conjunction with cystic rete ovarii. To the authors’ knowledge, ovarian granulosa cell tumor in guinea pigs has only been documented once before, in a report that consisted solely of a histologic description. Granulosa cell and granulosa-theca cell tumors are commonly reported neoplasms of several species of domestic animals (eg, horses and dogs) and rodents (eg, rats and gerbils), as well as being reported in numerous exotic species.

Abdominal distention in guinea pigs is a common clinical sign and may be caused by cystic rete ovarii, urinary obstruction, pregnancy, gastrointestinal tract obstruction, ascites, hemoperitoneum, uroperitoneum, or peritonitis. When investigating the cause of abdominal distention in guinea pigs, historical information (eg, ability to urinate, appetite, onset of distention, coughing, and changes in behavior or attitude) is critical. In guinea pigs and most other species, abdominal ultrasonography is a useful diagnostic tool in differentiating reproductive tract disorders.
Cystic rete ovarii is likely the most common reproductive tract disease that causes abdominal distention in guinea pigs.16,17 This is unlike dogs, in which cystic ovaries are reported by some to be the most common reproductive tract disease.18 In other species, gonadotropin-releasing hormone and human chorionic gonadotropin-releasing hormone may be used to induce luteinization of such ovarian follicular cysts, which aids in both diagnosis and treatment.14 In guinea pigs, however, cysts are most often of the rete and are not follicular in origin. Therefore, there is often no, or only temporary, response to treatment with releasing hormones.16,17 Similar to other species, measurement of endogenous hormone production is not a reliable diagnostic tool. Circulating serum concentrations of estrogen and progesterone may not be abnormal, even when fluid within a cyst or tumor contains high concentrations of hormones.18 Mares are often reported to have stallion-like behavior from the influence of androgenic hormones produced by granulosa-theca cell tumors.19 No changes in behavior were detected in the guinea pig reported here. To confuse matters further, female guinea pigs may mount other females and have vulvar swelling during normal estrus. However, normal estrus in guinea pigs should not persist for longer than 48 hours.20 Ultimately, the diagnosis is made on the basis of histologic examination.

Surgical treatment is indicated for cystic rete ovarii and neoplasms of the ovary in guinea pigs. A bilateral retroperitoneal approach has been reported for ovariectomy in guinea pigs and rodents with normal ovaries. The ventral midline approach used in the guinea pig reported here allowed easy removal of the large mass with complete ovariohysterectomy and provided greater visual inspection of the abdominal organs to assess metastasis. When performing a ventral midline laparotomy in guinea pigs, one should be aware that the skin of the ventral portion of the abdomen and the linea alba are extremely thin. The cecum is quite large, lies just beneath the linea alba, and has a tendency to protrude from the incision after the abdominal cavity is opened. For skin closure, suture material should be of small diameter, and a subcuticular pattern should be used to reduce irritation and chewing.21 Postoperative care should include frequent observations for complications. To decrease the incidence of postoperative hypoglycemia and gastrointestinal tract stasis, we recommend admitting guinea pigs to a critical care unit for administration of promotility agents such as cisapride (0.5 mg/kg, PO, q 8 h) and hourly force feedings.

References